FLOOD STUDY

for

WHITE TANKS/AGUA FRIA AREA DRAINAGE MASTER STUDY

VOLUME 2 OF 2

FEMA FORMS

Prepared For:
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, ARIZONA

For Submittal To:
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

August 26, 1993

Prepared By:
THE WLB GROUP, INC.
333 East Osborn Road, Suite 380
Phoenix, Arizona 85012
(602) 279-1016

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate study
     Explain
2. Flooding Source: Interstate 10, Tuthill Dike to Approx. 1.5 Mile To The West.
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: B, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040039	Buckeye, Town	Maricopa	AZ	04013C	2050E	09/04/91
	040039	Buckeye, Town	Maricopa	AZ	04013C	2055D	04/15/88
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2055D	04/15/88

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

Types of Flooding	Structures	Disciplines*
[ ] Riverine	[ ] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[X] Hydrology
[ ] Alluvial Fan	[X] Bridge/Culvert	[X] Hydraulics
[X] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by wind/wave action	[ ] Fill	[ ] Structural
[ ] Yes	[ ] Pump Station	[ ] Geotechnical
[ ] No	[ ] None	[X] Land Surveying
[ ] Other (describe)	[ ] Other (describe)	[ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___	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.)
X	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 ______________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ______________________

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S. Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

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FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] **No existing analysis**
- [X] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** ____________
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ____________
- [ ] **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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No
	If yes, explain how baseflow was determined:		
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No
	If yes, explain how calibration was performed.		

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13.	Future land use conditions:		☐ Yes ☒ 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, and supporting maps.

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FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ______ scale ______ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval
New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

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FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County - Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Rd.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At sub-basin 41A1
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 station 6255+85
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New study

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)
1-30" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

October 1992

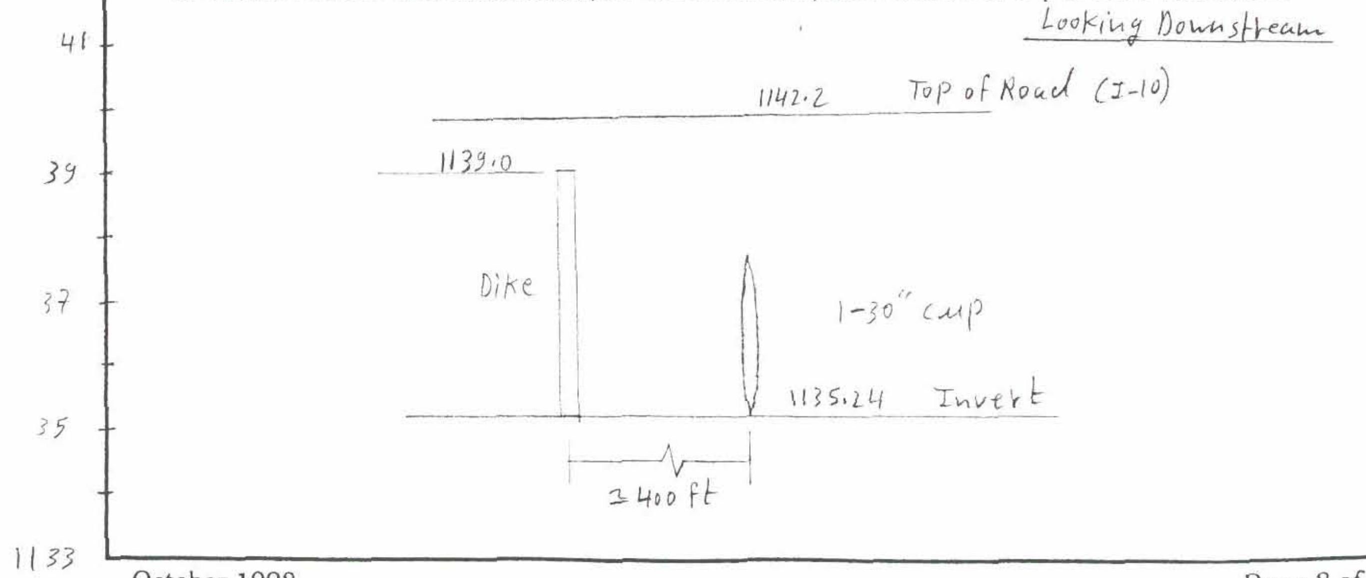
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

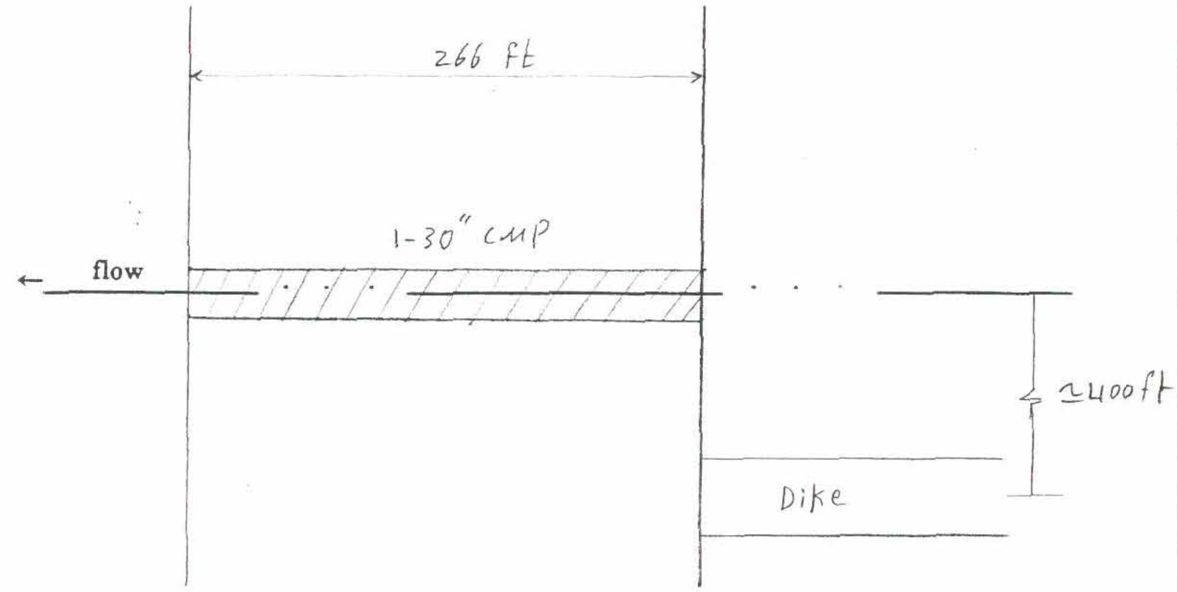
Downstream Invert = 1132.05

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	266
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	4.9

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Dike	
Upstream face		1139	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1135.75	N/A
Downstream face	N/A	N/A

Discharge

	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	23	0	23

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 41A2
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6261+65
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New study

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)
1-30" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

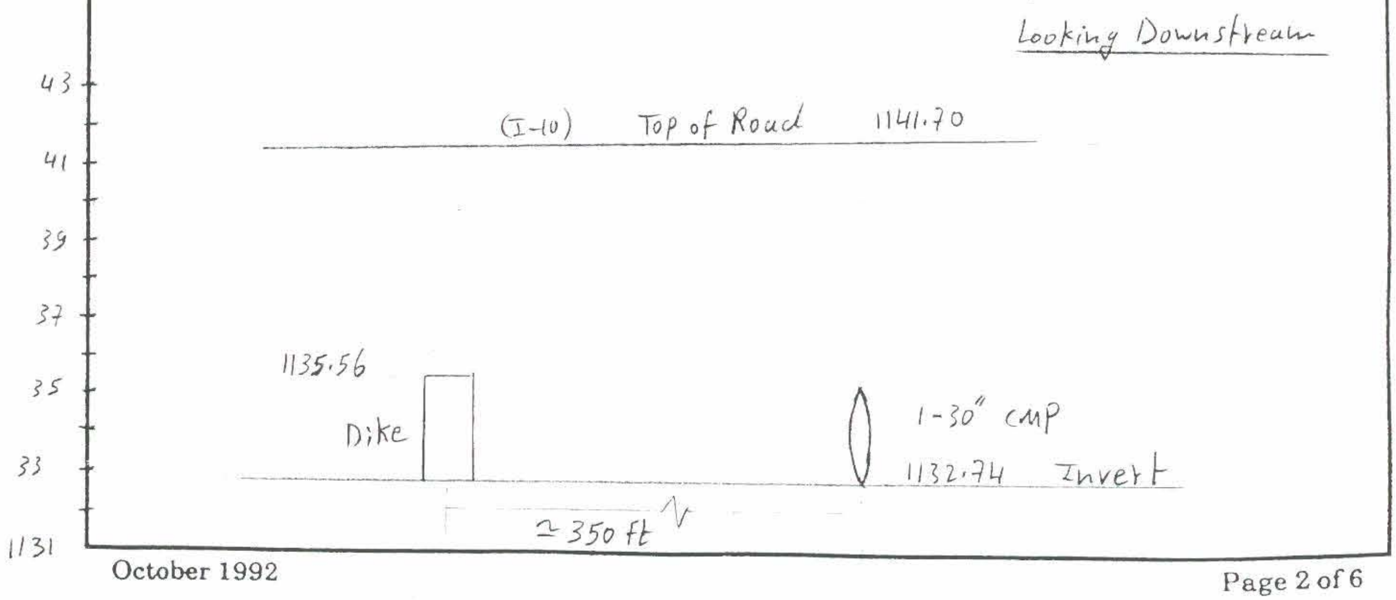
BRIDGE/CULVERT FORM

Analysis

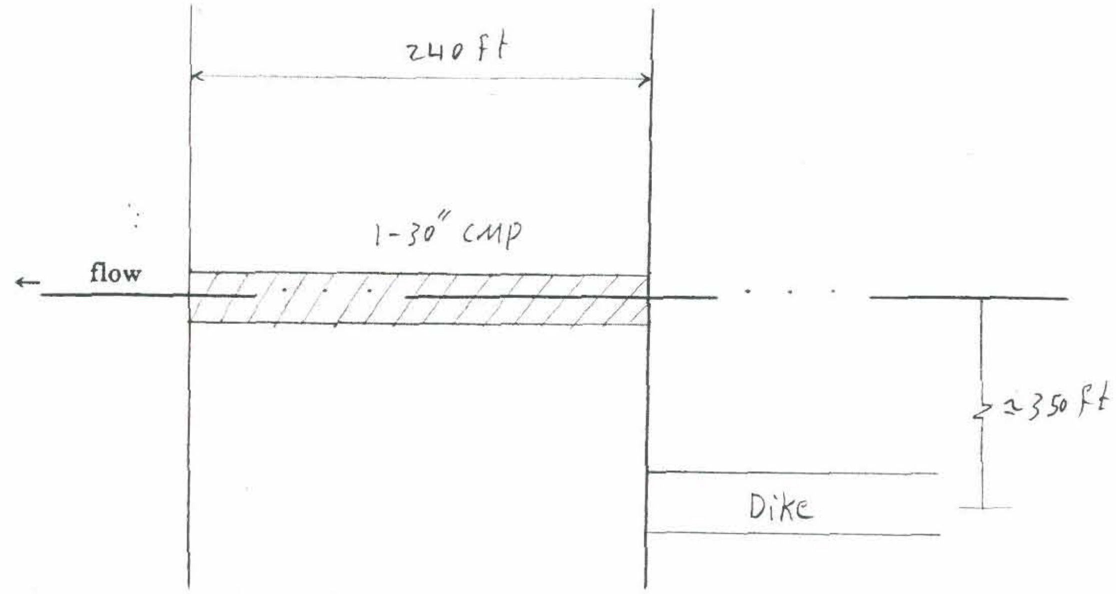
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1130.05

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. N/A Existing Structur

Culvert length or bridge width (ft.)	240
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	4.9

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1135.56	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1135.67	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	24	36	60

The maximum depth of flow over the roadway/ railroad (ft.)	0.11
Weir length (ft.)	100

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.5
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 41A3
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6267+60
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS See below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) 1-30" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

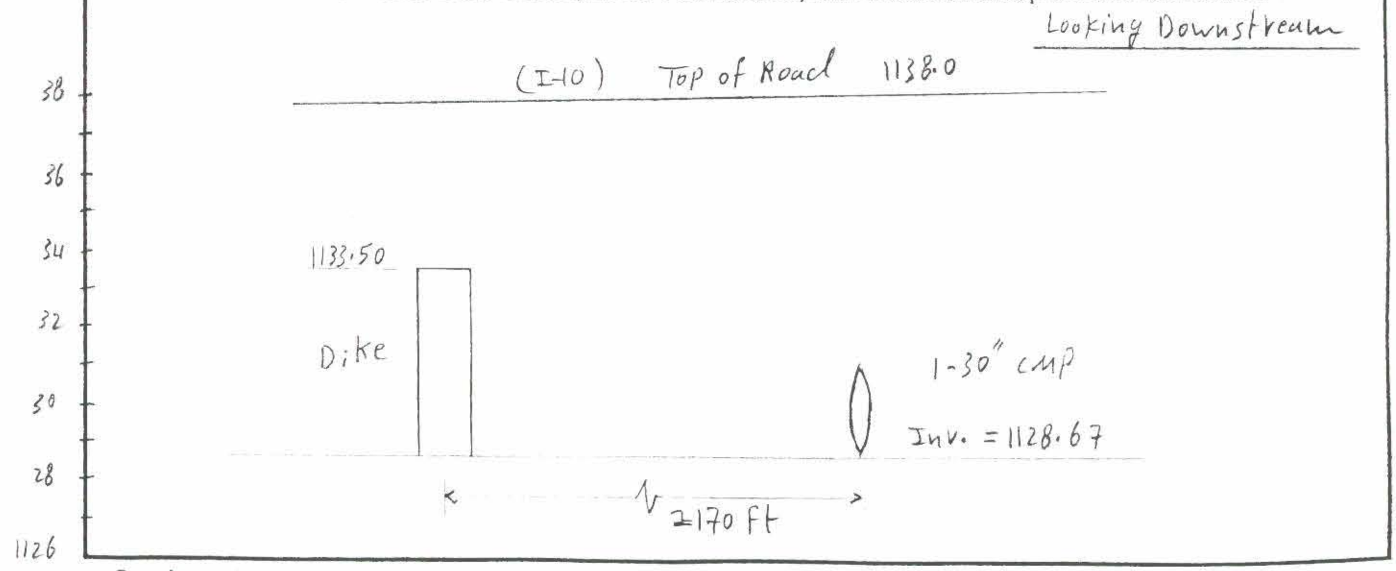
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

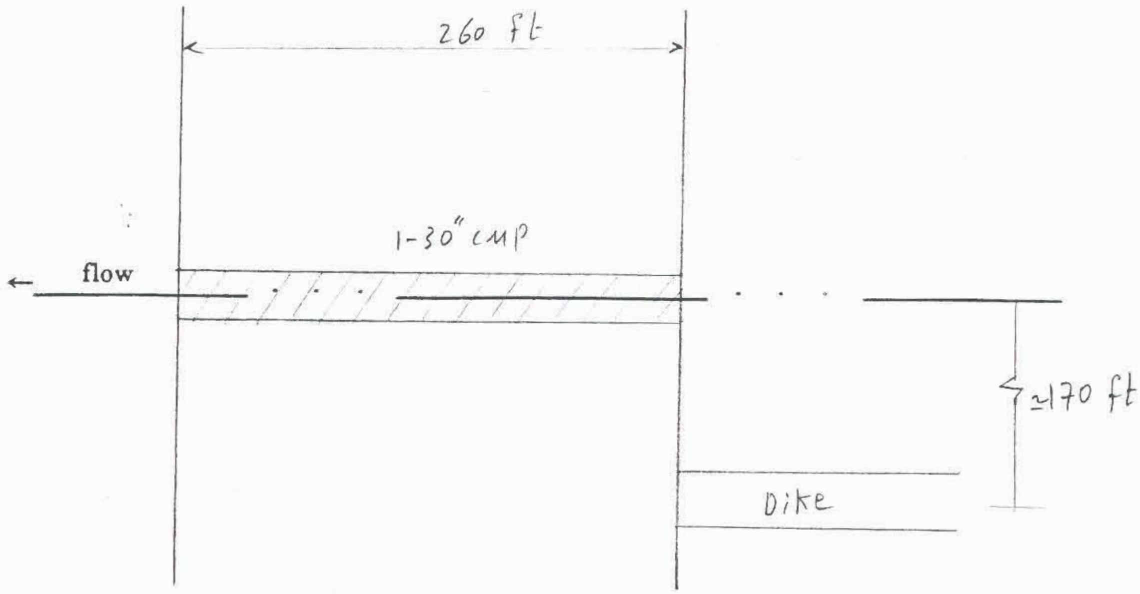
Downstream Invert = 1125.68

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	260
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	4.9

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Dike	
Upstream face		1133.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1131.18	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	24	0	24

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 41A
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6273+88
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed.) New study

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)
   1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

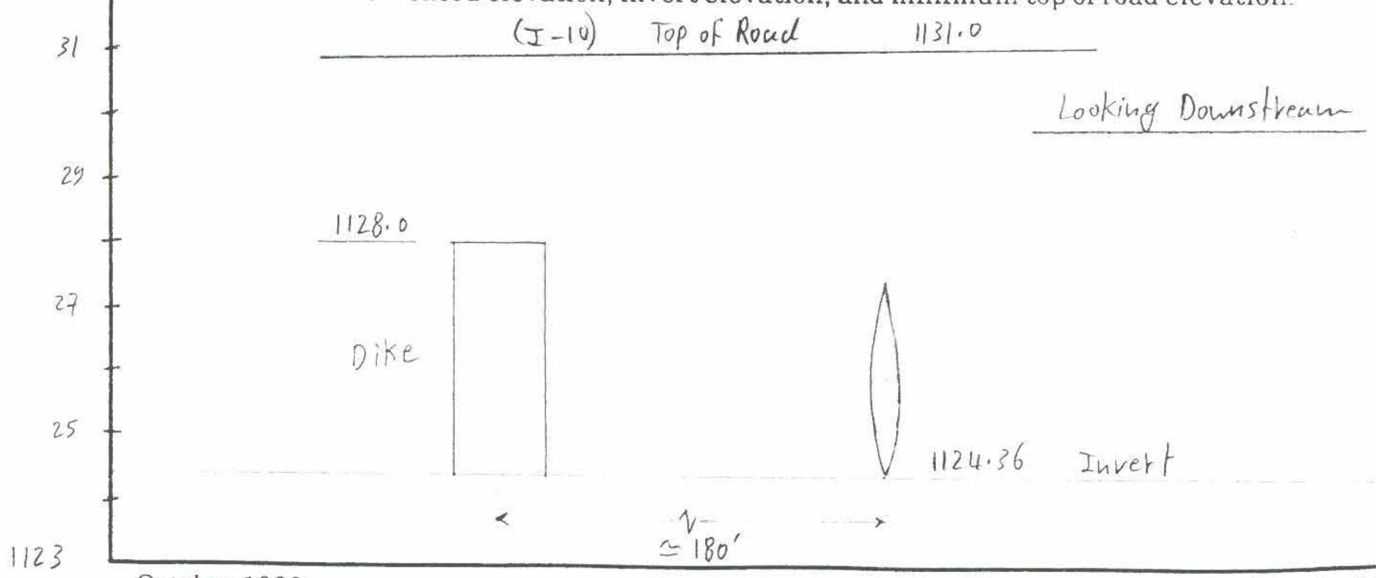
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

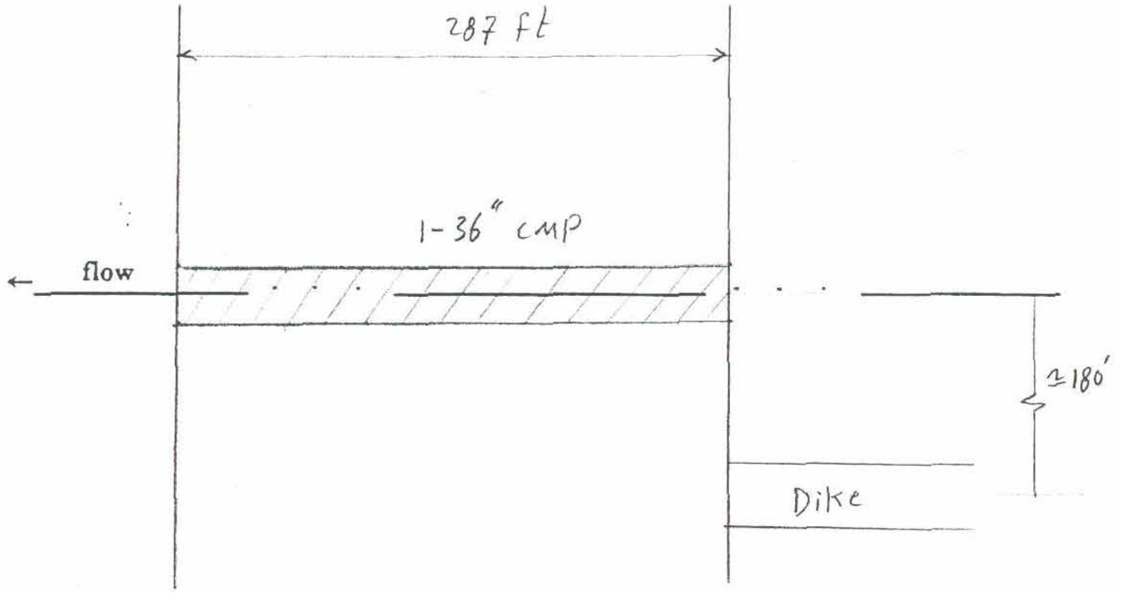
Downstream Invert = 1120.17

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	287
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1128.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face		N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	23	0	23

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At sub-basin 41-1
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6288+25
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   2-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

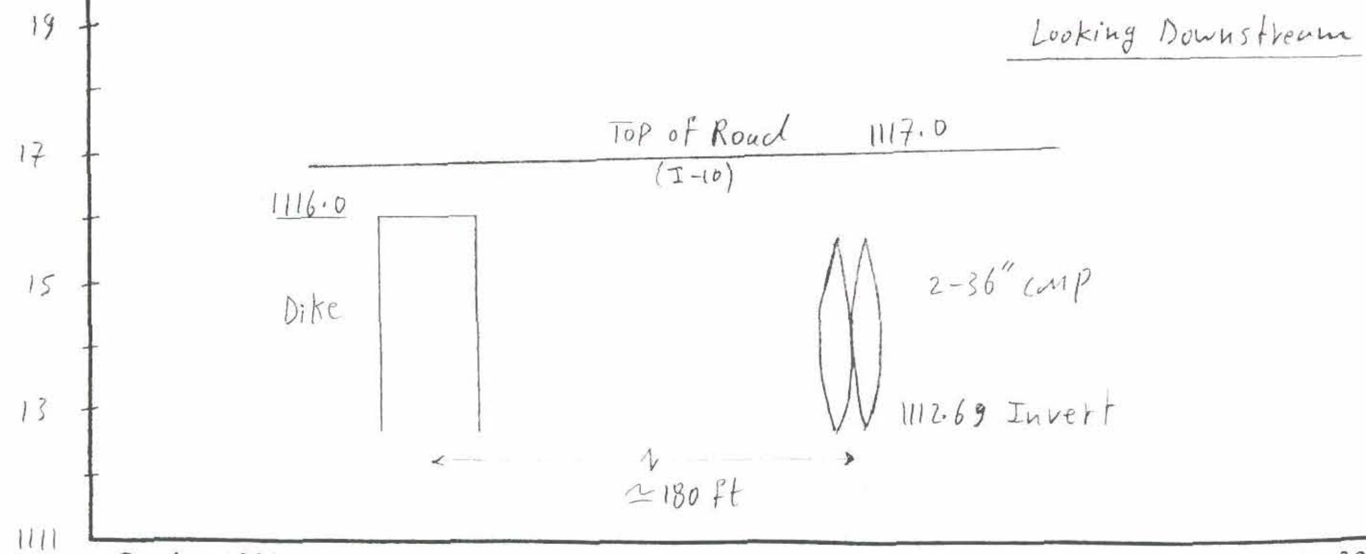
BRIDGE/CULVERT FORM

Analysis

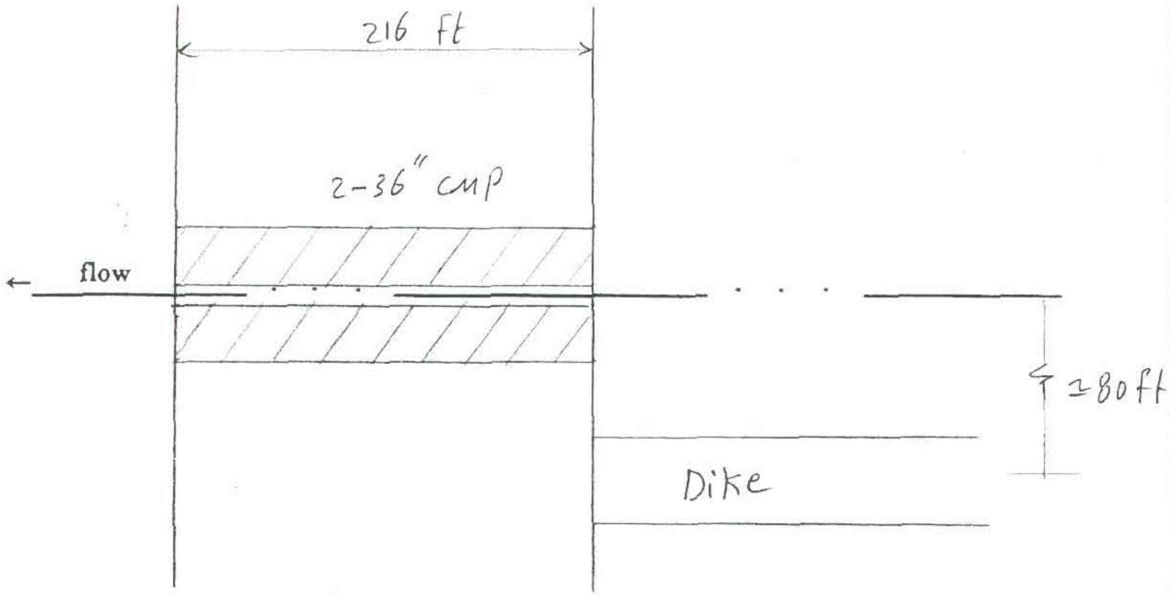
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1209.19

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. N/A Existing Structur

Culvert length or bridge width (ft.)	216
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	14.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1116.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1116.12	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	46	103	148
The maximum depth of flow over the roadway/ railroad (ft.)			0.12	
Weir length (ft.)			500	

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-~~length and depth over weir shown when used in the weir flow~~ equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 41-2
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6305+22
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS see below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS
  (Explain why new analysis was performed.) New study

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)
   2-42" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

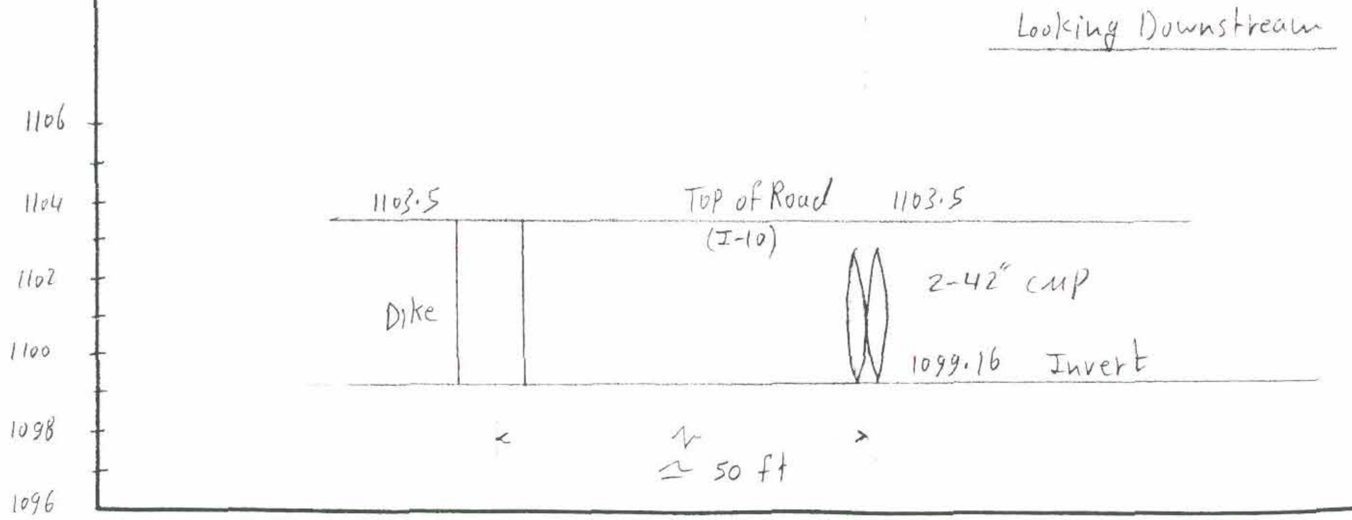
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

Downstream Invert = 1097.66

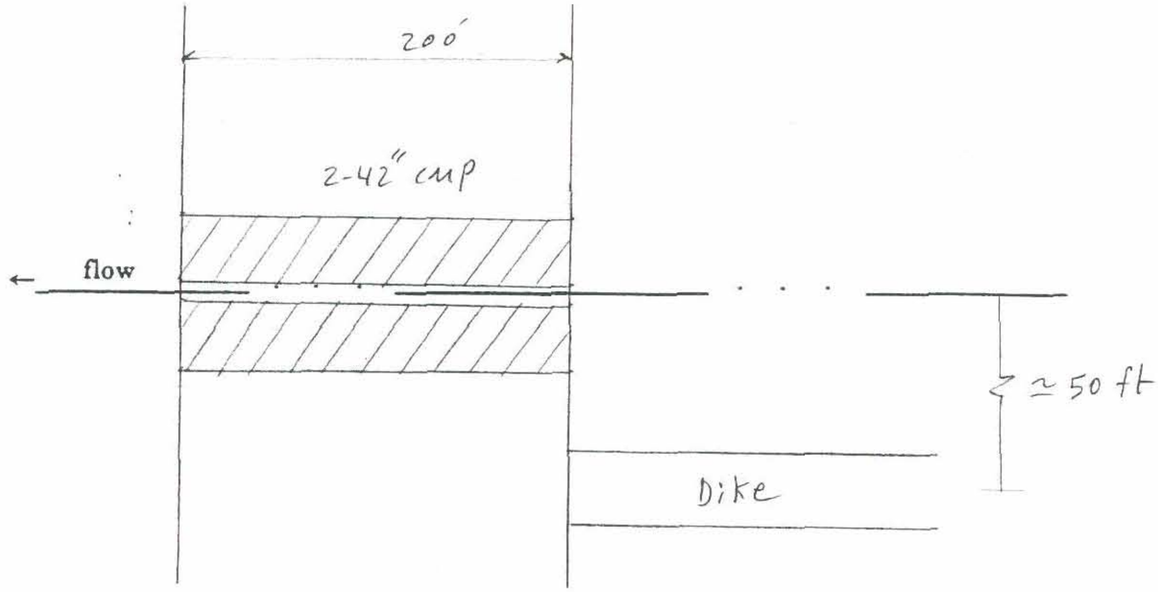
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structu

Culvert length or bridge width (ft.)	200
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	19.2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1103.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1101.73	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	33	0	33

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 41
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6315+00
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS   See below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New study

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)
   2-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

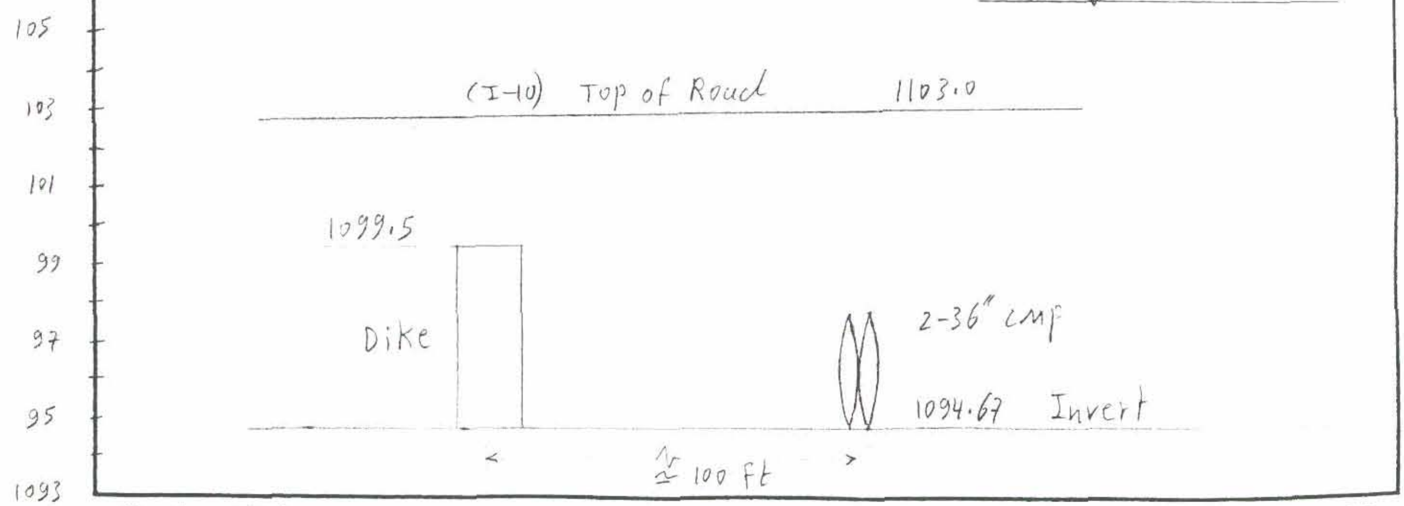
Analysis

Sketch the downstream 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.

Downstream Invert = 1092.70

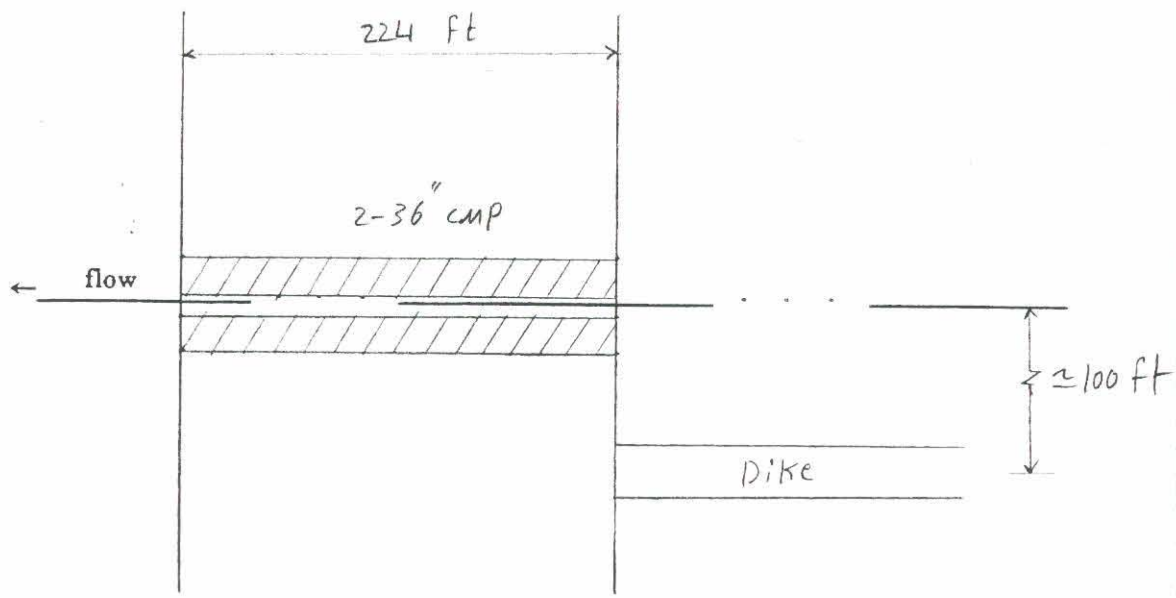
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking Downstream



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	224 ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	14.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
	Top of Dike 1099.5	
Upstream face		
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1100.11	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	47	484	531

The maximum depth of flow over the roadway/ railroad (ft.)	0.61
Weir length (ft.)	400

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ____________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-1
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Stations 6319+32, 6321+33, 6323+05, 6324+32
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS
  (Explain why new analysis was performed.) New Study

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)
   Corresponding to the above stations 1-48", 1-48", 1-48", 2-48" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

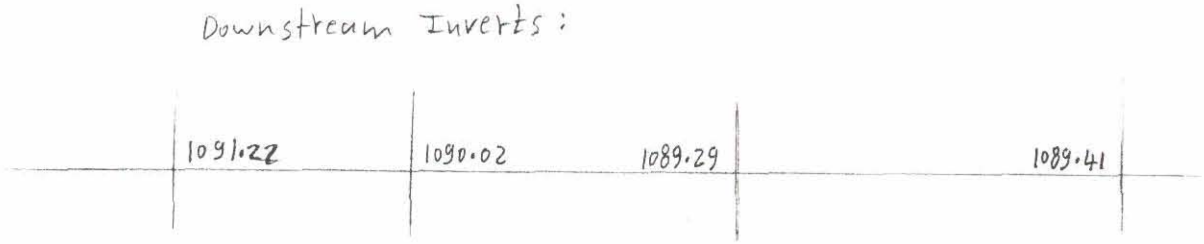
   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

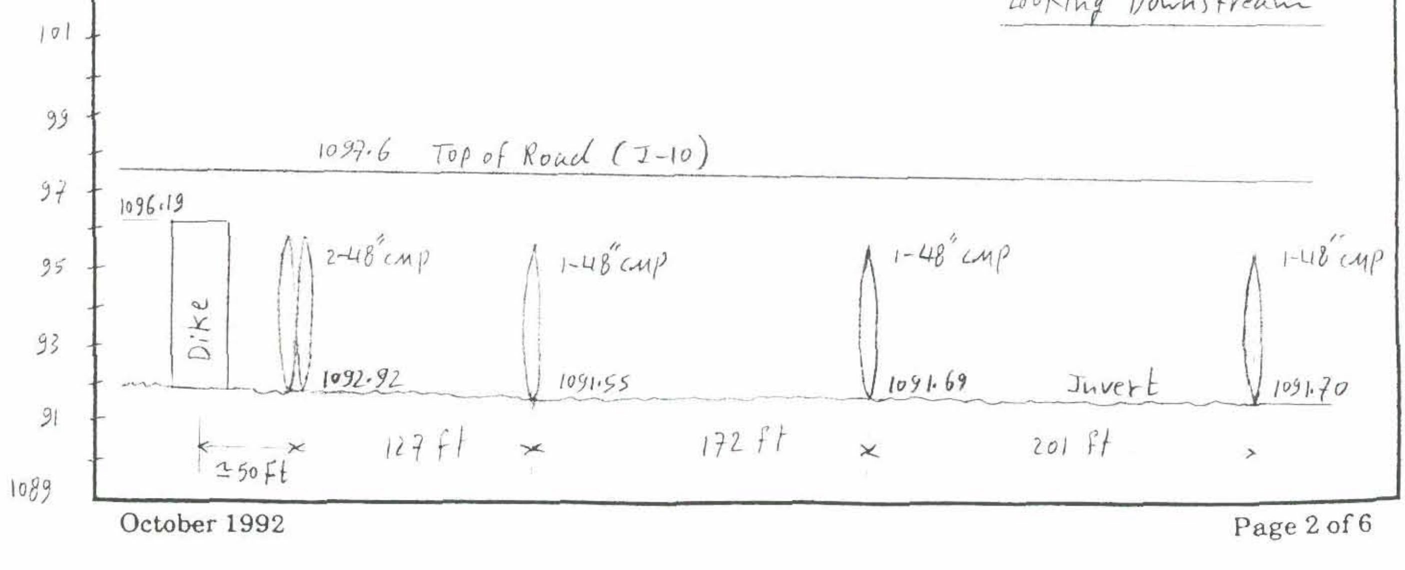
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.



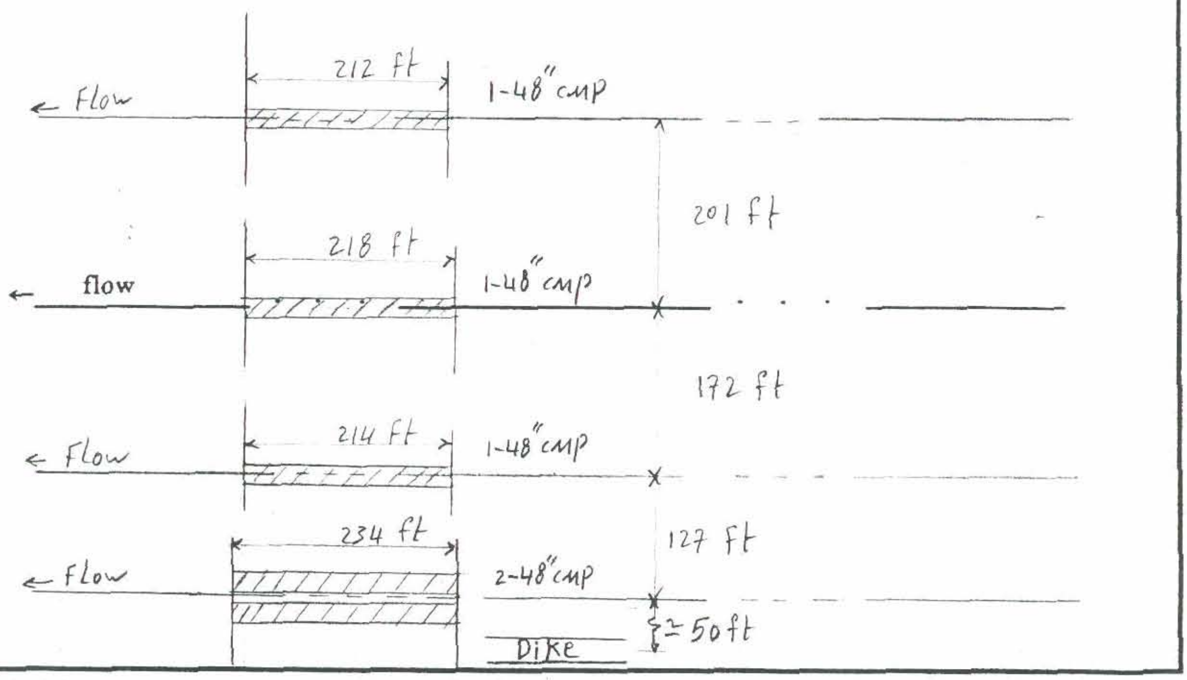
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	212, 218, 214, 234
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft²)	12.6, 12.6, 12.6, 25.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Dike	
Upstream face		1096.19	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1095.26	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	282	0	282

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-2
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6326+40
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) 1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

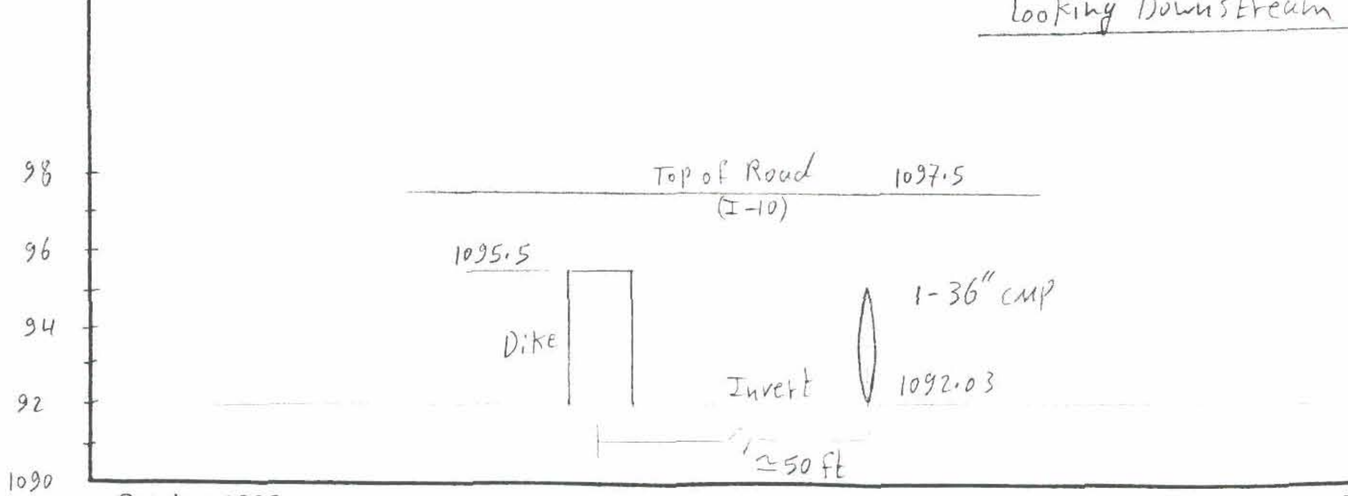
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

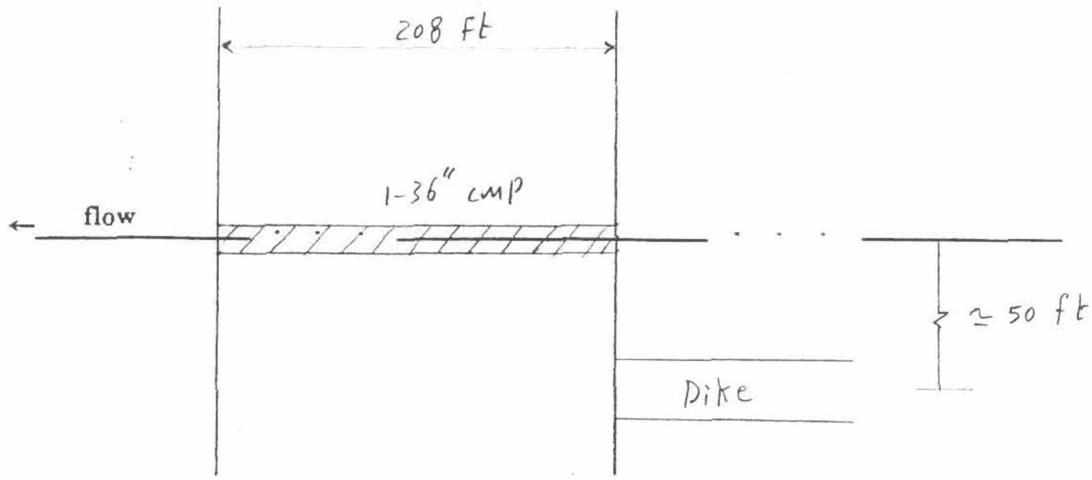
Downstream Invert = 1090.03

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	208
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1095.50	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1093.40	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow (Culvert Flow)	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	10	0	10

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-3
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Stations 6330+50, 6335+25, 6340+10
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS
  (Explain why new analysis was performed.) New study

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)
   Corresponding to the above stations 1-36", 1-36", 1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

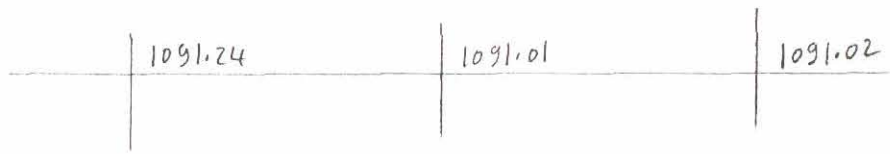
*One form per new/revised bridge/culvert

BRIDGE/CULVERT FORM

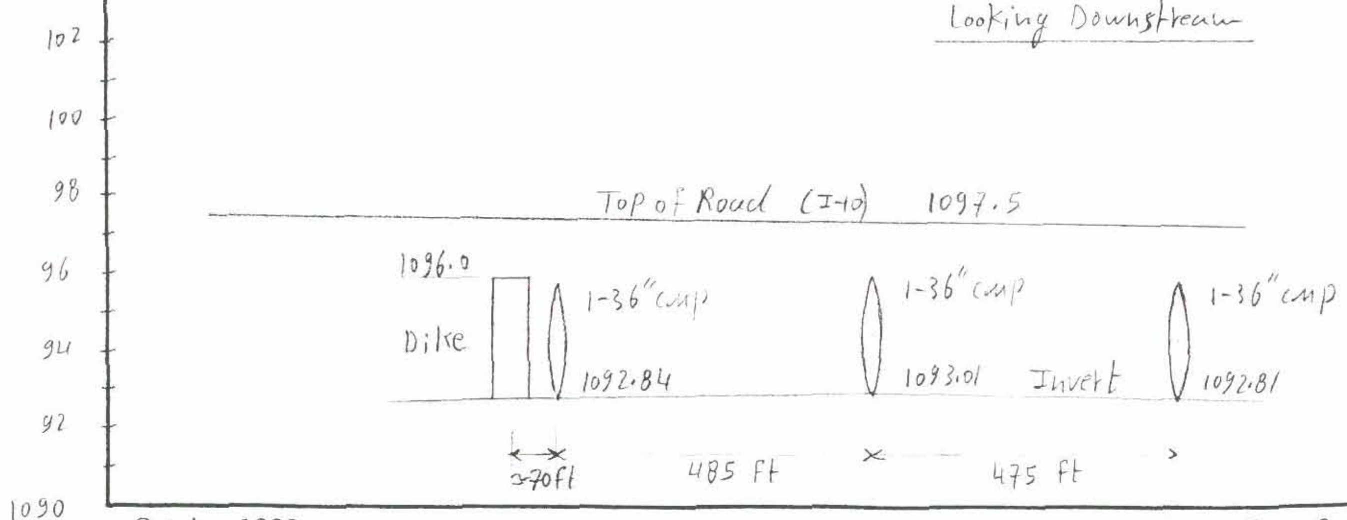
Analysis

Sketch the downstream 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.

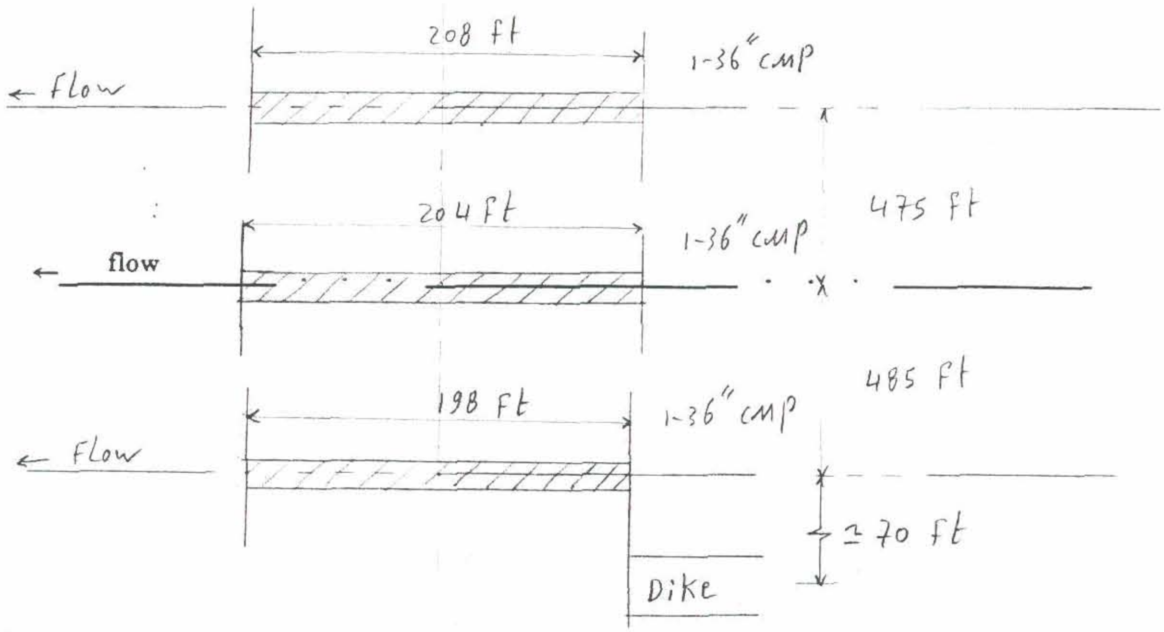
Downstream Invert:



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. N/A Existing Structur

Culvert length or bridge width (ft.)	208, 204, 198
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1, 7.1, 7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1096.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1093.93	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	23	0	23

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ________________________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-4
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 stations 6343+25, 6345+65
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS see below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   Corresponding to the above stations 1-36", 1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

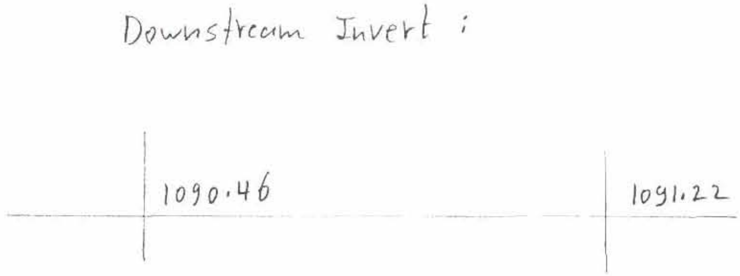
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

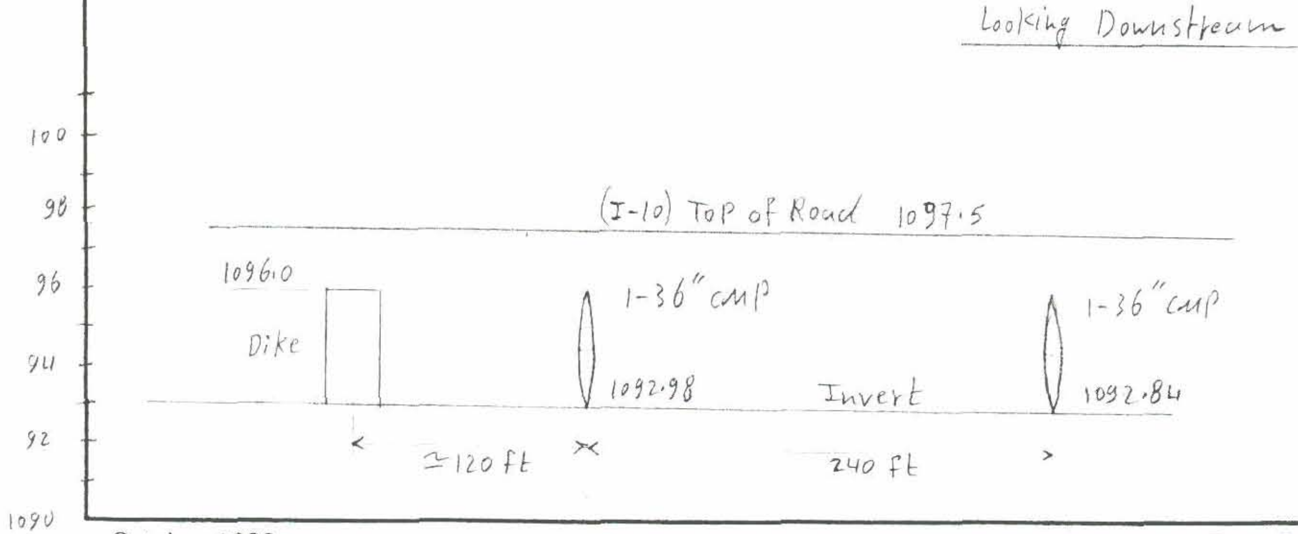
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

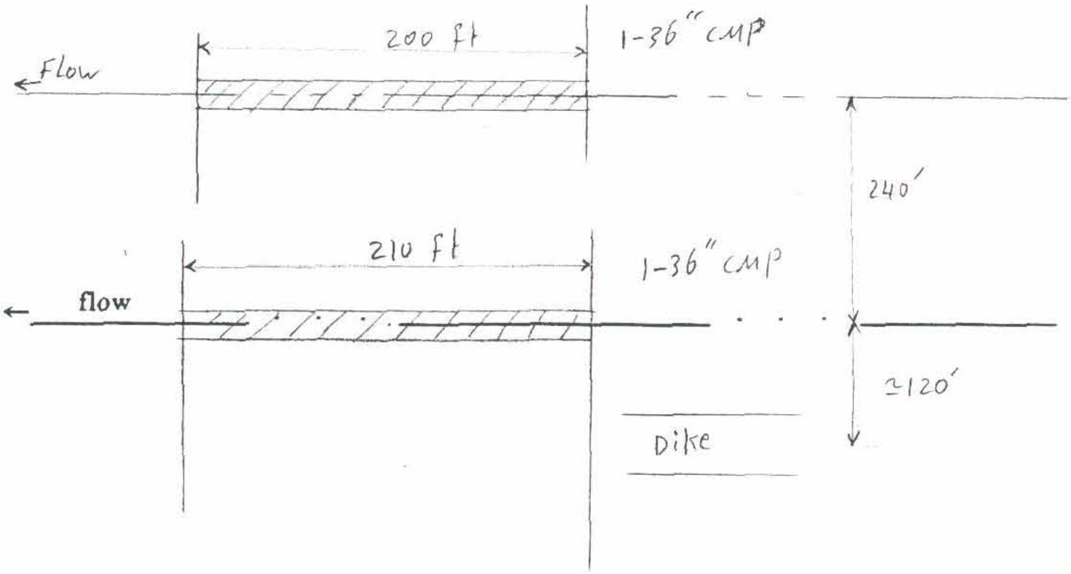


Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	200, 210
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1, 7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1096.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1094.25	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	21	0	21
The maximum depth of flow over the roadway/ railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ____________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-5
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6349+45
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS see below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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) 1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

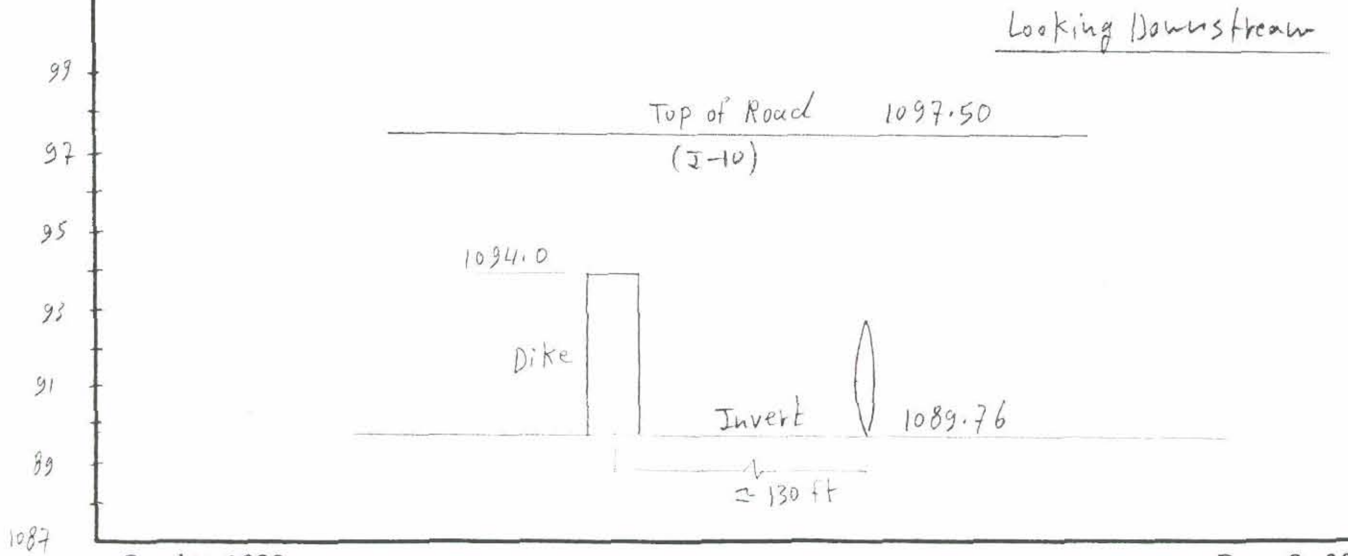
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

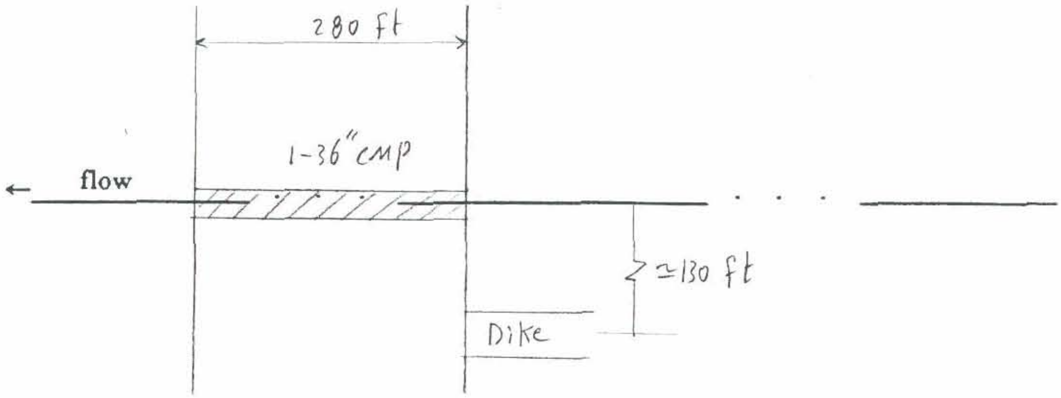
Downstream Invert = 1086.37

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.



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	280
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1094.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1091.76	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	19	0	19
The maximum depth of flow over the roadway/ railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-6
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6354+00
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Head walls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

BRIDGE/CULVERT FORM

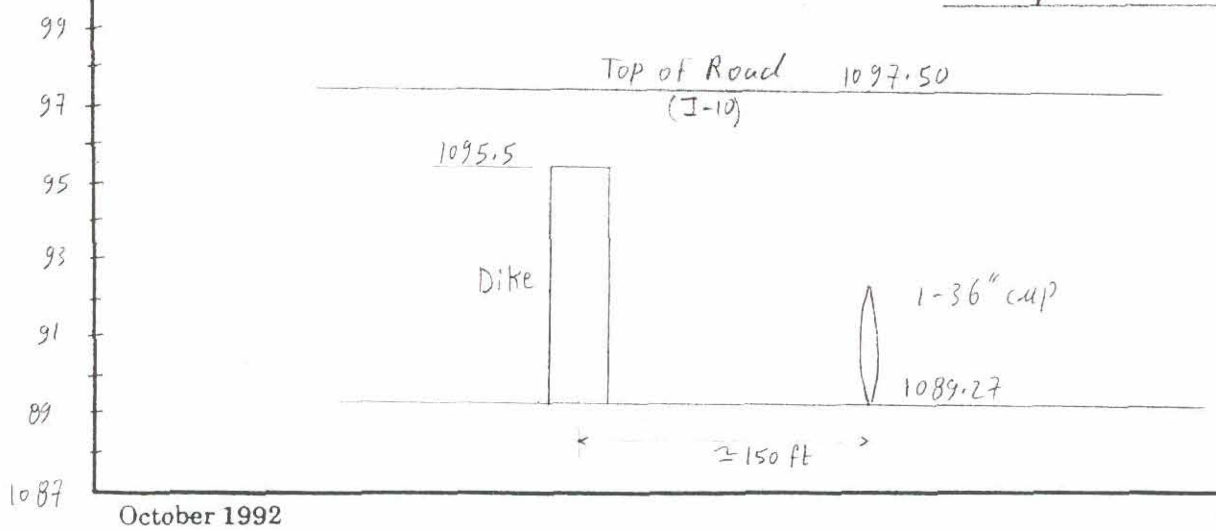
Analysis

Sketch the downstream 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.

Downstream Invert = 1085.38

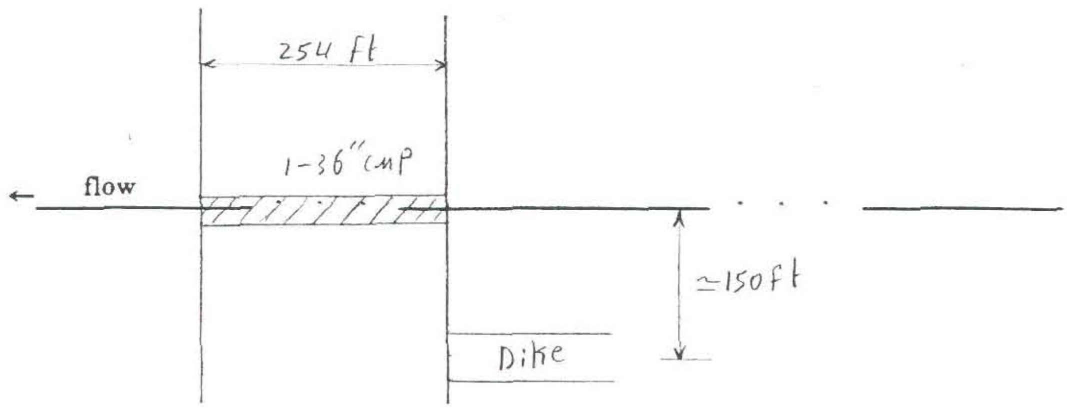
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking Downstream



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	254
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1095.50	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1090.14	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	6	0	6

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________

BRIDGE/CULVERT FORM

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir-flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), West of Tuthill Road
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-7
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6357+00
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS   see below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

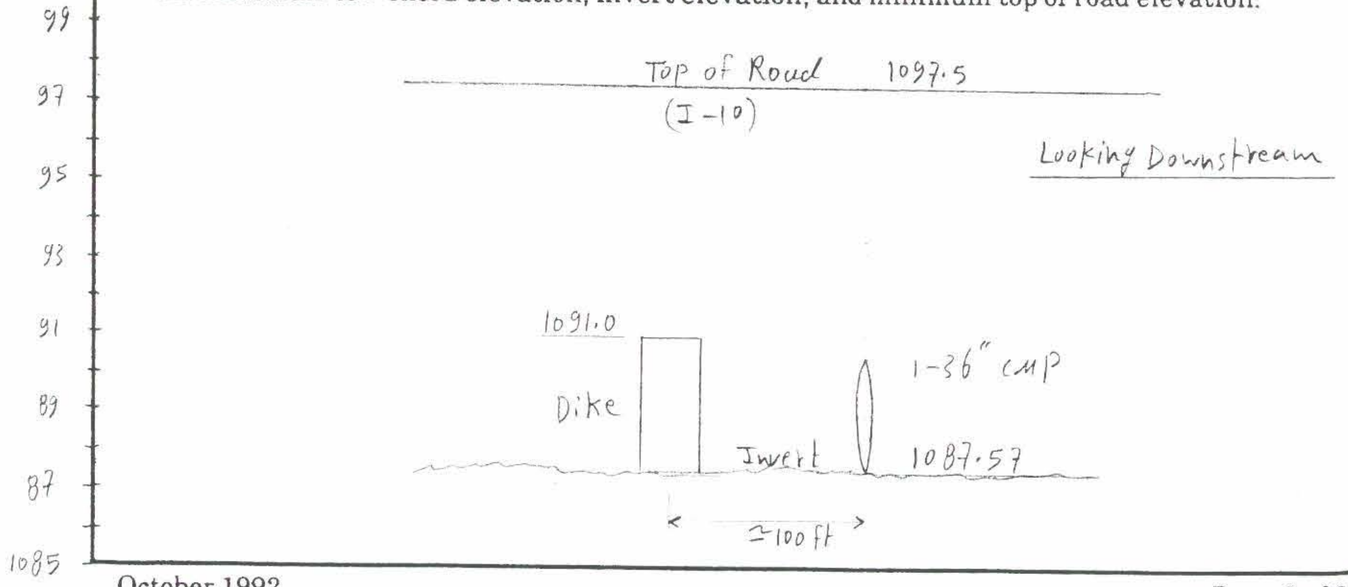
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

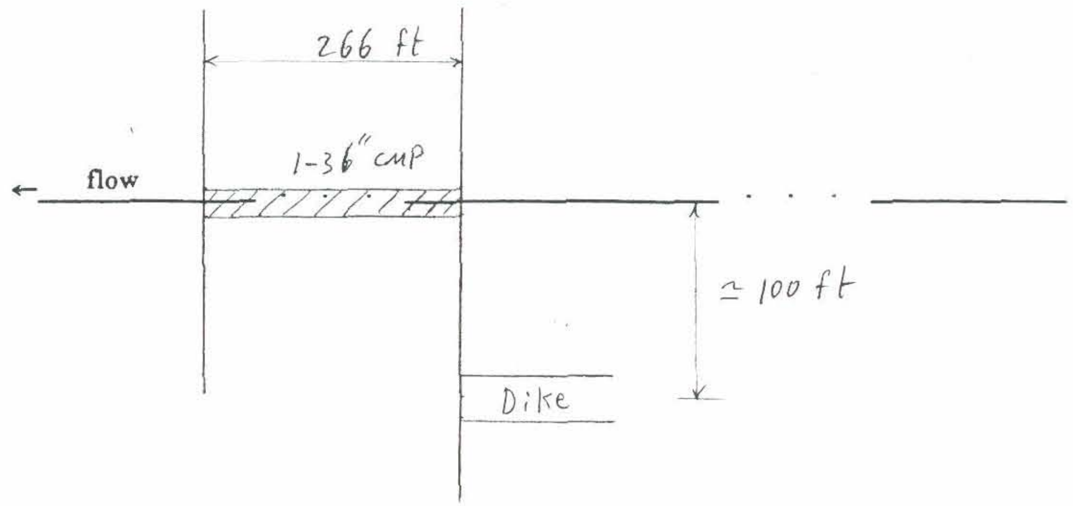
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1084.46

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. N/A Existing Structure

Culvert length or bridge width (ft.)	266
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1091.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1089.61	N/A
Downstream face	N/A	N/A

Discharge

	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	20	0	20
The maximum depth of flow over the roadway/ railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and Town of Buckeye
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), west of Tuthill Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 43-8
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6360+85
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   1-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

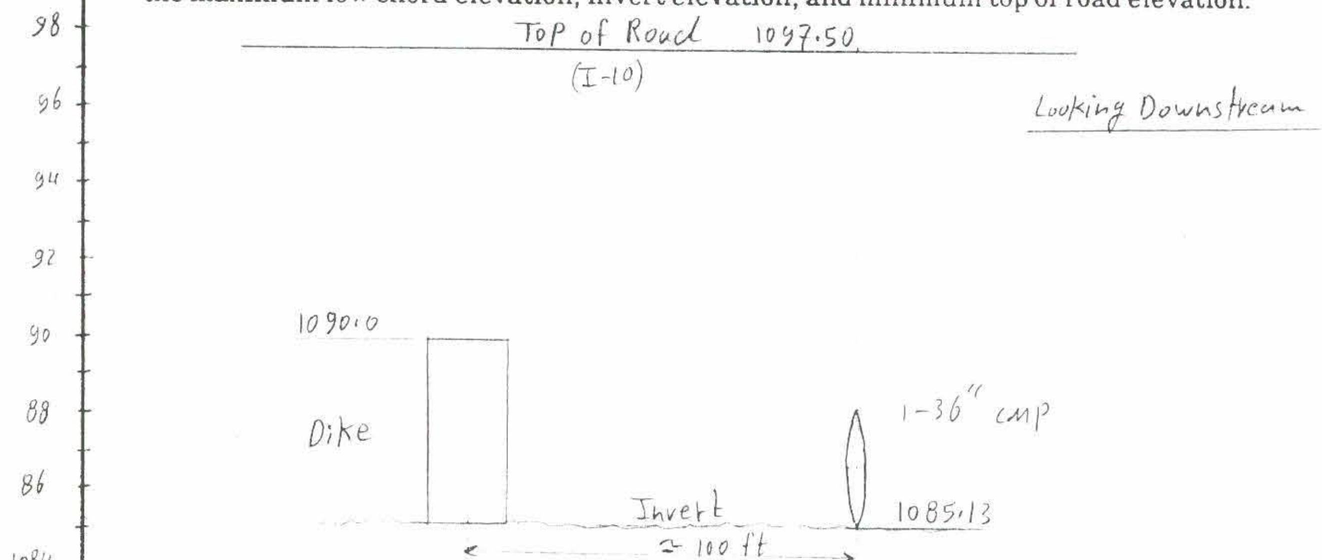
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

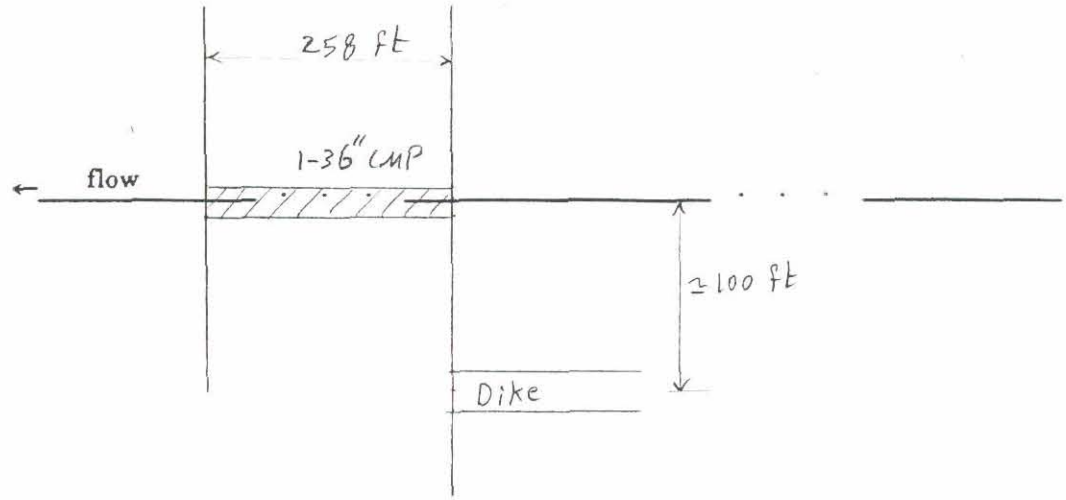
Downstream Invert = 1083.74

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.



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	258
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Dike	
Upstream face		1090.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1086.62	N/A
Downstream face	N/A	N/A

Discharge

	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	12	0	12

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

- [ ] Physical change
  - [ ] Existing
  - [ ] Proposed
- [ ] Improved methodology
- [ ] Improved data
- [ ] Floodway revision
- [X] Other New Approximate study

Explain

2. Flooding Source: Interstate 10, Citrus Road to Perryville Road
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: B

(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2055D	04/15/88
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2055D	04/15/88

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

Types of Flooding

- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [X] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures

- [ ] Channelization
- [ ] Levee/Floodwall
- [X] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe)

Disciplines*

- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____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.)
_X_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 ________________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Citrus Rd to Perryville Rd.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 275
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6486+00
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
4-36" RCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Square edge entrance with headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

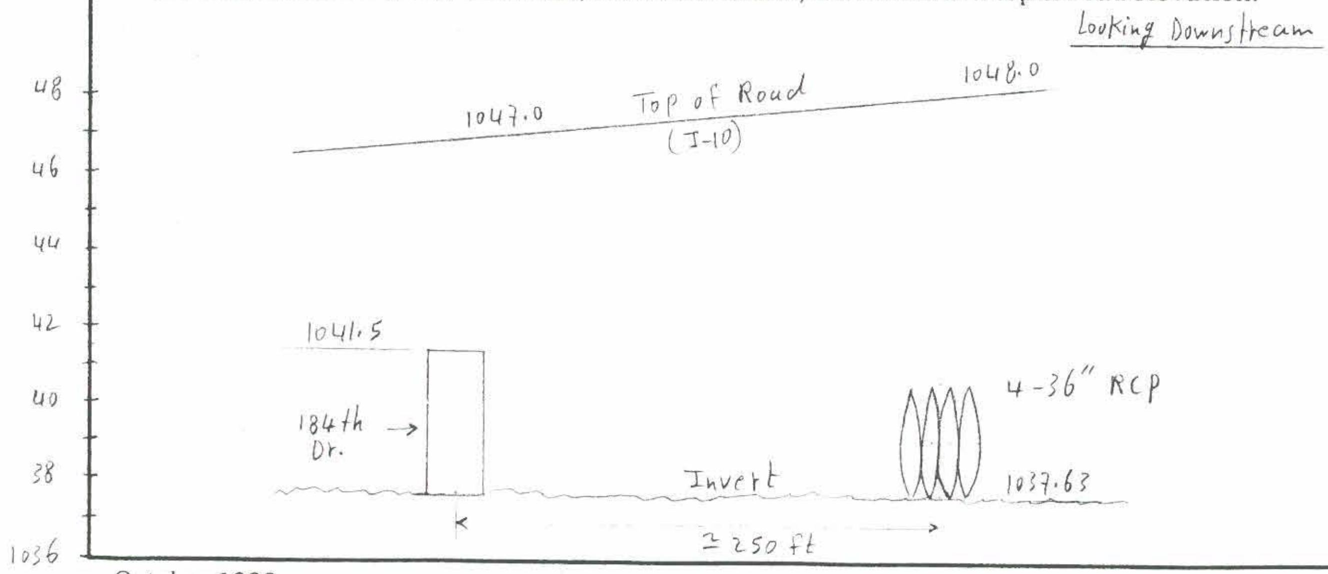
BRIDGE/CULVERT FORM

Analysis

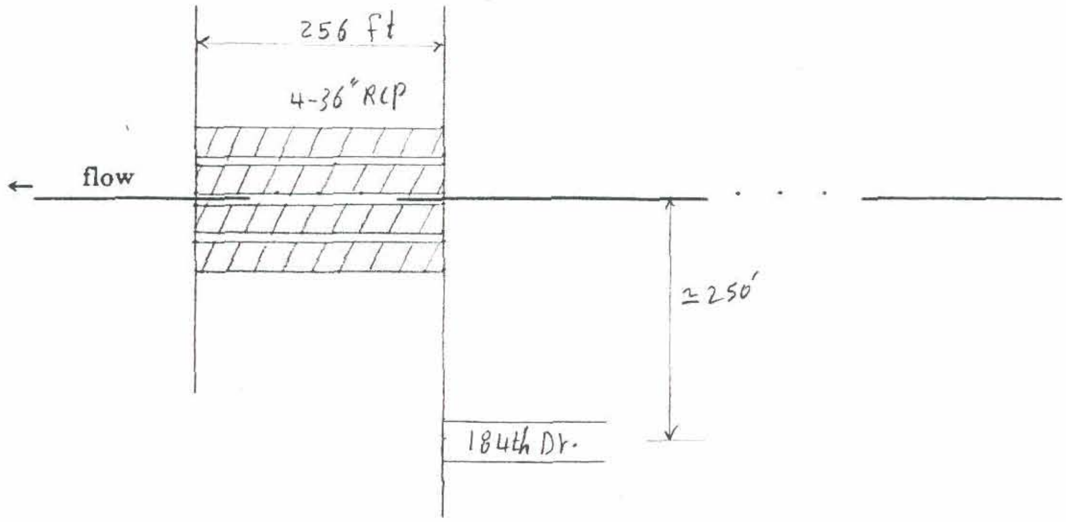
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1035.91

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. N/A Existing Structure

Culvert length or bridge width (ft.)	256
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	28.3

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Dike 1041.50	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1039.69	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	90	0	90

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Citrus Rd. to Perryville Rd.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Station 276
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6498+35
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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)
   3-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

October 1992

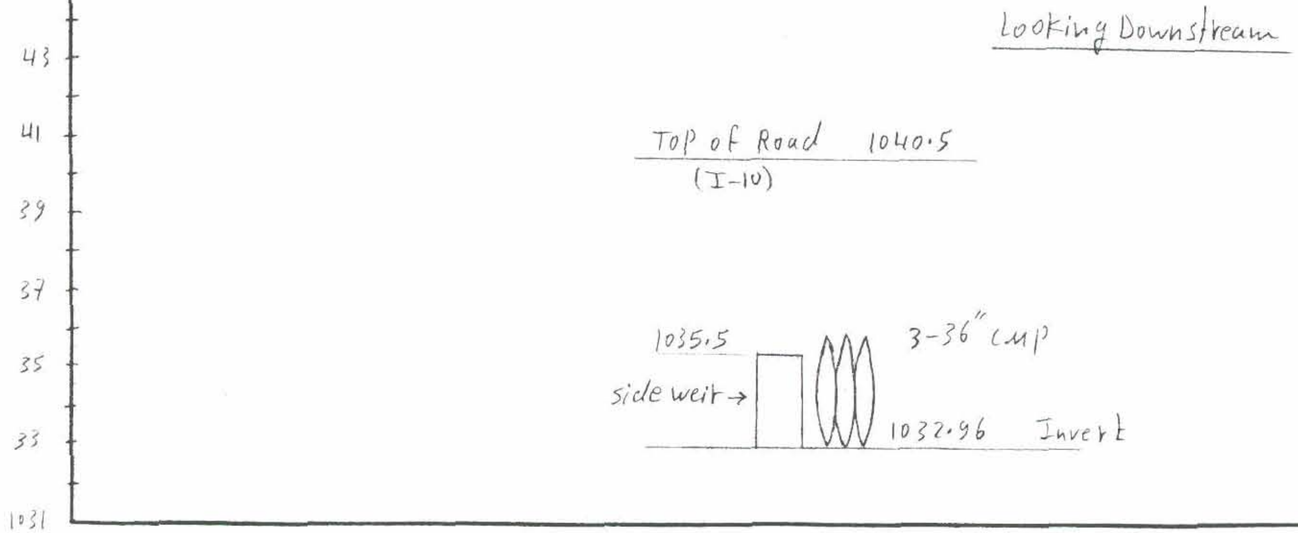
BRIDGE/CULVERT FORM

Analysis

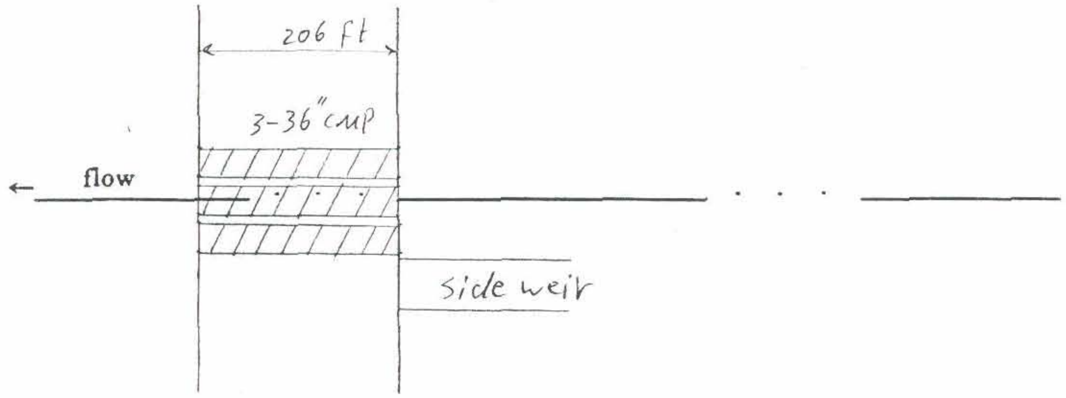
Sketch the downstream face of the structure together with the road profile. Show, at a **minimum**, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1031.95

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. N/A Existing Structure

Culvert length or bridge width (ft.)	206
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	21.2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of weir 1035.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1036.08	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	89	98	187

The maximum depth of flow over the roadway/railroad (ft.) 0.58

Weir length (ft.) 30

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Citrus Rd. to Perryville Rd.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 277
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6525+19 (Citrus Road)
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS See below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   Trapezoidal Bridge, BW = 68 ft and SS = 2:1
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   30°-75° wing walls with square top edge
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

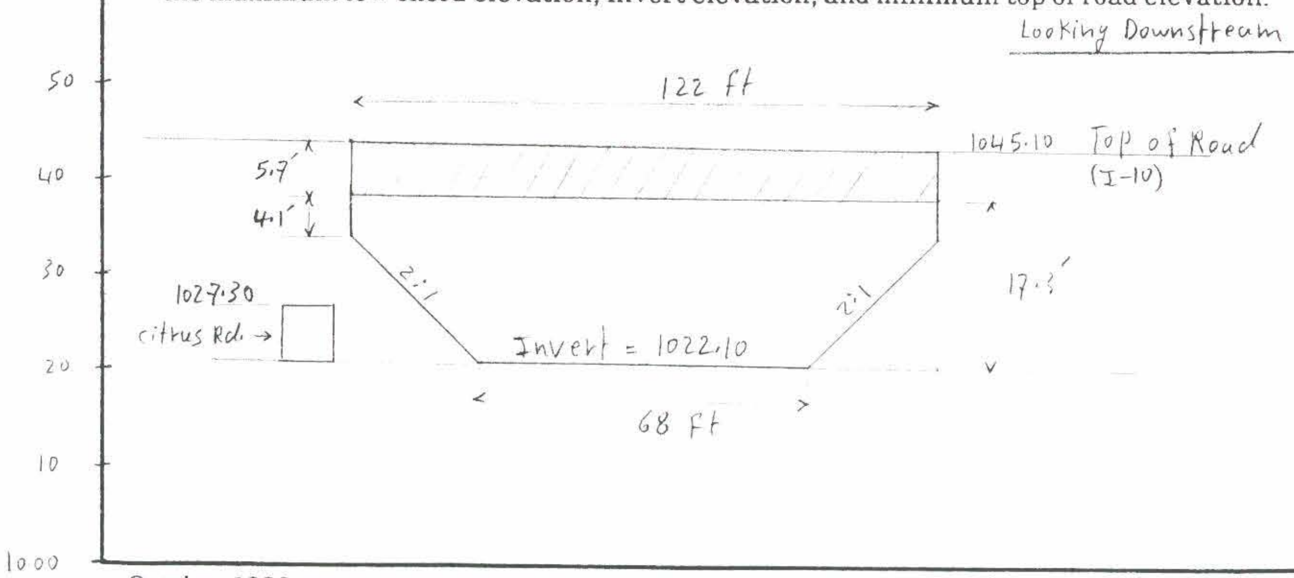
*One form per new/revised bridge/culvert

Analysis

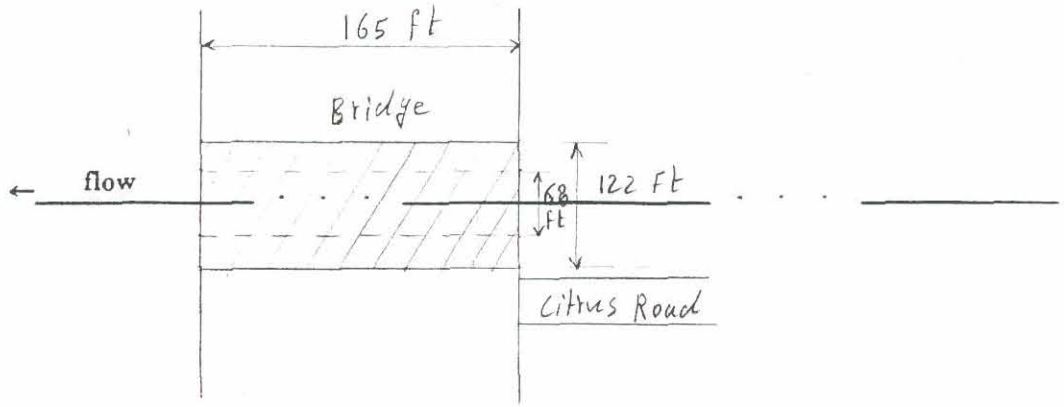
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1020.37

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. N/A Existing Structure

Culvert length or bridge width (ft.)	165
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	1754.2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Road	
Upstream face		1027.3	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1026.04	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	583	0	0	583

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.018
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate study
     Explain
2. Flooding Source: Interstate 10, Cotton Lane to Citrus Road
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: B
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2055D	04/15/88
	040046	Goodyear, Town	Maricopa	AZ	04013C	2060D	04/15/88

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [X] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [X] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe)

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____	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.)
X	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 ______________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ ____________

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Cotton Lane to Citrus Rd.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 279D
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6529+19
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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)
   1-24" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

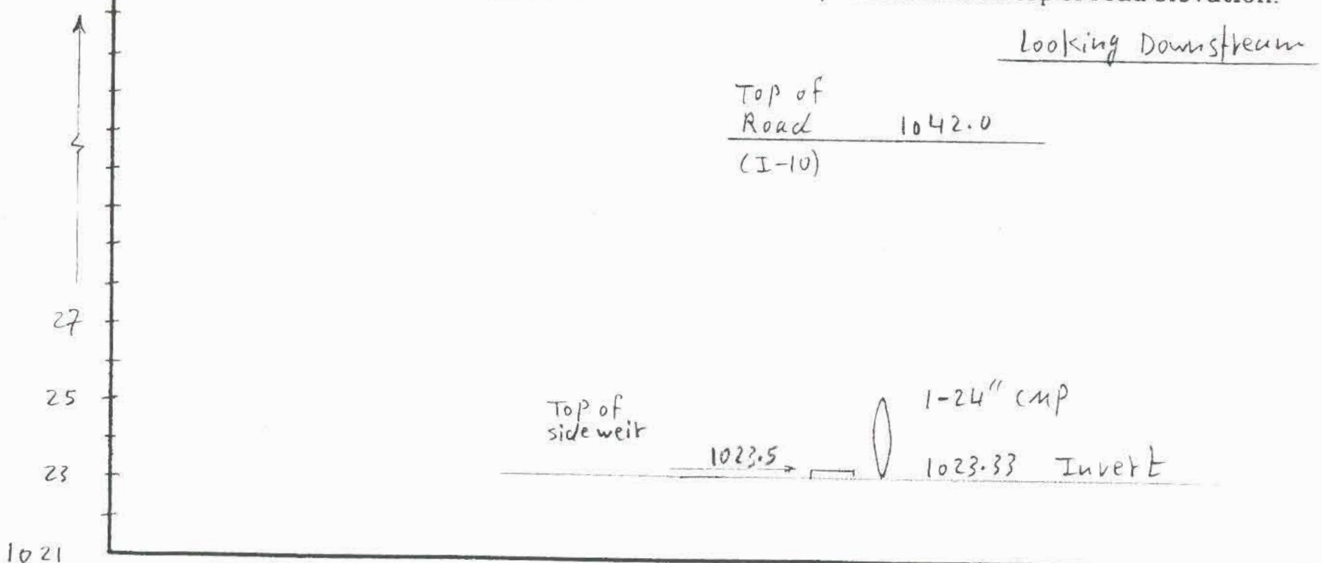
October 1992

Analysis

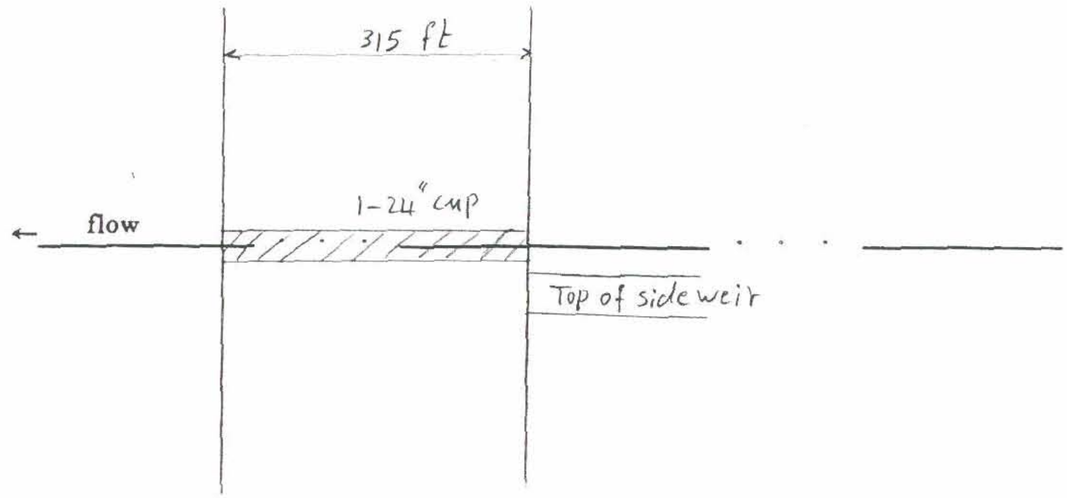
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 1021.76

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. N/A Existing Structure

Culvert length or bridge width (ft.)	315
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	3.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Weir 1023.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face		N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	32	0	32

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Cotton Lane to Citrus Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At sub-basin 279 C
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): AT I-10 Stations 6538+10 and 6538+28
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS see below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) Corresponding to the above Stations 4-36" and 1-24" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

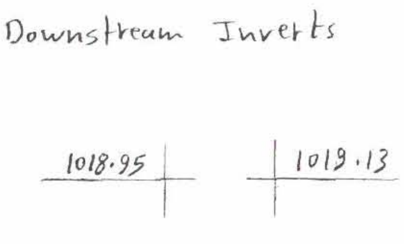
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

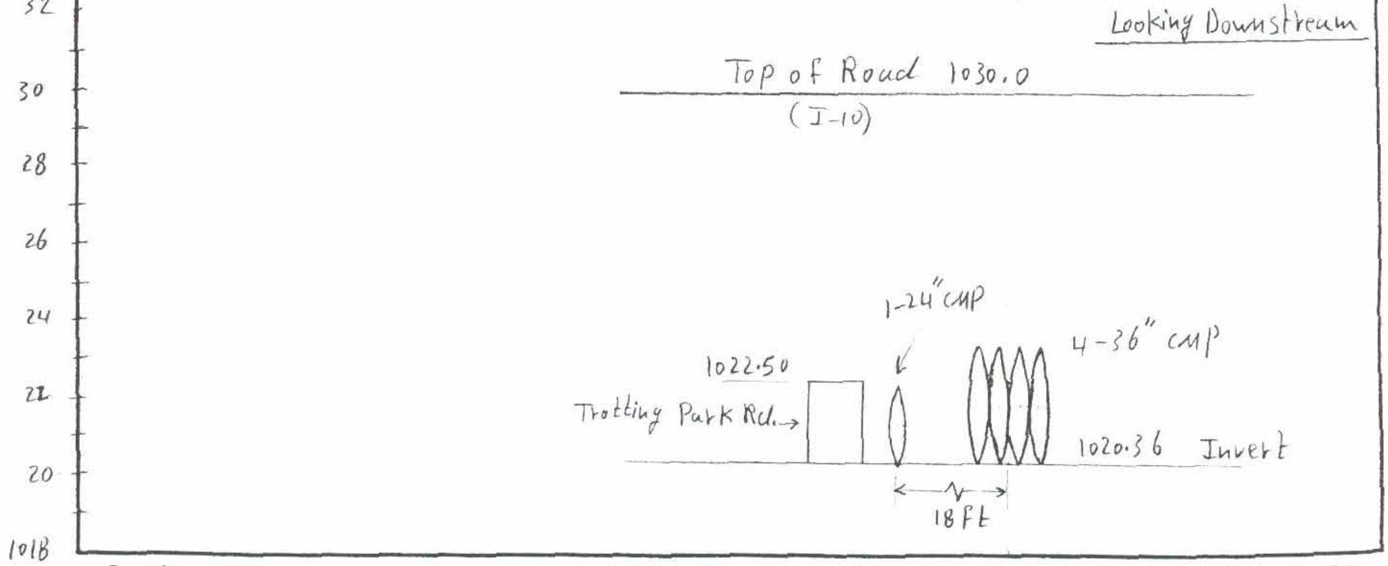
BRIDGE/CULVERT FORM

Analysis

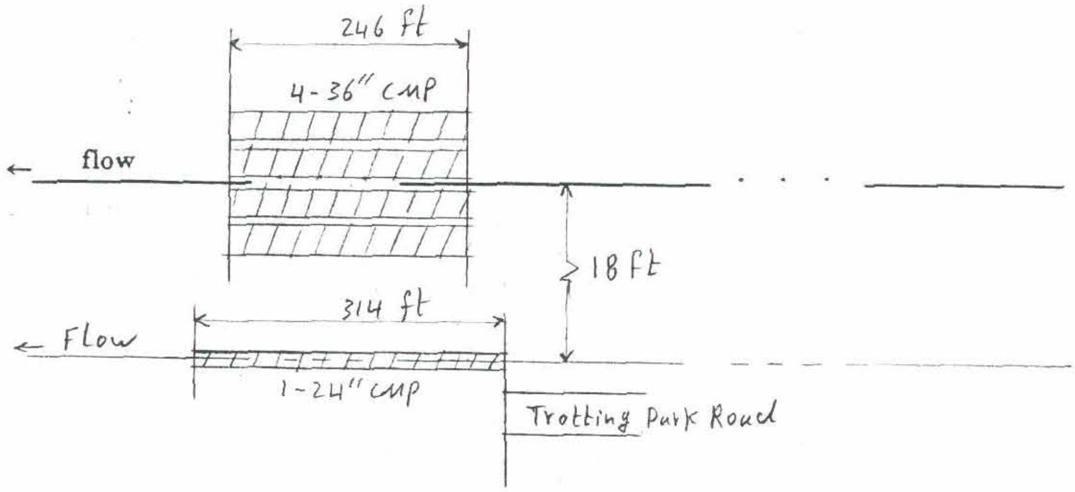
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the 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. N/A Existing Structur

Culvert length or bridge width (ft.)	246 , 314
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	28.3 , 3.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of Dike 1022.5	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1021.44	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	45	0	45

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
Upstream face	N/A Ponding Area	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.50
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Cotton Lane to Citrus Road
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 279-B
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6546+59
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New study

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)
1-24" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates
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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

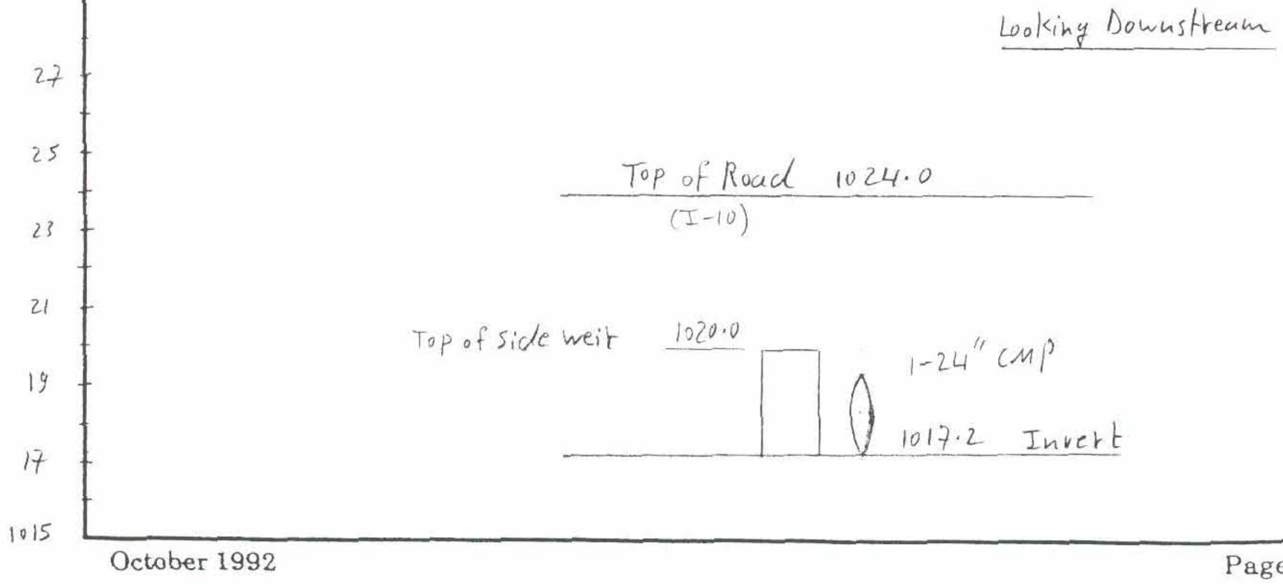
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

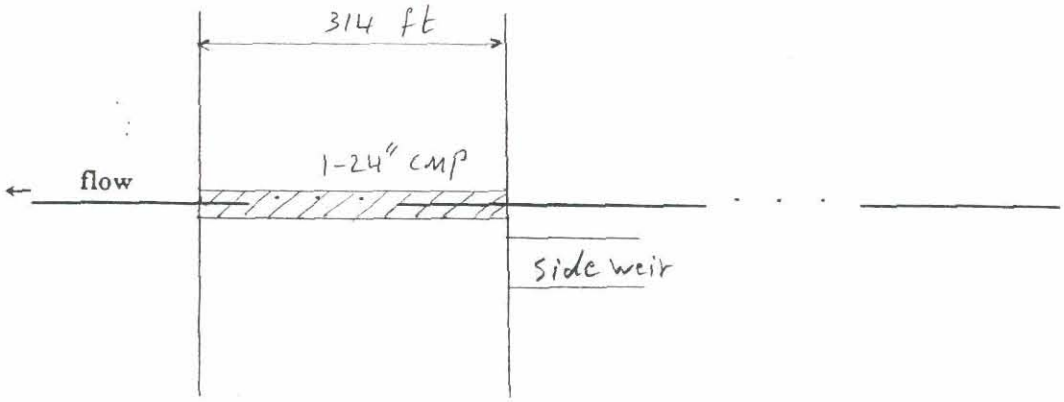
Downstream Invert = 1015.94

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	314
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	3.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Weir 1020.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1020.1	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	10	37	47

The maximum depth of flow over the roadway/railroad (ft.)	0.1
Weir length (ft.)	200

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Cotton Lane to Citrus Road
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 279A
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Stations 6559+90, 6562+00
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New study

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)
Corresponding to the above stations 1-24" CMP, 5-29"x45" HERCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwall, Square edge with headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates, and HY8 V: 3.2
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 explanation)

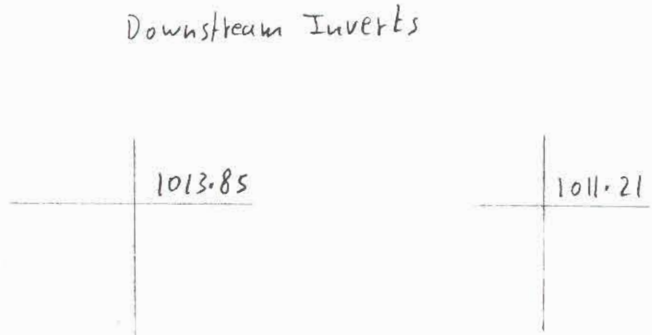
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

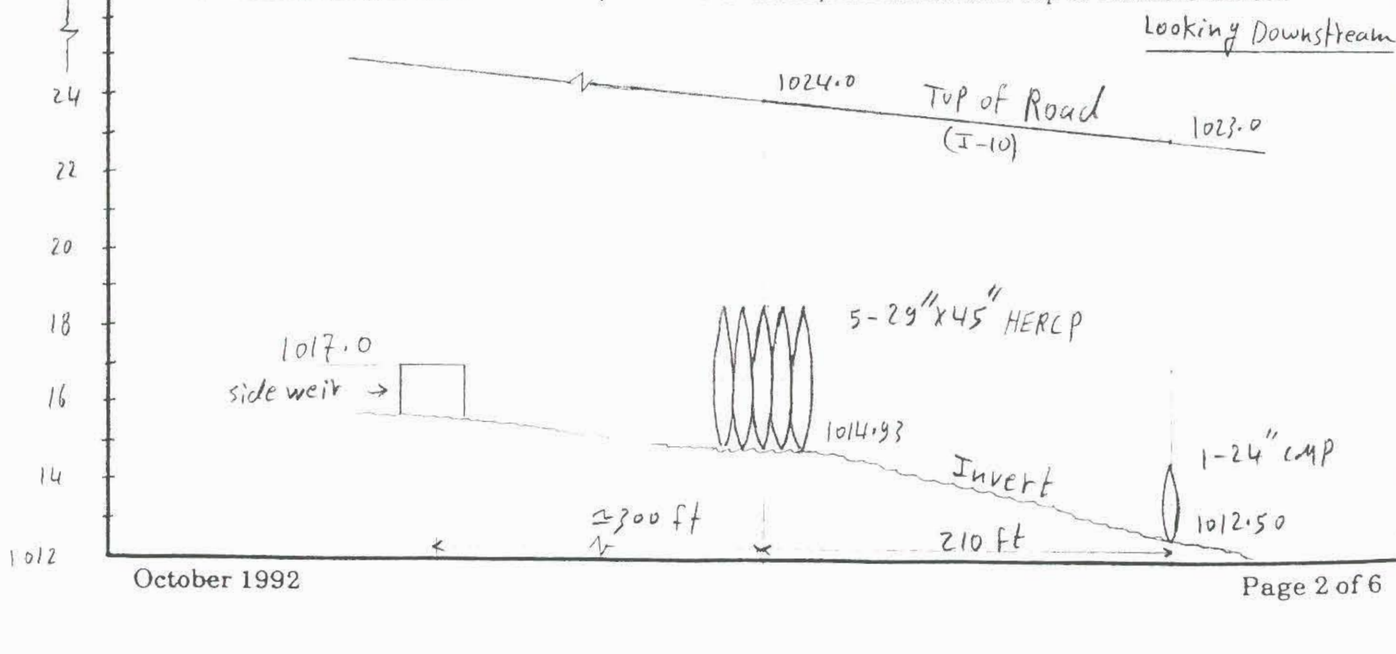
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

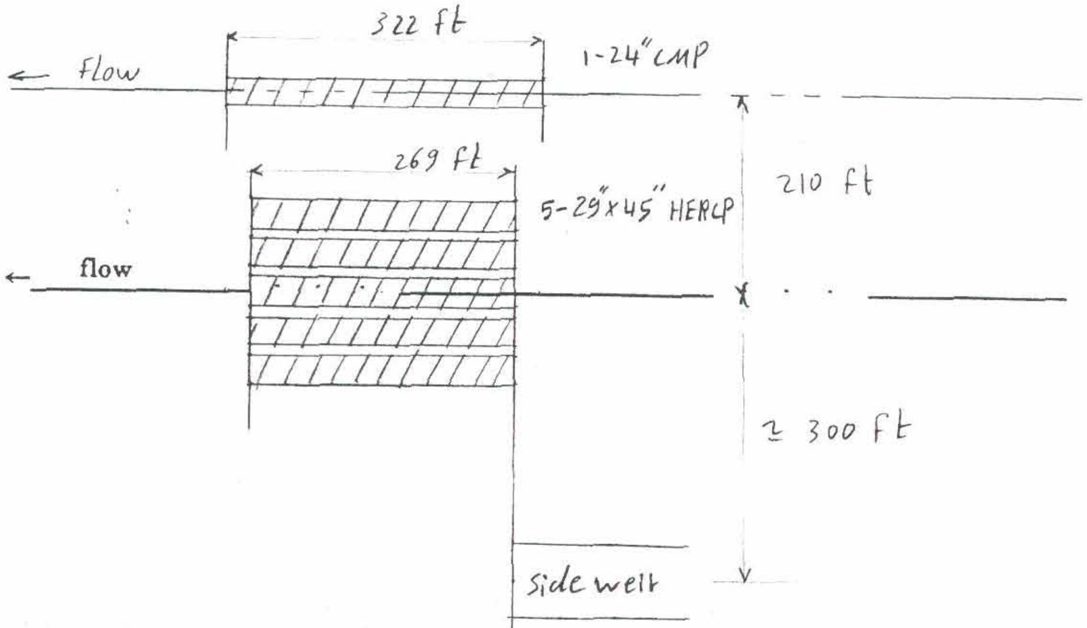


Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	322 , 269
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	3.1 , 45.4

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
	Top of weir	
Upstream face		
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face		N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	67	0	67
The maximum depth of flow over the roadway/ railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024 , 0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Cotton Lane to Citrus Rd.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 279
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6577+15 (Cotton Lane)
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New study

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)
   2-36" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

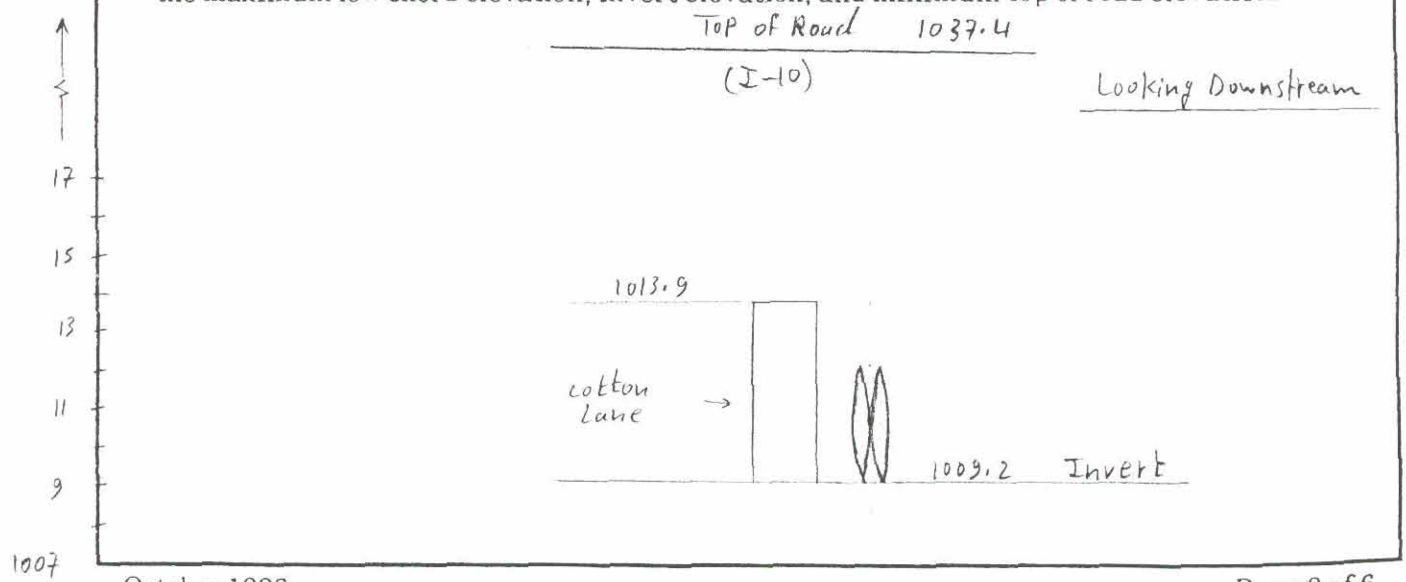
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

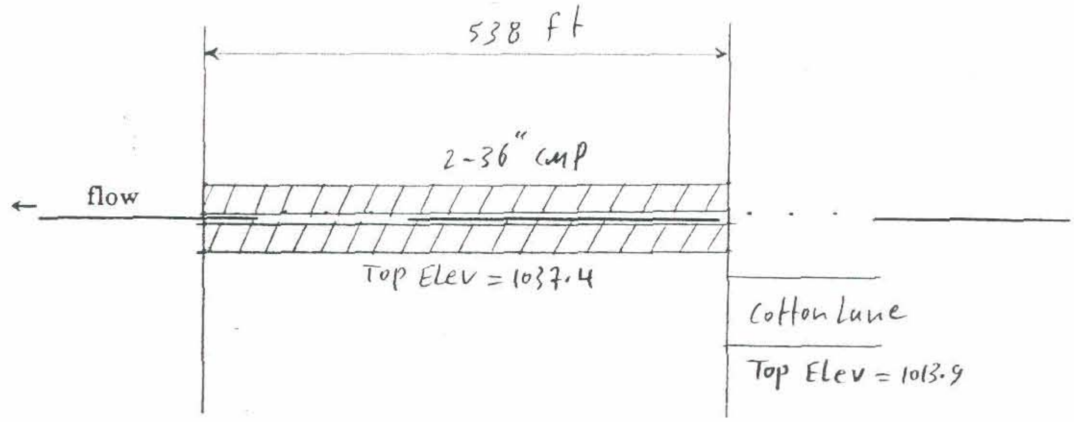
Downstream Invert = 1008.23

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	538
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	14.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Road	
Upstream face		1013.9	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1015.20	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	738	896	1634

The maximum depth of flow over the roadway/ railroad (ft.) 1.3

Weir length (ft.) 200

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate Study
     Explain __________
2. Flooding Source: Interstate 10, Estrella Parkway to Sarival Avenue
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: B
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2060D	04/15/88

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

Types of Flooding	Structures	Disciplines*
[ ] Riverine	[ ] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[X] Hydrology
[ ] Alluvial Fan	[X] Bridge/Culvert	[X] Hydraulics
[X] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by	[ ] Fill	[ ] Structural
wind/wave action	[ ] Pump Station	[ ] Geotechnical
[ ] Yes	[ ] None	[X] Land Surveying
[ ] No	[ ] Other (describe)	[ ] Other (describe)
[ ] Other (describe)	________	________
________		

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____	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.)
X	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 ________________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________ .

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Estrella Parkway to Surival Av.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At sub-basin 282
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 stations 6630+44, 6630+84, 6631+22 (Surival Av)
3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS See below

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) Corresponding to the above stations: 36" RGRCP, Trapezoidal 68ft B.W and 2:1 side slopes Bridge, 30" RGRCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Square edge entrance with headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

Analysis

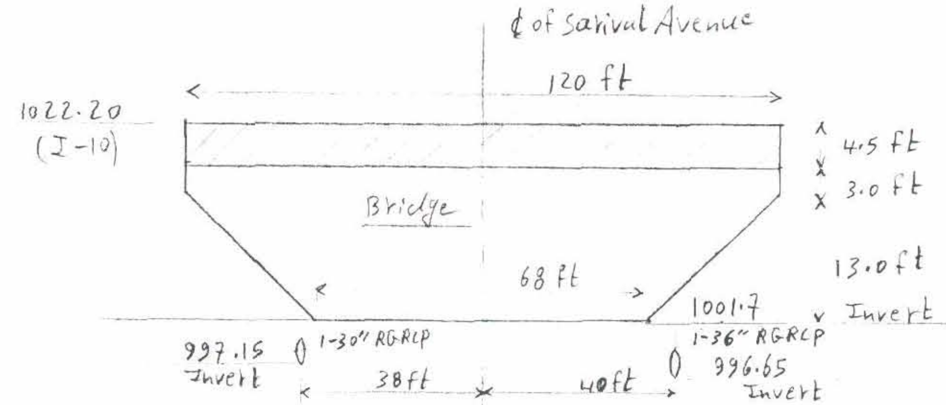
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Inverts

Culvert	Bridge	Culvert
989.71	1001.32	995.90

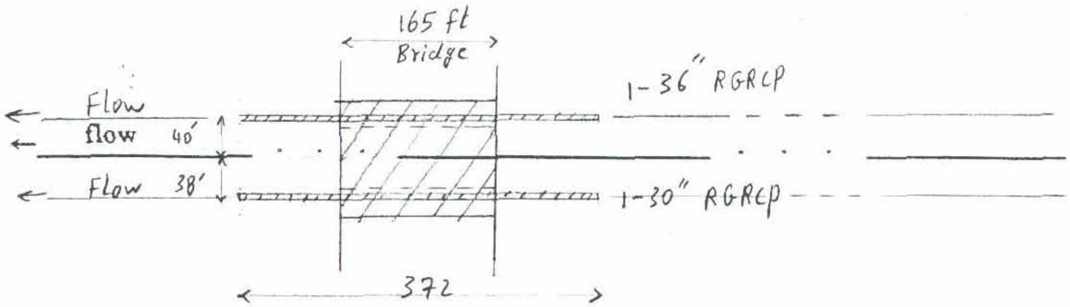
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking South



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	372, 165, 372
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1, 1582, 4.9

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Top of (I-10)	Right Overbank
Upstream face		1022.2	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1003.0	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	Bridge and Culverts Flow 562		0	562

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain	(Ponding)	Floodway
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012, 0.022, 0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	N/A
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Behind Interstate 10 (I-10), Estrella Parkway to Sarival Av.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 285B
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Stations 6653+00, 6656+10, 6656+50
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS   see below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.)   New Study

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)
   Corresponding to the above Stations 5-29"x45" HERCP, 2-24" CMP, 24" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Headwalls, square edge with headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1, Culvert Analysis Programs by Dodson and Associates, HY8 - V:3.2

   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 explanation)

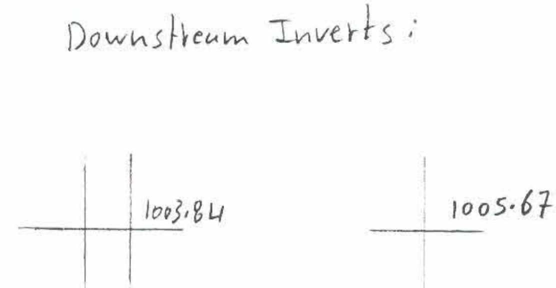
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

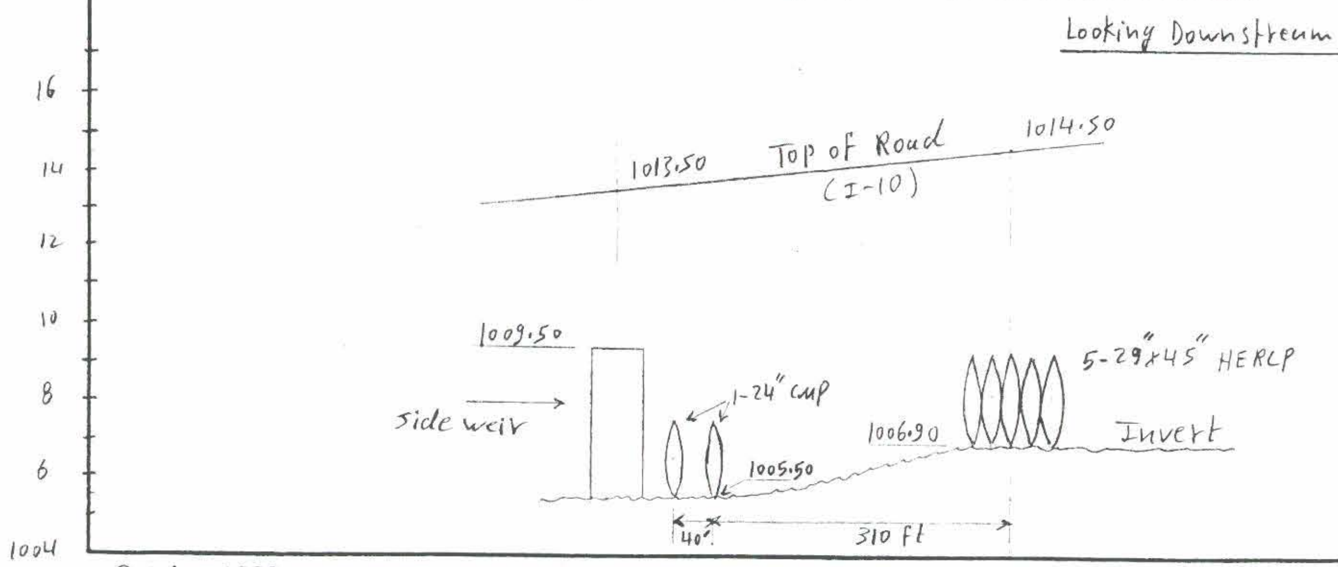
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

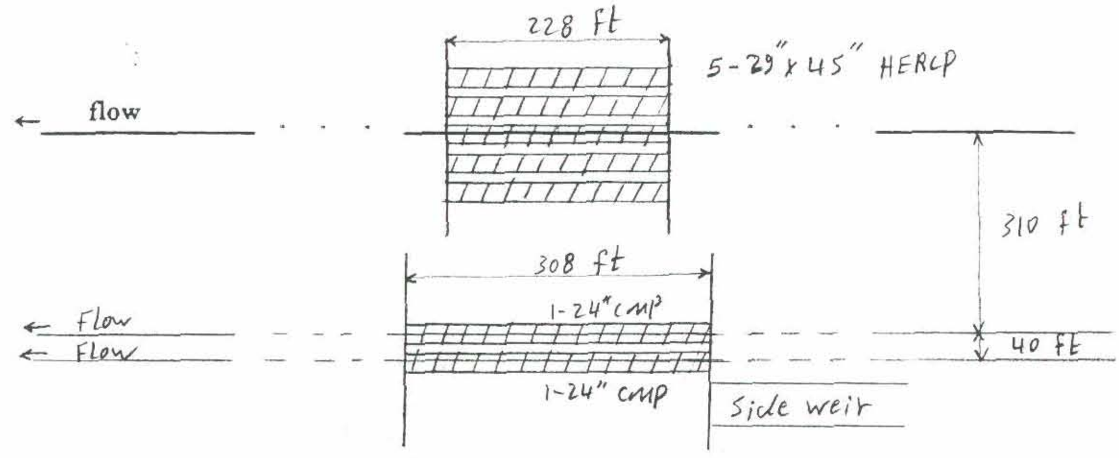


Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	228, 308, 308
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	45.3, 3.1, 3.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of weir 1009.50	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1009.48	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	220	5	225

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Behind Interstate 10 (I-10), Estrella Parkway, to Sarival Av.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 285A
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 stations 6664+91, 6665+37, 6670+45
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) Corresponding to the above stations 30" RGRCP, 6'x4' B.C, 30" RGRCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Square edge with headwalls for pipes and Wingwalls 30° to 70° with square top edge for B.C
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) Culvert Analysis Programs by Dodson and Associates

   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 explanation)

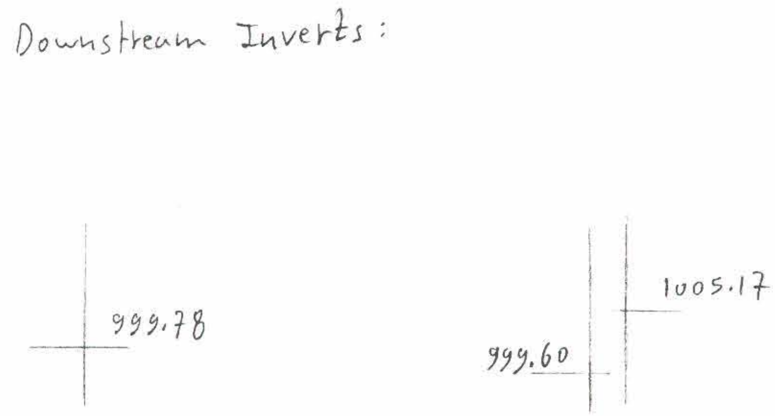
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

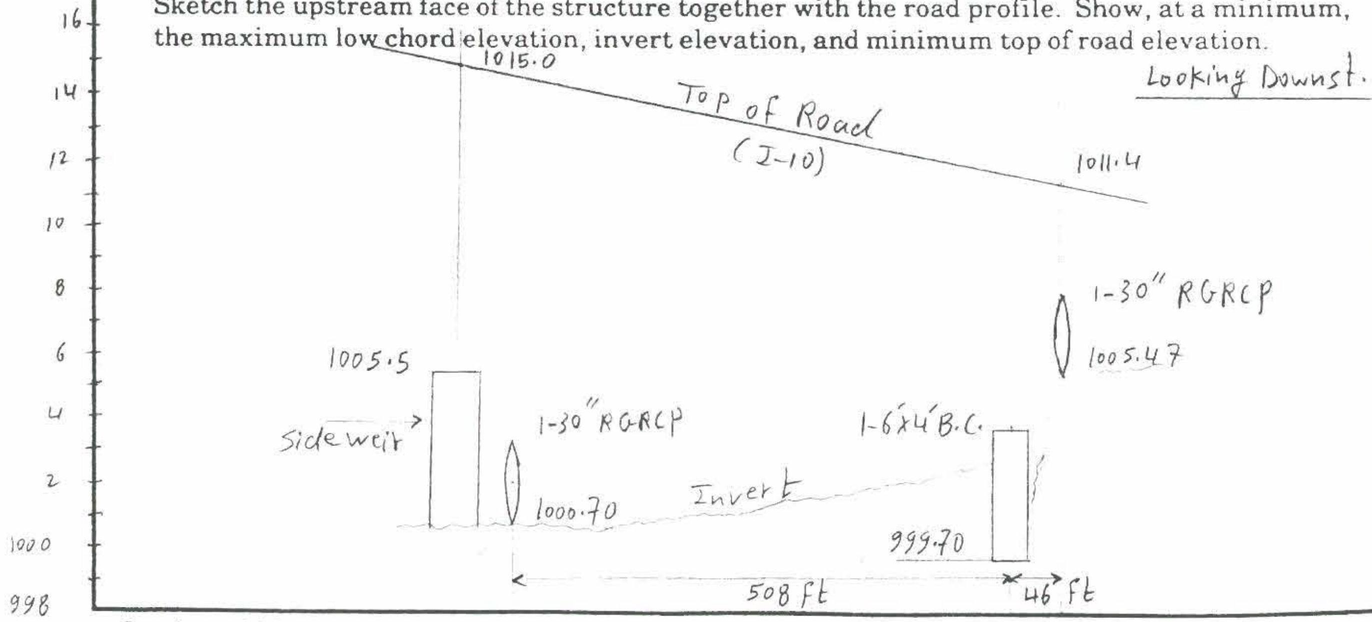
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

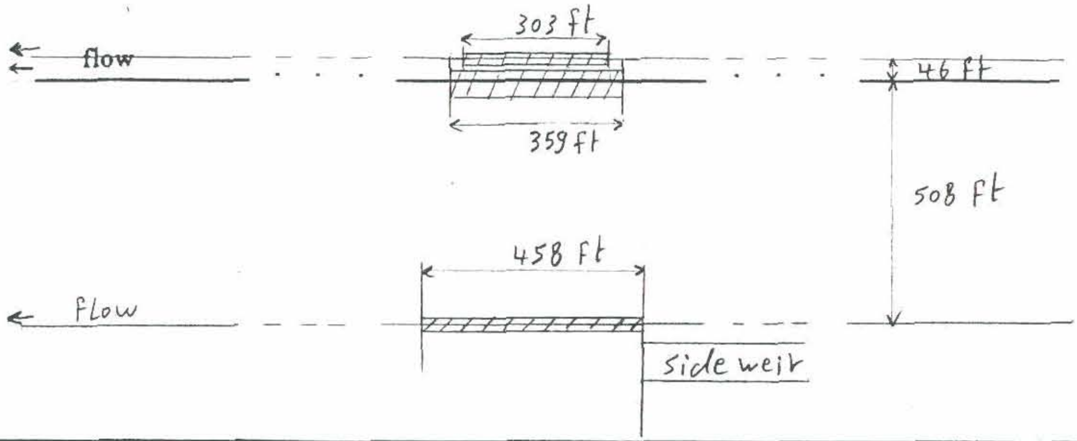


Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	303, 359, 458
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	4.9, 24, 4.9

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Top of weir	Right Overbank
Upstream face		1005.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1006.61	N/A
Downstream face	N/A	N/A

Discharge

	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	246	1012	1258
The maximum depth of flow over the roadway/railroad (ft.)			1.11	
Weir length (ft.)			298	

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Behind Interstate 10 (I-10), Estrella Parkway to Sarival Av.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 285
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6682+82 (Reems Road)
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
95 feet Bottom width and 2:1 side slopes Bridge opening.
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
30°-75° Wingwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Trapezoidal Channel Analysis by Dodson and Associates
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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

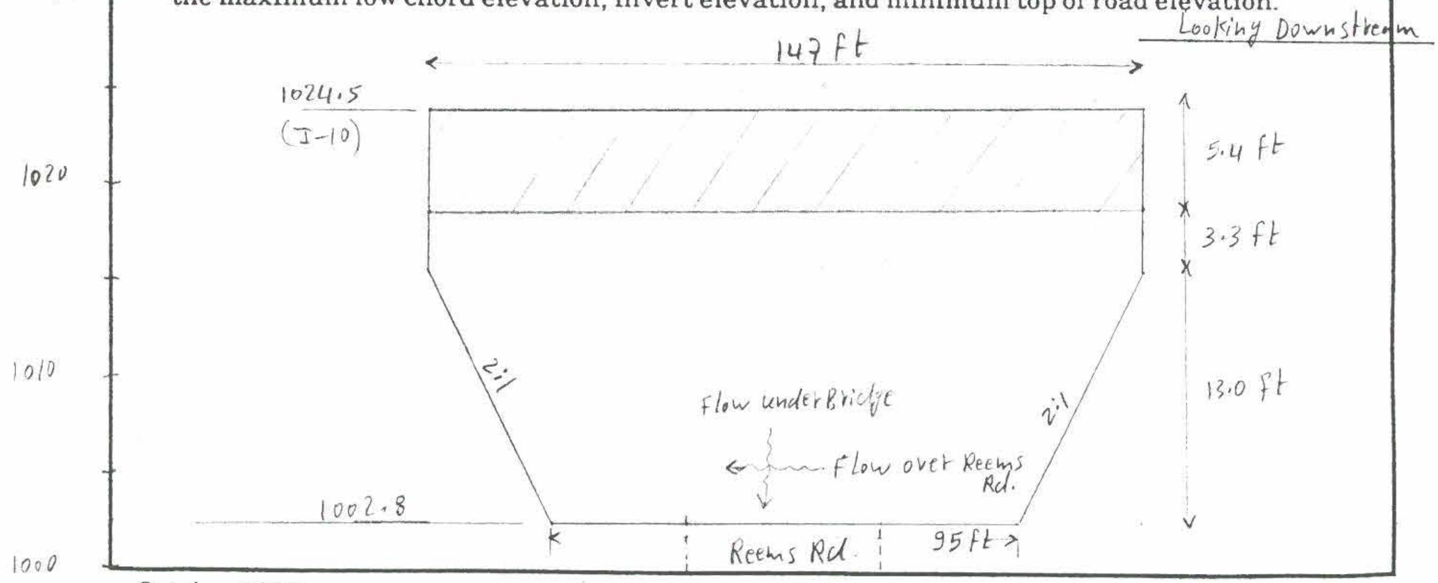
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

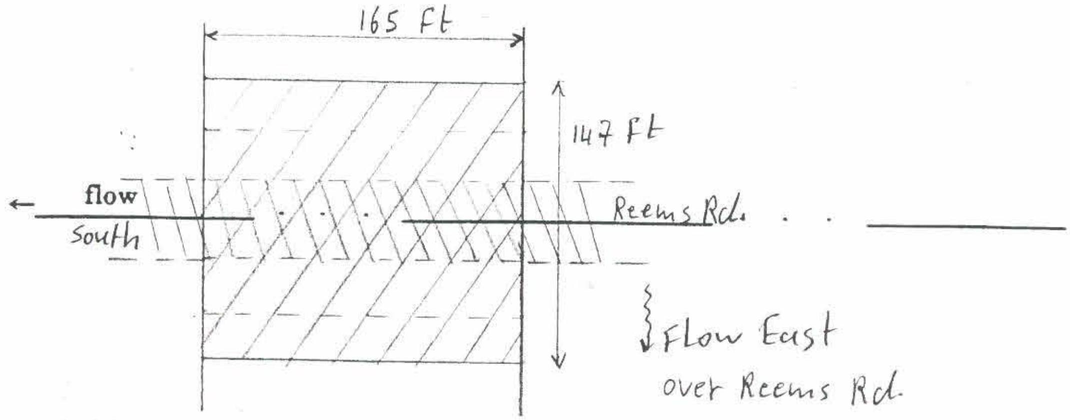
Downstream Invert = 1002.34

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	165
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft²)	N/A

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of Reems Road 1002.80	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	1003.66	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
	under Bridge		Low Flow over Reems Rd.	
Amount of flow through/over the structure(s) (cfs)	274		733	1007

The maximum depth of flow over the roadway/ railroad (ft.) N/A
Weir length (ft.) N/A

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	N/A
Manning's "n" value assigned to the structure(s)	.022 Under Bridge , .05 over Reems Rd.
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	N/A
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

- [ ] Physical change
  - [ ] Existing
  - [ ] Proposed
- [ ] Improved methodology
- [ ] Improved data
- [ ] Floodway revision
- [X] Other New Approximate Study

  Explain ______

2. Flooding Source: Interstate 10, Bullard Wash to Estrella Parkway
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: B

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2060D	04/15/88

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

Types of Flooding

- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [X] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures

- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [X] None
- [ ] Other (describe) ______

Disciplines*

- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___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.)
_X_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 ______________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ ________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Detailed Study

     Explain

2. Flooding Source: Interstate 10, Detention Basin between Dysart Road and Bullard Avenue
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2080F	09/04/91

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

Types of Flooding

- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [X] Other (describe) Flood Control Detention Basin

Structures

- [ ] Channelization
- [ ] Levee/Floodwall
- [X] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [X] Other (describe) Flood Control Detention Basin

Disciplines*

- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).

____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.)

_X_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 ______________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ______________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Dysart Road to Bullard Av.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 287A
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6776+00 to 6777+14 (Between Detention Basins)
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) 1-48" RCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Square Edge Entrance With Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

October 1992

BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

Downstream Invert = 975.61

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.

1002

Looking East

992

Top of Road 988.8

Between Basins

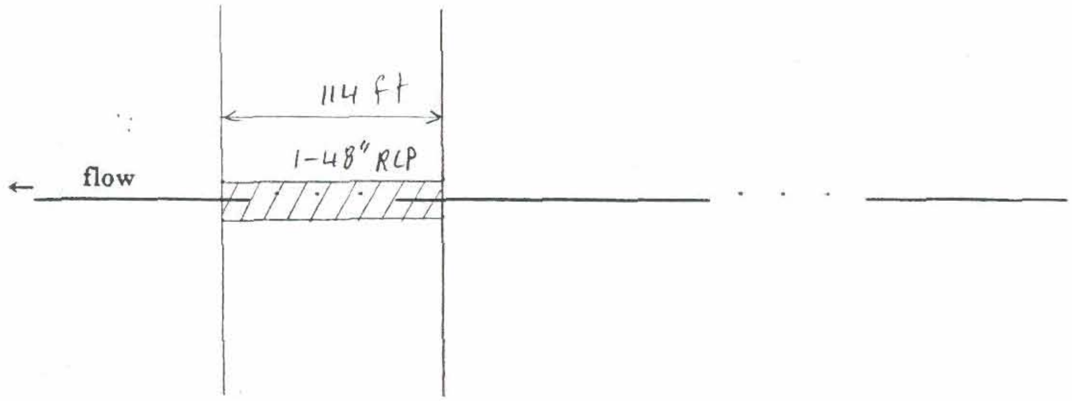
982

Invert 975.71

972

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	114
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	12.6

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank Top of Dike	Right Overbank
Upstream face	988.80	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	980.87	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	55	0	55

The maximum depth of flow over the roadway/railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain Ponding Area	Floodway
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Dysart Road to Bullard Av.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At sub-basin 287B
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6789+18 (Between Detention Basins)
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) 2-77"x121" HERCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Square Edge Entrance With Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

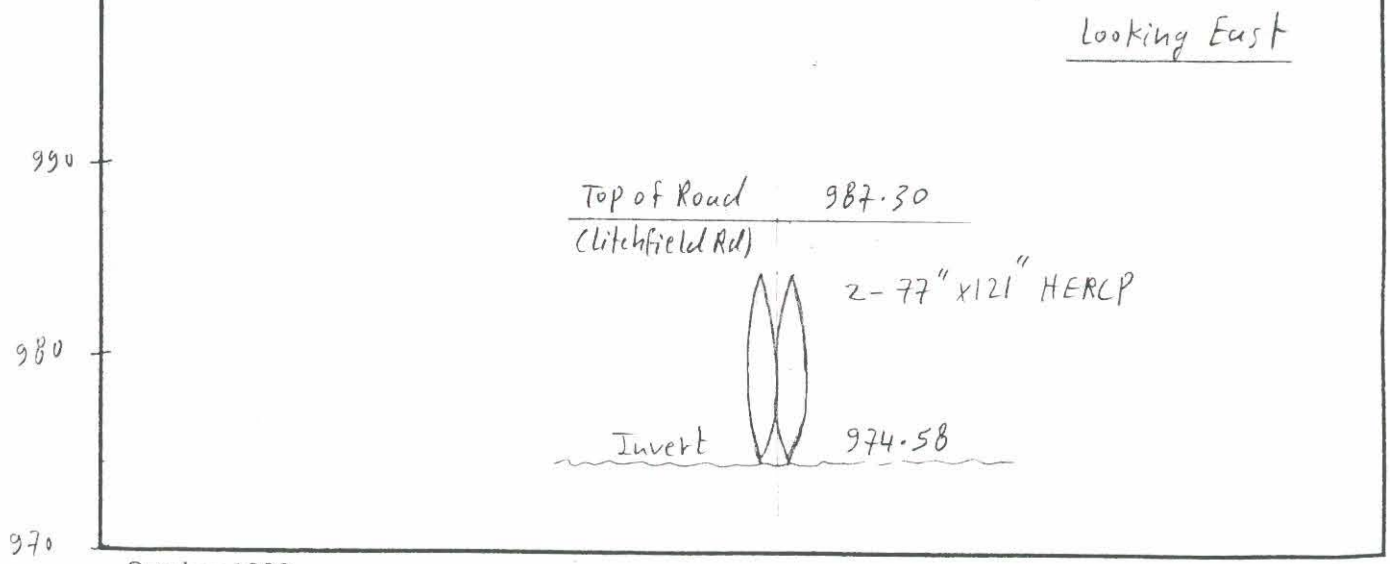
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

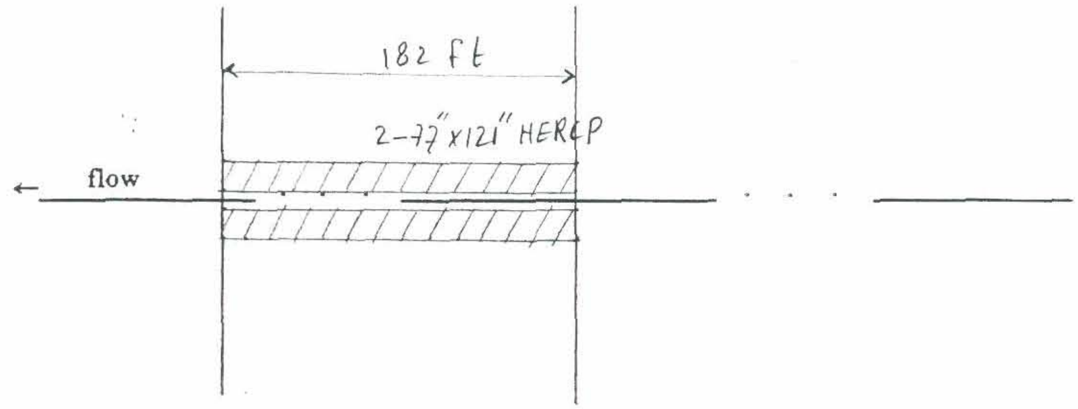
Downstream Invert = 974.52

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	182
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	129.4

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
	Top of Road 987.30	
Upstream face		
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	980.05	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	65	0	65

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Dysart Road to Bullard Av.
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 287C
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): I-10 Station 6815+00
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS see below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   2-84" RCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Square Edge Entrance with Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

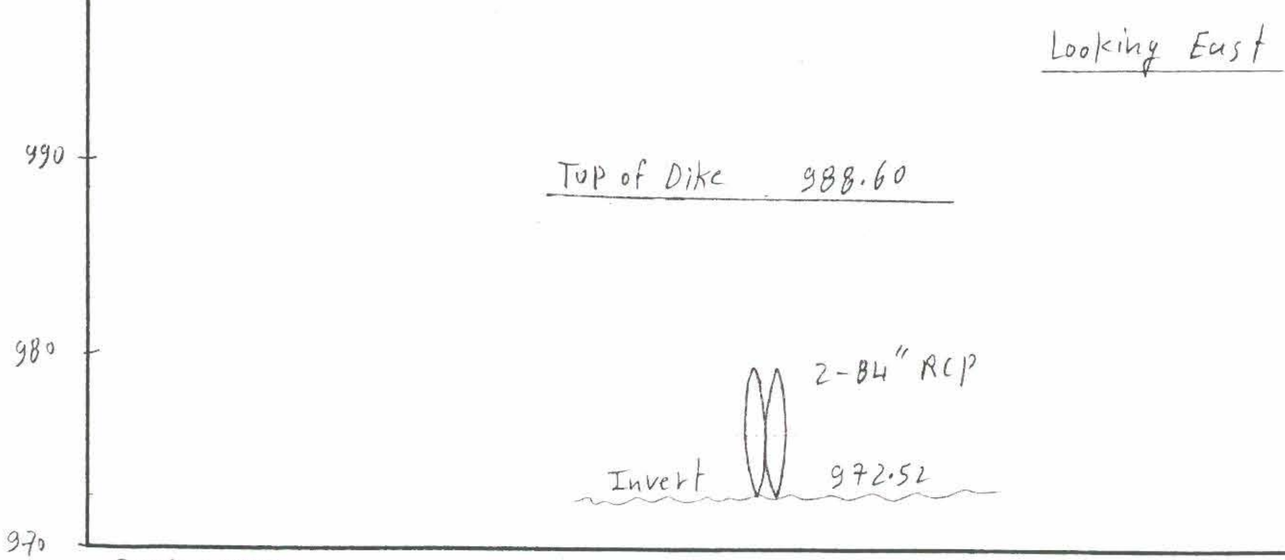
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

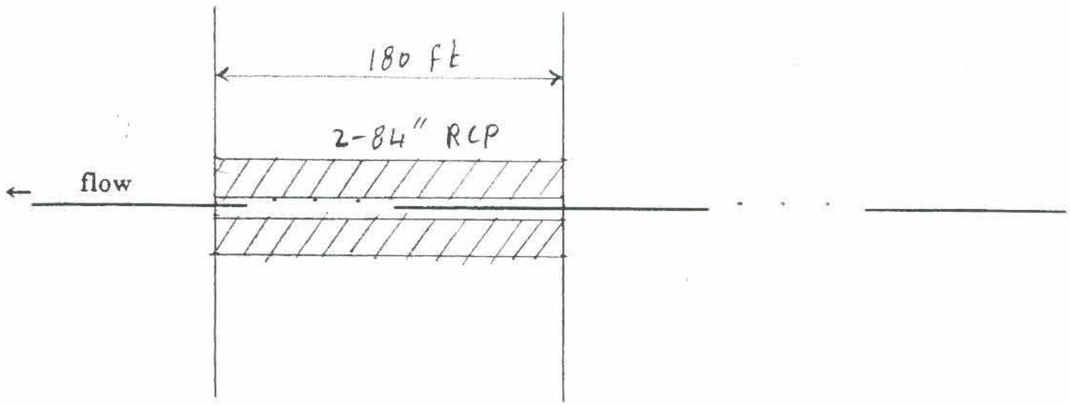
Downstream Invert = 972.37

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	180
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	77

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of Dike 988.60	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	979.26	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	376	0	376

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
Upstream face	N/A Ponding Area	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Areas Behind Interstate 10 (I-10), Dysart Road to Bullard Av.
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10, At Sub-basin 287D
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6836+80
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   1-48" S.D.
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Square Edge Entrance With Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

Downstream Invert = 966.98

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.

995

Top of 990.5 Looking Downstream
Detention Basin
for weir
flow

985

975

1-48" S.D.

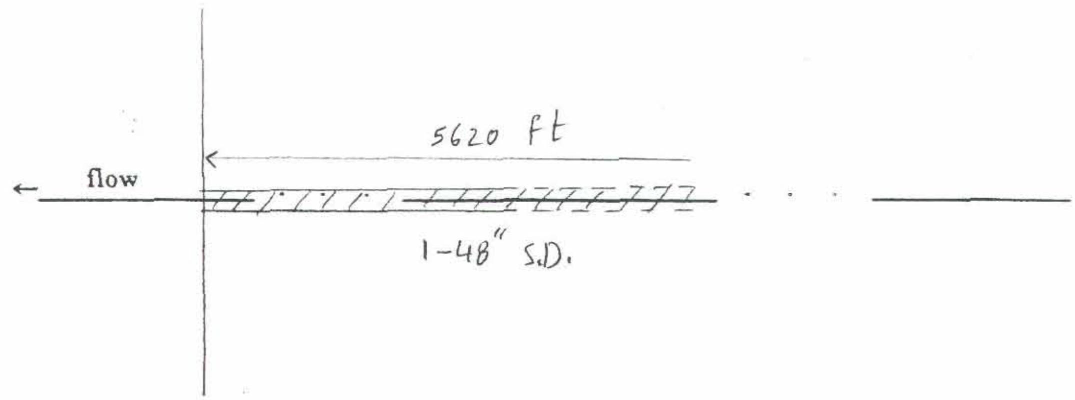
Invert 970.46

965

BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	5620
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	12.6

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of Detention Basin 990.5	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	983.05	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	68	0	68

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.5
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: City of Avondale
Flooding Source: Ponding Areas Behind Interstate 10 (I-10)
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: I-10 at sub-basin 287E
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At I-10 Station 6854+67
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) 1-36" RCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Square Edge Entrance With Headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson & Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

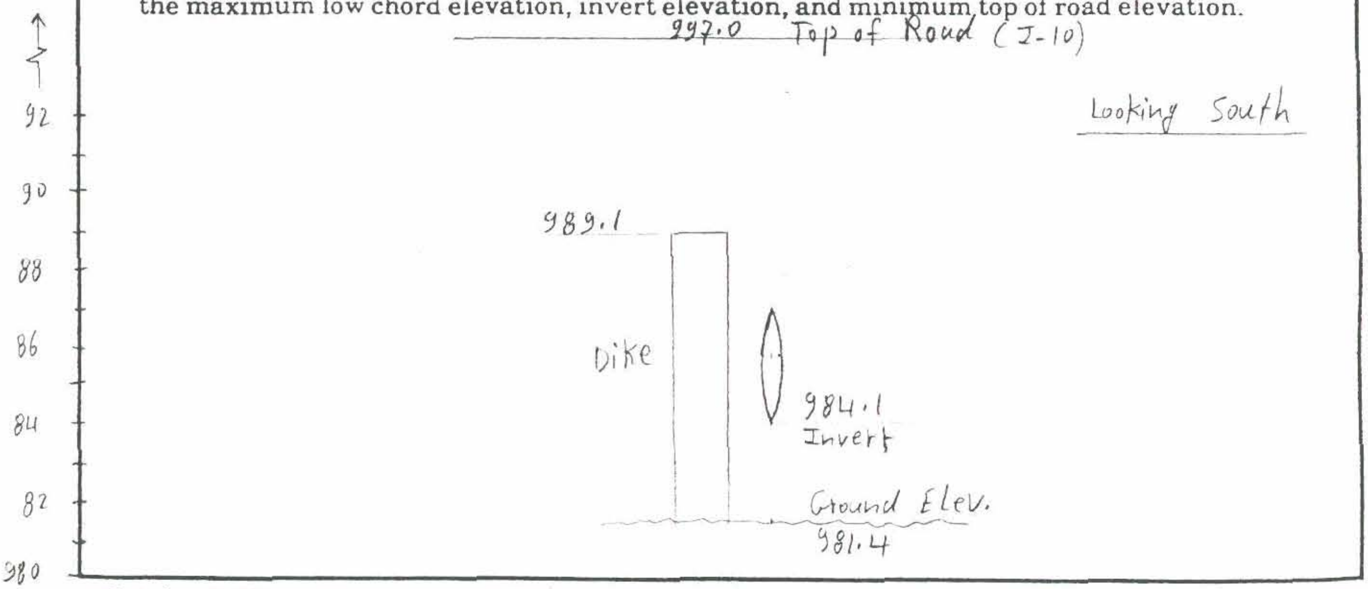
*One form per new/revised bridge/culvert

Analysis

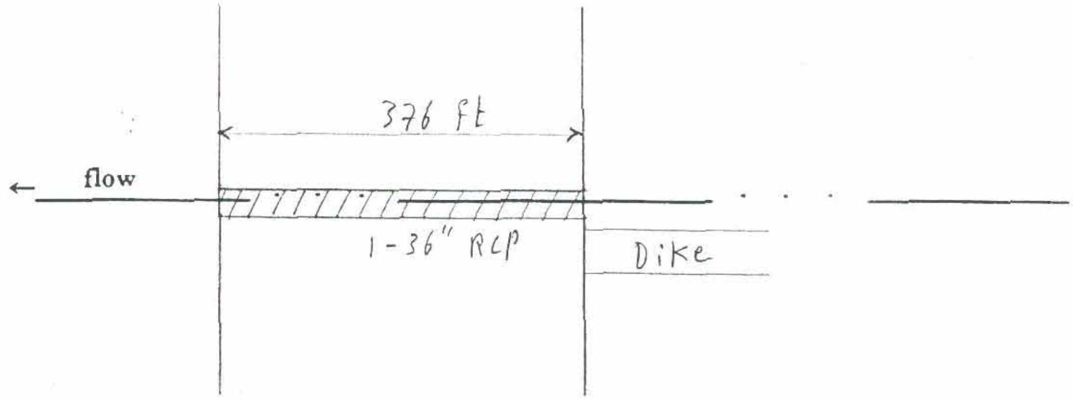
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Invert = 982.10

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. N/A Existing Structur

Culvert length or bridge width (ft.)	376
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of Dike 989.10	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	985.57	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow Culvert Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	14	0	14

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain	Floodway
Upstream face	N/A Ponding Area	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.6
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ____________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate Study
     Explain
2. Flooding Source: Dysart Drain (Wash 17)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1600 F	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615 F	09/04/91

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

Types of Flooding
- [X] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [X] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe)

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___ 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.)
X 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 ______________________

Forms Included

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 riverine flooding 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 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ ____________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

   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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-23-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE No. 23980 JEFFREY S. ERICKSON Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

[X] Approximate study stream (Zone A)

[X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

[X] No existing analysis

[X] Improved data (see data revision on page 3)

[ ] Changed physical conditions of watershed (explain) ______

[ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ______

[ ] 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.

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

Approval of Analysis

[X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________
Maximum peak discharge: ____________ cfs
Second highest peak discharge: ____________ cfs
Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available
Gaging Station: ____________
Drainage area at gage: ____________ mi^2
Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: Maricopa County - Unincorporated Areas

Flooding Source: Dysart Drain Wash

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Reach to be Revised

Downstream limit 0.000 mile

Upstream limit 4.482 mile

Effective FIS

[X] Not studied

[ ] Studied by approximate methods

Downstream limit of study _____

Upstream limit of study _____

[ ] Studied by detailed methods

Downstream limit of study _____

Upstream limit of study _____

[ ] Floodway delineated

Downstream limit of floodway _____

Upstream limit of floodway _____

Hydraulic Analysis

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

[ ] Not studied in FIS

[ ] Improved hydrologic data/analysis. Explain: _____

[ ] Improved hydraulic analysis. Explain: _____

[ ] Flood control structure. Explain: _____

[X] Other. Explain: New Study

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ Duplicate Effective Model — Natural ☐ Floodway ☐

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.

☐ Corrected Effective Model — Natural ☐ Floodway ☐

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.

☐ Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected effective 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.

☐ Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

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.

☒ Other: Please attach a sheet describing all other models submitted. New Study — Natural ☒ Floodway ☒

Model Parameters
(from model used to revise 100-year water surface elevations)

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	4.482 mile	0.000 mile
500-year		

Attach diagram showing changes in 100-year discharge N/A

2. Explain how the starting water surface elevations were determined

Critical Depth

	Starting Water Surface Elevation
10-year	
50-year	
100-year	1054.94
Floodway	N/A
500-year	

3. Give range of friction loss coefficients 0.016 - 0.050

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
N/A		

Explain: New Study

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.

Taken from new topographic mapping, 1" = 400', 2 foot contour intervals. New Study

Model Parameters (Cont'd)

5. Explain how reach lengths for channel and overbanks were determined:
Along channel centerline and straight line between cross-sections in estimated overbank reaches.

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? ☐ Yes ☒ No

   b. Supercritical depth? ☐ Yes ☒ No

   c. Critical depth? ☒ Yes ☐ No

   d. Other unique situations? ☐ 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.

2. What is the maximum head loss between cross-sections? N/A At Downstream End Control structure 10.76 Ft

3. What is the distance between the cross-sections in 2 above? 101 Ft

4. What is the maximum distance between cross-sections? 638 Ft

5. Floodway determination

   a. What is the maximum surcharge allowed by the community or State? 1 foot

   b. What is the maximum surcharge for the revised conditions? N/A foot

   c. What is the maximum velocity? 11.6 fps

   d. What type of erosion protection is provided? N/A

   Explain:

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? ☐ Yes ☒ No

If yes, explain:

Attach a Floodway Data Table showing data for each cross section listed in the published floodway data table in the FIS report. N/A

7. Do 100-year water surface elevations increase at any location? ☐ Yes ☒ No
N/A

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.

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

Not Applicable

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 ______ within ______ feet and upstream of the project at cross section ______ within ______ feet.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section ______ within ______ feet and upstream of the project at cross section ______ within ______ feet.

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 studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits.

Proceed to Riverine/Coastal Mapping Form.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ______ scale ______ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval

New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

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FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: EL Mirage Road
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 0.187
3. This revision reflects (check one of the following):

- ☒ New bridge/culvert not modeled in the FIS See below
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
44 ft x 84 ft Bridge, No piers
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

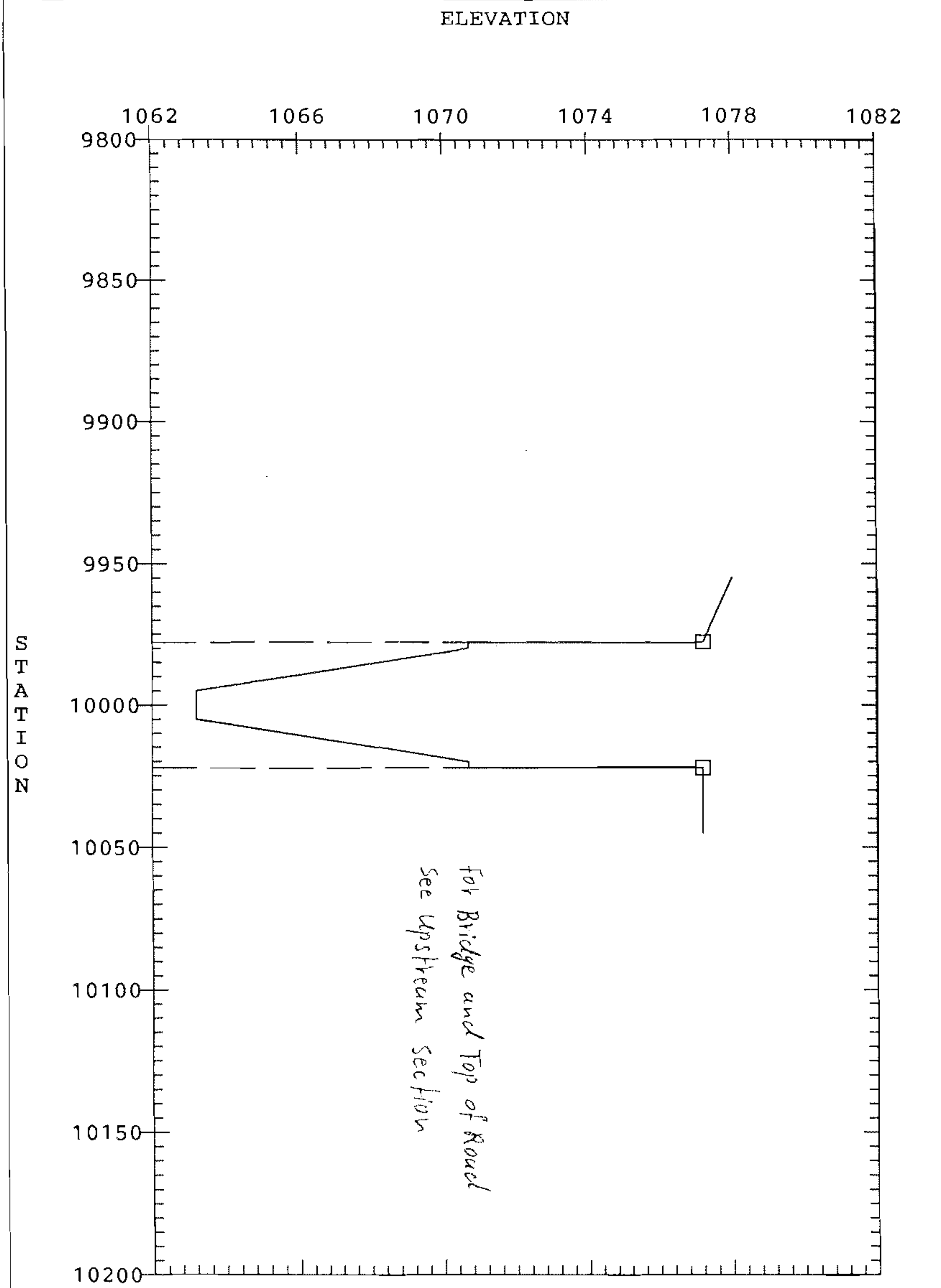
Analysis

Sketch the downstream 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.

See Attached Sheet

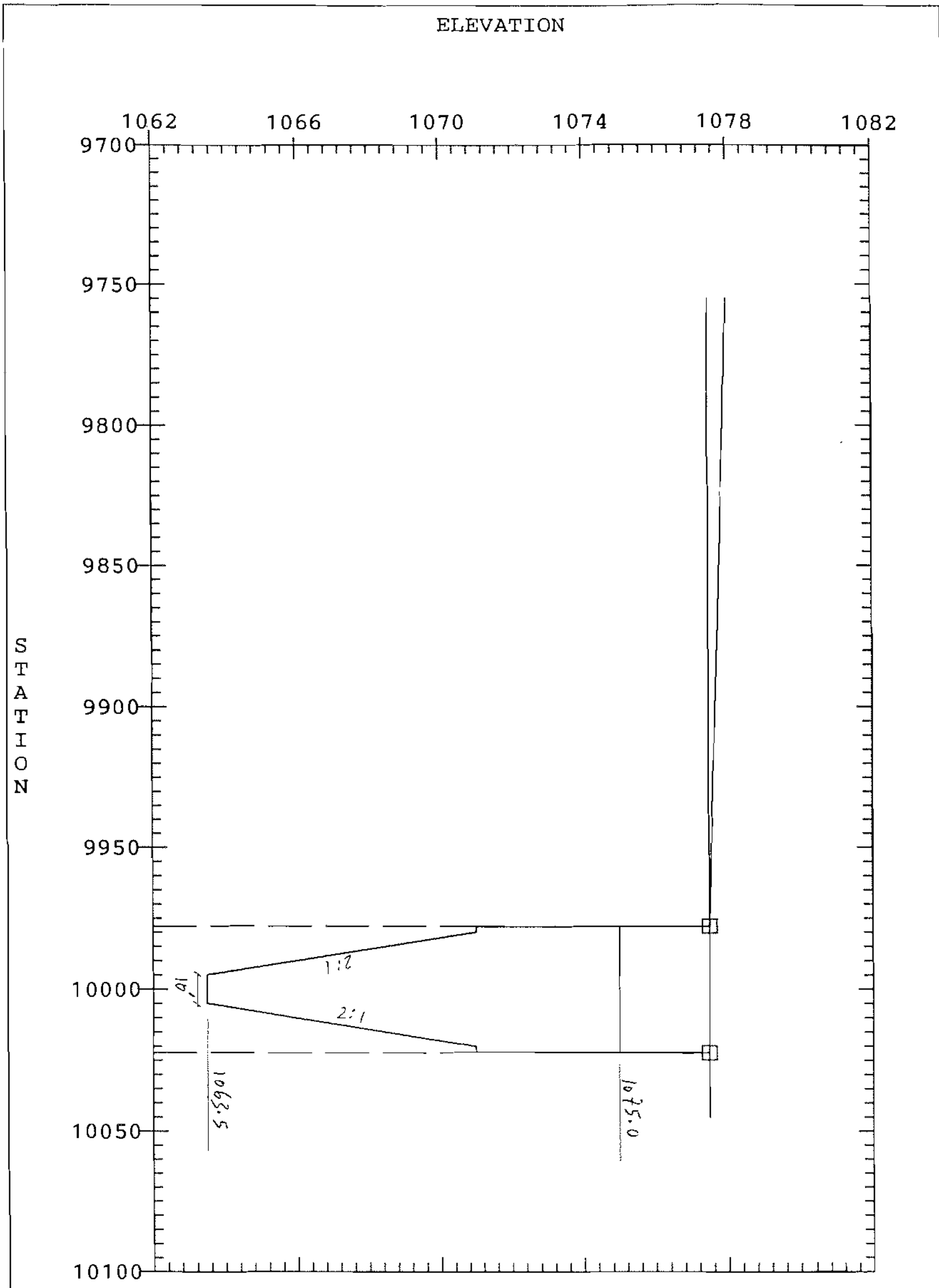
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : .187

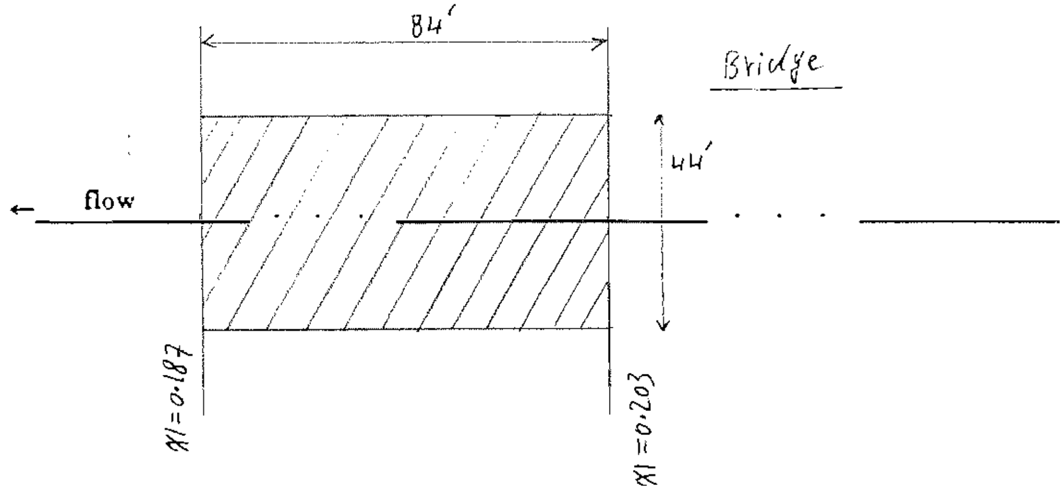
WASH "17" - DYSART DRAIN - WHITE TANKS



SECTION : .203

WASH "17" - DYSART DRAIN - WHITE TANKS

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. N/A Existing Structur

Culvert length or bridge width (ft.)	84 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	363.5 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1077.5	1077.5
Downstream face	1076.0	1076.0

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1077.5	1077.5
Downstream face	1077.5	1077.5

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1069.96	1072.06
Downstream face	1069.67	1071.76

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	1722	0	0	1722

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain	Floodway
Upstream face	36	N/A
Downstream face	36	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	36	36
Downstream face	36	36

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.016
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	0.10
Expansion loss coefficient	0.30

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

Comments (explain any unusual situations):

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Farm Bridge
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 0.938
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   46 ft x 25 ft Bridge, No piers
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

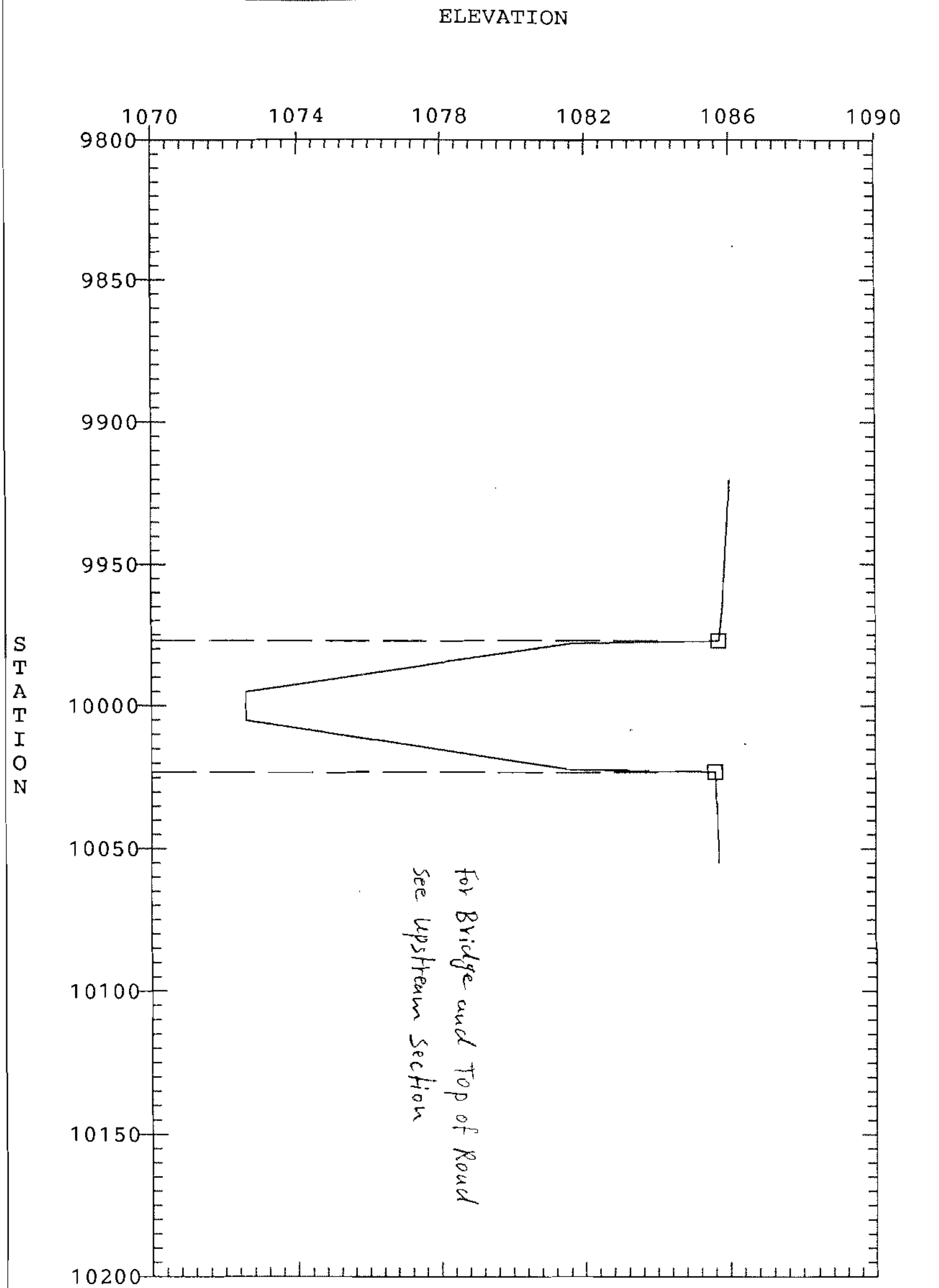
Analysis

Sketch the downstream 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.

See Attached Sheet

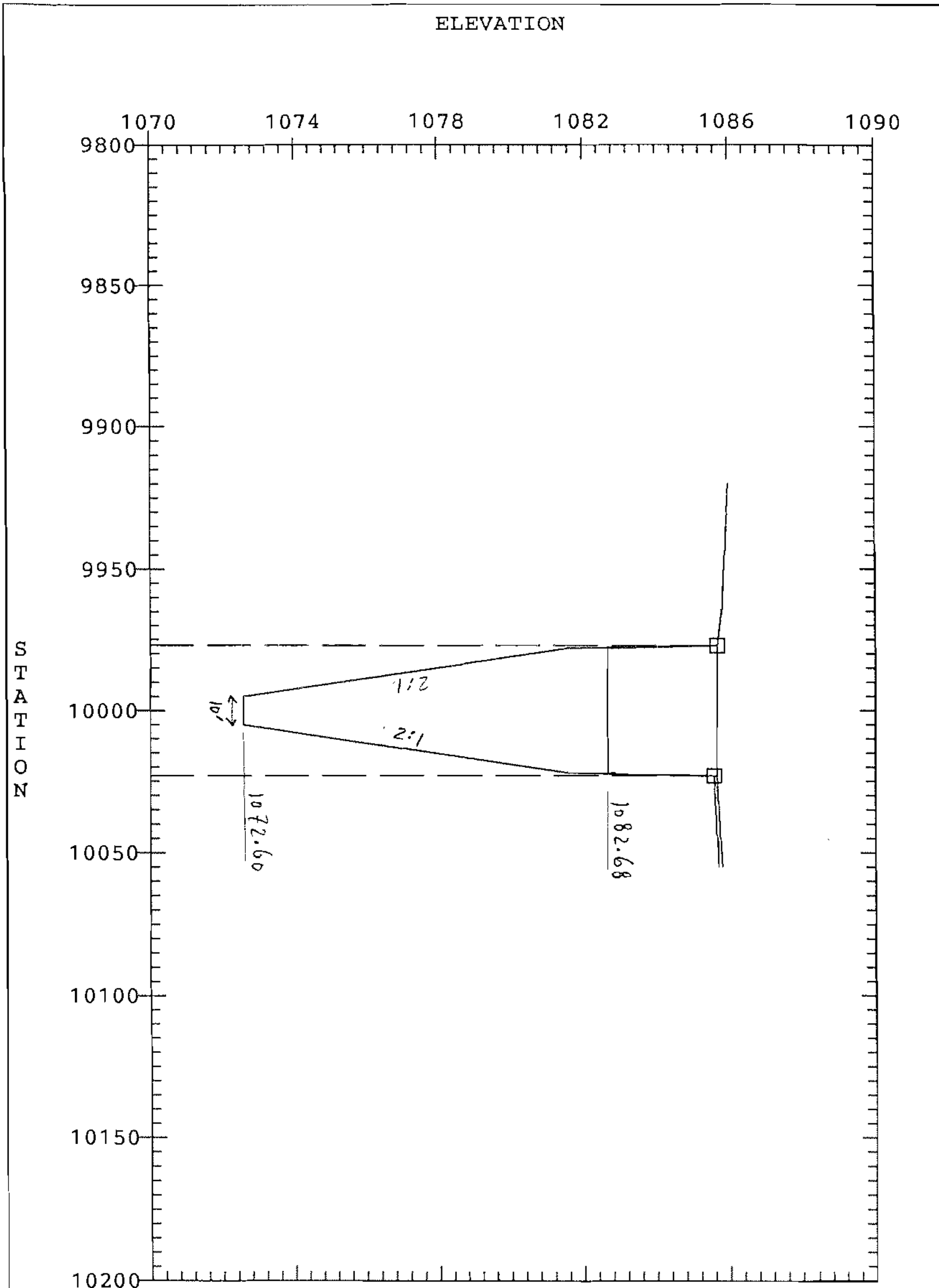
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : .938

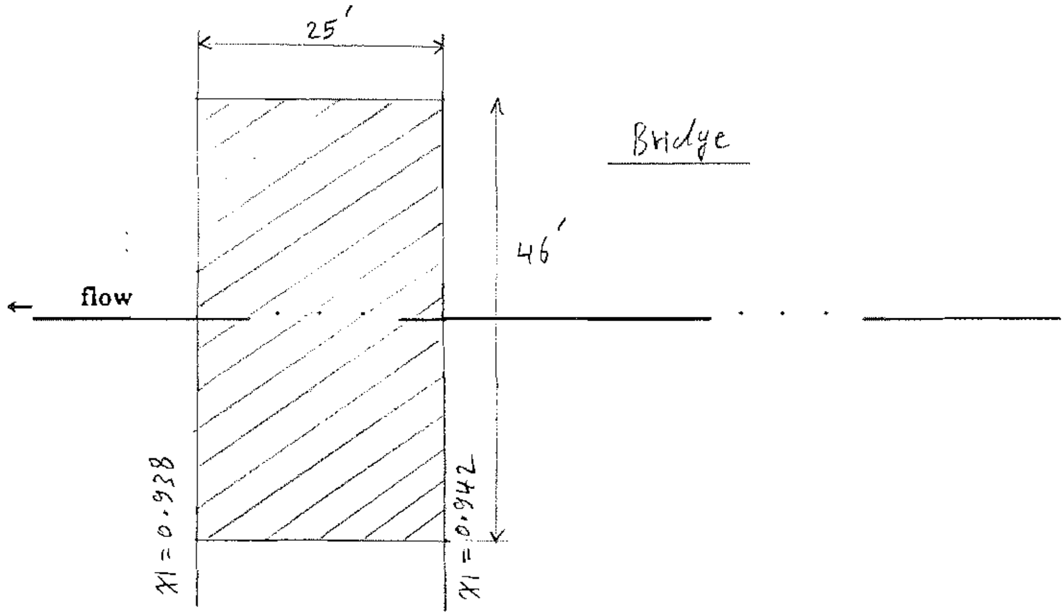
WASH "17" - DYSART DRAIN - WHITE TANKS



SECTION : .942

WASH "17" - DYSART DRAIN - WHITE TANKS

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. N/A Existing Structur

Culvert length or bridge width (ft.)	25 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	301.7 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1085.68	1085.68
Downstream face	1084.18	1084.18

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1085.68	1085.70
Downstream face	1085.68	1085.70

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1078.75	1079.03
Downstream face	1078.74	1079.03

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	565	0	0	565

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain	Floodway
Upstream face	33.2	N/A
Downstream face	33.2	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	33.2	33.2
Downstream face	33.2	33.2

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.016
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	0.10
Expansion loss coefficient	0.30

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Dysart Road
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 1.184
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
46 Ft x 43 Ft Bridge, No piers
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

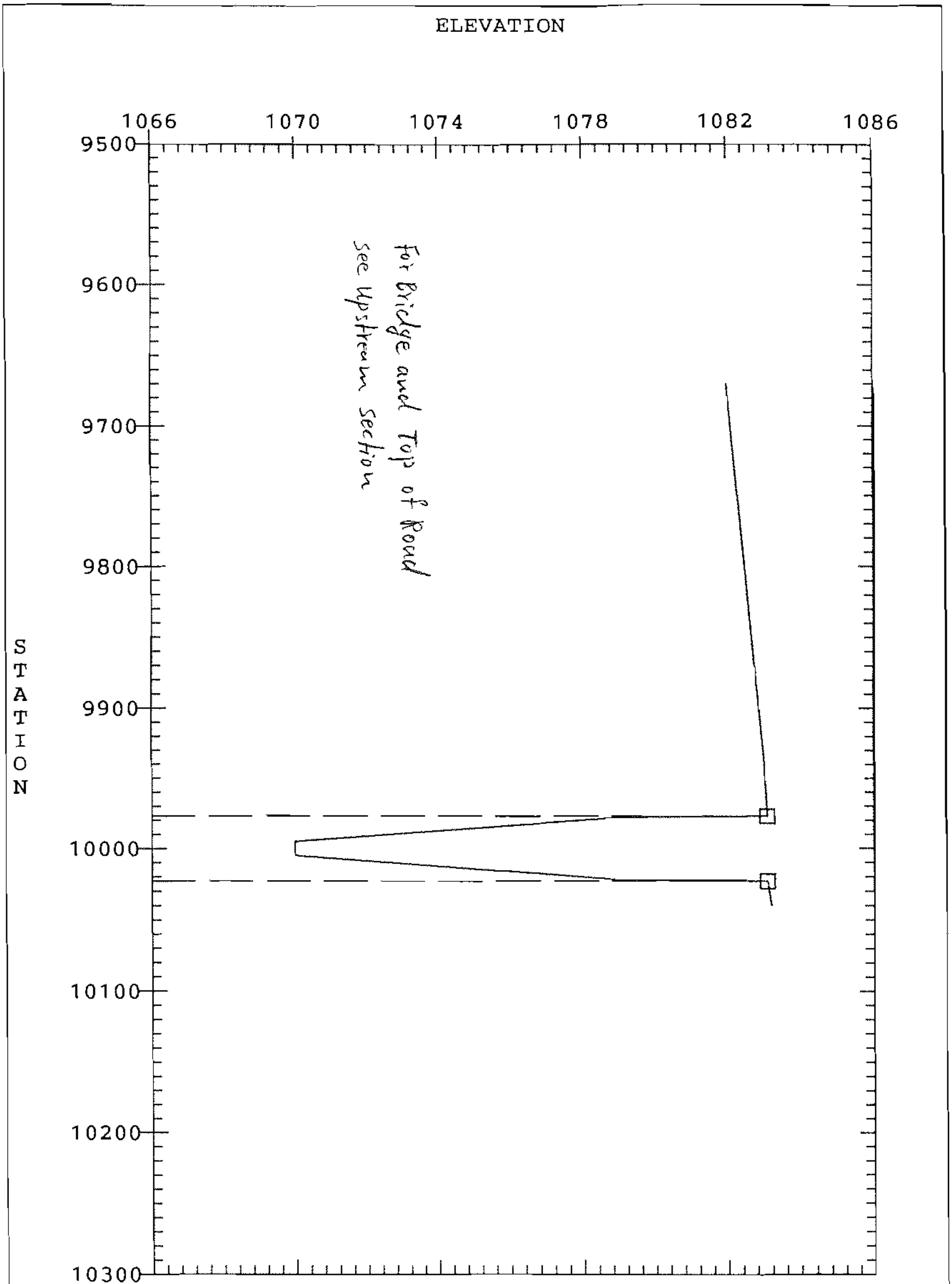
Analysis

Sketch the downstream 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.

See Attached Sheet

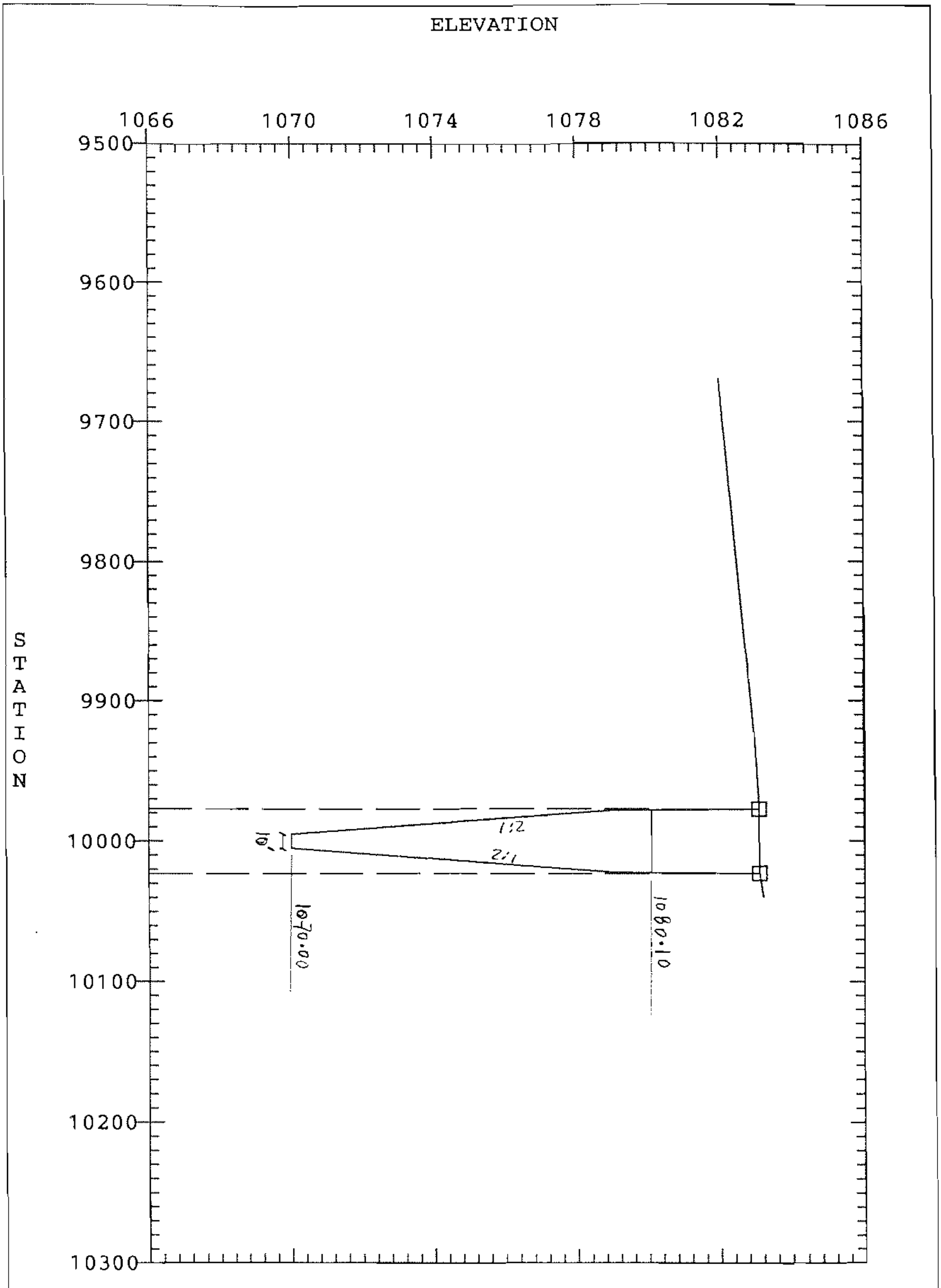
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 1.184

WASH "17" - DYSART DRAIN - WHITE TANKS

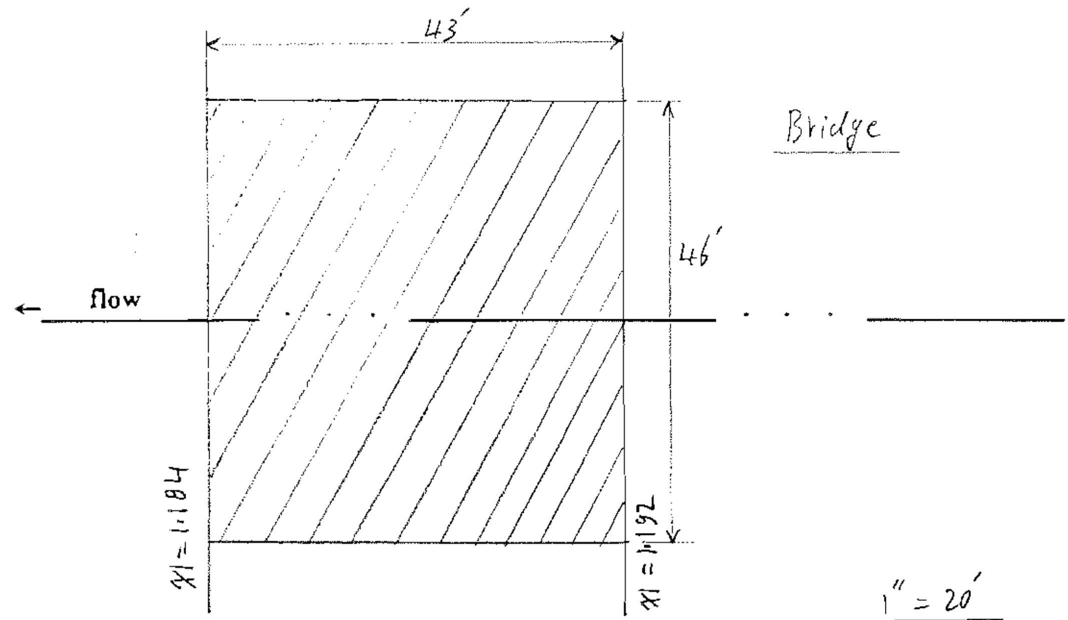


SECTION : 1.192

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	43 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	301.7 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1083.1	1083.1
Downstream face	1081.6	1081.6

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1083.0	1083.1
Downstream face	1083.0	1083.1

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1079.2	1079.3
Downstream face	1079.2	1079.3

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	565	0	0	565

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
Upstream face	44	N/A
Downstream face	44	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	44	44
Downstream face	44	44

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.016
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	0.10
Expansion loss coefficient	0.30

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Litchfield Road
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 2.203
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
42 ft x 130 ft Bridge with a 1.5 ft diameter circular pier
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

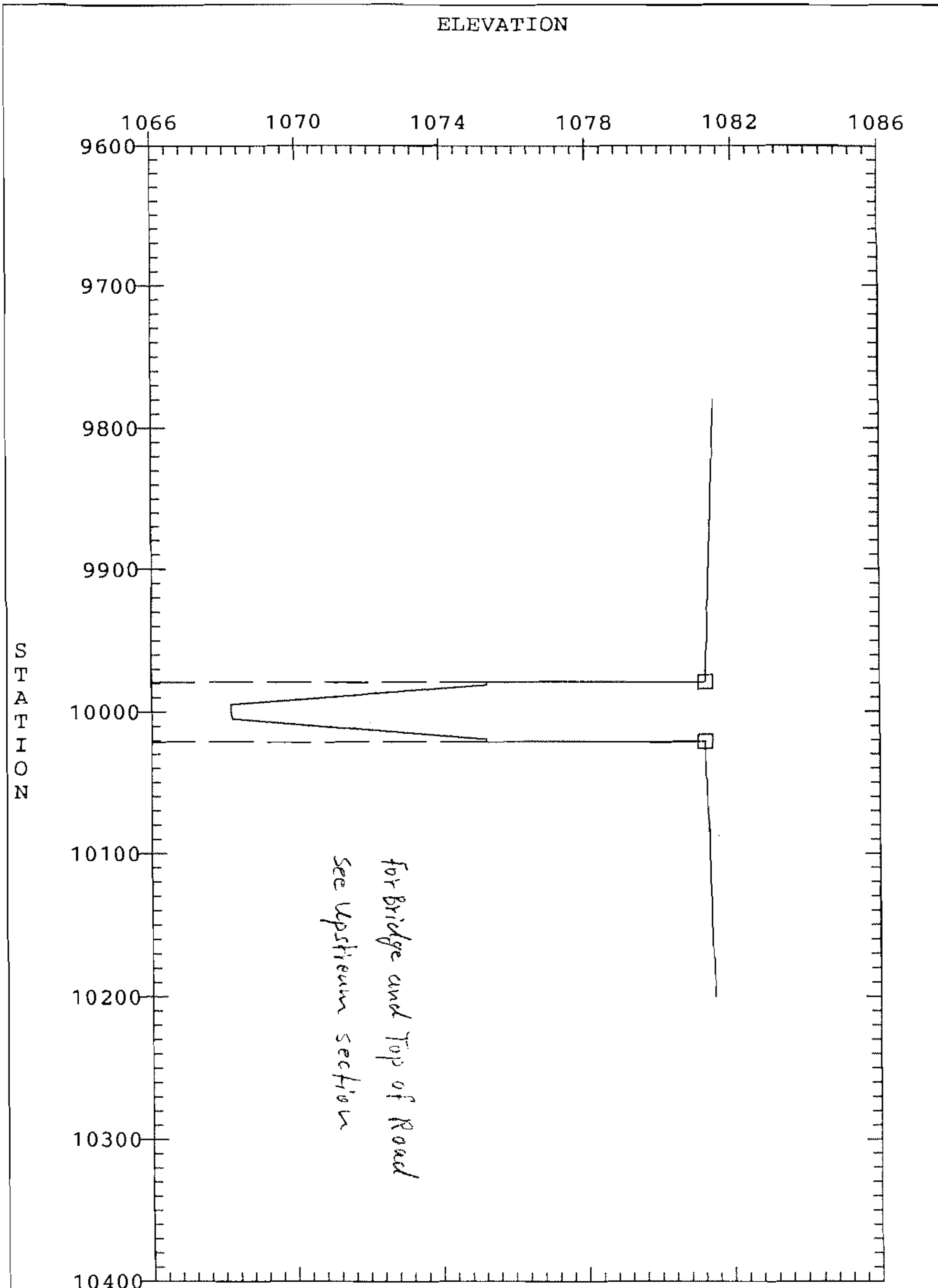
Analysis

Sketch the downstream 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.

See Attached Sheet

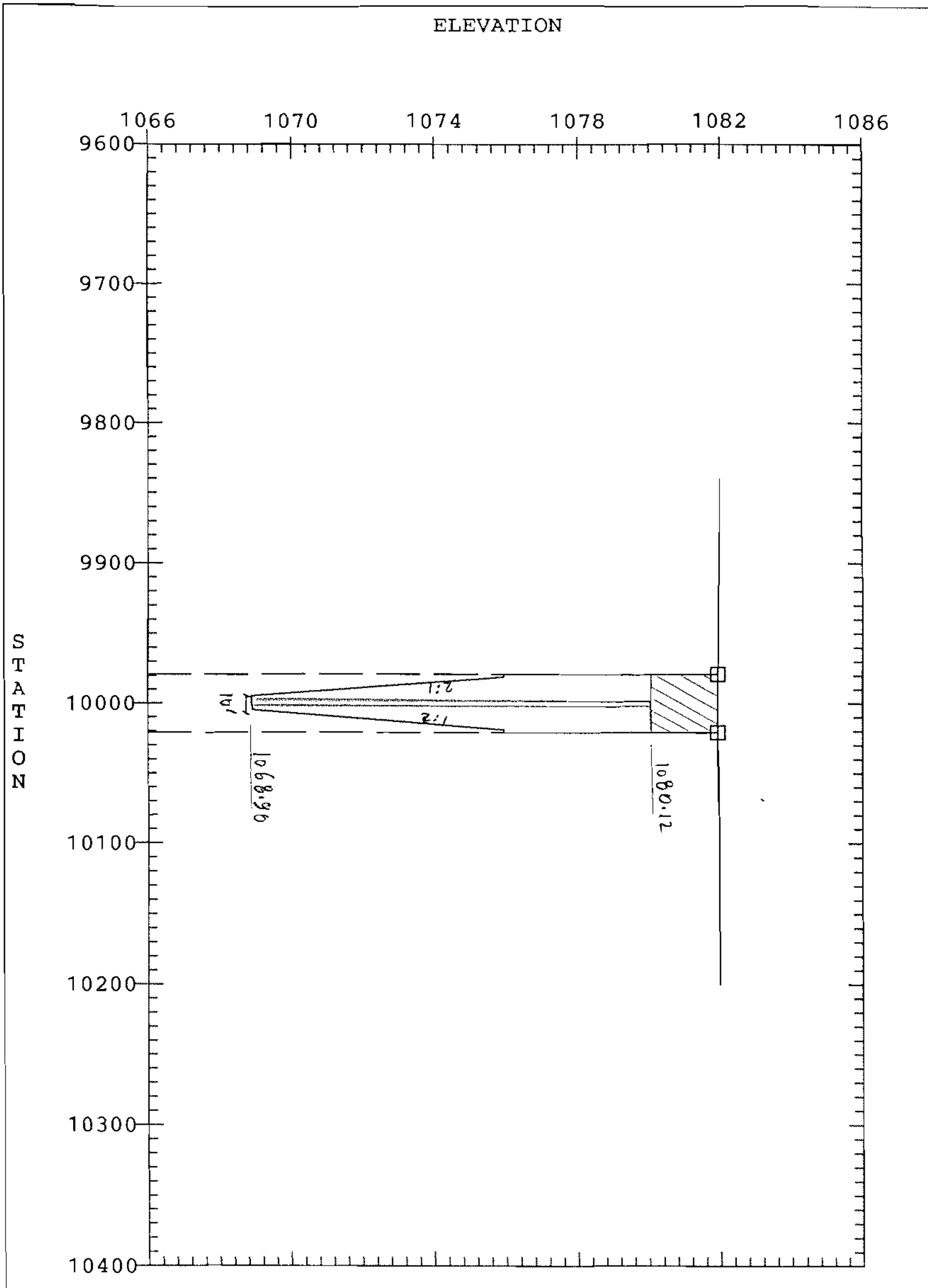
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 2.203

WASH "17" - DYSART DRAIN - WHITE TANKS

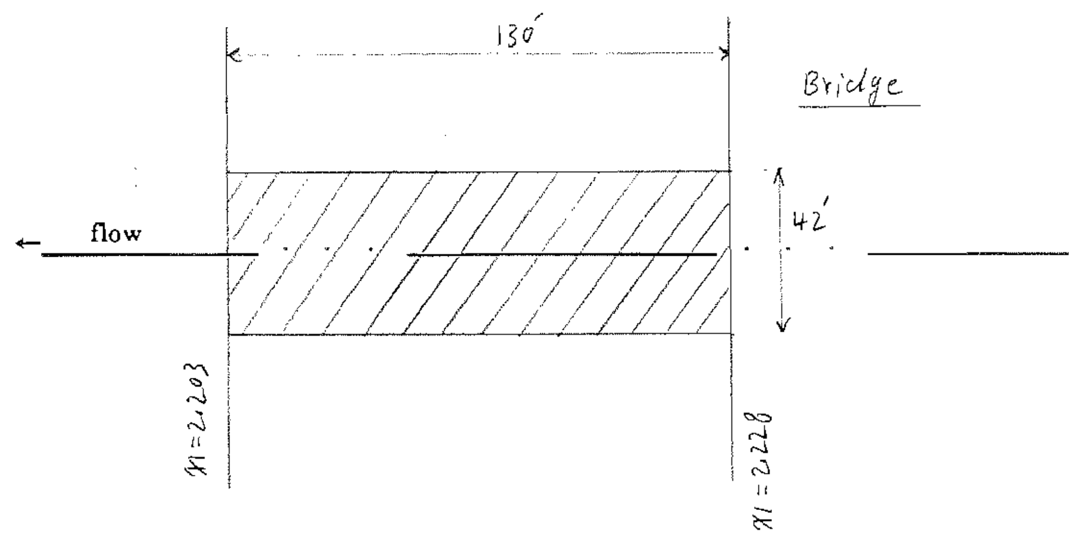


SECTION : 2.228

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	130 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	295 Ft^2
Total culvert/bridge area (ft^2)	326.8 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1081.95	1081.95
Downstream face	1081.25	1081.25

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1081.95	1081.95
Downstream face	1081.95	1081.95

100-Year Elevations	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1079.24	1079.39
Downstream face	1079.23	1079.36

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	945	0	0	945

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths	Floodplain	Floodway
Upstream face	41.9	N/A
Downstream face	41.9	N/A

Top Widths	Effective Flow	Effective and Ineffective Flow
Upstream face	41.9	41.9
Downstream face	41.9	41.9

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.016
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	1.05
Contraction loss coefficient	0.10
Expansion loss coefficient	0.30

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

____

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____

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Luke Air Force Base Bridge
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 2.454
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
34 Ft x 26 Ft Bridge, No piers
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

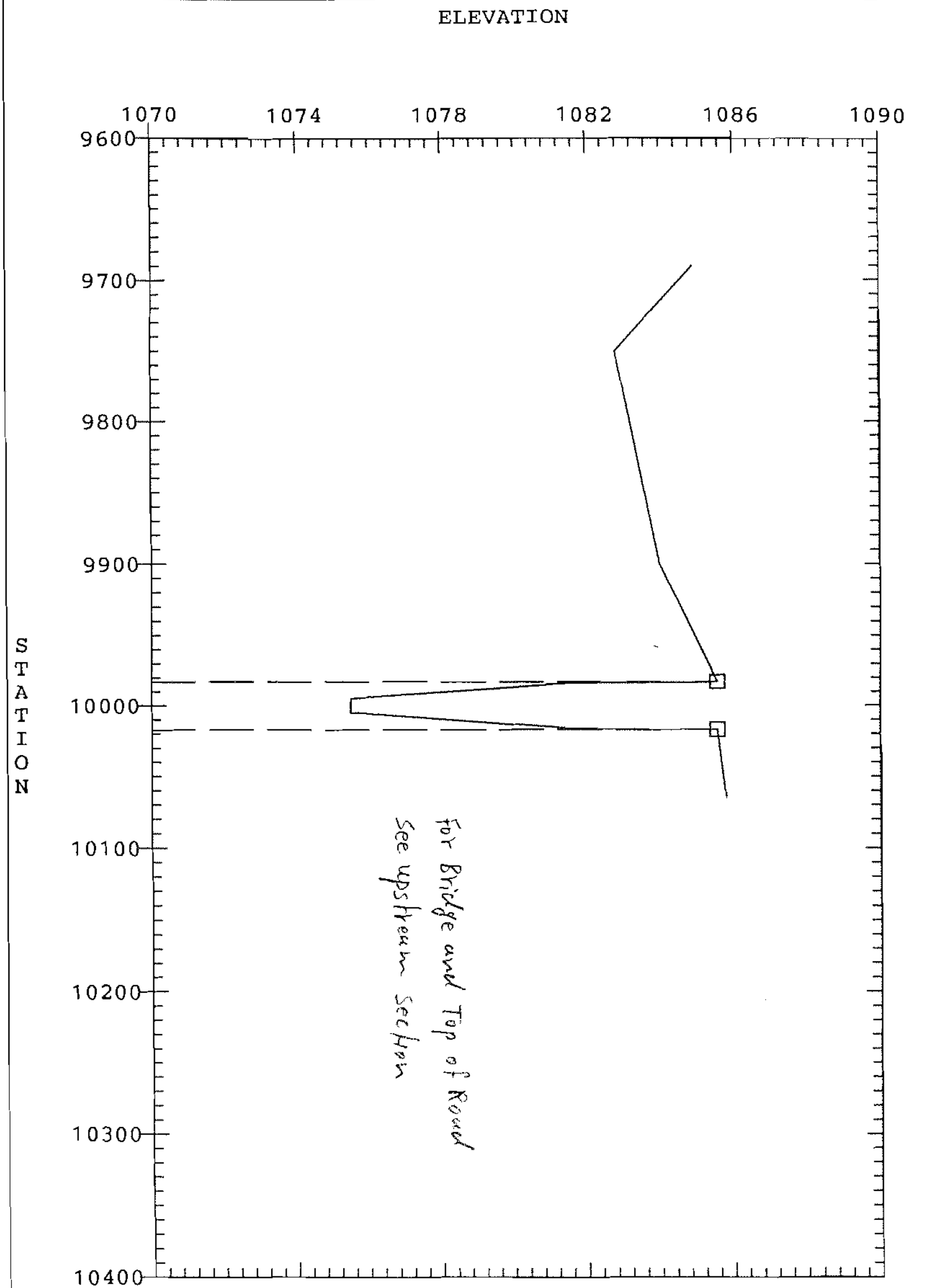
Analysis

Sketch the downstream 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.

See Attached Sheet

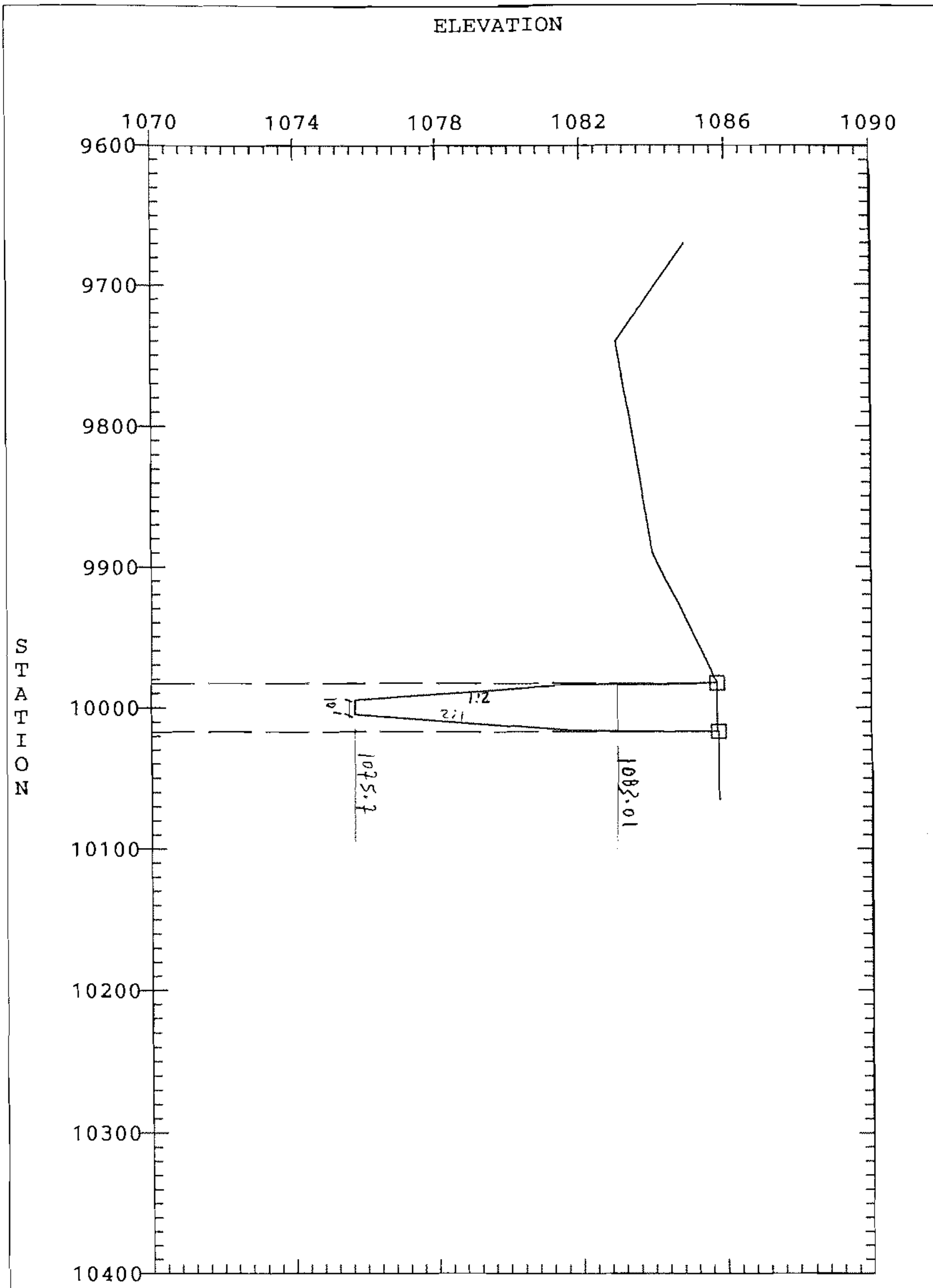
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 2.454

WASH "17" - DYSART DRAIN - WHITE TANKS

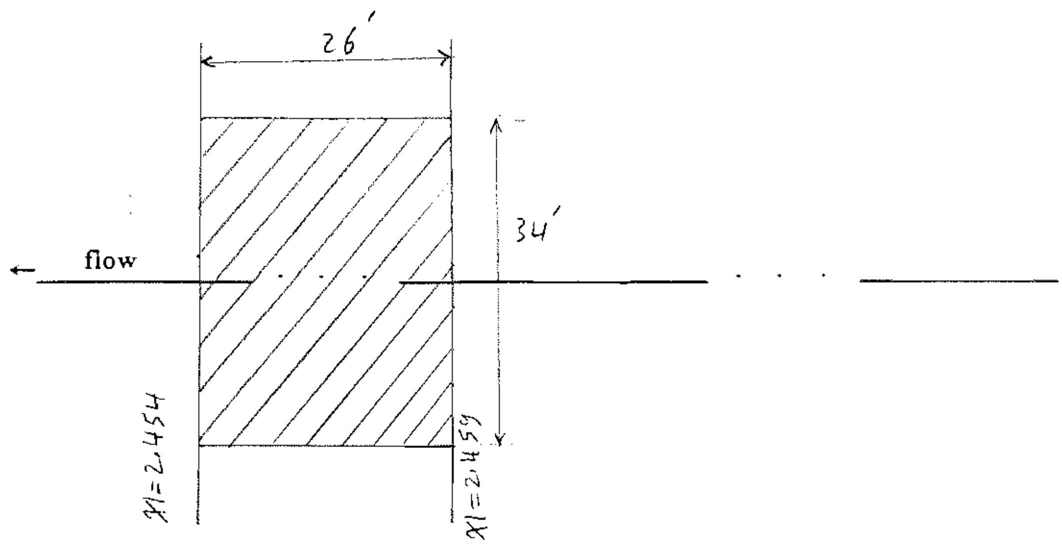


SECTION : 2.459

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	26 Ft
Calculated culvert/bridge area (ft²) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft²)	176.5 Ft²

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1085.76	1085.76
Downstream face	1084.20	1084.20

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1085.76	1085.80
Downstream face	1085.76	1085.80

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1080.54	1082.20
Downstream face	1080.34	1082.00

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	945	0	0	945

The maximum depth of flow over the roadway/railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain	Floodway
Upstream face	27.7	N/A
Downstream face	27.7	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	27.7	27.7
Downstream face	27.7	27.7

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.016
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	0.10
Expansion loss coefficient	0.30

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

____

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____

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Luke Air Force Base
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 2.672
3. This revision reflects (check one of the following): See below

- [X] New bridge/culvert not modeled in the FIS
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
2-10 ft x 5 ft x 638 ft Box Culverts
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-2 With Special Culvert 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

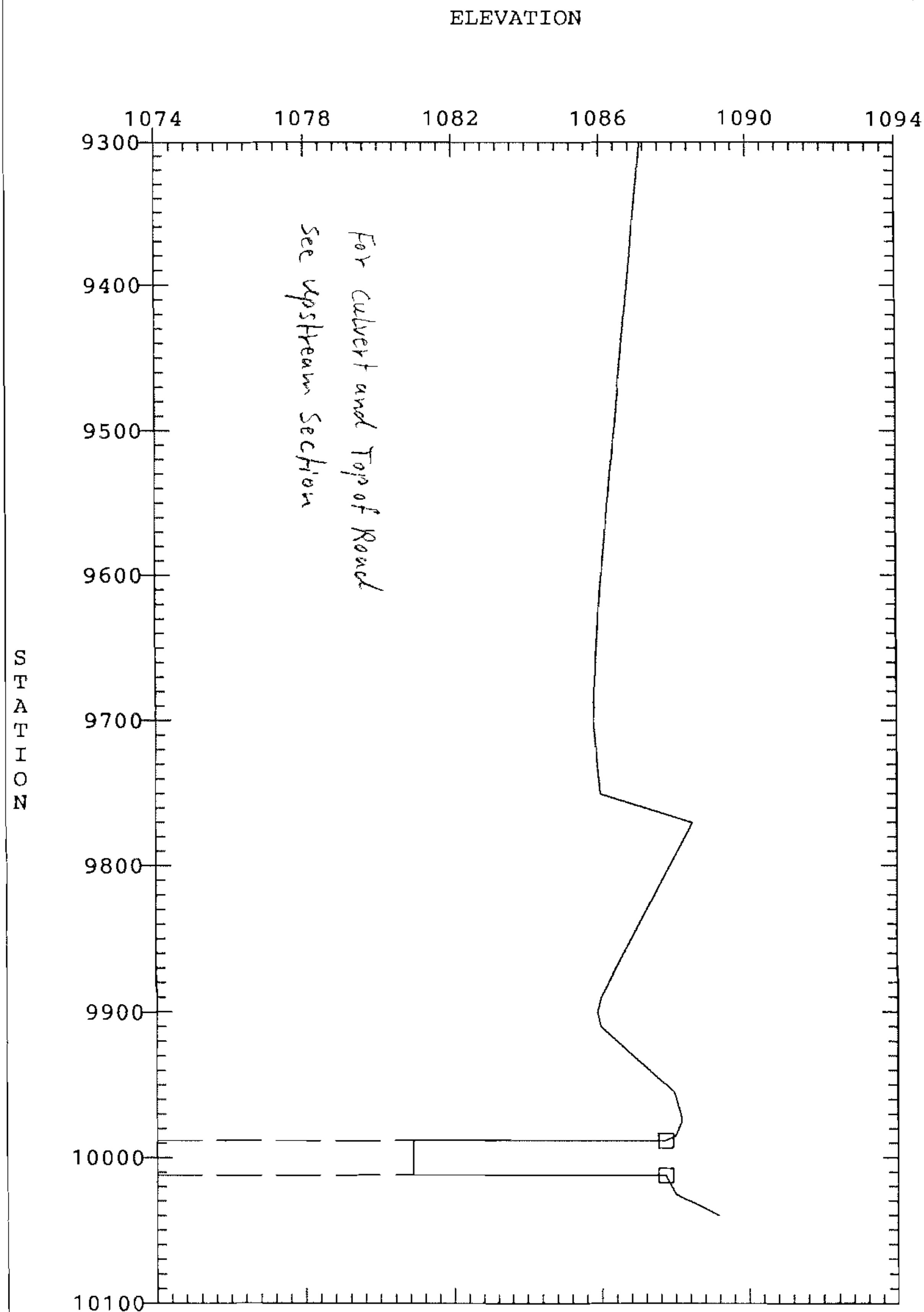
Analysis

Sketch the downstream 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.

See Attached Sheet

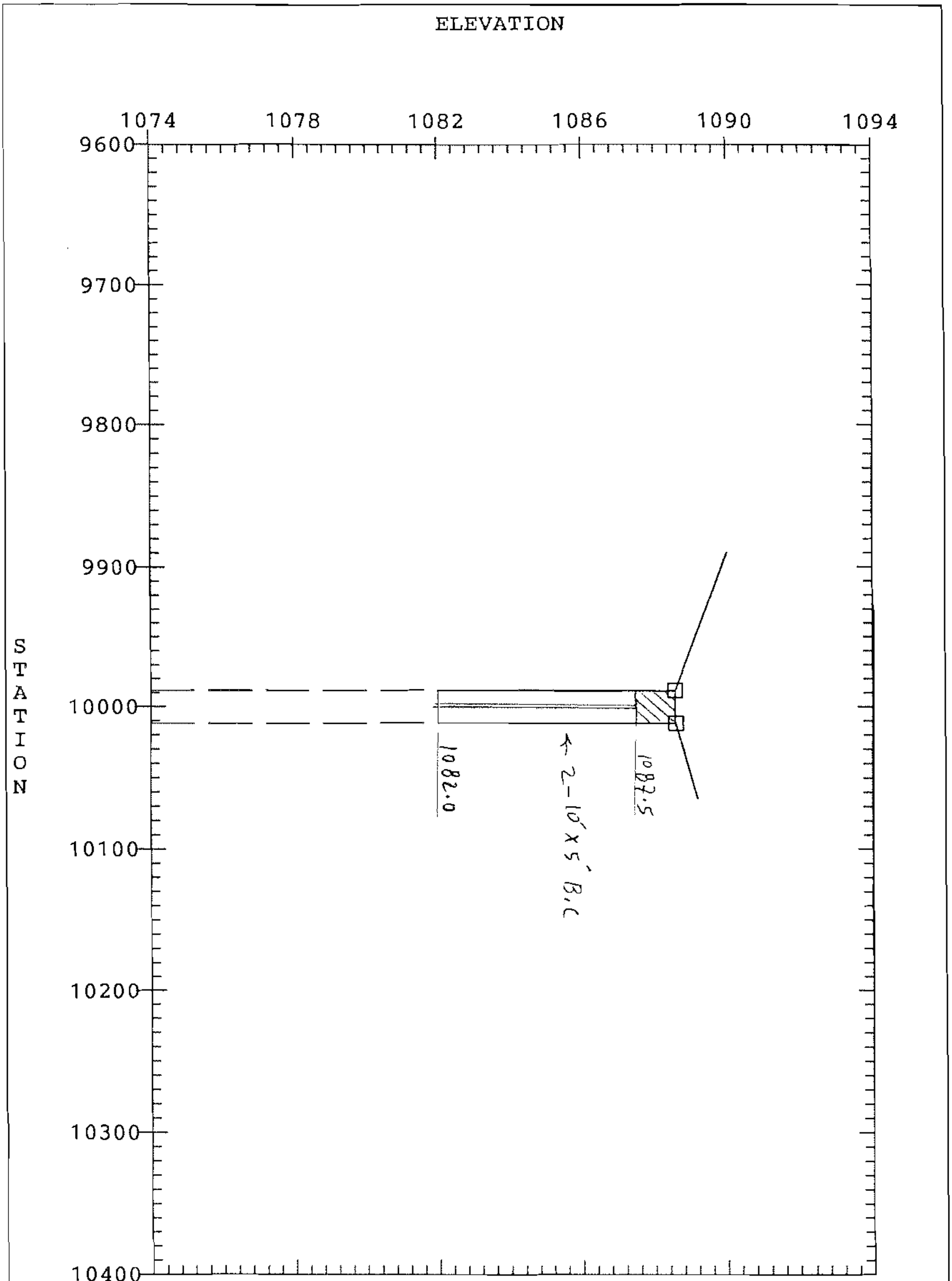
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 2.672

WASH "17" - DYSART DRAIN - WHITE TANKS

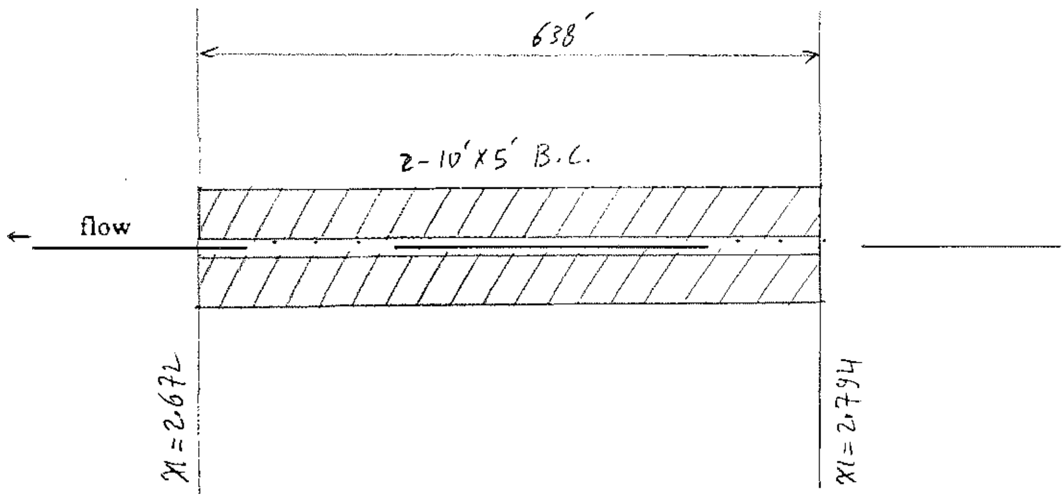


SECTION : 2.794

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	638 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	100 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1088.58	1088.58
Downstream face	1087.08	1087.08

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1088.58	1088.58
Downstream face	1088.58	1088.58

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1086.73	1087.07
Downstream face	1085.92	1086.19

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	0	Culvert Flow 509	0	509

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
Upstream face	24	N/A
Downstream face	24	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	24	24
Downstream face	24	24

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.013
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	
Weir coefficient	3.0
Pier coefficient	N/A
Contraction loss coefficient	0.30
Expansion loss coefficient	0.50

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

____

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____

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Farm Road Crossing
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 3.974
3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS See below

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New bridge/culvert previously modeled in the FIS
   (Explain why new analysis was performed.) New Study

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)
   2-66" RCP's
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Square edge Entrance with headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-2 with Special Culvert 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

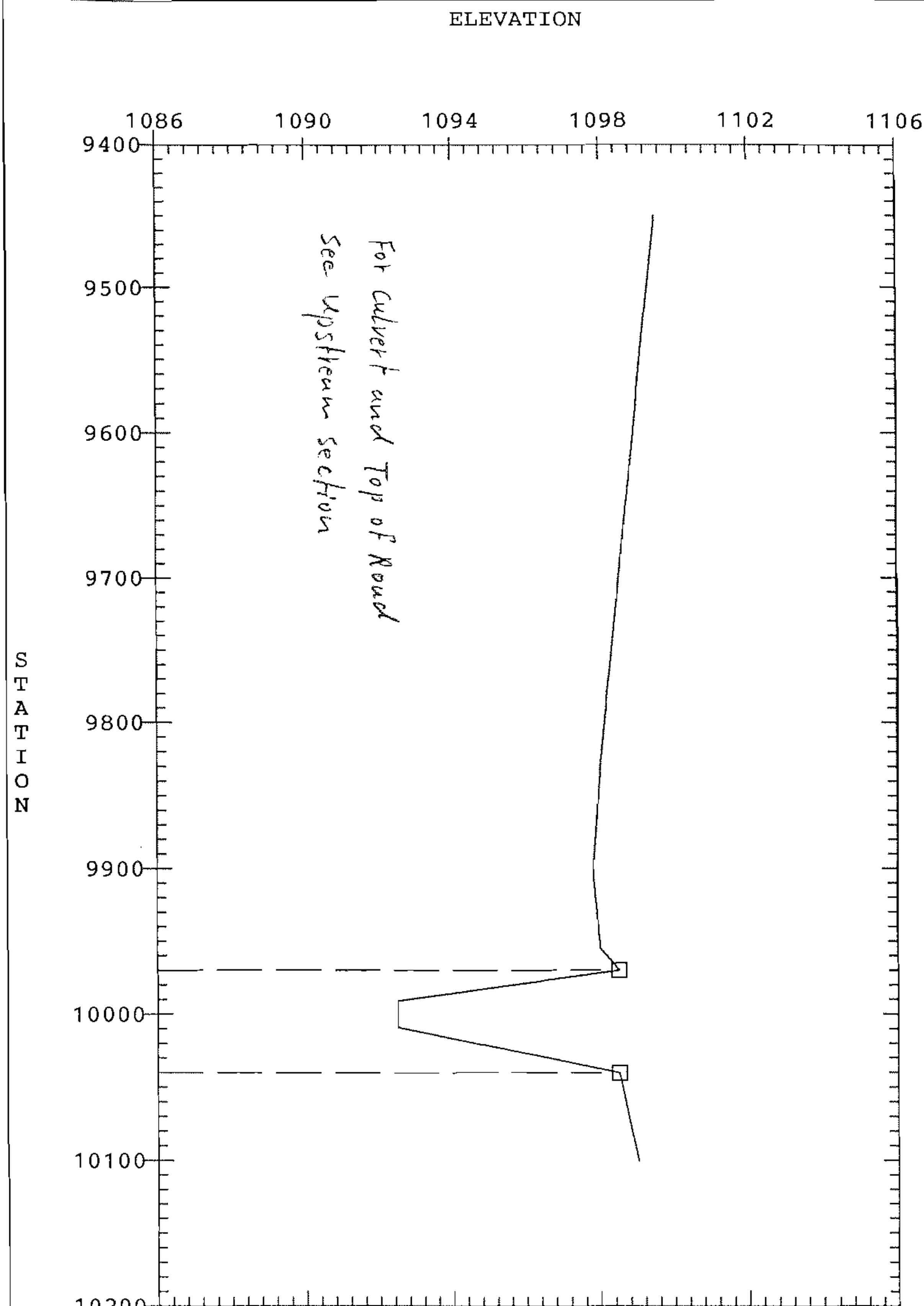
Analysis

Sketch the downstream 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.

See Attached Sheet

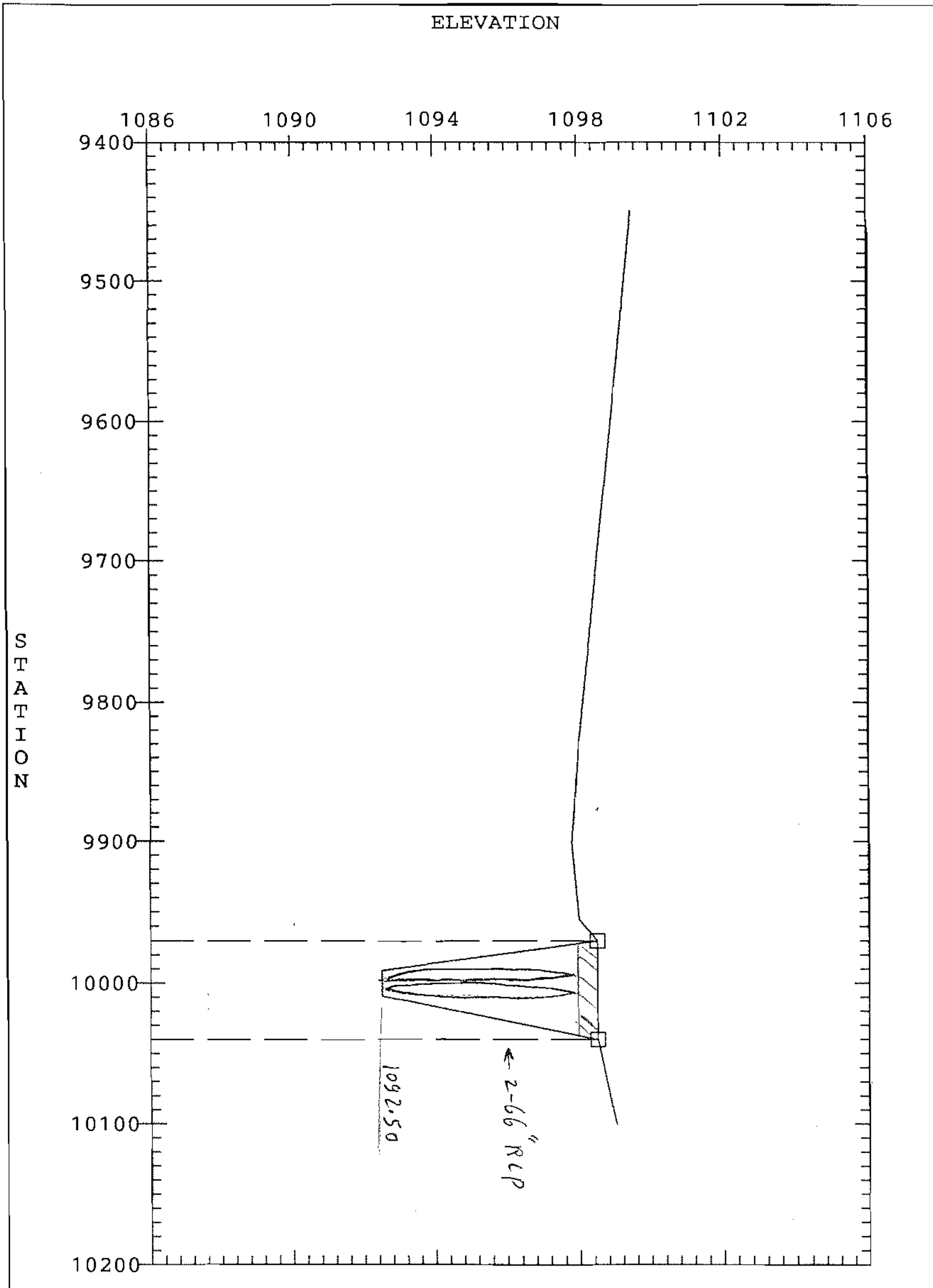
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 3.974

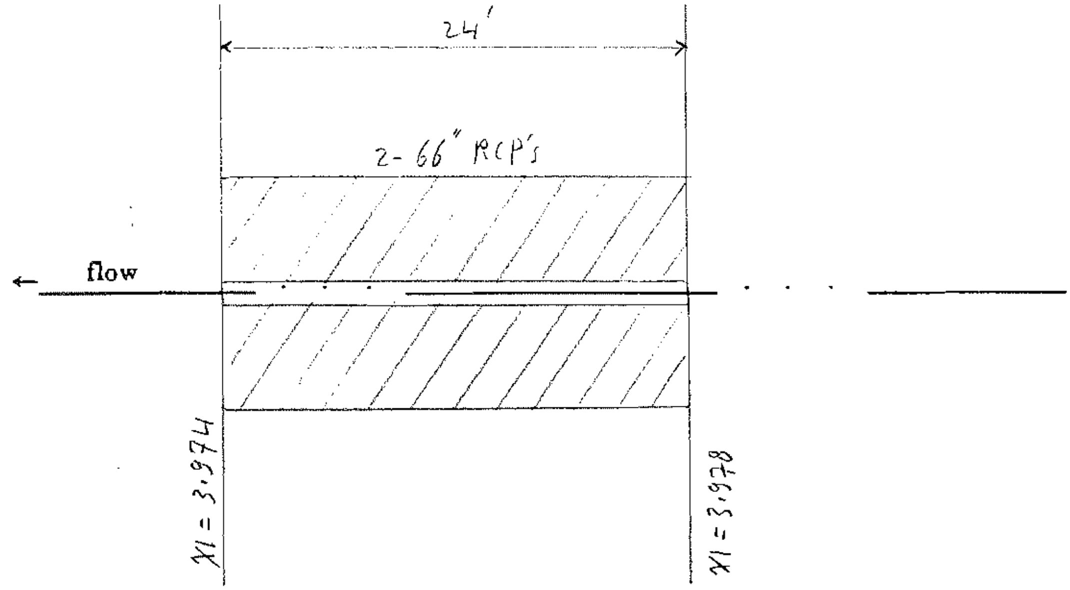
WASH "17" - DYSART DRAIN - WHITE TANKS



SECTION : 3.978

WASH "17" - DYSART DRAIN - WHITE TANKS

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. N/A Existing Structur

Culvert length or bridge width (ft.)	24 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	48 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1098.5	1098.5
Downstream face	1098.0	1098.0

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1098.5	1098.5
Downstream face	1098.5	1098.5

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1098.70	1098.79
Downstream face	1098.20	1098.36

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	0	Culvert Flow 367	449	816

The maximum depth of flow over the roadway/ railroad (ft.) 0.2 Ft

Weir length (ft.) 444

Top Widths

	Floodplain	Floodway
Upstream face	412	N/A
Downstream face	249	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	70	412
Downstream face	70	249

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	0.30
Expansion loss coefficient	0.50

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

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____

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County–Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Northern Avenue
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): XI = 3,894
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS See below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   2 - 4 ft x 2.5 ft Box Culverts
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Square Edge Entrance with Headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-2 With Special Bridge Method

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

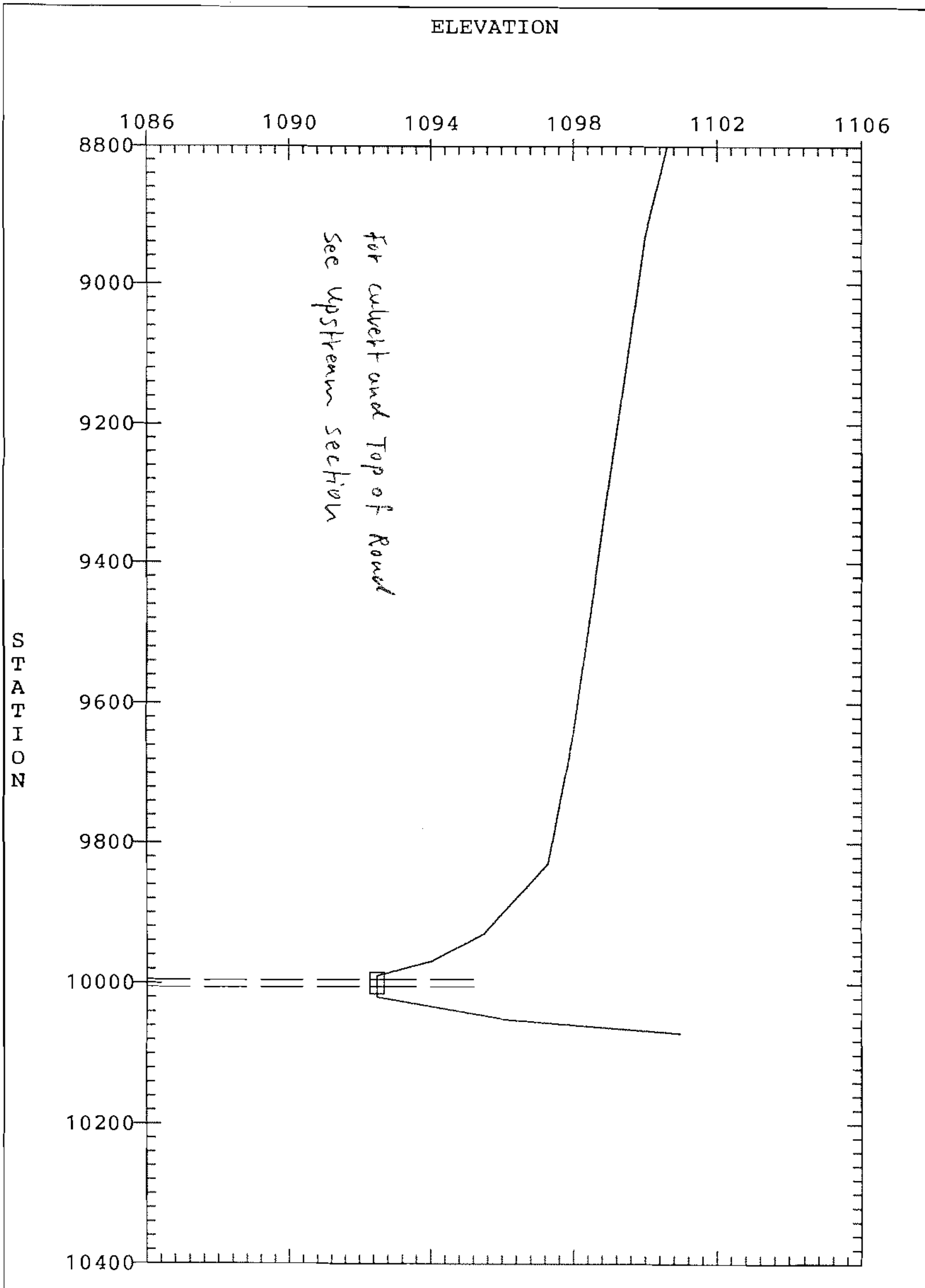
Analysis

Sketch the downstream 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.

See Attached Sheet

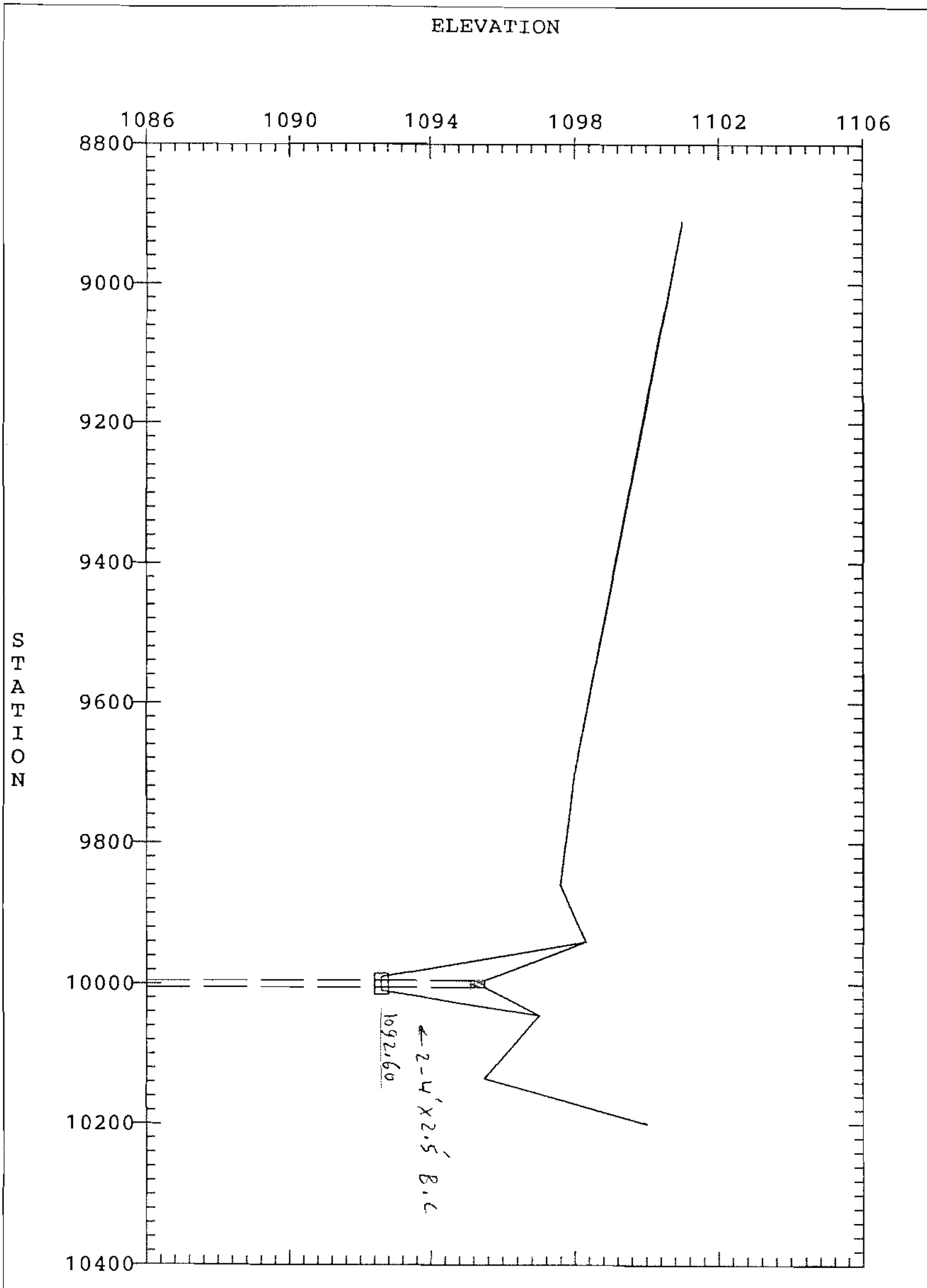
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 3.894

WASH "17" - DYSART DRAIN - WHITE TANKS

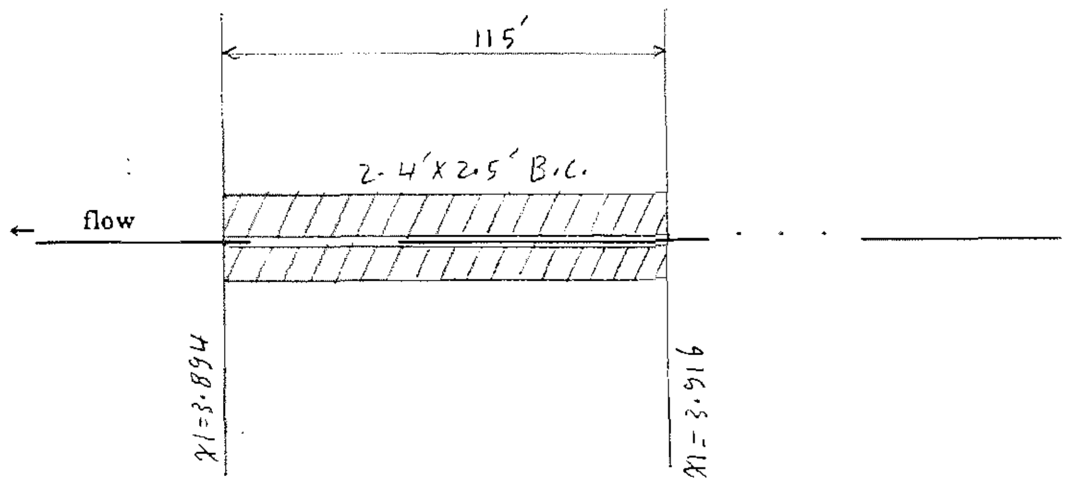


SECTION : 3.916

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	115 Ft
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	20 Ft^2
Total culvert/bridge area (ft^2)	20 Ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1095.5	1095.5
Downstream face	1095.5	1095.5

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1095.5	1095.5
Downstream face	1095.5	1095.5

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1098.07	1098.10
Downstream face	1098.07	1098.10

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	0	22	790	812

The maximum depth of flow over the roadway/railroad (ft.)	2.57 ft
Weir length (ft.)	477 ft

Top Widths

	Floodplain	Floodway
Upstream face	467	N/A
Downstream face	443	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	10	467
Downstream face	10	443

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.025
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	1.60
Weir coefficient	2.60
Pier coefficient	1.05
Contraction loss coefficient	0.30
Expansion loss coefficient	0.50

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

____

____

____

____

____

____

____

Attach analysis

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FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Dysart Drain Wash
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Farm Road Crossing
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): X1 = 4,212
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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)
2-54" RCP's
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Square edge Entrance with headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-2 with Special Culvert 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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

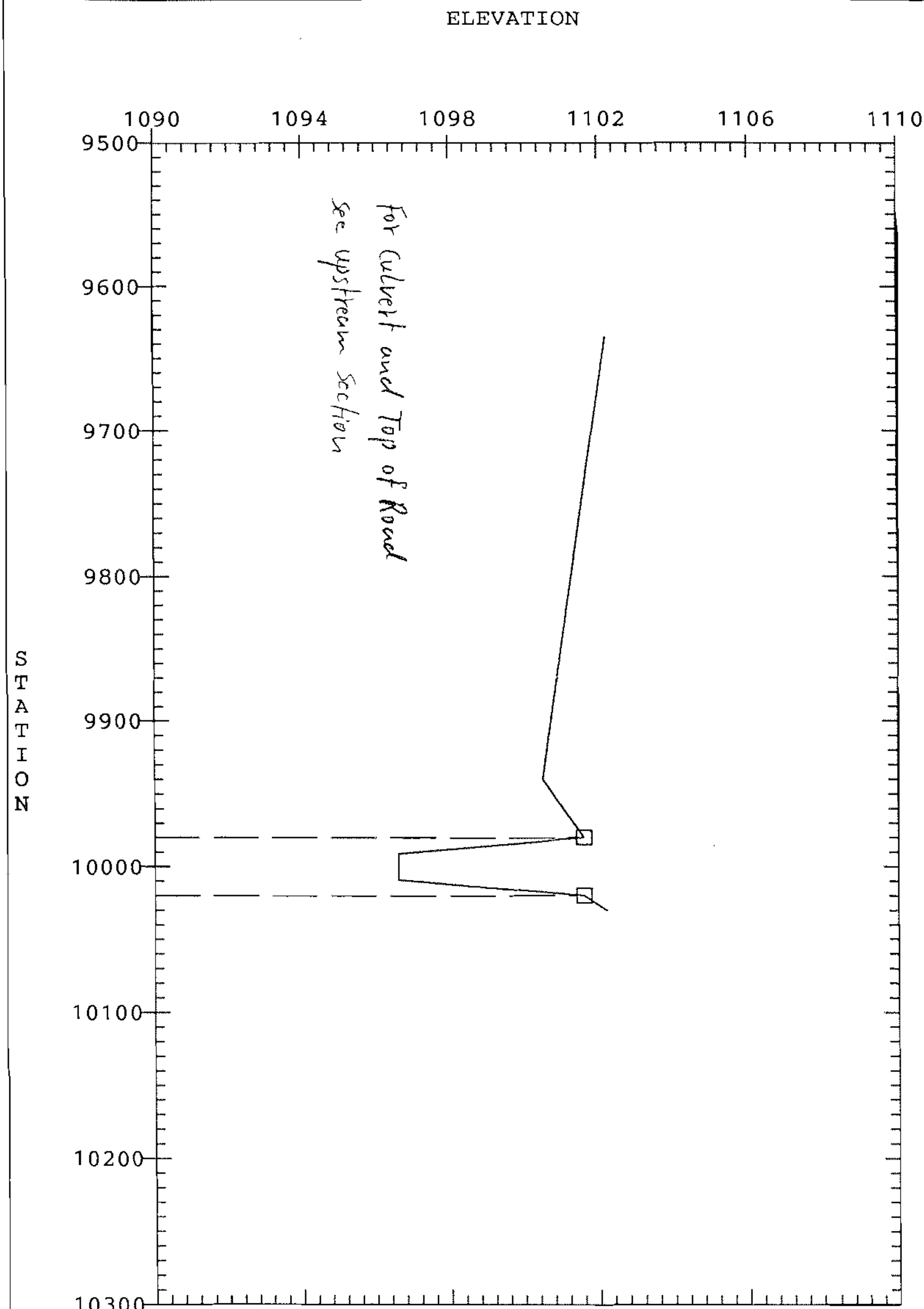
Analysis

Sketch the downstream 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.

See Attached Sheet

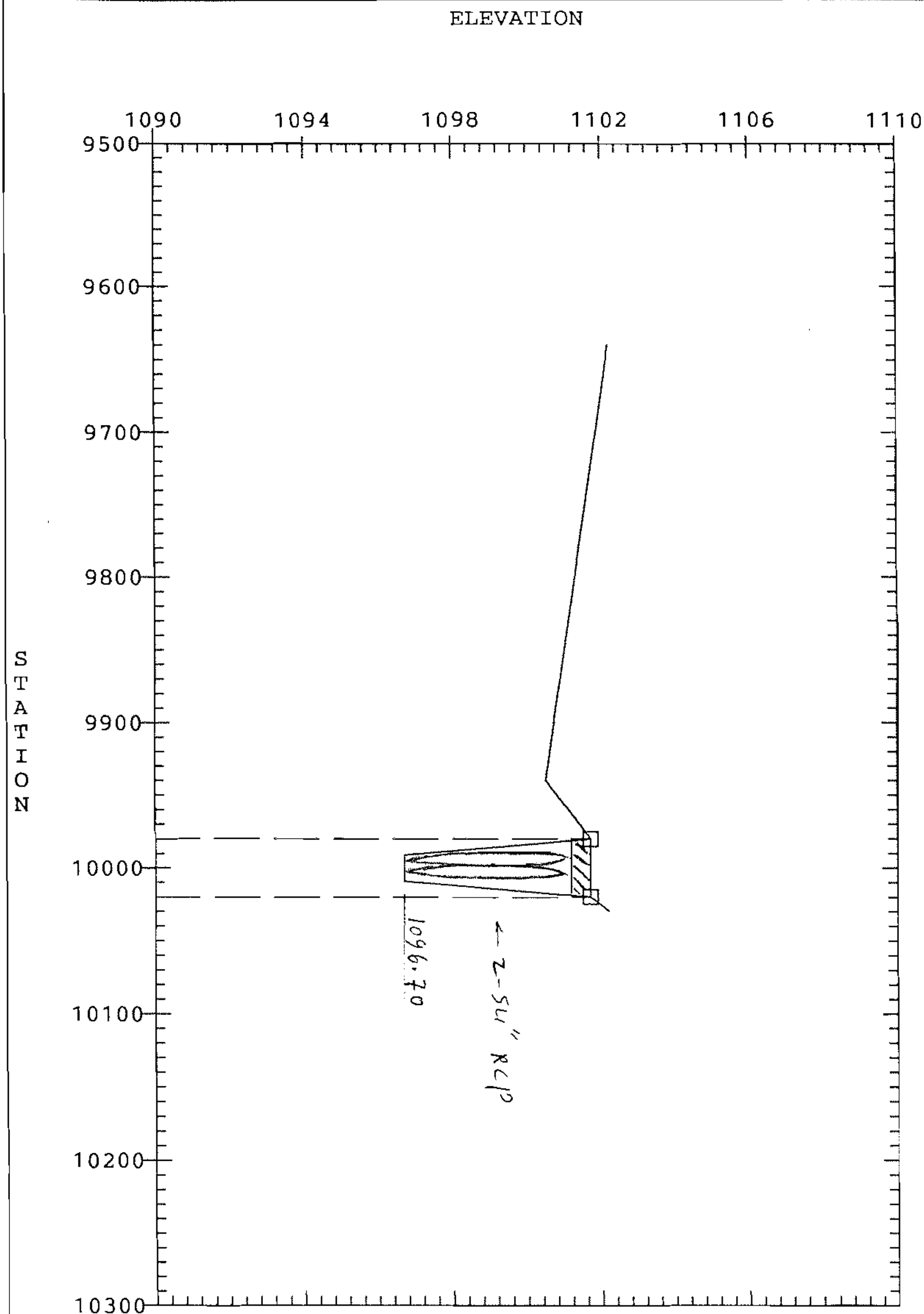
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

See Attached Sheet



SECTION : 4.212

WASH "17" - DYSART DRAIN - WHITE TANKS

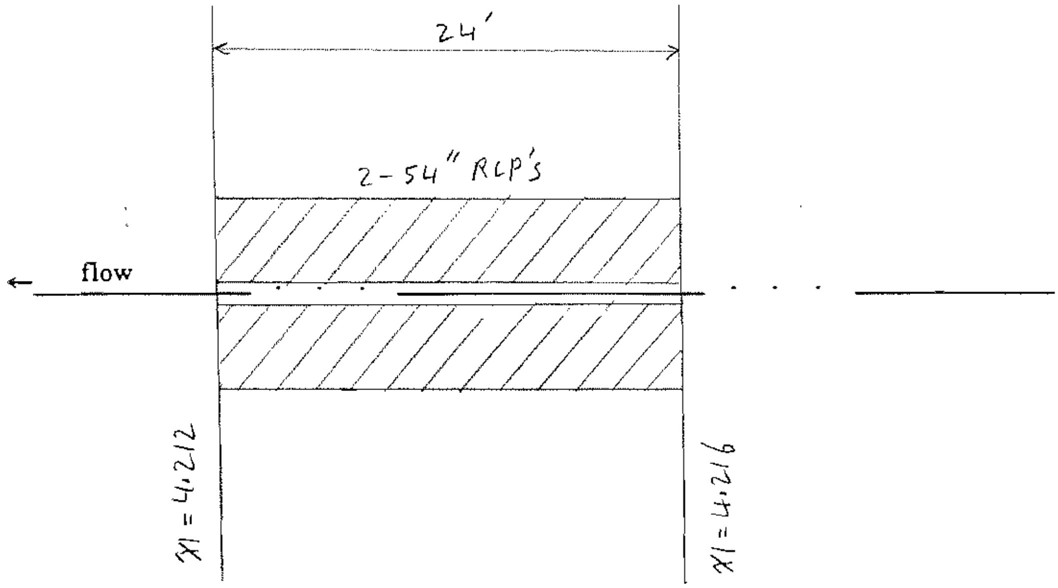


SECTION : 4.216

WASH "17" - DYSART DRAIN - WHITE TANKS

Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	24
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	32 ft^2

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	1101.7	1101.7
Downstream face	1101.4	1101.4

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	1101.7	1101.7
Downstream face	1101.7	1101.7

100-Year Elevations

	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1101.73	1101.94
Downstream face	1101.72	1101.93

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	0	Culvert Flow 237	576	813

The maximum depth of flow over the roadway/ railroad (ft.)	0.03
Weir length (ft.)	339

Top Widths

	Floodplain	Floodway
Upstream face	301	N/A
Downstream face	298	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	40	301
Downstream face	40	298

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	
Other loss coefficients (e.g., bend, manhole, etc.)	
Total loss coefficient	
Weir coefficient	3.0
Pier coefficient	N/A
Contraction loss coefficient	0.30
Expansion loss coefficient	0.50

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Attach analysis

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate study
     Explain
2. Flooding Source: AT&SF Railroad Wash, Northern Avenue to ½ Mile North of Olive Avenue (Wash 18)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1605E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615F	09/04/91

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

Types of Flooding	Structures	Disciplines*
[X] Riverine	[ ] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[X] Hydrology
[ ] Alluvial Fan	[ ] Bridge/Culvert	[X] Hydraulics
[ ] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by wind/wave action	[ ] Fill	[ ] Structural
[ ] Yes	[ ] Pump Station	[ ] Geotechnical
[ ] No	[X] None	[X] Land Surveying
[ ] Other (describe)	[ ] Other (describe)	[ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____	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.)
X	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 ________________

Forms Included

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 riverine flooding 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 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ________________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-23-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
   [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
   Floodplain/Floodway Delineation, Hydrologic Analysis
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)

   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 New Study
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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE
23980
JEFFREY S.
ERICKSON
Date Signed 8/16/93
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ______
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ______
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ______
Maximum peak discharge: ______ cfs
Second highest peak discharge: ______ cfs
Source of information: ______

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available
Gaging Station: ______
Drainage area at gage: ______ mi^2
Number of years of data: ______

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ______

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

		FIS:	Revised:
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: Maricopa County - Unincorporated Areas

Flooding Source: AT&SF Railroad Wash, Northern Avenue to ½ Mile North of Olive Avenue

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Reach to be Revised

Downstream limit 0.000 mile

Upstream limit 1.468 mile

Effective FIS

[X] Not studied

[ ] Studied by approximate methods
- Downstream limit of study ______
- Upstream limit of study ______

[ ] Studied by detailed methods
- Downstream limit of study ______
- Upstream limit of study ______

[ ] Floodway delineated
- Downstream limit of floodway ______
- Upstream limit of floodway ______

Hydraulic Analysis

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

[ ] Not studied in FIS

[ ] Improved hydrologic data/analysis. Explain: ______

[ ] Improved hydraulic analysis. Explain: ______

[ ] Flood control structure. Explain: ______

[X] Other. Explain: New Study

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ Duplicate Effective Model — Natural ☐ Floodway ☐

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.

☐ Corrected Effective Model — Natural ☐ Floodway ☐

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.

☐ Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected effective 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.

☐ Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

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.

☒ Other: Please attach a sheet describing all other models submitted. New Study — Natural ☒ Floodway ☒

Model Parameters
(from model used to revise 100-year water surface elevations)

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	1.468 mile	0.000 mile
500-year		

Attach diagram showing changes in 100-year discharge N/A

2. Explain how the starting water surface elevations were determined

Slope-Area Method

	Starting Water Surface Elevation
10-year	
50-year	
100-year	1091.22
Floodway	N/A
500-year	

3. Give range of friction loss coefficients 0.013 – 0.070

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
N/A		

Explain: New Study

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.

Taken from new topographic mapping, 1" = 400', 2 foot contour intervals. New Study

Model Parameters (Cont'd)

5. Explain how reach lengths for channel and overbanks were determined:
Along channel centerline and straight line between cross-sections in estimated overbank reaches.

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? ☐ Yes ☒ No

b. Supercritical depth? ☐ Yes ☒ No

c. Critical depth? ☒ Yes ☐ No

d. Other unique situations? ☐ 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.

2. What is the maximum head loss between cross-sections? 3.02 Ft

3. What is the distance between the cross-sections in 2 above? 465 Ft

4. What is the maximum distance between cross-sections? 635 Ft

5. Floodway determination

a. What is the maximum surcharge allowed by the community or State? 1 foot

b. What is the maximum surcharge for the revised conditions? N/A foot

c. What is the maximum velocity? 9.8 fps

d. What type of erosion protection is provided? N/A

Explain:

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? ☐ Yes ☒ No

If yes, explain:

____

Attach a Floodway Data Table showing data for each cross section listed in the published floodway data table in the FIS report. N/A

7. Do 100-year water surface elevations increase at any location? ☐ Yes ☒ No
N/A

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.

____

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

Not Applicable

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 ________ within ________ feet and upstream of the project at cross section ________ within ________ feet.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section ________ within ________ feet and upstream of the project at cross section ________ within ________ feet.

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 studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits.

Proceed to Riverine/Coastal Mapping Form.

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FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval

New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate Study

     Explain ______
2. Flooding Source: AT&SF Railroad wash, ½ mile west to ½ mile East of Litchfield Road, ½ mile North of Olive Avenue (wash 19)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1605E	09/04/91

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

Types of Flooding
- [X] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [X] None
- [ ] Other (describe) ______

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___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.)
_X_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 ________________________________

Forms Included

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 riverine flooding 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 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ __________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.   Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

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FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

[X] Approximate study stream (Zone A)

[X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

[X] No existing analysis

[X] Improved data (see data revision on page 3)

[ ] Changed physical conditions of watershed (explain) __________

[ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) __________

[ ] 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.

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

Approval of Analysis

[X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No
	If yes, explain how baseflow was determined:		

11. Snowmelt considerations: FIS: ☐ Yes ☐ No — Revised: ☐ Yes ☒ No

12. Model calibration: FIS: ☐ Yes ☐ No — Revised: ☒ Yes ☐ No
If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas

Flooding Source: AT&SF Railroad Wash, ½ Mile West to ½ Mile East of Litchfield Road, ½ Mile North of Olive Avenue

Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Reach to be Revised

Downstream limit 0.000 mile

Upstream limit 0.693 mile

Effective FIS

[X] Not studied

[ ] Studied by approximate methods
Downstream limit of study ______
Upstream limit of study ______

[ ] Studied by detailed methods
Downstream limit of study ______
Upstream limit of study ______

[ ] Floodway delineated
Downstream limit of floodway ______
Upstream limit of floodway ______

Hydraulic Analysis

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

[ ] Not studied in FIS

[ ] Improved hydrologic data/analysis. Explain: ______

[ ] Improved hydraulic analysis. Explain: ______

[ ] Flood control structure. Explain: ______

[X] Other. Explain: New Study

October 1992

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ Duplicate Effective Model — Natural ☐ Floodway ☐

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.

☐ Corrected Effective Model — Natural ☐ Floodway ☐

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.

☐ Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected effective 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.

☐ Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

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.

☒ Other: Please attach a sheet describing all other models submitted. New Study — Natural ☒ Floodway ☒

Model Parameters
(from model used to revise 100-year water surface elevations)

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	0.693 mile	0.000 mile
500-year		

Attach diagram showing changes in 100-year discharge N/A

2. Explain how the starting water surface elevations were determined

Slope-Area Method

	Starting Water Surface Elevation
10-year	
50-year	
100-year	1110.65
Floodway	N/A
500-year	

3. Give range of friction loss coefficients 0.035 - 0.070

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
N/A		

Explain: New Study

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.

Taken from new topographic mapping, 1" = 400', 2 foot contour intervals. New Study

Model Parameters (Cont'd)

5. Explain how reach lengths for channel and overbanks were determined:
Along channel centerline and straight line between cross-sections in estimated overbank reaches.

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? ☐ Yes ☒ No
   b. Supercritical depth? ☐ Yes ☒ No
   c. Critical depth? ☒ Yes ☐ No
   d. Other unique situations? ☐ 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.

2. What is the maximum head loss between cross-sections? 1.92 Ft
3. What is the distance between the cross-sections in 2 above? 420 Ft
4. What is the maximum distance between cross-sections? 590 Ft
5. Floodway determination
   a. What is the maximum surcharge allowed by the community or State? 1 foot
   b. What is the maximum surcharge for the revised conditions? N/A foot
   c. What is the maximum velocity? 4.1 fps
   d. What type of erosion protection is provided? N/A

   Explain:

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? ☐ Yes ☒ No

If yes, explain:

____

____

____

Attach a Floodway Data Table showing data for each cross section listed in the published floodway data table in the FIS report. N/A

7. Do 100-year water surface elevations increase at any location? ☐ Yes ☒ No
N/A

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.

____

____

____

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

Not Applicable

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 __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

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 studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits.

Proceed to Riverine/Coastal Mapping Form.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval
New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate Study

     Explain
2. Flooding Source: AT&SF Railroad Wash, Approx. ½ mile west of Lithfield Road and ½ mile South of Peoria Avenue to ¾ Miles North of Cactus Road (Wash 20)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1605E	09/04/91
	040053	Surprise, Town	Maricopa	AZ	04013C	1605E	09/04/91

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

Types of Flooding
- [X] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [X] None
- [ ] Other (describe)

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____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.)
X 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 ________________________________

Forms Included

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 riverine flooding 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 4)
- The request is based solely on updated topographic information — [X] Riverine/Coastal Mapping (Form 5)
- The request involves any type of channel modification — [ ] Channelization (Form 6)
- The request involves new bridge or culvert or revised analysis of an existing bridge or culvert — [ ] Bridge/Culvert Form (Form 7)
- The request involves a new or revised levee/floodwall system — [ ] Levee/Floodwall System Analysis (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 (Form 10)
- The request involves an existing, proposed, or modified dam — [ ] Dam Form (Form 11)
- This request involves structures credited as providing protection from the 100-year flood on an alluvial fan — [ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ ____________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.   Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

   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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE (CIVIL)
Jeffrey S. Erickson
23980
JEFFREY S.
ERICKSON
Date Signed 8/16/93
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

October 1992

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] **No existing analysis**
- [X] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** ______
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ______
- [ ] **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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

		FIS:	Revised:
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas and Town of Surprise

Flooding Source: AT&SF Railroad Wash, Approx. ½ Mile West of Litchfield Road and ½ Mile South of Peoria Avenue to 3/4 Mile North of Cactus Road

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Reach to be Revised

Downstream limit 0.000 mile

Upstream limit 2.111 mile

Effective FIS

[X] Not studied

[ ] Studied by approximate methods

Downstream limit of study ______

Upstream limit of study ______

[ ] Studied by detailed methods

Downstream limit of study ______

Upstream limit of study ______

[ ] Floodway delineated

Downstream limit of floodway ______

Upstream limit of floodway ______

Hydraulic Analysis

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

[ ] Not studied in FIS

[ ] Improved hydrologic data/analysis. Explain: ______

[ ] Improved hydraulic analysis. Explain: ______

[ ] Flood control structure. Explain: ______

[X] Other. Explain: New Study

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ Duplicate Effective Model — Natural ☐ Floodway ☐

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.

☐ Corrected Effective Model — Natural ☐ Floodway ☐

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.

☐ Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected effective 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.

☐ Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

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.

☒ Other: Please attach a sheet describing all other models submitted. New Study — Natural ☒ Floodway ☒

Model Parameters
(from model used to revise 100-year water surface elevations)

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	2.111 mile	0.000 mile
500-year		

Attach diagram showing changes in 100-year discharge N/A

2. Explain how the starting water surface elevations were determined

Slope-Area Method

	Starting Water Surface Elevation
10-year	
50-year	
100-year	1110.28
Floodway	N/A
500-year	

3. Give range of friction loss coefficients 0.035 – 0.070

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
N/A		

Explain: New Study

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.

Taken from new topographic mapping, 1" = 400', 2 foot contour intervals. New Study

Model Parameters (Cont'd)

5. Explain how reach lengths for channel and overbanks were determined:
Along channel centerline and straight line between cross-sections in estimated overbank reaches.

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? ☐ Yes ☒ No

   b. Supercritical depth? ☐ Yes ☒ No

   c. Critical depth? ☒ Yes ☐ No

   d. Other unique situations? ☐ 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.

2. **What is the maximum head loss between cross-sections?** 4.33 Ft

3. **What is the distance between the cross-sections in 2 above?** 390 Ft

4. **What is the maximum distance between cross-sections?** 640 Ft

5. Floodway determination

   a. What is the maximum surcharge allowed by the community or State? 1 foot

   b. What is the maximum surcharge for the revised conditions? N/A foot

   c. What is the maximum velocity? 4.6 fps

   d. What type of erosion protection is provided? N/A

   Explain:

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? ☐ Yes ☒ No

If yes, explain:

____

____

____

Attach a Floodway Data Table showing data for each cross section listed in the published floodway data table in the FIS report. N/A

7. Do 100-year water surface elevations increase at any location? ☐ Yes ☒ No
N/A

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.

____

____

____

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

Not Applicable

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 __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

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 studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits.

Proceed to Riverine/Coastal Mapping Form.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ______ scale ______ Contour interval

   b. Revision Request 1" = 400' scale 2 Foot Contour interval

   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Detailed Study

     Explain
2. Flooding Source: Litchfield Wash (Wash 21)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615 F	09/04/91

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

Types of Flooding
- [X] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [X] None
- [ ] Other (describe)

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___	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.)
X	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 ________________________

Forms Included

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 riverine flooding 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 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices: Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

   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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE No. 23980 JEFFREY S. ERICKSON Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] **No existing analysis**
- [X] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** ______
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ______
- [ ] **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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

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

None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

		FIS:	Revised:
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

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FORM 4

RIVERINE HYDRAULIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas

Flooding Source: Litchfield Wash

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Reach to be Revised

Downstream limit 0.000 mile

Upstream limit 1.080 mile

Effective FIS

[X] Not studied

[ ] Studied by approximate methods

Downstream limit of study ____

Upstream limit of study ____

[ ] Studied by detailed methods

Downstream limit of study ____

Upstream limit of study ____

[ ] Floodway delineated

Downstream limit of floodway ____

Upstream limit of floodway ____

Hydraulic Analysis

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

[ ] Not studied in FIS

[ ] Improved hydrologic data/analysis. Explain: ____

[ ] Improved hydraulic analysis. Explain: ____

[ ] Flood control structure. Explain: ____

[X] Other. Explain: New Study

Models Submitted

Full input and output listings along with files on diskette (if available) for each of the models listed below and a 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). Only the Duplicate Effective and the Revised or Post-Project Conditions models must be submitted. See instructions for directions on when other models may be required. Only the 100-year flood profile is required for SFHAs with a Zone A designation.

☐ Duplicate Effective Model — Natural ☐ Floodway ☐

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.

☐ Corrected Effective Model — Natural ☐ Floodway ☐

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.

☐ Existing or Pre-Project Conditions Model — Natural ☐ Floodway ☐

The duplicate effective or corrected effective 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.

☐ Revised or Post-Project Conditions Model — Natural ☐ Floodway ☐

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.

☒ Other: Please attach a sheet describing all other models submitted. New Study — Natural ☒ Floodway ☒

Model Parameters
(from model used to revise 100-year water surface elevations)

1. Discharges:

	Upstream Limit	Downstream Limit
10-year		
50-year		
100-year	1.080 mile	0.000 mile
500-year		

Attach diagram showing changes in 100-year discharge N/A

2. Explain how the starting water surface elevations were determined

Slope-Area Method

	Starting Water Surface Elevation
10-year	
50-year	
100-year	1062.22
Floodway	1062.22
500-year	

3. Give range of friction loss coefficients 0.025-0.050

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
N/A		

Explain: New Study

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.

Taken from new topographic mapping, 1" = 400', 2 foot contour intervals. New Study

Model Parameters (Cont'd)

5. Explain how reach lengths for channel and overbanks were determined:
Along channel centerline and straight line between cross-sections in estimated overbank reaches.

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? ☐ Yes ☒ No

   b. Supercritical depth? ☐ Yes ☒ No

   c. Critical depth? ☒ Yes ☐ No

   d. Other unique situations? ☐ 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.

2. What is the maximum head loss between cross-sections? 2.84 Ft

3. What is the distance between the cross-sections in 2 above? 385 Ft

4. What is the maximum distance between cross-sections? 530 Ft

5. Floodway determination

   a. What is the maximum surcharge allowed by the community or State? 1 foot

   b. What is the maximum surcharge for the revised conditions? N/A foot

   c. What is the maximum velocity? 7.4 fps

   d. What type of erosion protection is provided? N/A

   Explain:

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? ☐ Yes ☒ No

If yes, explain:

____

____

____

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

7. Do 100-year water surface elevations increase at any location? ☐ Yes ☒ No
N/A

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.

____

____

____

Please attach a completed comparison table entitled: Water Surface Elevation Check.

Revised FIRM/FBFM and Flood Profiles

Not Applicable

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 __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section __________ within __________ feet and upstream of the project at cross section __________ within __________ feet.

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 studied (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits.

Proceed to Riverine/Coastal Mapping Form.

FLOODWAY DATA, LITCHFIELD WASH,AT LITCH
PROFILE NO. 2

	------- FLOODWAY -------			WATER SURFACE ELEVATION		
STATION	WIDTH	SECTION AREA	MEAN VELOCITY	WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
.000	34.	74.	7.0	1062.2	1062.2	.0
.085	909.	2746.	.2	1063.1	1063.1	.0
.165	1106.	2202.	.2	1063.1	1063.1	.0
.238	27.	46.	7.5	1065.1	1065.1	.0
.319	34.	69.	5.1	1067.5	1067.5	.0
.414	44.	57.	6.1	1069.3	1069.3	.0
.477	73.	72.	4.8	1070.9	1070.9	.0
.496	62.	67.	5.2	1071.6	1071.4	.2
.597	65.	128.	2.0	1073.2	1072.6	.6
.684	60.	83.	3.1	1073.7	1073.4	.3
.775	35.	57.	4.6	1075.3	1074.9	.4
.856	37.	70.	1.1	1076.2	1075.7	.5
.938	30.	57.	1.4	1076.3	1076.0	.3
1.019	35.	55.	1.4	1076.5	1076.3	.2
1.080	25.	42.	1.8	1076.6	1076.5	.1

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FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ______ scale ______ Contour interval
   b. Revision Request 1" = 400' scale 2 Foot Contour interval
   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______
2. Flooding Source: Ponding Areas Behind the West Side of The Agua Fria River Dike
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: AH, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2080 F	09/04/91
	040038	Avondale, City	Maricopa	AZ	04013C	2080 F	09/04/91
	040038	Avondale, city	Maricopa	AZ	04013 C	2090 E	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [x] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe) ______

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).

____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.)

_X_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 ________________________________

____

____

Forms Included

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 riverine flooding 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 — [ ] Riverine Hydraulic Analysis (Form 4)
- The request is based solely on updated topographic information — [X] Riverine/Coastal Mapping (Form 5)
- The request involves any type of channel modification — [ ] Channelization (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 or revised levee/floodwall system — [ ] Levee/Floodwall System Analysis (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 (Form 10)
- The request involves an existing, proposed, or modified dam — [ ] Dam Form (Form 11)
- This request involves structures credited as providing protection from the 100-year flood on an alluvial fan — [ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ __________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.   Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-23-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ______
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ______
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations: If yes, explain how baseflow was determined:	☐ Yes ☐ No	☐ Yes ☒ No
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration: If yes, explain how calibration was performed.	☐ Yes ☐ No	☒ Yes ☐ No

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ________ scale ________ Contour interval

   b. Revision Request 1" = 400' scale 2 Foot Contour interval
   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and City of Avondale
Flooding Source: Ponding Behind the West Side of the Agua Fria River Dike
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Agua Fria River Dike, At Sub-basin 290
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At Agua Fria River Dike and Thomas Road.
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS See below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study.

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) 2-36" CP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

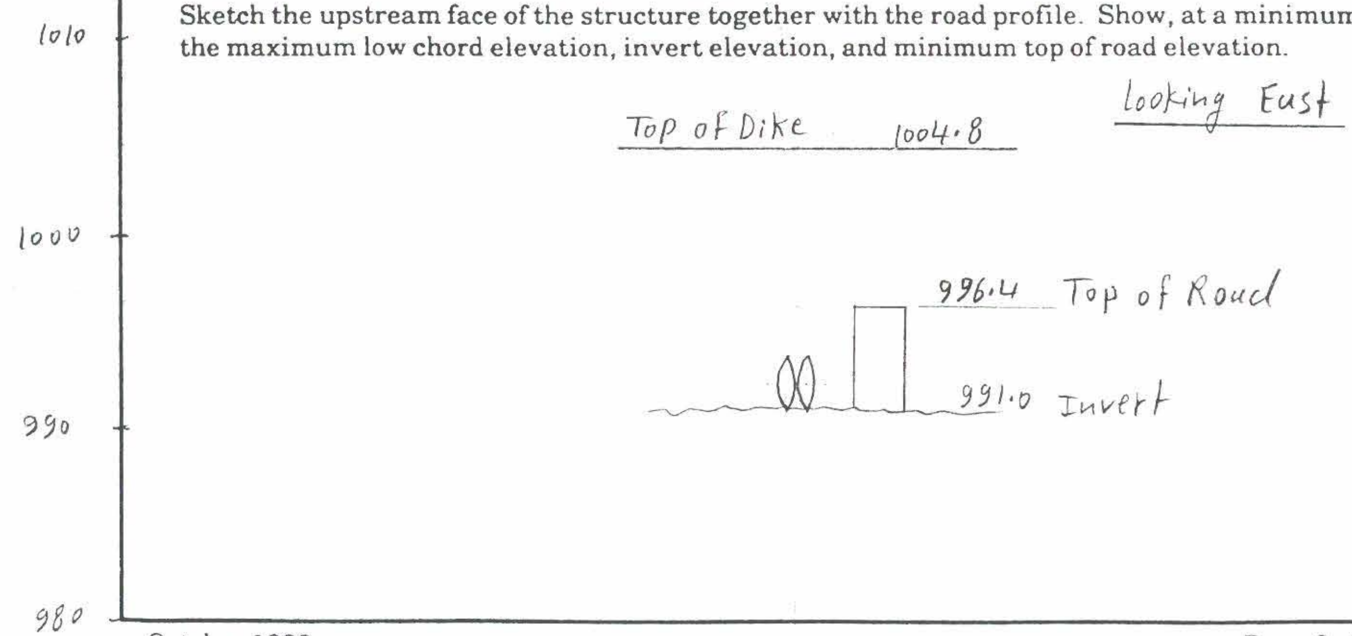
BRIDGE/CULVERT FORM

Analysis

Sketch the downstream 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.

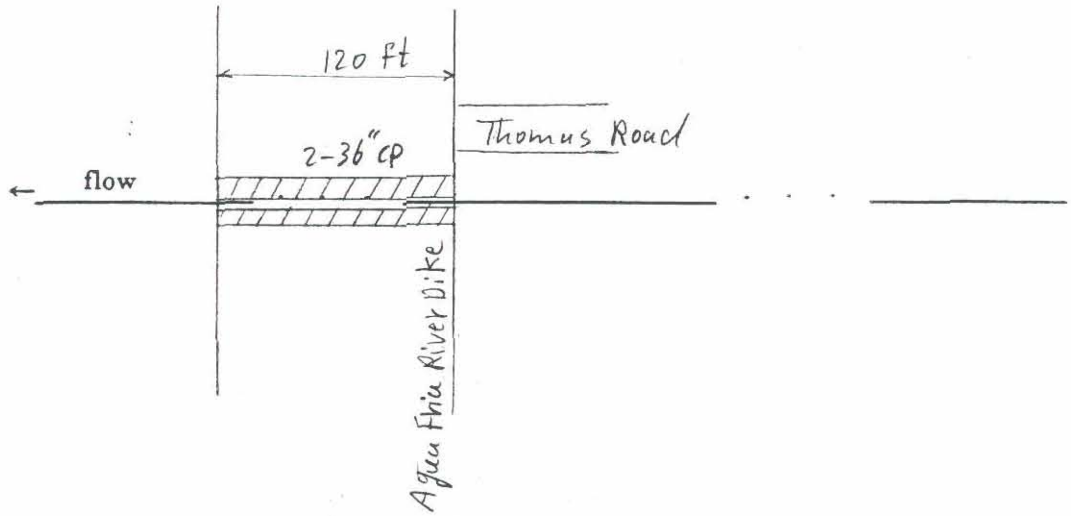
Downstream Invert = 990.4

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.



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	120
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	14.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
Upstream face		Top of Road 996.4	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	996.55	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	N/A	culvert flow 133	186	319

The maximum depth of flow over the roadway/ railroad (ft.) 0.15

Weir length (ft.) 150

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas and City of Avondale
Flooding Source: Ponding Behind the west side of the Agua Fria River Dike
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Mc Dowell Road, At Sub-basin 291
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At Agua Fria River Dike and McDowell Road
3. This revision reflects (check one of the following):
   - [X] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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) 3-48" CMP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) Headwalls
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

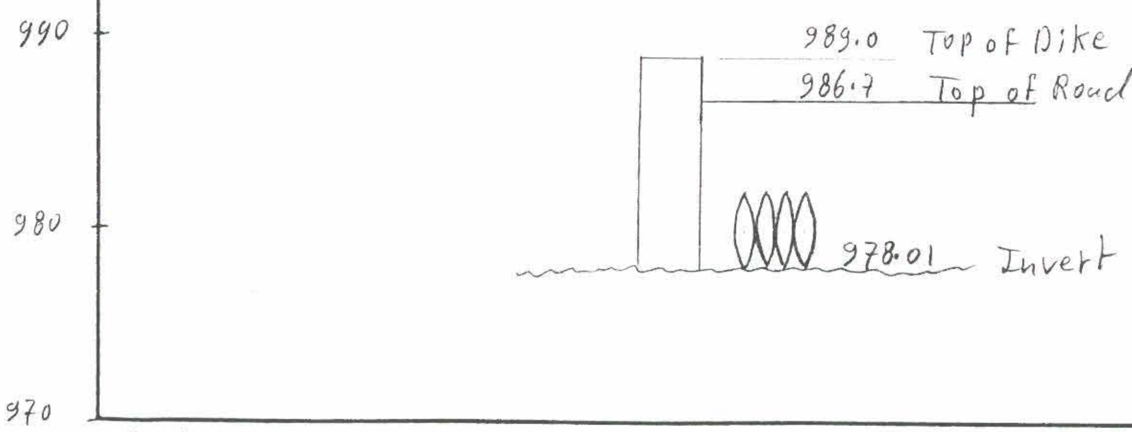
Analysis

Sketch the downstream 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.

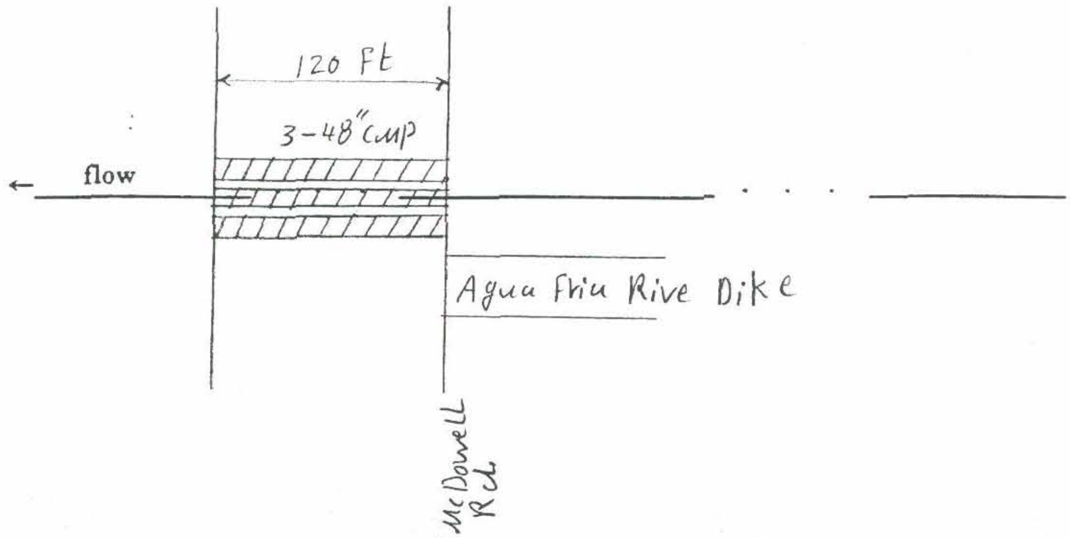
Downstream Invert = 977.41

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.

looking south



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. N/A Existing Structure

Culvert length or bridge width (ft.)	120
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	37.7

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Road 986.7	
Upstream face			
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	983.3	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		culvert flow		
Amount of flow through/over the structure(s) (cfs)	N/A	128	0	128

The maximum depth of flow over the roadway/ railroad (ft.) 0

Weir length (ft.) 0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.024
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: City of Avondale
Flooding Source: Ponding Behind the West Side of the Agua Fria River Dike
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Agua Fria River Dike, At Sub-basin 302
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At Agua Fria River Dike and Vanburen Street
3. This revision reflects (check one of the following):

- [X] New bridge/culvert not modeled in the FIS see below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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)
1-36" CP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
Headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis programs by Dodson and Associates

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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

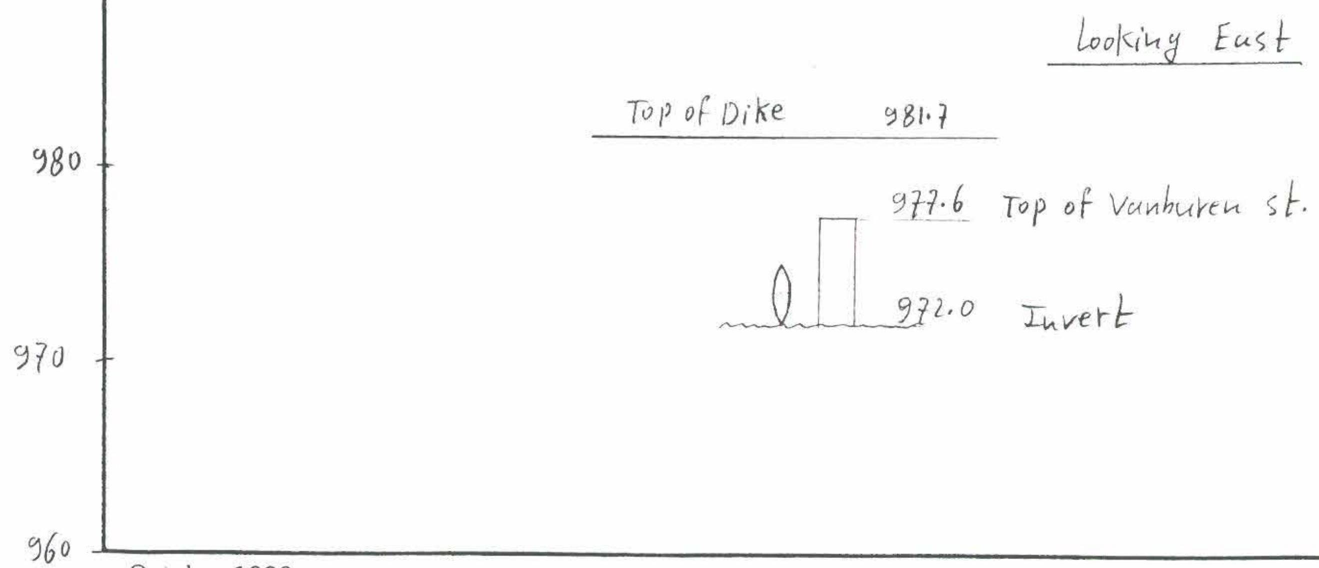
*One form per new/revised bridge/culvert

Analysis

Sketch the downstream 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.

Downstream Invert = 971.5

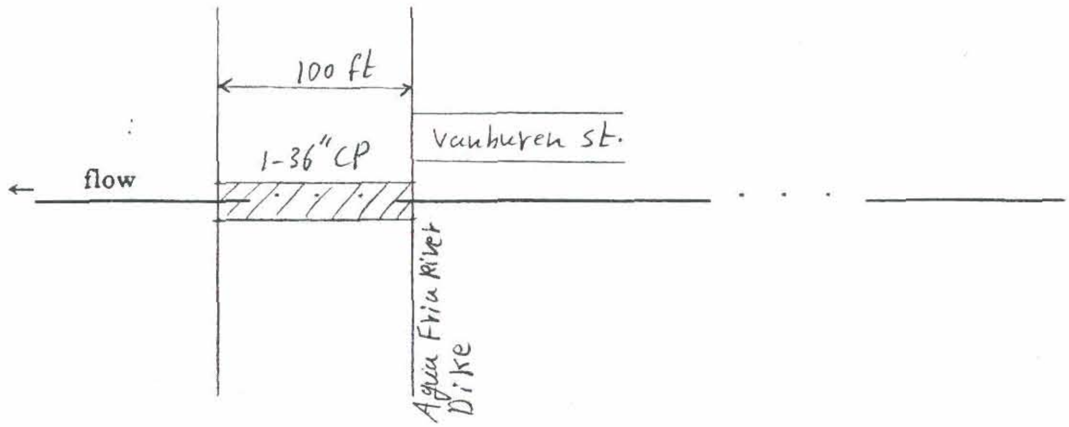
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	100
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Top of Road	Right Overbank
Upstream face		977.6	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	976.1	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	39	0	39

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Ponding Area	Floodway
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

______

______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

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FORM 7

BRIDGE/CULVERT FORM*

Community Name: City of Avondale
Flooding Source: Ponding Behind the west Side of the Agua Fria River Dike
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: Lower Buckeye Road, At Sub-basin 338A
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At Agua Fria River Dike and Lower Buckeye Road
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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) 3-11 Ft x 6 Ft B.C
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) 30°-75° wingwalls with square top edge
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

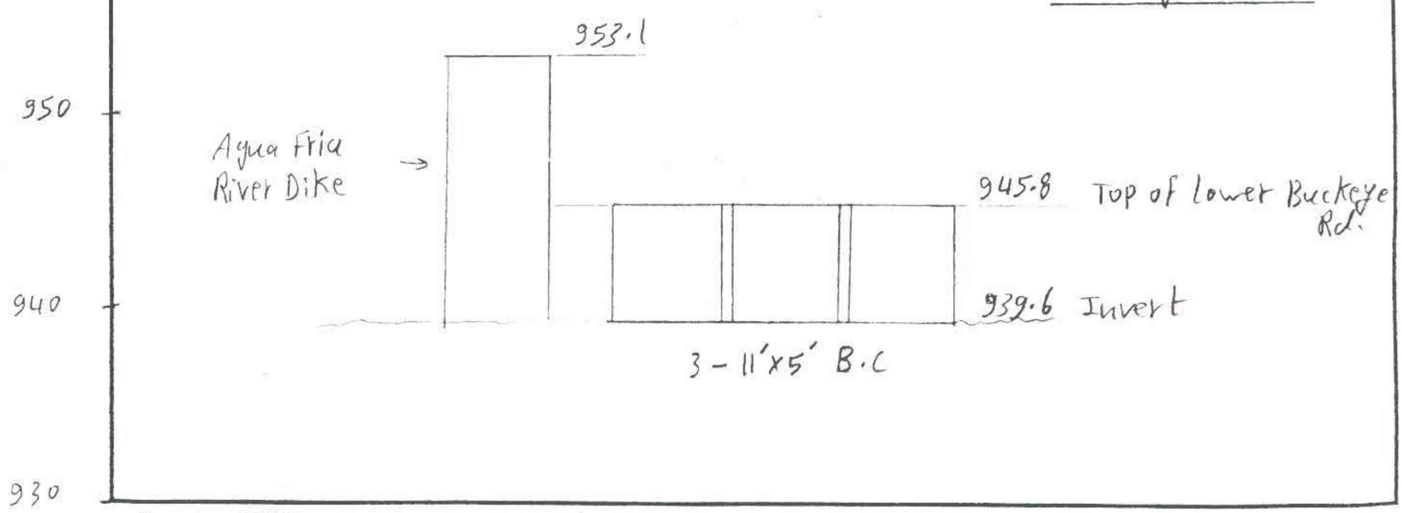
Analysis

Sketch the downstream 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.

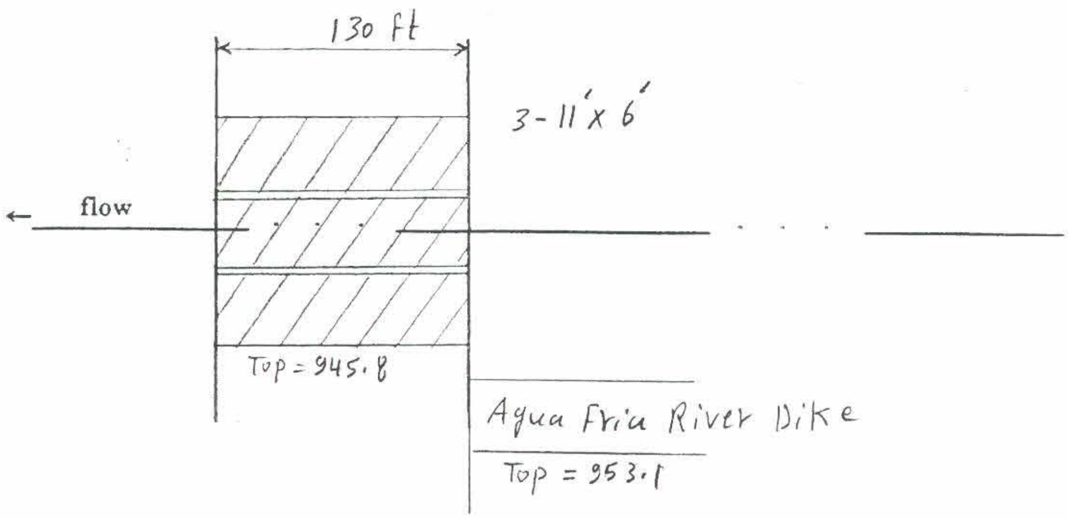
Downstream Invert = 939.92

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.

looking south



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. N/A Existing Structur

Culvert length or bridge width (ft.)	130
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	198

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Road	
Upstream face		945.80	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	943.77	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	646	0	646

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
Upstream face	N/A	Ponding Area	N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ____________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ____
     Explain ____
2. Flooding Source: Approximate Ponding Areas Behind Airline Canal
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615F	09/04/91
	040128	Litchfield Park, City	Maricopa	AZ	04013C	1615F	09/04/91
	040128	Litchfield Park, City	Maricopa	AZ	04013C	2080F	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ____

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [x] None
- [ ] Other (describe) ____

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ____

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____	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.)
X	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 ________________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

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FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S. Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

   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 New Study
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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.
Jeffrey S. Erickson

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ____
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ____
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ______________

Maximum peak discharge: ______________ cfs

Second highest peak discharge: ______________ cfs

Source of information: ______________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ______________

Drainage area at gage: ______________ mi^2

Number of years of data: ______________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ______________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No
	If yes, explain how baseflow was determined:		
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No
	If yes, explain how calibration was performed.		

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

			Revised:
13.	Future land use conditions: If yes, explain why.		☐ Yes ☒ No

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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ________ scale ________ Contour interval
   b. Revision Request 1" = 400' scale 2 Foot Contour interval
   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______
2. Flooding Source: Ponding Areas Behind Buckeye Canal
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2050E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2065E	09/04/91
	040046	Goodyear, Town	Maricopa	AZ	04013C	2065E	09/04/91
	040046	Goodyear, Town	Maricopa	AZ	04013C	2070E	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [x] None
- [ ] Other (describe) ______

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___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.)
X 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 ______________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. / 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer / Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal (Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER
CERTIFICATE
23980
JEFFREY S.
ERICKSON
Date Signed 8/16/93
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ____
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ____
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

HYDROLOGIC ANALYSIS FORM

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ______________

Maximum peak discharge: ______________ cfs

Second highest peak discharge: ______________ cfs

Source of information: ______________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ______________

Drainage area at gage: ______________ mi^2

Number of years of data: ______________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ______________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

		FIS:	Revised:
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	<u>Tie-ins</u> between the <u>effective</u> and <u>revised</u> 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval

New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

- [ ] Physical change
  - [ ] Existing
  - [ ] Proposed
- [ ] Improved methodology
- [ ] Improved data
- [ ] Floodway revision
- [X] Other New Approximate Study

Explain

2. Flooding Source: Approximate Delineation of Breakouts South over Dysart Drain
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X

(example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1600E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615F	09/04/91

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

Types of Flooding

- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [X] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)

Structures

- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [X] None
- [ ] Other (describe)

Disciplines*

- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____ 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.)
X 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 ________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

   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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

Registered Professional Engineer (Civil) Certificate No. 15594 Mark T. Gavan Date Signed ... Arizona, U.S.A.

Registered Land Surveyor Certificate No. 16131 Mark T. Gavan Date Signed ... Arizona, U.S.A.

Seal (Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

   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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] **No existing analysis**
- [X] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** ______
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ______
- [ ] **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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

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

None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations: If yes, explain how baseflow was determined:	☐ Yes ☐ No	☐ Yes ☒ No
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration: If yes, explain how calibration was performed.	☐ Yes ☐ No	☒ Yes ☐ No

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ________ scale ________ Contour interval

   b. Revision Request 1" = 400' scale 2 Foot Contour interval
   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Detailed Study

     Explain
2. Flooding Source: Litchfield Park Detention Facility
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X

   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1615 F	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes

  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [X] Other (describe) Flood Control Detention Basin

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [X] Other (describe) Flood Control Detention Basin

Disciplines*
- [X] Water Resources
  - [X] Hydrology
  - [X] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [X] Land Surveying
- [ ] Other (describe)

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____ 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.)
X 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 ________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ______________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 14 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 design, were performed in accordance with sound engineering practices: Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping
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)

   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 New Study
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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal (Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

   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 New Study
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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER
CERTIFICATE
23980
JEFFREY S.
ERICKSON
Date Signed 8/16/93
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

[X] **Approximate study stream (Zone A)**

[X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

[X] **No existing analysis**

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

[ ] **Changed physical conditions of watershed (explain)** ______

[ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ______

[ ] **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.

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

Approval of Analysis

[X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ______

Maximum peak discharge: ______ cfs

Second highest peak discharge: ______ cfs

Source of information: ______

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ______

Drainage area at gage: ______ mi^2

Number of years of data: ______

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ______

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations: If yes, explain how baseflow was determined:	☐ Yes ☐ No	☐ Yes ☒ No
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration: If yes, explain how calibration was performed.	☐ Yes ☐ No	☒ Yes ☐ No

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13.	Future land use conditions: If yes, explain why.		☐ Yes ☒ No

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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	☒ Yes ☐ No ☐ N/A
B.	Revised 100- and 500-year floodplain boundaries	☐ Yes ☐ No ☒ N/A
C.	Revised 100-year floodway boundaries	☒ Yes ☐ No ☐ N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	☒ Yes ☐ No ☐ N/A
E.	Stream alignments, road and dam alignments	☒ Yes ☐ No ☐ N/A
F.	Current community boundaries	☒ 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	☐ Yes ☐ No ☒ N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	☐ Yes ☐ No ☒ N/A
I.	The requestor's property boundaries and community easements	☐ Yes ☐ No ☒ N/A
J.	The signed certification of a registered professional engineer	☒ Yes ☐ No ☐ N/A
K.	Location and description of reference marks	☒ Yes ☐ No ☐ N/A
L.	Vertical datum (example: NGVD 1929, NAVD 1988, etc.)	☒ Yes ☐ No ☐ N/A NGVD 1981
M.	Coastal zone designations tie into adjacent areas not being revised	☐ Yes ☐ No ☒ N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses	☐ Yes ☐ No ☒ N/A

If any of the items above are marked no or N/A, please explain: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval
New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.**

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. **Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM?** N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [ ] Improved data
   - [ ] Floodway revision
   - [X] Other New Approximate Study
     Explain
2. Flooding Source: Reems Road, Northern Avenue to Beardsley Road
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040053	Surprise, Town	Maricopa	AZ	04013C	1145E	09/04/91
	040053	Surprise, Town	Maricopa	AZ	04013C	1600E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1600E	09/04/91

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

Types of Flooding	Structures	Disciplines*
[ ] Riverine	[ ] Channelization	[X] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[X] Hydrology
[ ] Alluvial Fan	[ ] Bridge/Culvert	[X] Hydraulics
[X] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by	[ ] Fill	[ ] Structural
wind/wave action	[ ] Pump Station	[ ] Geotechnical
[ ] Yes	[X] None	[X] Land Surveying
[ ] No	[ ] Other (describe)	[ ] Other (describe)
[ ] Other (describe)		

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____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.)
_X_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 ______________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ________________

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations: If yes, explain how baseflow was determined:	☐ Yes ☐ No	☐ Yes ☒ No
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration: If yes, explain how calibration was performed.	☐ Yes ☐ No	☒ Yes ☐ No

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 years experience in the expertise listed above.

4. I have ☐ prepared ☒ reviewed the attached supporting data and analyses related to my expertise.

5. I ☒ have ☐ have not visited and physically viewed the project.

6. In my opinion, the following analyses and/or design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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. ☒ Other New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.

Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

   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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ______
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ______
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89
Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval
New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.**

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. **Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM?** N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______
2. Flooding Source: Roosevelt Irrigation District Canal Ponding Areas
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, B, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040039	Buckeye, Town	Maricopa	AZ	04013C	2050E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2050E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2065E	09/04/91
	040039	Buckeye, Town	Maricopa	AZ	04013C	2065E	09/04/91

Continue next page

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [x] None
- [ ] Other (describe) ______

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - ☐ Physical change
     - ☐ Existing
     - ☐ Proposed
   - ☐ Improved methodology
   - ☒ Improved data
   - ☐ Floodway revision
   - ☐ Other ______
     Explain ______
2. Flooding Source: Roosevelt Irrigation District Canal Ponding Areas
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EX:	480301	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040039	Buckeye, Town	Maricopa	AZ	04013C	2055D	04/15/88
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2055D	04/15/88
	040046	Goodyear, Town	Maricopa	AZ	04013C	2055D	04/15/88
	040046	Goodyear, Town	Maricopa	AZ	04013C	2060D	04/15/88

Continue next page

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

Types of Flooding	Structures	Disciplines*
☐ Riverine	☐ Channelization	☒ Water Resources
☐ Coastal	☐ Levee/Floodwall	☒ Hydrology
☐ Alluvial Fan	☒ Bridge/Culvert	☒ Hydraulics
☒ Shallow Flooding	☐ Dam	☐ Sediment Transport
☐ Lakes	☐ Coastal	☐ Interior Drainage
Affected by	☐ Fill	☐ Structural
wind/wave action	☐ Pump Station	☐ Geotechnical
☐ Yes	☐ None	☒ Land Surveying
☐ No	☐ Other (describe) ______	☐ Other (describe) ______
☐ Other (describe) ______		

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

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______

2. Flooding Source: Roosevelt Irrigation District Canal Ponding Areas
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, B, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2080F	09/04/91
	040038	Avondale, City	Maricopa	AZ	04013C	2080F	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2080F	09/04/91

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

Types of Flooding	Structures	Disciplines*
[ ] Riverine	[ ] Channelization	[x] Water Resources
[ ] Coastal	[ ] Levee/Floodwall	[x] Hydrology
[ ] Alluvial Fan	[x] Bridge/Culvert	[x] Hydraulics
[x] Shallow Flooding	[ ] Dam	[ ] Sediment Transport
[ ] Lakes	[ ] Coastal	[ ] Interior Drainage
Affected by	[ ] Fill	[ ] Structural
wind/wave action	[ ] Pump Station	[ ] Geotechnical
[ ] Yes	[ ] None	[x] Land Surveying
[ ] No	[ ] Other (describe) ______	[ ] Other (describe) ______
[ ] Other (describe) ______		

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  ☐ Yes ☒ No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  ☐ Yes ☐ No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? ☒ Yes ☐ 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.

Proposed Encroachments

With floodways:

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

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

Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ 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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No
- 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 acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).

____ 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.)

_X_ 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 ________________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

   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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.   Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980

Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE 23980 JEFFREY S. ERICKSON (CIVIL) Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

[X] Approximate study stream (Zone A)

[X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

[X] No existing analysis

[X] Improved data (see data revision on page 3)

[ ] Changed physical conditions of watershed (explain) ____________

[ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ____________

[ ] 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.

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

Approval of Analysis

[X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ______________

Maximum peak discharge: ______________ cfs

Second highest peak discharge: ______________ cfs

Source of information: ______________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ______________

Drainage area at gage: ______________ mi^2

Number of years of data: ______________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ______________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ______ scale ______ Contour interval

   b. Revision Request 1" = 400' scale 2 Foot Contour interval

   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)

- [ ] Physical change
  - [ ] Existing
  - [ ] Proposed
- [ ] Improved methodology
- [x] Improved data
- [ ] Floodway revision
- [ ] Other ____________
  - Explain ____________

2. Flooding Source: Ponding Behind the Southern Pacific Railroad (S.P.R.R.)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: AH, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2050E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2065E	09/04/91
	040039	Buckeye, Town	Maricopa	AZ	04013C	2065E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2070E	09/04/91

continue next page

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  - Affected by wind/wave action
    - [ ] Yes
    - [ ] No
- [ ] Other (describe) ____________

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [x] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe) ____________

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ____________

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

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______
2. Flooding Source: Ponding Behind the Southern Pacific Railroad (S.P. R.R.)
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: AH, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040046	Goodyear, Town	Maricopa	AZ	04013C	2070E	09/04/91
	040046	Goodyear, Town	Maricopa	AZ	04013C	2090E	09/04/91
	040038	Avondale, city	Maricopa	AZ	04013C	2090E	09/04/91
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2090E	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [x] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe) ______

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [x] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [ ] Other (describe) ______

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___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.)
_X_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 ______________________________

Forms Included

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):

Condition	Form
• Hydrologic analysis for riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (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 or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[ ] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

  [ ] Yes [ ] No

  If yes, the amount submitted is $ ____________________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

  [X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying (example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.)

3. I have 14 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 design, were performed in accordance with sound engineering practices: Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

   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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S. Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 15594 MARK T. GAVAN (CIVIL) Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
   [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
   Floodplain/Floodway Delineation, Hydrologic Analysis
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)

   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 New Study
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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE 23980 JEFFREY S. ERICKSON Date Signed 8/16/93 ARIZONA, U.S.A.

Jeffrey S Erickson

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

[X] Approximate study stream (Zone A)

[X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

[X] No existing analysis

[X] Improved data (see data revision on page 3)

[ ] Changed physical conditions of watershed (explain) ________

[ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ________

[ ] 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.

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

Approval of Analysis

[X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

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

None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi^2

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:		Maricopa County Hydrologic Manual
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No
	If yes, explain how baseflow was determined:		
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No
	If yes, explain how calibration was performed.		

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ________ scale ________ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval

New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

   New Study

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 349
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): 3150' West of Airport Road and 700' East of Dean Road.
3. This revision reflects (check one of the following):
   - ☒ New bridge/culvert not modeled in the FIS See below
   - ☐ Modified bridge/culvert previously modeled in the FIS
   - ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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)
   Bridges, see sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

Analysis

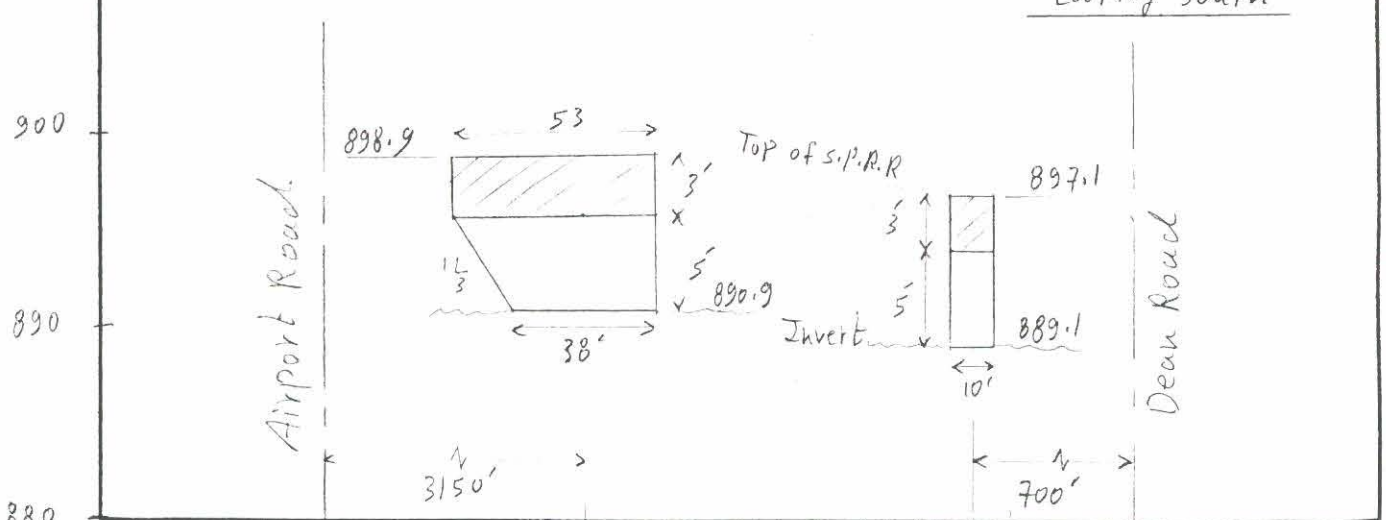
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Inverts:

890.78 888.98

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.

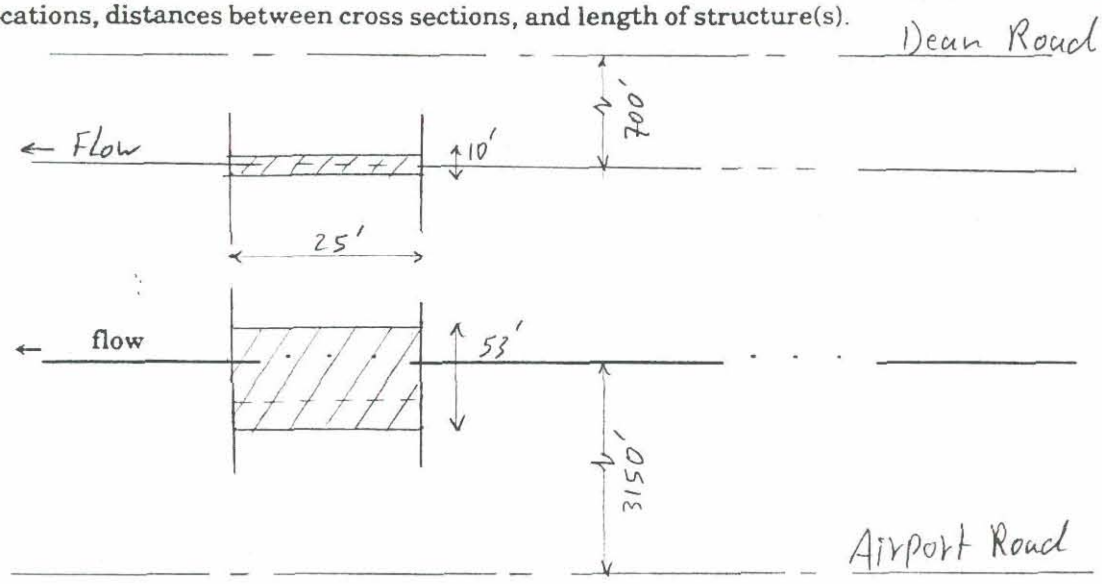
Looking South



BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	25
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	228.50

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of S.P.R.R.	
Upstream face		897.1	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	695.59	N/A
Downstream face	N/A	N/A

Discharge

	Low Flow + Pressure Flow		Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	1416		0	1416

The maximum depth of flow over the roadway/railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.03
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 351
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): 3050 Ft West and 4000 Ft West of Jackrabbit Trail
3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS see below

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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) Bridges, see sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) ______
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

Analysis

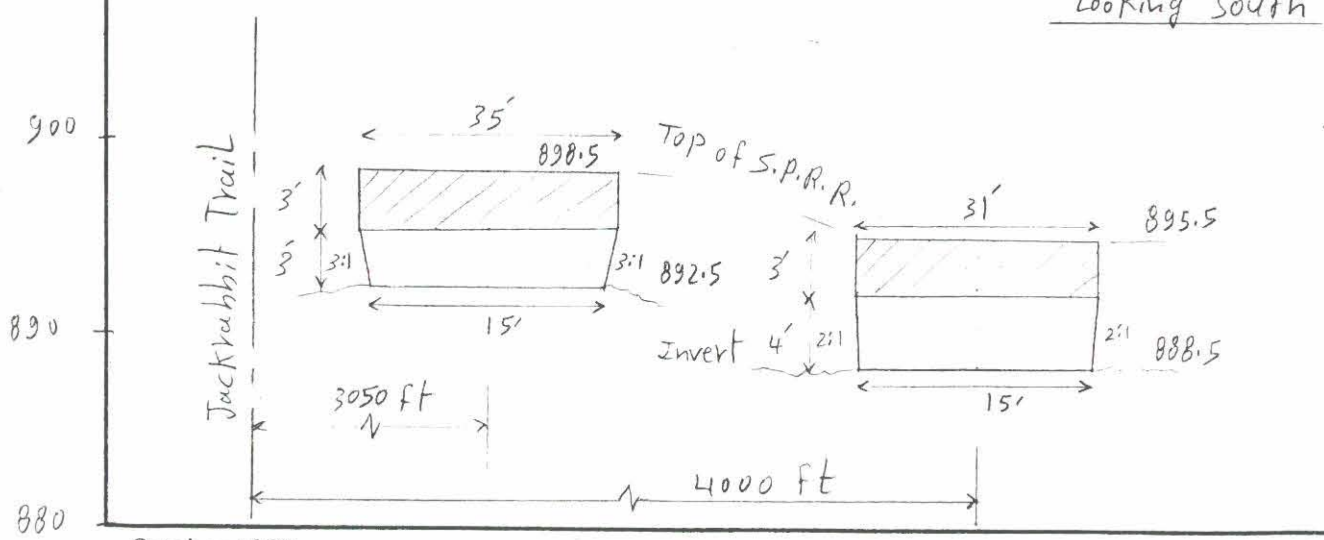
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Downstream Inverts:

892.38 888.38

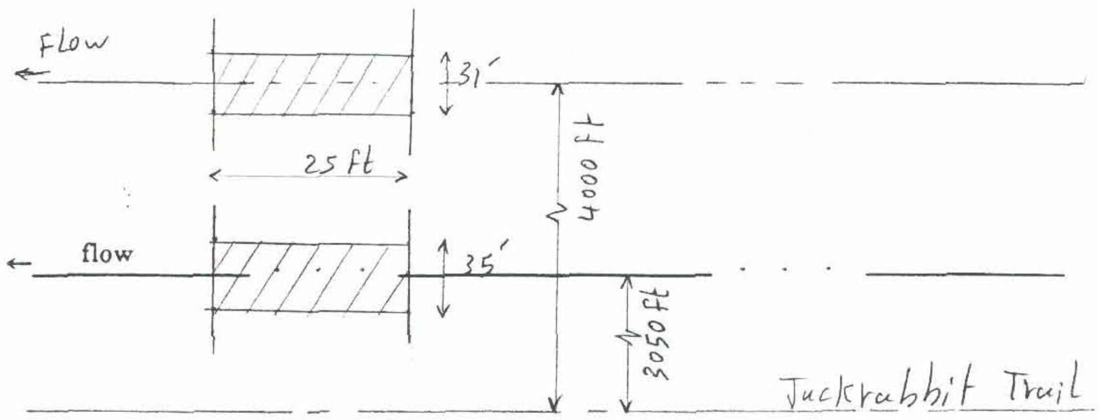
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking South



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	25
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	75, 92

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of S.P.R.R	
Upstream face		895.5	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	**Energy Gradient Elevations**
Upstream face	894.81	N/A
Downstream face	N/A	N/A

Discharge	**Low Flow** +	**Pressure Flow**	**Weir Flow**	**Total Flow**
Amount of flow through/over the structure(s) (cfs)	1003		0	1003
The maximum depth of flow over the roadway/ railroad (ft.)			0	
Weir length (ft.)			0	

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.03
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ____________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 354
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): 1820 Ft west of Perryville Rd., 1550 Ft East of Jackrabbit Trail
3. This revision reflects (check one of the following):

- ☒ New bridge/culvert not modeled in the FIS see below
- ☐ Modified bridge/culvert previously modeled in the FIS
- ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New study

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)
Corresponding to the above stations: Bridge (see sketch, 1-49" x 32" HERCP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates and HY8, V.3.2
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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

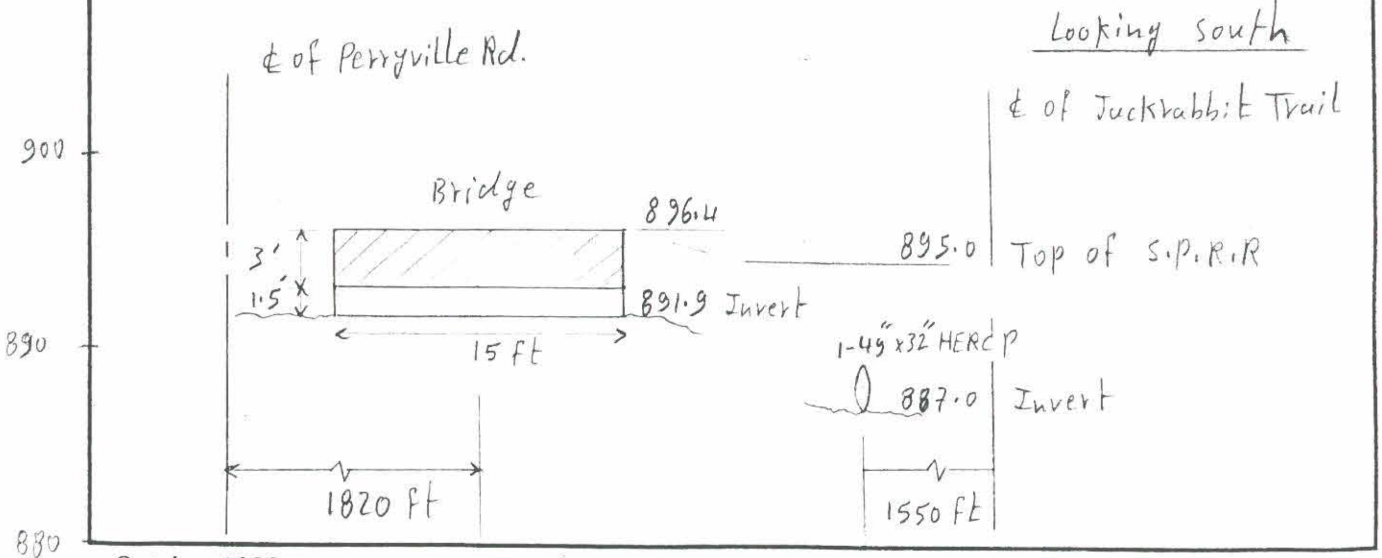
Analysis

Sketch the downstream 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.**

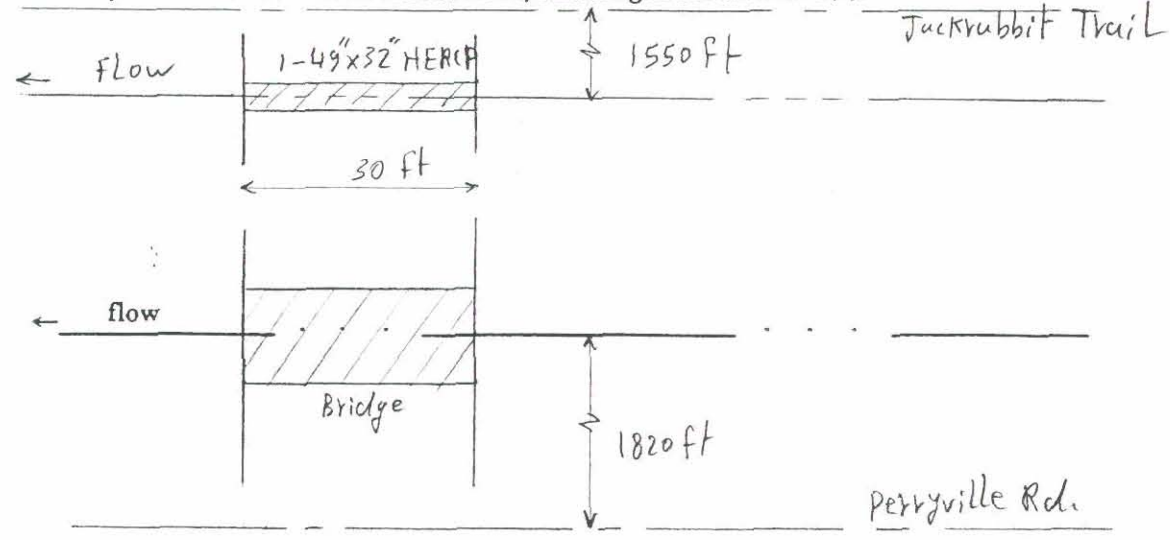
Downstream Inverts:

891.75   886.95

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. N/A Existing Structur

Culvert length or bridge width (ft.)	30
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	NA
Total culvert/bridge area (ft^2)	22.5, ≃ 11

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of S.P.R.R	
Upstream face		895.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	895.24	N/A
Downstream face	N/A	N/A

Discharge	Low Flow +	Pressure Flow +	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		539		539
The maximum depth of flow over the roadway/railroad (ft.)				0.24
Weir length (ft.)				

Top Widths

	Floodplain	Ponding Area	Floodway
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012, 0.030
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 356
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At Perryville Road
3. This revision reflects (check one of the following):

☒ New bridge/culvert not modeled in the FIS See below

☐ Modified bridge/culvert previously modeled in the FIS

☐ New bridge/culvert previously modeled in the FIS
(Explain why new analysis was performed.) New Study

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) Bridge, See dimensions on sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments) ______
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

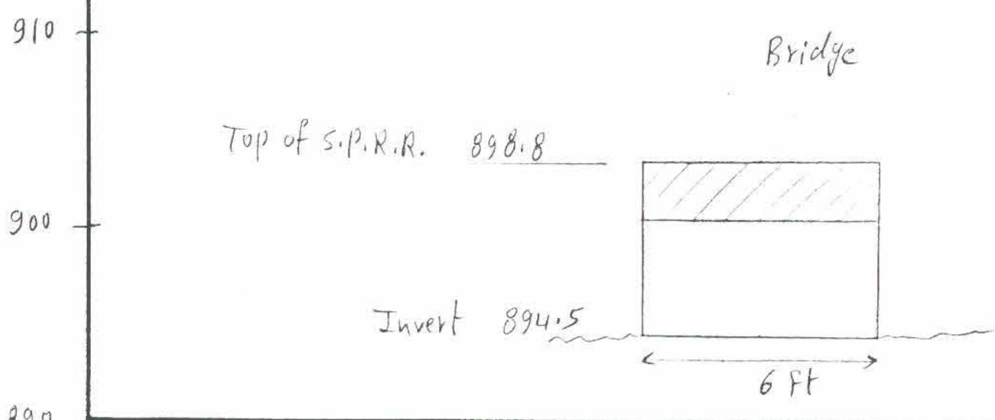
Analysis

Sketch the downstream 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.

Downstream Invert = 894.35

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.

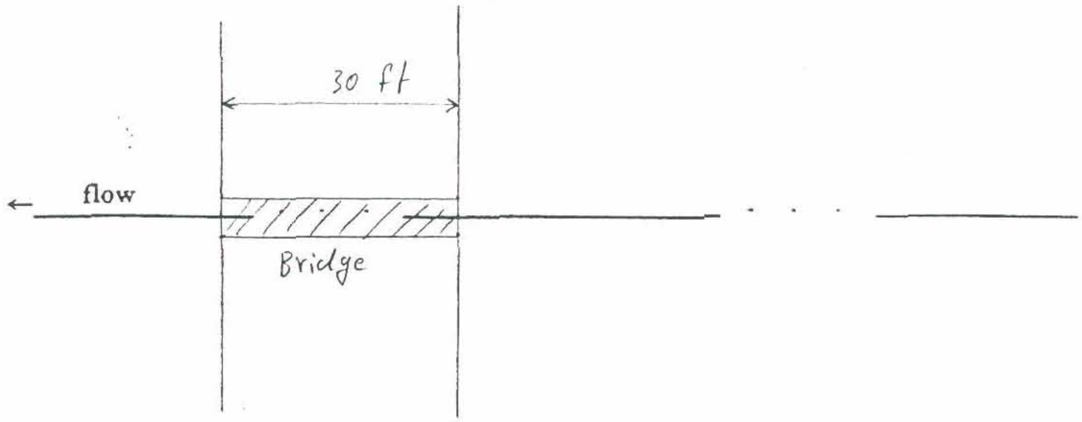
Looking South



BRIDGE/CULVERT FORM

Analysis (Cont'd)

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. N/A Existing Structu

Culvert length or bridge width (ft.)	30
Calculated **culvert/bridge area (ft^2)** by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	24

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
Upstream face	Top of S.P.R.R. 898.8	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	999.71	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow + Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		1775	1775
The maximum depth of flow over the roadway/railroad (ft.)			0.91
Weir length (ft.)			

Top Widths

Ponding Area

	Floodplain	Floodway
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.03
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________________________

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Maricopa County-Unincorporated Areas
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At sub-basins 357 and 359
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): Just East of Citrus Road.
3. This revision reflects (check one of the following):

   ☒ New bridge/culvert not modeled in the FIS See below

   ☐ Modified bridge/culvert previously modeled in the FIS

   ☐ New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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) Bridge, See dimensions on sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

BRIDGE/CULVERT FORM

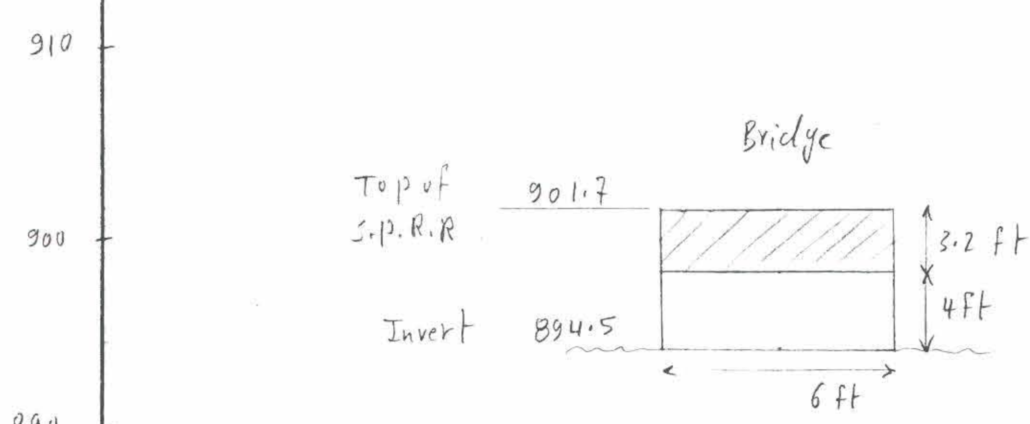
Analysis

Sketch the downstream 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.

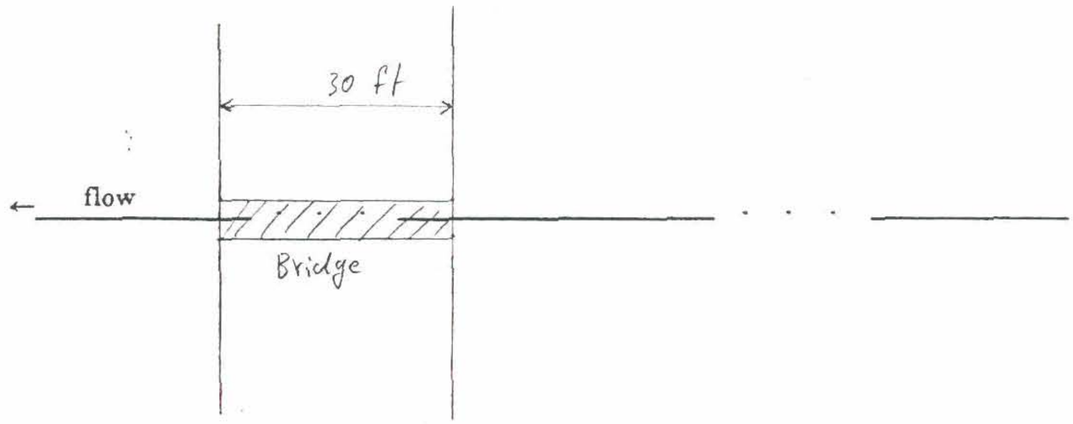
Downstream Invert = 894.35

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.

Looking South



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. N/A Existing Structure

Culvert length or bridge width (ft.)	30
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	24

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of S.P.R.R	
Upstream face		901.70	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	901.94	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow + Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	0	803	803
The maximum depth of flow over the roadway/ railroad (ft.)			0.24
Weir length (ft.)			

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.03
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ______________________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 347
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): Along S.P.R.R., between Sarival Av. and Cotton lane
3. This revision reflects (check one of the following):
   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS (Explain why new analysis was performed.) New Study

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) Bridges See dimensions on sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

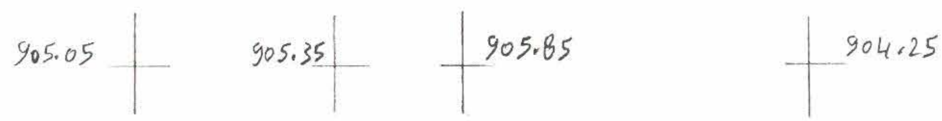
Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

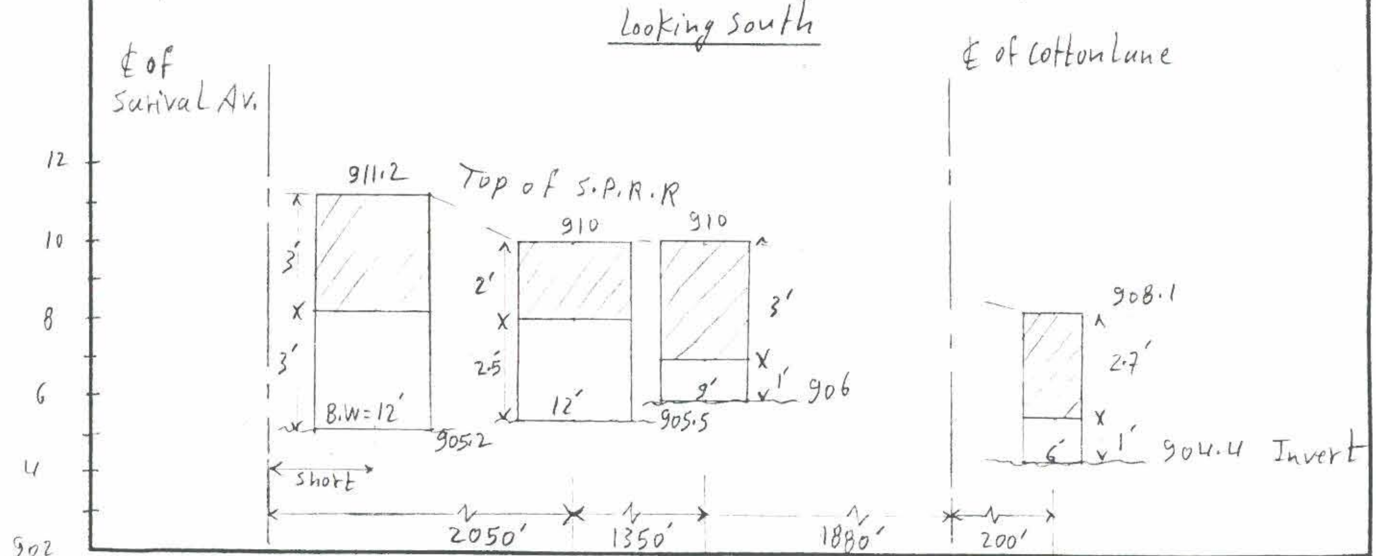
Analysis

Sketch the downstream 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.

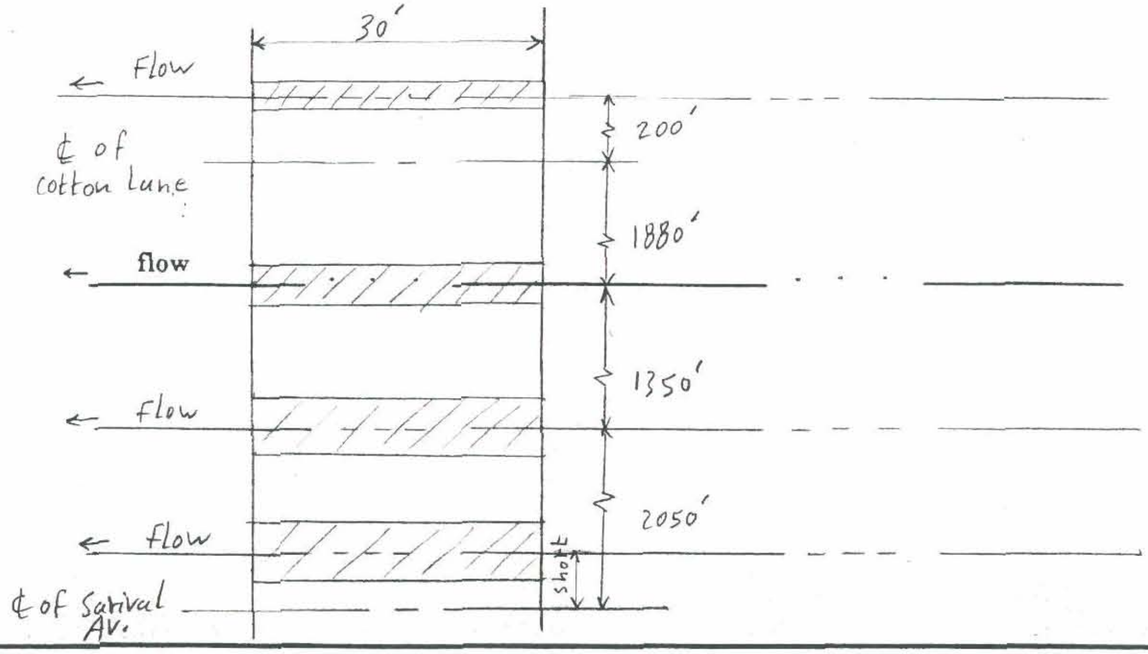
Downstream Inverts;



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. N/A Existing Structur

Culvert length or bridge width (ft.)	30
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	36, 30, 9, 6

Sarival Av. →

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of S.P.R.R.	
Upstream face		908.1	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	908.16	N/A
Downstream face	N/A	N/A

Discharge	Low Flow +	Pressure Flow +	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	611			611
The maximum depth of flow over the roadway/railroad (ft.)				0.06
Weir length (ft.)				

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.030
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? __________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table.. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Town of Goodyear
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At Sub-basin 348B
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): 1/2 mile West of Reems Road
3. This revision reflects (check one of the following):

- [x] New bridge/culvert not modeled in the FIS see below
- [ ] Modified bridge/culvert previously modeled in the FIS
- [ ] New bridge/culvert previously modeled in the FIS
  (Explain why new analysis was performed.) New Study

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) Bridge, See dimensions on sketch
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

BRIDGE/CULVERT FORM

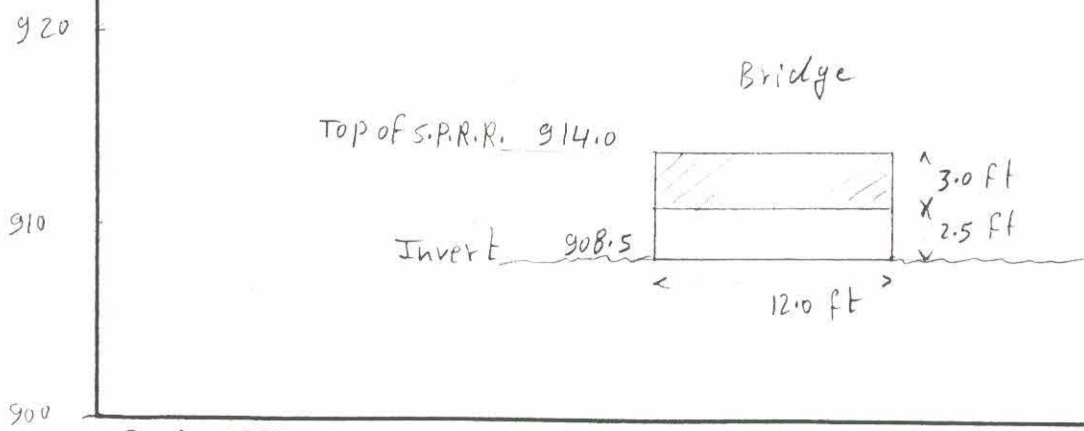
Analysis

Sketch the downstream 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.

Downstream Invert = 908.35

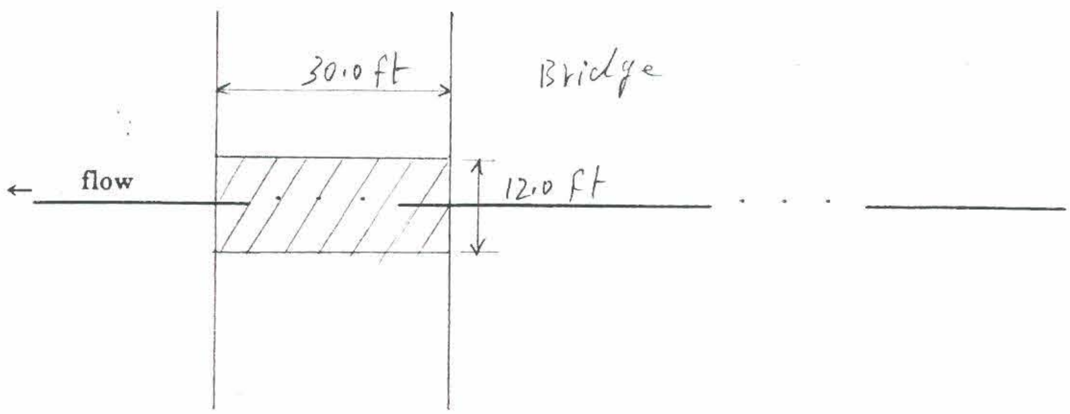
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking South



Analysis (Cont'd)

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. N/A Existing Structur

Culvert length or bridge width (ft.)	30
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	30

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank		Right Overbank
		Top of Railroad	
Upstream face		914.0	
Downstream face	N/A		N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	914.7	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow + Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)		645	645
The maximum depth of flow over the roadway/ railroad (ft.)			0.7
Weir length (ft.)			

Top Widths

	Floodplain		Floodway
		Ponding Area	
Upstream face	N/A		N/A
Downstream face	N/A		N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Analysis (Cont'd)

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.030
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ____

Comments (**explain any unusual situations**):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

FEMA USE ONLY

FORM 7

BRIDGE/CULVERT FORM*

Community Name: Avondale City
Flooding Source: Ponding Behind Southern Pacific Railroad (S.P.R.R.)
Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Identifier

1. Name of roadway, railroad, etc.: S.P.R.R., At sub-basin 320
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): At S.P.R.R and Agua Fria River
3. This revision reflects (check one of the following):

   - [x] New bridge/culvert not modeled in the FIS See below
   - [ ] Modified bridge/culvert previously modeled in the FIS
   - [ ] New bridge/culvert previously modeled in the FIS
     (Explain why new analysis was performed.) New Study

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)
   1-36" CP
2. Entrance geometry of culvert/ type of bridge opening (e.g. 30° - 75° wing walls with square top edge, sloping embankments and vertical abutments)
   Square edge entrance with headwall
3. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO,HY8) HEC-1 and Culvert Analysis Programs by Dodson and Associates

   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 explanation)

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A

*One form per new/revised bridge/culvert

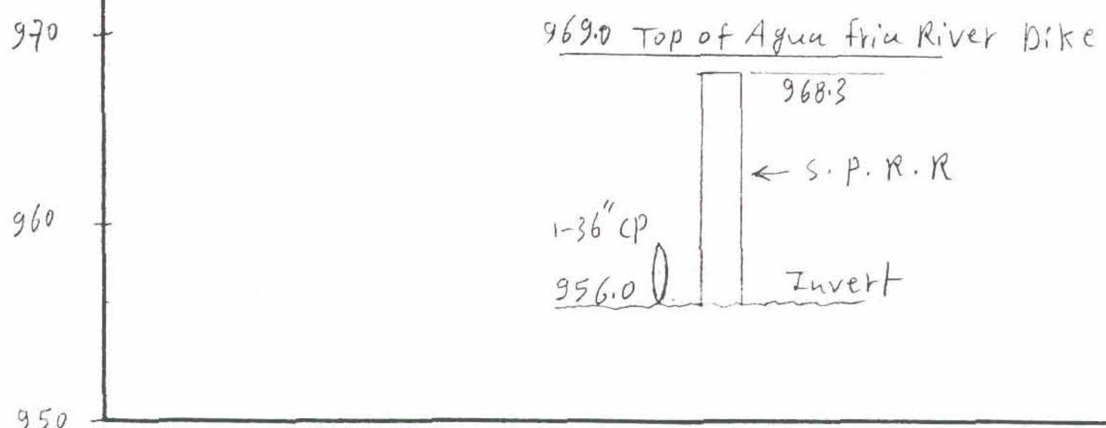
Analysis

Sketch the downstream 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.

Downstream Invert = 955.7 Ft

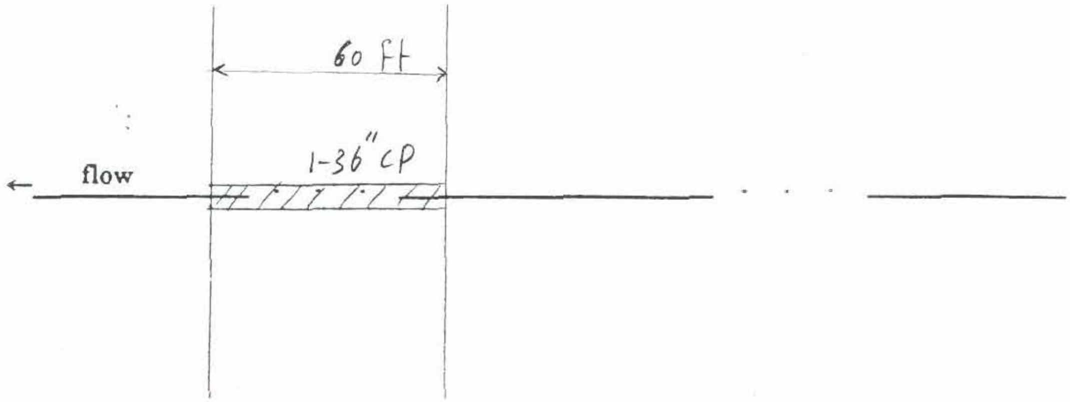
Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.

Looking East



Analysis (Cont'd)

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. N/A Existing Structure

Culvert length or bridge width (ft.)	60
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	N/A
Total culvert/bridge area (ft^2)	7.1

Analysis (Cont'd)

Elevations Above Which Flow is Effective for Overbanks

	Left Overbank	Right Overbank
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Minimum Top of Road Elevation

	Left Overbank	Right Overbank
	Top of S.P.R.R	
Upstream face	968.3	
Downstream face	N/A	N/A

100-Year Elevations

	Water-Surface Elevations (Ponding)	Energy Gradient Elevations
Upstream face	960.1	N/A
Downstream face	N/A	N/A

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
		Culvert Flow		
Amount of flow through/over the structure(s) (cfs)	N/A	51	0	51

The maximum depth of flow over the roadway/ railroad (ft.)	0
Weir length (ft.)	0

Top Widths

	Floodplain	Floodway
	Ponding Area	
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Top Widths

	Effective Flow	Effective and Ineffective Flow
Upstream face	N/A	N/A
Downstream face	N/A	N/A

Loss Coefficients

Entrance loss coefficient	0.50
Manning's "n" value assigned to the structure(s)	0.012
Friction loss coefficient through structure(s)	N/A
Other loss coefficients (e.g., bend, manhole, etc.)	N/A
Total loss coefficient	N/A
Weir coefficient	2.60
Pier coefficient	N/A
Contraction loss coefficient	N/A
Expansion loss coefficient	N/A

Sediment Transport Considerations (Not in Scope)

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 ☐ 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 ☐ 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 what is the impact on the conveyance capacity through the bridge/culvert? ________

Analysis (Cont'd)

Floodway Analysis N/A

Explain method of bridge encroachment
(floodway run) ______________________

____

____

Comments (explain any unusual situations):

Ponding W.S. elevation at culvert is interpolated from the stage-storage-discharge table. The W.S. elevation's in the HEC-1 summary printout are incorrect. The HEC-1 program does not print out the correct W.S. elevation when using the JD card. Also the weirflow shown, if any, from HEC-1 does not correspond exactly to the weir-length and depth over weir shown when used in the weir flow equation due to interpolation in a nonlinear equation.

Attach analysis

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FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     - Explain ______
2. Flooding Source: White Tanks Flood Retarding Structure #3
3. Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, X
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	1600 E	09/04/91

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes
  - Affected by wind/wave action
    - [ ] Yes
    - [ ] No
- [ ] Other (describe)
  Flood Control Detention Basin

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [x] Other (describe)
  Flood Control Detention Basin

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
____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.)
_X_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 ______________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[X] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

• The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________________.

or

• This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 14 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 design, were performed in accordance with sound engineering practices: Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping
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)

   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 New Study
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: Mark T. Gavan (please print or type)

Title: Vice President - The WLB Group, Inc. (please print or type)

Registration No. 15594, P.E. 16131, R.L.S. Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-22-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal (Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 8 years experience in the expertise listed above.

4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis

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)

   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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE
23980
JEFFREY S.
ERICKSON
Date Signed 8/16/93
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Aqua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] Approximate study stream (Zone A)
- [X] Detailed study stream (briefly explain methodology) U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] No existing analysis
- [X] Improved data (see data revision on page 3)
- [ ] Changed physical conditions of watershed (explain) ______
- [ ] Alternative methodology (justify why the revised model is better than model used in the effective FIS) ______
- [ ] 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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ________

Maximum peak discharge: ________ cfs

Second highest peak discharge: ________ cfs

Source of information: ________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ________

Drainage area at gage: ________ mi²

Number of years of data: ________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No
	If yes, explain how baseflow was determined:		
11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No
	If yes, explain how calibration was performed.		

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

		Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

   a. Effective FIS ________ scale ________ Contour interval

   b. Revision Request 1" = 400' scale 2 Foot Contour interval

   New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

   If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 11

DAM FORM

Community Name: Maricopa County, Unincorporated Areas

Flooding Source: Beardsley Canal Wash

Project Name/Identifier: White Tanks / Agua Fria Area Drainage Master Study

Identifier

Name of dam: White Tanks Flood Retarding Structure # 3

Location of dam along flood source (in terms of stream distance or cross section identifier): XI = 0.000

Check one of the following:

- [x] Existing dam
- [ ] New dam
- [ ] Modifications of existing dam (describe modifications) ________

Was the dam designed by __X__ Federal agency ______ State agency ______ Local government agency ______ Private organization?

Background

Does the dam have dedicated flood control storage? [x] Yes [ ] No

Does the project involve revised hydrology? [x] Yes [ ] No

Existing Dam with New Mapping for Storage Check

If yes, complete Hydrologic Analysis Form and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide any necessary debris and sediment yield analysis.

Does the revised hydrology affect the 100-year water-surface elevation behind the dam or downstream of the dam?

[x] Yes [ ] No

If yes, complete the Riverine Hydraulic Analysis Form and complete the table shown on the following page. N/A – WSEL computed by HEC-1 Stage - Storage - Disharge routine.

Results

	Stillwater Elevation Behind the Dam	
	FIS	Revised
10-year		
50-year		
100-year Intepolated From HEC-1 Model	—	1198.13
500-year		
Normal Pool Elevation		

Was long term sediment accumulation taken into consideration in determining the normal pool elevation?
☐ Yes ☒ No

Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the 100-year flood?
☒ Yes ☐ No

If no, and the dam has a reasonable probability of failure during the 100-year flood, please attach dam break analysis.

Provide the following data on the dam:

Height: 1212.1
Crest Elevation: 1209.0
100-year flood storage capacity: 722 AC-Ft.
Freeboard (measured from 100-year water surface elevation): 13.97'

Spillway(s):

Type: ☐ gated ☒ ungated
Width: Natural Ground ≅ 100'
Height: N/A
Crest Elevation: 1209.0

Outlet(s):

Type: ☐ gated ☐ ungated
Width:
Height:
Diameter:
Invert Elevation:

Explain flow regulation plan: Flood Control Structure with small gated outlets to slowly release storage once flood has passed.

Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam?
☒ Yes ☐ No

Was the dam designed in accordance with all currently applicable local, State, and Federal regulations?
☒ Yes ☐ No

If no, please provide explanation.

FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.

Attach copy of formal operation and maintenance plan Contact Flood Control District of Maricopa County

Answer N/A to any questions which are not applicable

FEMA USE ONLY

FORM 1

REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

1. The basis for this revision request is (are): (check all that apply)
   - [ ] Physical change
     - [ ] Existing
     - [ ] Proposed
   - [ ] Improved methodology
   - [x] Improved data
   - [ ] Floodway revision
   - [ ] Other ______
     Explain ______
2. Flooding Source: White Tanks Flood Retarding Structure #4
3. Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study
4. FEMA zone designations affected: A, B
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, 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	Katy, City	Harris, Fort Bend	TX	480301	0005D	02/08/83
	480287	Harris County	Harris	TX	48201C	0220G	09/28/90
	040037	Unincorporated Areas	Maricopa	AZ	04013C	2055D	04/15/88

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

Types of Flooding
- [ ] Riverine
- [ ] Coastal
- [ ] Alluvial Fan
- [ ] Shallow Flooding
- [ ] Lakes
  Affected by wind/wave action
  - [ ] Yes
  - [ ] No
- [ ] Other (describe)
  Flood Control Detention Basin

Structures
- [ ] Channelization
- [ ] Levee/Floodwall
- [ ] Bridge/Culvert
- [ ] Dam
- [ ] Coastal
- [ ] Fill
- [ ] Pump Station
- [ ] None
- [x] Other (describe)
  Flood Control Detention Basin

Disciplines*
- [x] Water Resources
  - [x] Hydrology
  - [x] Hydraulics
  - [ ] Sediment Transport
  - [ ] Interior Drainage
- [ ] Structural
- [ ] Geotechnical
- [x] Land Surveying
- [ ] Other (describe) ______

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

Floodway Information

- Does the affected flooding source have a floodway designated on the effective FIRM or FBFM?
  [ ] Yes [X] No
- Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM?
  [ ] Yes [ ] No

If yes, give reason: N/A

Attach request to revise the floodway from community CEO or designated official.

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.

Does the State have jurisdiction over the floodway or it's adoption by communities participating in the NFIP? [X] Yes [ ] 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.

Proposed Encroachments

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 increase at any location by more than 0.000 feet? [ ] Yes [ ] No

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 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 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.

Revision Requestor Acknowledgement

- Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, 65, and 72, I believe that the proposed revision [X] is [ ] is not in compliance with the requirements of the aforementioned NFIP Regulations.

Community Official Acknowledgement

- Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? [X] Yes [ ] No
- Does this revision request have the endorsement of the community? [X] Yes [ ] No

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

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

Operation and Maintenance

- Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? ☐ Yes ☒ 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

Requested Response from FEMA

- 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).
___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.)
_X_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 ________________________________

Forms Included

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 riverine flooding 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	[ ] Riverine Hydraulic Analysis (Form 4)
• The request is based solely on updated topographic information	[X] Riverine/Coastal Mapping (Form 5)
• The request involves any type of channel modification	[ ] Channelization (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	[ ] Bridge/Culvert Form (Form 7)
• The request involves a new or revised levee/floodwall system	[ ] Levee/Floodwall System Analysis (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 (Form 10)
• The request involves an existing, proposed, or modified dam	[X] Dam Form (Form 11)
• This request involves structures credited as providing protection from the 100-year flood on an alluvial fan	[ ] Alluvial Fan Flooding Form (Form 12)

Initial Review Fee

- The minimum initial review fee for the appropriate request category has been included.

[ ] Yes [ ] No

If yes, the amount submitted is $ ____________.

or

- This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development.

[X] Yes [ ] No

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.

2. I am licensed with an expertise in Hydrology, Hydraulics, Land Surveying [example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]

3. I have 14 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis, Survey & Topographic Mapping

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)

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 New Study

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: Mark T. Gavan
(please print or type)

Title: Vice President - The WLB Group, Inc.
(please print or type)

Registration No. 15594, P.E. 16131, R.L.S.   Expiration Date: December 31, 1993

State Arizona

Type of License Professional Engineer Registered Land Surveyor

Mark T. Gavan
Signature

8-23-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 15594 MARK T. GAVAN Date Signed ARIZONA, U.S.A. (CIVIL)

REGISTERED LAND SURVEYOR CERTIFICATE NO. 16131 MARK T. GAVAN Date Signed ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 2

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Hydrology, Hydraulics
[example: water resources (hydrology, hydraulics, sediment transport, interior drainage)* structural, geotechnical, land surveying.]
3. I have 8 years experience in the expertise listed above.
4. I have [X] prepared [ ] 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 design, were performed in accordance with sound engineering practices:
Floodplain/Floodway Delineation, Hydrologic Analysis
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)

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 New Study

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: Jeffrey S. Erickson
(please print or type)

Title: Assistant Vice President
(please print or type)

Registration No. 23980 Expiration Date: September 31, 1993

State Arizona

Type of License Professional Engineer

Jeffrey S. Erickson
Signature

8-16-93
Date

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE (CIVIL) 23980 JEFFREY S. ERICKSON Date Signed 8/16/93 ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

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

FEMA USE ONLY

FORM 3

HYDROLOGIC ANALYSIS FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale, and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Hydrologic Analysis in FIS

- [X] **Approximate study stream (Zone A)**
- [X] **Detailed study stream (briefly explain methodology)** U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package

Reason for New Hydrologic Analysis

- [X] **No existing analysis**
- [X] **Improved data (see data revision on page 3)**
- [ ] **Changed physical conditions of watershed (explain)** ____________
- [ ] **Alternative methodology (justify why the revised model is better than model used in the effective FIS)** ____________
- [ ] **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.

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

Approval of Analysis

- [X] Approval of the hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., Study prepared under direct contract with 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.

Review of Results

Stream White Tanks/Agua Fria Drainage Area

Comparison of 100-year Discharges

Location:	FIS:	Revised:
N/A	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs
	cfs	cfs

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).

N/A

Attach a completed Review of Results page for each flooding source.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (i.e. no changed hydraulic conditions)? ☐ Yes ☒ No New Study

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.

Historical Flooding Information

Is historical data available for the flooding source? ☐ Yes ☒ No
If yes, provide the following:

Location along flooding source: ____________

Maximum peak discharge: ____________ cfs

Second highest peak discharge: ____________ cfs

Source of information: ____________

Gage Record Information

Location of nearest gage to project site (along flooding source or similar watershed; specify)
None Available

Gaging Station: ____________

Drainage area at gage: ____________ mi²

Number of years of data: ____________

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
Subbasin Area	☒	☐	New 1"=400' Topographic Mapping
Lag Time, L, LeA, S, Kn	☒	☐	USGS
Green & Ampt	☒	☐	FCD Manual
Routing Reach	☒	☐	FCD Manual
Storage Routing	☒	☐	New 1"=400' Topographic Mapping

- 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 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.

Methodology for New Analysis

☐ Statistical Analysis of Gage Records (use Attachment A)

☐ Regional Regression Equations (use Attachment B)

☒ Precipitation/Runoff Model (use Attachment C)

☐ Other (specify; attach backup computations and supporting data) ____________

Attachment C: Precipitation/Runoff Model

		FIS:	Revised:
1.	Method or model used:	N/A	HEC-1
	Version:	N/A	Version 4.0
	Date:	N/A	
2.	Source of rainfall depth:	N/A	NOAA Atlas II
3.	Source of rainfall distribution:	N/A	SCS Type II
4.	Rainfall duration:	N/A	24-Hour
5.	Areal adjustment to precipitation (%):		NOAA Atlas II - Varies
6.	Hydrograph development method:	N/A	Phoenix Valley S-Graph
7.	Loss rate method:	N/A	Green-Ampt
	Source of soils information:	Maricopa County Hydrologic Manual	
	Source of land use information:	N/A	Maricopa County Zoning Maps
8.	Channel routing method:	N/A	Normal Depth
9.	Reservoir routing:	☐ Yes ☐ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

11.	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☒ Yes ☐ No

If yes, explain how calibration was performed.

Checked against Previous Hydrologic Analyses performed in the Study Area to see if results were within reasonable limits.

13. Future land use conditions: ☐ Yes ☒ 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, and supporting maps.

FEMA USE ONLY

FORM 5

RIVERINE/COASTAL MAPPING FORM

Community Name: Maricopa County-Unincorporated Areas, Towns of: Surprise, El Mirage, Goodyear, Litchfield Park, Avondale and Buckeye

Flooding Source: White Tanks/Agua Fria Drainage Area

Project Name/Identifier: White Tanks/Agua Fria Area Drainage Master Study

Mapping Changes

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

	Item	Included
A.	Revised 100- year floodplain boundaries (Zone A)	[X] Yes [ ] No [ ] N/A
B.	Revised 100- and 500-year floodplain boundaries	[ ] Yes [ ] No [X] 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	[ ] Yes [ ] No [X] N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	[ ] Yes [ ] No [X] N/A
I.	The requestor's property boundaries and community easements	[ ] Yes [ ] No [X] 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 1929, NAVD 1988, etc.) NGVD 1981	[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: New Study

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 Topos, 12/89 Field Survey 1/88-1/89

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

a. Effective FIS ______ scale ______ Contour interval

b. Revision Request 1" = 400' scale 2 Foot Contour interval
New Study

Note: Revised topographic information must be of equal or greater detail

Mapping Changes (Continued)

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.

   Attach additional pages if needed. Red-lined maps are submitted for entire study area.

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 ☒ No

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

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

      If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries.

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

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM? N/A ☐ Yes ☐ 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? N/A ☐ Yes ☐ No

   If no, explain:

8. Manual or digital map submission:

   ☒ Manual
   ☐ 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.

Not Applicable

Earth Fill Placement

1. Has fill been placed in the regulatory floodway? ☐ Yes ☐ No

If yes, please attach completed Riverine Hydraulic Form.

2. Has fill been placed in floodway fringe (area between the floodway and 100-year floodplain boundaries)? ☐ Yes ☐ 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.

3. Has fill been placed in a V-zone? ☐ Yes ☐ 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.

FEMA USE ONLY

FORM 11

DAM FORM

Community Name: Maricopa County - Unincorporated Areas

Flooding Source: Tuthill Dike Wash, Jackrabbit Trail Wash

Project Name/Identifier: White Tanks / Agua Fria Area Drainage Master Study

Identifier

Name of dam: White Tanks Flood Retarding Structure #4

Location of dam along flood source (in terms of stream distance or cross section identifier):

X = 0.000 Tuthill Dike Wash

X = 0.000 Jackrabbit Trail Wash

Check one of the following:

- [X] Existing dam
- [ ] New dam
- [ ] Modifications of existing dam (describe modifications) ______

Was the dam designed by __X__ Federal agency _____ State agency _____ Local government agency _____ Private organization?

Background

Does the dam have dedicated flood control storage? [X] Yes [ ] No

Does the project involve revised hydrology? [X] Yes [ ] No

Existing Dam with New Mapping for Storage Check

If yes, complete Hydrologic Analysis Form and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide any necessary debris and sediment yield analysis.

Does the revised hydrology affect the 100-year water-surface elevation behind the dam or downstream of the dam?

[X] Yes [ ] No

If yes, complete the Riverine Hydraulic Analysis Form and complete the table shown on the following page. N/A - WSEL computed by HEC-1 Stage-Storage-Discharge routine.

Results

	Stillwater Elevation Behind the Dam FIS	Revised
10-year		
50-year		
100-year Interpolated From HEC-1 Model	—	1041.42
500-year		
Normal Pool Elevation		

Was long term sediment accumulation taken into consideration in determining the normal pool elevation?

☐ Yes ☒ No

Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the 100-year flood?

☒ Yes ☐ No

If no, and the dam has a reasonable probability of failure during the 100-year flood, please attach dam break analysis.

Provide the following data on the dam:

Height: 1054.0
Crest Elevation: 1048.5
100-year flood storage capacity: 658 Ac-Ft.
Freeboard (measured from 100-year water surface elevation): 12.6 Ft.

Spillway(s):
Type: ☐ gated ☒ ungated
Width: Natural Ground ≅ 100 ft
Height: N/A
Crest Elevation: 1048-5

Outlet(s):
Type: ☐ gated ☐ ungated
Width:
Height:
Diameter:
Invert Elevation:

Explain flow regulation plan: Flood Control Structure will small gated outlets to slowly release storage once flood has passed

Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam?

☒ Yes ☐ No

Was the dam designed in accordance with all currently applicable local, State, and Federal regulations?

☒ Yes ☐ No

If no, please provide explanation.

FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.

Attach copy of formal operation and maintenance plan Contact Flood Control District of Maricopa County

Answer N/A to any questions which are not applicable