ISAACSON & ARFMAN, P.A. Consulting Engineering Associates
Thomas O. Isaacson, PE(RET.) & LS(RET.) . Fred C. Arfman, PE . Åsa Nilsson-Weber, PE

March 3, 2015

FEMA LOMC Clearinghouse
Attention: LOMR Manager
847 South Pickett Street
Alexandria, VA 22304-4605

RE: Case No. 15-06-0805R
Response to Request for Additional Information

Dear Mr. Makhdoom:

We have received your request for additional information. We have responded to your comments in the following manner:

1. *"This CLOMR request will be processed by FEMA only after FEMA receives documentation from the requestor that demonstrates compliance with the Endangered Species Act (ESA). The requestor must demonstrate ESA compliance by submitting to FEMA either an Incidental Take Permit, Incidental Take Statement, "not likely to adversely affect" determination from the National Marine Fisheries Service or the U.S. Fish and Wildlife Service (collectively known as "the Services"), or an official letter from the Services concurring that the project has "No Effect" on listed species or critical habitat.*
If the project is likely to cause jeopardy or adverse modification to species, FEMA may deny the CLOMR request. For additional information about the ESA and compliance requirements and for responses to frequently asked questions, please refer to FEMA Procedure Memorandum 64, which can be accessed on FEMA's Web site at http://www.fema.gov/media-library-data/1388780442489-c5e577ea3d1da878b40e20b776804736/Procedure+Memorandum+64-Compliance+with+the+Endangered+Species+Act+(ESA)+for+Letters+of+Map+Change+(Aug+2010).pdf.
Please submit all necessary information to the Services, such as a biological assessment report that determines what impact the project will have on each threatened or endangered species in the area affected by the project. Once a response is received from the Services, please submit to us, a copy of your assessment (including all background information) and all correspondence with the Services.

I apologize. We had an email from the NM Environment Department, but I neglected to add it to the submittal. It is provided in the revision.

2. *"Our review revealed that Section C (Bridge/Culvert) of Application/Certification Form 3, entitled "Riverine Structures Form," was not filled out for Box Culverts under Tramway Boulevard. Please resubmit revised copy of Application/Certification Form 3 after filling out*

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Section C and ensure that all the structures not modeled in the effective Flood Insurance Study (FIS) are included in the MT-2 Form 3."

One of the Section C's provided should have been labeled as "Existing Tramway Blvd Box Culvert" instead of "Pino Arroyo Box Culvert." A correction is provided in the revision.

3. *"Please submit legible copy of the as-built construction plans for the Box Culverts under Tramway Boulevard. Please also submit construction plans for the proposed Pino Arroyo Box Culvert. Please highlight the dimension of the structures and all elevations necessary for verification of the hydraulic modeling. Please ensure the drawings are certified and reference the vertical datum."*

At the time this structure was built the New Mexico State Highway and Transportation Department (now known as the NMDOT) used standard details to cover almost all of their concrete box culvert construction. They didn't include a detail for the box culvert in the as-built drawings.

The dimensions provided for the hydraulic modeling were based on the topographic survey generated for this CLOMR.

4. *"According to the submittal, improvements were made to Tramway Boulevard in 1993 that were never addressed with a Conditional Letter of Map Revision (CLOMR) request and a Letter of Map Change (LOMC). Please provide details of all the construction already completed at the site including dates when these changes occurred. Please also provide a detailed explanation of the circumstances for not submitting a Letter of Map Revision (LOMR) request for all the completed work so far."*

The as-builts provided in Appendix C were from the construction that changed the infrastructure and flooding conditions. They are dated 1993.

I am not part of the NMDOT's decision-making process, and the people who would have made those decisions at NMDOT 22 years ago are gone. My best guess is that the NMDOT had no motivation to spend the time or money to submit a LOMR, since they don't have any structures that require flood insurance.

5. *"Our review revealed that revised hydrology has been used for this CLOMR. Please provide all supporting documentation such as certified copy of the drainage basin delineations supported by topographic contour data. Please also clarify if a revised model was created for this CLOMR. In that case, a digital executable copy of the hydrologic model used should be provided."*

We are requesting revised hydrology as shown on Form 1, Section B.5.a., Form 2, Section A, and the report and memorandum in Appendix B. Hydrology digital files were included on the CD in Appendix F. I've also added language to the Introduction to make this clearer.

The hydrology is based on the "High Desert Subdivision Drainage Management Master Plan," by Bohannan Huston, December 1993. This report was previously approved by the City of

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Albuquerque. The "Technical Memorandum" by Bohannon-Huston, Inc dated September 24, 2014 slightly modifies the basins to detail the site. The memorandum is stamped by Alandren Etlantus (NMPE #19995). The memorandum includes the basin map from the "High Desert Subdivision Drainage Management Master Plan" stamped by Craig W. Hoover (NMPE #11848).

6. *"Our review revealed that none of the culverts have been modeled in the submitted HEC-RAS models. Please submit the revised hydraulic models."*

The cross-section lid was used for these culverts. This is an appropriate use of the cross-section lid because:

- In both culverts the flow is supercritical and never approaches the low chord.
- The existing box culvert has multiple openings. According to the HEC-RAS 4.1 Reference Manual "The HEC-RAS multiple opening methodology is limited to subcritical flow profiles. The program can also be run in mixed flow regime mode, but only a subcritical profile will be calculated in the area of the multiple opening." (Page 7-2, 2nd paragraph.) A subcritical profile is an inaccurate representation of this culvert.
- The proposed box culvert geometry changes internally, including the invert slope, width of the box, and curves. All of these conditions cannot be modeled with the culvert function in HEC-RAS. (Please see comments in "cHECk-RAS Report" in Appendix B.)

7. *"Our review revealed that ineffective flow areas are required to be included at Cross-Sections 2300 and 2400 in the proposed conditions model and Cross-Sections 1462.03, 1481.63, 1550, 2300, and 2400 in the submitted existing conditions HEC-RAS model. Please submit the revised models after including ineffective flow area wherever needed."*

I added ineffective flow in those areas.

8. *"Our review revealed that the 1-percent-annual-chance (base) Flood Elevations (BFEs) are higher than the end points of Cross-Sections 1873.47, 1086, and 1054.4 in the submitted existing conditions HEC-RAS hydraulic computer model and Cross-Sections 1086 and 1054.4 in the submitted proposed conditions HEC-RAS mode along Pino Arroyo. The use of vertically extended cross sections might both overestimate the BFEs and underestimate the width of the base floodplain. Please revise the cross-section geometry coordinates so that the end points of all cross sections are equal to or extend higher than the corresponding BFEs, or provide documentation that quantifies the amount of split flow that would occur if the cross-sections were not extended and the extent of all flow breakouts."*

Downstream of Tramway Blvd (in the existing conditions only) Cross Section 1873.47 would divert into the portion of the Pino Arroyo that rejoins the main flow just upstream of the dam. This area is problematic. The analysis area would more than double in width if I ensure that there are no overflow locations. The cross-sections would be so wide they would intersect each other. I believe this is an overly complicated solution for this minor concern.

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Cross Sections 1086 and 1054.4 are within the 100-year dam pool. The flow will definitely be higher than the end points of the cross sections, but will be contained within the dam. Break-outs are not a concern.

9. *"Our review revealed that the submitted existing and proposed conditions hydraulic models were run using the mixed flow regime. FEMA accepts base floodplain boundary delineations based on supercritical flow depths only for concrete-lined, engineered channels. Because the existing and proposed channel are not concrete lined, critical depth is the minimum depth permissible to map the base floodplain boundary delineations along this reach. Please revise the hydraulic analysis for this portion of the channel using subcritical modeling, or provide an explanation for not using subcritical modeling."*

According to the cHECk-RAS results "The profile is computed as mixed flow regime. It is acceptable if part of the stream is an engineered channel. For Flood Insurance Studies a subcritical flow regime should be selected,for natural streams. Supercritical flow regime should be selected if the entire stream is an engineered channel. The flow regime should be changed appropriately or justify the selection of mixed flow regime."

Both the existing and proposed conditions are a mix of lined and natural channel.

In the existing condition the culvert under Tramway Blvd and the concrete rundown into the Pino Dam are lined channels in a supercritical condition. The remaining portions are natural. There is hydraulic jump upstream and downstream of the existing box culvert.

For the proposed condition the 70'± portion upstream of the existing condition is a natural channel. Everything else is either in a culvert or a lined channel. There is hydraulic jump upstream of the existing box culvert.

Per the HEC-RAS User's Manual, hydraulic jump is another reason to use the mixed flow regime. Mixed flow regime is appropriate for both analyses.

10. *"Our review revealed that the submitted work map, entitled " Topographic Work Map, Proposed Conditions," prepared by Issacson & Arfman, P.A. Consulting Engineering Associates, sealed, signed, and dated October 22, 2014, is either not clear or does not provide essential information required to complete our review of this request. Please submit a topographic work map, certified by a registered Professional Engineer, that shows all applicable items listed in Section C of Application/Certification Form 2, entitled "Riverine Hydrology and Hydraulics Form," including the following information:*

    a. *Please show clearly boundary delineations of the proposed conditions and currently effective base floodplain on the same map.* See revised Topographic Work Map. *Please do not show existing conditions floodplain.* OK. *It is helpful to use different line types and line colors to differentiate delineations. Please do not use shading. Please continue to show a legend to all the proposed and effective flood hazard information shown."* OK.
    b. *Logical tie-ins between the proposed and effective flood hazard boundary delineations. Please provide both BFE and graphical tie-in at the upstream and*

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downstream ends. I've added the BFE's at the upstream tie-in. The downstream tie-in is the existing BFE for the Pino Dam – Zone AE (EL 5973). For the graphical I believe I did provide logical tie-ins.

c. *Please continue to show topographic contour information used in the hydraulic model and for the boundary delineations of the base floodplain."* OK.

d. *Locations and alignments of all cross-sections used in the hydraulic model.* On the plans.

e. *The flow line used in the hydraulic model.* On the plans.

f. *Certification by a registered Professional Engineer.* On the plans.

g. *Reference to a datum, such as the National Geodetic Vertical Datum of 1929.* Thanks for pointing that out. I missed that one. It is added to the Topographic Work Map in the revision.

h. *Please ensure that the top width of the base floodplain computed in the proposed conditions hydraulic model match, at all cross-sections, the base floodplain top width shown on the topographic work map. The geometry of the cross-sections in the proposed conditions hydraulic model should reflect the topography shown on the work map.* Done.

i. *Please ensure that the channel distances computed in the proposed conditions hydraulic analysis at all cross-sections match the approximate channel distance shown on the above-referenced topographic work map.* Done.

j. *Please continue to provide digital Computer-Aided Design (CAD) or Geographic Information System (GIS) data that reflect the revised topographic work map. Please ensure the digital data are spatially referenced and cite what projection (coordinate system, example: UTM/State Plane) was used, so that the data may be used for accurate mapping. The important data to show on the digital work map are the contour information, the profile baseline, the cross-section lines, the road crossings and hydraulic structures, the effective and proposed conditions flood hazard delineations and the tie-in locations. All data should be clearly labeled, and all information should be contained within the drawing and not externally referenced."* Done.

11. *"Please submit an updated annotated Flood Insurance Rate Map (FIRM), at the scale of the effective FIRM, that clearly shows the effective boundary delineation and revised boundary delineation as shown on the submitted work map of the base floodplain and how the revised boundary delineation ties-in to the boundary delineation shown on the effective FIRM at the downstream and upstream ends of the revised reach."*

I've added the upstream BFE to the annotated FIRM. The downstream reach ties-in at the 100-year dam pool.

12. *"Our review indicates that the proposed project causes an increase of more than 1.0 foot in BFEs,the elevation of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). Please provide evidence that the proposed project satisfies the requirements of Section 65.12 of the National Flood Insurance Program (NFIP) regulations, including the items stated below.*

    a. *Documentation that individual legal notices have been sent to all property owners affected by the increases in BFEs due to the proposed project. Documentation of legal notice may take the form of a copy of the letter sent and either a mailing list or*

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certified mailing receipts. The attached template may be used to prepare the legal notice. ***Prior to distribution, please submit a draft copy of the notice for verification of content.***

b. *Certification by a Professional Engineer that no structures are located in the areas that would be impacted by the increases in BFEs due to the project.*
c. *An evaluation of alternatives that would not result in an increase in BFE of more than 1.0 foot and an explanation why these alternatives are not feasible.*

Please see Appendix D for revised sample letters.

Sincerely,
ISAACSON & ARFMAN, P.A.

Genevieve Donart, PE
GD/gld

ATTACHMENTS

CC: Curtis Cherne, City of Albuquerque Floodplain Administrator
Lynn Mazur, Albuquerque Metropolitan Area Flood Control Authority
John Mechenbier, Americus, LLC

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