



January 7, 2021

Eric Salazar, PE  
Senior Engineer/Project Manager  
Public Works Department  
City of San Antonio  
114 W. Commerce, 5<sup>th</sup> Floor  
San Antonio, TX 78205

**Re: Floodplain Variance (FPV) #21-002  
FPDP# 2021142 (Denied) - Culebra Creek Channel Improvements  
Public Works Department Capital Improvement Project (WBS# 23-03730)**

Dear Mr. Salazar,

The Public Works Department (PWD) Storm Water Division has reviewed the design and Floodplain Development Permit (FPDP) request associated with the proposed improvements for the Culebra Creek Channel Improvements capital project, WBS# 23-03730. The request for a FPDP has been denied as the proposed project improvements are not in compliance with the current City of San Antonio Unified Development Code (UDC) Appendix F – Floodplains as follows:

1. The proposed development does not meet the following UDC requirements:
  - Appendix F, Subdivision C, Section 35-F124(c)(1-2,4) pertaining to permitted increases in water surface elevations, which states, *"An increase in water surface elevation [for special flood hazard areas] is permitted solely when all the following conditions are met:*
    1. *Property owner owns both sides of the floodplain.*
    2. *The increase in the regulatory floodplain is contained in a dedicated drainage easement or right-of-way as required per subsection 35-504(d)(3).*
    4. *No increase in water surface elevations or velocities upstream and downstream outside of the owner's property limits."*
  - Appendix F, Subdivision C, Section 35-F133(c)(2-3) pertaining to Conditional Letter of Map Revision (CLOMR) requirements for a floodplain development permit which states,  
*"(2). No construction activity that will result in a change in the alignment, width, or elevation of a FEMA designated 1% A.C. current conditions floodplain is allowed prior to a conditional letter of map revision (CLOMR) being submitted to FEMA.*  
  
*AND*  
*(3). Excluding capital improvement projects managed by a public agency, no construction activity that will result in a change in the alignment, width, or elevation of a FEMA designated floodplain is allowed prior to a CLOMR being approved by FEMA."*

2. A variance to the above UDC requirements will be required by PWD Storm Water Division prior to issuance of the Floodplain Development Permit to allow project construction.
3. The applicant has provided the following information to assist with the review of the variance to the above UDC requirements:
  - The engineer of record has conducted a comprehensive flood study to evaluate the accuracy of the 100-year (1% annual chance) floodplain spill that occurs in the vicinity of the Timber Path bridge and the overall channel hydraulics based on several different FEMA-level modeling scenarios. The engineer summarized the study findings into a concise letter format and submitted the letter as justification for the Variance request.
4. The PWD Storm Water Division supports the Variance request for the following reasons:
  - The engineer of record has made extensive efforts to understand the complex channel hydraulics in order to minimize proposed water surface elevation (WSE) increases using all practicable measures. The maximum WSE increases are 0.03 feet (0.4 inches) or less at three (3) downstream cross-sections in the hydraulic model. The WSE increases do not translate to a measurable difference in the floodplain mapping or pose a potential adverse impact to the adjacent structures evaluated in the study.
  - The slight WSE increases mentioned above are reflected only in a comparison of the 'Proposed' and 'Corrected Effective' hydraulic modeling scenarios. Even when these slight increases are factored in, the proposed water surface elevations are between two (2) and five (5) feet lower than the adjacent structures' finished floor elevations. Reference Figure 2 in the engineer's variance request letter.
  - A comparison of the 'Proposed' and 'Effective FEMA' hydraulic modeling scenarios and resulting water surface elevations shows that the proposed water surface elevations are expected to be lower than the current Effective water surface elevations, thereby expecting to provide a reduction in flood insurance requirements, even outside of the project limits, following project construction and remapping. Reference Figure 2 in the engineer's variance request letter.
  - The channel improvements proposed with this capital project are estimated to remove approximately 169 structures from the floodplain. As such, the project is expected to provide a substantial reduction in flood risk while at the same time not causing adverse impacts to existing structures.
  - Based on the findings of no adverse impact from the comprehensive flood study and Variance request letter, a Conditional Letter of Map Revision (CLOMR) would not provide a benefit to the City of San Antonio since the proposed water surface elevations were shown to be less than the current Effective water surface elevations.
5. PWD will support a variance to the above UDC requirements with the following conditions:
  - Construction activities associated with the project within the FEMA designated floodplain shall not commence prior to approval of the final construction documents and related engineering analyses by the PWD Storm Water Division so that staff can verify the final results do not differ from what was presented for this Variance request.

If the Variance is approved by the Planning Commission, PWD Storm Water Division will issue an approved Floodplain Development Permit (FPDP) once the above conditions are met. If you have further questions or require any further assistance and/or information, please contact me at (210) 207-0182 or [sabrina.santiago@sanantonio.gov](mailto:sabrina.santiago@sanantonio.gov)

Sincerely,

*Sabrina Santiago*

Sabrina Santiago, EIT, CFM  
Interim Storm Water Engineering Manager

Attachments: AEVR# 21-002 Application  
Variance Request Letter with Attachments  
Denied FPDP# 2021142

cc: Bryan Blaisdell, PE, GISP, CFM, AECOM  
Bobby Mengden, PE, CFM, AECOM  
City of San Antonio, Planning Commission



# CITY OF SAN ANTONIO

## FLOOD PLAIN DEVELOPMENT PERMIT



Application Number 21-142 Date 6/15/2020 Permit Number 2021142

### 1. APPLICANT DATA (Owner)

Company Name City of San Antonio - Public Works Department  
 First Name Eric MI MI Last Salazar  
 Address: Number 114 Street W. Commerce, 5th Floor City San Antonio  
 State TX Zip Code 78205 Phone (210) 207-8128

THE ABOVE PERMITTEE HAS APPLIED FOR A FLOODPLAIN DEVELOPMENT PERMIT. THE APPLICATION HAS BEEN REVIEWED BY THE FLOOD PLAIN ADMINISTRATOR AND IT IS HIS DETERMINATION THAT THE PROPOSED DEVELOPMENT IS LOCATED WITHIN AN IDENTIFIED FLOOD PLAIN OF THE CITY OF SAN ANTONIO OR E.T.J.

THE FLOOD PLAIN ADMINISTRATOR HAS REVIEWED PLANS AND SPECIFICATIONS OF THE PROPOSED DEVELOPMENT FOR CONFORMANCE WITH THE FLOOD PLAIN ORDINANCE NO. 57969 OF THE CITY OF SAN ANTONIO, TEXAS.

YOU ARE HEREBY AUTHORIZED TO PROCEED WITH THE FOLLOWING PROPOSED CONSTRUCTION:

### 2. TYPE OF PROPOSED DEVELOPMENT

Proposed use: Other\*

\*If non-residential or other selected complete the following:

Type of use proposed: Flood control project: Culebra Creek Channel Improvements (WBS #23-03730)

Occupant Name COSA - capital improvement project Phone (210) 207-8128

### 3. DESCRIPTION OF CONSTRUCTION - NOTE: Applicant shall provide two sets of plans of the proposed construction or development.

Type: Other Other (Describe): Channel improvements through grading, retaining wall, armoring of specific areas; new creekway trail (Parks & Recreation Dept.)

ON THE FOLLOWING DESCRIBED PROPERTY:

### 4. LOCATION

Subdivision N/A Number        Lot Number        Block        NCB        Tract       

Location Description: Culebra Creek 100YR SFHA: (1.) second Culebra Rd. crossing (grading, armoring under bridge) (2.) at Timber Path Rd. crossing from about 200 ft. U/S of Timber Path to approx. 800 ft. D/S of Timber Path (grading, retaining wall)

\_\_\_\_\_  
 Permittee Print Name

\_\_\_\_\_  
 Permittee Signature

\_\_\_\_\_  
 Date

12/21/2020

\_\_\_\_\_  
 RECOMMEND FOR DISAPPROVAL

\_\_\_\_\_  
 Date

12/21/2020

\_\_\_\_\_  
 FLOOD PLAIN ADMINISTRATOR (DIR. OF PUBLIC WORKS)

\_\_\_\_\_  
 Date

(Conditions and provisions on next page)



# CITY OF SAN ANTONIO

## FLOOD PLAIN DEVELOPMENT PERMIT



### FOR OFFICE USE ONLY

Application Number 21-142

Date 6/15/2020

Permit 2021142

**TO MAINTAIN COMPLIANCE WITH THE FLOOD PLAIN ORDINANCE REGULATIONS AND TO ELIMINATE OR MINIMIZE FLOOD DAMAGE POTENTIAL TO THE PROPOSED DEVELOPMENT, YOU ARE HEREBY DIRECTED TO CONSTRUCT YOUR PROPOSED DEVELOPMENT IN ACCORDANCE WITH THE FOLLOWING SPECIAL PROVISIONS:**

- ☐ For residential structures, the lowest floor (including basement) must be elevated to \_\_\_\_\_ feet mean sea level.
- ☐ For non-residential structures, the lowest floor (including basement) must be elevated or floodproofed to \_\_\_\_\_ feet mean sea level.
- ☐ Permittee must submit an elevation certificate from a registered professional engineer or surveyor that the finished floor level of each structure has been constructed at the specified elevation.
- ☐ For non-residential floodproofing, a registered professional engineer or architect must certify that the floodproofing methods are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood.
- ☒ **Other provisions:**

\* The request for a Floodplain Development Permit (FPDP) is denied because the proposed project improvements are not compliant with the following sections of UDC Appendix F:

-- Section 35-F124(c) pertaining to permitted increases in water surface elevations, states: "An increase in water surface elevation (for special flood hazard areas is permitted solely when the following conditions are met: (1.) Property owner owns both sides of the floodplain (2.) The increase in regulatory floodplain is contained in a dedicated drainage easement or right-of-way as required by subsection 35-504(d)(3) (4.) No increase in water surface elevations or velocities upstream and downstream outside of the owner's property limits.

-- Section 35-F133(c)(2-3) pertaining to Conditional Letter of Map Revision (CLOMR) requirements for a floodplain development permit, which states: "(2.) No construction activity that will result in a change in the alignment, width, or elevation of a FEMA designated

1% AC current conditions floodplain is allowed prior to a CLOMR being submitted to FEMA. (3.) Excluding capital improvement projects managed by a public agency, no construction activity that will result in a change of the alignment, width, or elevation if a FEMA

designated is allowed prior to a CLOMR being approved by FEMA.

\* PROJECT DESIGN CONSULTANT: AECOM, Inc. (210) 296-2000

Is Additional Information Required? Yes

Are other Federal, State, or Local Permits required? Yes

Permit Application - Reviewed By: Jeremy George, PE, CFM

### WARNING:

**The flood hazard boundary maps and other flood data used by the Flood Plain Administrator in evaluating flood hazards to proposed developments are considered reasonable and accurate for regulatory purposes and are based on the best available scientific and engineering data. On rare occasions greater floods can and will occur and flood heights may be increased by man-made or natural causes. Issuance of this permit does not imply that land outside the areas of special flood hazards or that the uses permitted within such areas will be free from flooding or flood damages due to local conditions. Construction standards required by this permit are the minimum standards deemed necessary to minimize or eliminate flood damage, but reliance on these minimum standards shall not create liability on the part of the City, the Flood Plain Administrator or any officer or employee of the City of San Antonio in the event flooding or flood damage does occur.**

\_\_\_\_\_  
Permittee Initial



# CITY OF SAN ANTONIO

## DEVELOPMENT SERVICES DEPARTMENT

1901 S. Alamo, San Antonio, TX 78204

### ADMINISTRATIVE EXCEPTION/VARIANCE REQUEST APPLICATION

|                             |                                                                    |
|-----------------------------|--------------------------------------------------------------------|
| <b>Project Name:</b>        | Culebra Creek Channel Improvements (Timber Path to Old Grissom Rd) |
| <b>A/P # /PPR # /Plat #</b> | City of San Antonio Project Number WBS # 23-03730                  |
| <b>Date:</b>                | December 17, 2020                                                  |
| <b>Code Issue:</b>          | WSE Rise/CLOMR Requirement                                         |
| <b>Code Sections:</b>       | 35-F124(c) and 35-F133(c)(2-3)                                     |

**Submitted By:** ☒ Owner ☐ Owners Agent \* (Requires notarized Letter of Agent)

**Owners Name:** Eric Salazar, PE, Project Manager

**Company:** City of San Antonio Public Works Department

**Address:** 114 W. Commerce Street, San Antonio, Texas **Zip Code:** 78205

**Tel #:** 210-207-8128 **Fax#** 210-207-7196 **E-Mail:** Eric.Salazar@sanantonio.gov

**Consultant:** Bobby Mengden, PE, CFM / Bryan Blaisdell, PE, GISP, CFM

**Company:** AECOM

**Address:** 112 E. Pecan St., Suite 400, San Antonio **Zip Code:** 78205

**Tel #:** 210-296-2146 **Fax#** **E-Mail:** bryan.blaisdell@aecom.com

**Signature:** *Eric Salazar, P.E.*

#### Additional Information – Subdivision Plat Variances & Time Extensions

1. ☐ Time Extension ☐ Sidewalk ☒ Floodplain Permit ☐ Completeness Appeal  
☐ Other \_\_\_\_\_

2. City Council District 6 Ferguson Map Grid \_\_\_\_\_ Zoning District N/A

3. San Antonio City Limits ☒ Yes ☐ No

4. Edwards Aquifer Recharge Zone? ☐ Yes ☒ No

5. Previous/existing landfill? ☐ Yes ☒ No

6. Parkland Greenbelts or open space? Floodplain? ☒ Yes ☐ No

December 23, 2020

Administrative Exception / Variance Request (AEVR) Review  
c/o Development Services Staff  
Development Services Department  
City of San Antonio  
1901 S. Alamo  
San Antonio, TX 78204

Re: Culebra Creek Channel Improvements (Timber Path to Old Grissom Rd)  
WBS #23-03730  
UDC Codes 35-F124(c) and 35-F133(c)(2-3)

- ☒ **Administrative Exception**
- ☐ **Environmental Variance**
- ☐ **Subdivision Platting Variance – Time Extension**

Dear Development Services Staff,

The Culebra Creek Channel Improvements project proposes channel grading and armoring north of the roadway intersection of Culebra Road and Timber Path with channel improvements beginning at Timber Path bridge and ending approximately 1,200 feet downstream of Timber Path bridge. These channel improvements will reduce the risk of flooding to nearby commercial and residential structures – including the Culebra Crossing and Westover Elms subdivisions – within the Effective FEMA Existing 1% annual chance (AC) Special Flood Hazard Area (Zones A and AE) of Culebra Creek. The project was designed by AECOM for the City of San Antonio Public Works as a bond-funded project. An overview map of the project area and Effective FEMA floodplain is provided in Exhibit 1.

### **Background Information**

In designing the channel improvements, hydrologic and hydraulic analyses were performed using HEC-HMS v. 3.0.1 and HEC-RAS v. 5.0.7 to evaluate proposed flood reduction benefits with the detailed results of these analyses documented in the Culebra Creek 100% Hydraulic Design Report submitted to the City of San Antonio's Public Works Department. In accordance with City capital project design guidelines, the project was evaluated for both Effective FEMA (DFIRM) and NOAA Atlas 14 rainfall design scenarios. Additionally, as typically required, the analysis included the following three stages of hydraulic model development:

- **Effective Conditions** – the Effective model is a direct copy of the current FEMA hydraulic model, which serves as the current basis for regulatory floodplain mapping and property owner flood insurance

requirements. The FEMA-approved Effective model produces the mapped Special Flood Hazard Areas (SFHA) depicted on the Flood Insurance Rate Map.

- Corrected Effective Conditions – the Corrected Effective model includes corrections to the Effective FEMA model (such as updates to topography, cross section placement, ineffective flow areas, roughness coefficients, and other hydraulic parameters) and reflects the best present understanding of flood risk. The Corrected Effective model establishes an updated baseline from which to evaluate the flood benefits or impacts from the Proposed project improvements.
- Proposed Conditions – the Proposed model includes any hydraulic changes related to the project improvements (such as channel regrading, bank stabilization, or erosion protection). The Proposed model is typically compared against the Corrected Effective model when evaluating potential impacts to flood risk. Once the project construction and a subsequent FEMA Letter of Map Revision (LOMR) are completed, the Proposed model becomes the new Effective model to be used as the new starting point for future flood studies.

Under the FEMA rainfall design scenario – which is the primary scenario used for evaluating floodplain development permit requirements under the two FEMA-specific Unified Development Code (UDC) sections described below – the project is estimated to reduce water surface elevations (WSEs) by an amount of 0.5 to 2.8 feet within the project area compared to the Corrected Effective hydraulic model. These WSE reductions result in a reduced risk of flooding for an estimated 169 adjacent structures. Immediately downstream of the project area (within approximately 600-800 feet downstream), the Proposed hydraulic model shows minor increases in WSEs less than 0.03 feet (0.4 inches) compared to the Corrected Effective hydraulic model. Following an investigation of these minor WSE rises, it was concluded that the increases would only be fully eliminated in the Proposed model by expanding the project area further downstream beyond the original limits of construction.

## Code Issues

Due to these findings, this letter is to request a design variance from the City of San Antonio with regards to two Unified Development Code sections (applicable portions for the variance request have been italicized for emphasis):

- 35-F124(c) pertaining to permitted increases in water surface elevations, which states:  
*"An increase in water surface elevation [for special flood hazard areas] is permitted solely when all the following conditions are met:*
  - 1. Property owner owns both sides of the floodplain.*
  - 2. The increase in the regulatory floodplain is contained in a dedicated drainage easement or right-of-way as required per subsection 35-504(d)(3).*
  - 3. Increase in water surface elevation for the 1% annual chance floodplain does not exceed six (6) inches.*
  - 4. No increase in water surface elevations or velocities upstream and downstream outside of the owner's property limits.", and*
- 35-F133(c)(2-3) pertaining to Conditional Letter of Map Revision (CLOMR) requirements for a floodplain development permit which states:  
*"2. No construction activity that will result in a change in the alignment, width, or elevation of a FEMA designated 1% A.C. current conditions floodplain is allowed prior to a conditional letter of map revision (CLOMR) being submitted to FEMA.*

AND

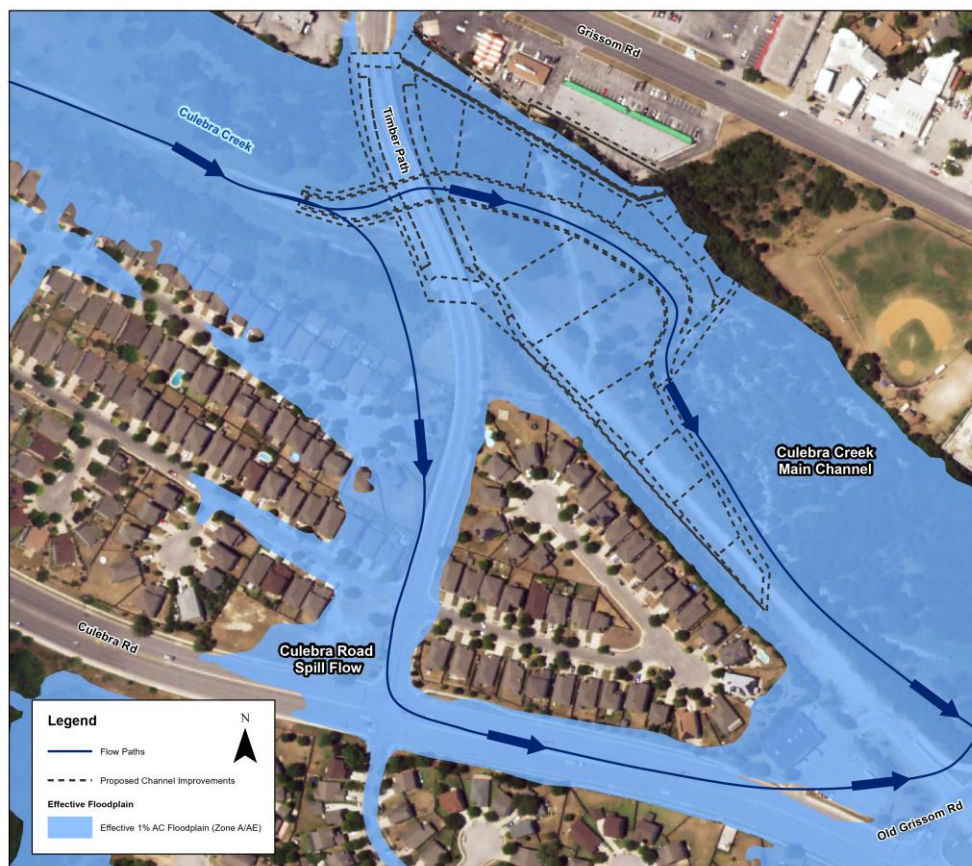
*3. Excluding capital improvement projects managed by a public agency, no construction activity that will result in a change in the alignment, width, or elevation of a FEMA designated floodplain is allowed prior to a CLOMR being approved by FEMA."*

Excerpts from the Culebra Creek 100% Hydraulic Design Report have been provided in Attachment A and show the overall impacts of the proposed project WSEs compared to the Corrected Effective hydraulic model. As illustrated in Attachment A Table 8 and Figure 8 (using the same references as in the report with minor WSE rises highlighted for emphasis), the proposed improvements show notable decreases in WSE greater than 0.2 feet between river stations 13538 and 9000 with relatively minor increases in WSE between river stations 8529 and 8037. While the proposed channel improvements are primarily located downstream of Timber Path Bridge, no channel modifications or project fills are proposed within the area of the rise.

### Justification for Variance Request

Through further investigation, it was found that the minor increases of WSEs in the Proposed model compared to the Corrected Effective model are the result of the Proposed model's reduced spilling of channel flows upstream of Timber Path Bridge into the overbank areas which run parallel to the creek (including the Culebra Crossing subdivision and Culebra Road south of the channel as shown in Figure 1). Since the proposed Culebra Creek channel improvements are designed to convey more flow than the current channel while also reducing the risk of overbank flooding upstream of the project, the reduction in spill flows is a primary element of the project's design.

Figure 1. Culebra Road Spill Flow



The hydraulic model accounts for the out-of-bank spill flows returning to the main channel by reallocating them further downstream where they return near Old Grissom Road Bridge. Downstream of this point, the Proposed model no longer shows minor increases in WSEs compared to the Corrected Effective model where the flow rates in the two models are equal from the flow reallocation process. As a result, the area of increasing WSEs is limited to approximately 600-800 feet downstream of the project area.

As a conservative measure, an impact analysis was conducted to assess potential adverse impacts from the Proposed model's 0.02 to 0.03 feet water surface rises. After identifying eight structures within the potential area of increase, right of entry agreements were obtained from each property owner to collect structure survey points to compare against the proposed main channel WSEs. Three survey points were collected for each structure by a registered professional land surveyor (RPLS) including two ground elevations located at the building corners closest to the creek and one typical finished floor elevation (i.e., the top surface of a building's structural slab or FFE). A map of the survey area and elevation survey points for each structure is provided in Exhibit 2. Exhibit 2 also shows an overlay of both Proposed and Corrected Effective floodplains, although due to the minor extent of the WSE rises, the two floodplains appear highly similar when mapped.

Table 1 below compares the surveyed structure FFEs for each structure with adjacent Proposed 1% annual chance WSEs under the FEMA rainfall design scenario (as estimated from interpolated water surface grids

**Table 1. Structure Elevations (Surveyed FFE vs. Proposed 1% AC WSE)**

| Structure Address | Location in Hydraulic Model (River Station) | Lowest Adjacent Surveyed Ground Elevations (ft) <sup>b</sup> | Surveyed Finished Floor Elevation (FFE) (ft) <sup>c</sup> | Proposed 1% AC Water Surface Elevation (WSE) (ft) <sup>d</sup> | FFE Height Above Proposed WSE (ft) |
|-------------------|---------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------|------------------------------------|
| 8619 Brisa Royale | 8611 <sup>a</sup>                           | 805.5                                                        | 807.5                                                     | 802.9                                                          | 4.6                                |
| 8615 Brisa Royale | 8570 <sup>a</sup>                           | 805.3                                                        | 806.8                                                     | 802.7                                                          | 4.1                                |
| 8611 Brisa Royale | 8529                                        | 805.2                                                        | 807.0                                                     | 802.5                                                          | 4.5                                |
| 8607 Brisa Royale | 8462 <sup>a</sup>                           | 804.9                                                        | 806.8                                                     | 802.3                                                          | 4.5                                |
| 8603 Brisa Royale | 8390 <sup>a</sup>                           | 805.0                                                        | 806.6                                                     | 801.9 <sup>e</sup>                                             | 4.7 <sup>e</sup>                   |
| 8602 Brisa Royale | 8390 <sup>a</sup>                           | 805.7                                                        | 806.9                                                     | 801.9 <sup>e</sup>                                             | 5.0 <sup>e</sup>                   |
| 8603 Culebra Rd   | 8285                                        | 803.6                                                        | 804.6                                                     | 801.5 <sup>e</sup>                                             | 3.1 <sup>e</sup>                   |
| 8570 Grissom Rd   | 8037                                        | 802.0                                                        | 803.3                                                     | 801.1                                                          | 2.2                                |

<sup>a</sup>Indicates river stations which do not have a corresponding cross section in the hydraulic model but were interpolated between upstream and downstream cross sections.

<sup>b</sup>This table reports the lower of the two adjacent surveyed ground elevations for each structure. For a complete summary of survey elevation points collected, refer to Exhibit 2.

<sup>c</sup>The estimated accuracy of surveyed elevations is within  $\pm 0.1$  ft.

<sup>d</sup>Proposed 1% AC WSEs are reported based on the Effective FEMA (DFIRM) rainfall design scenario with WSEs estimated from interpolated water surface grids outputted from the main channel hydraulic model.

<sup>e</sup>Indicates properties offset from the main channel in the FEMA Zone A that may still be at risk of flooding by spills from Culebra Road which could result in higher proposed WSEs than shown in Table 1. However, these spills would be reduced by the proposed project channel improvements, resulting in lower proposed WSEs than in the Corrected Effective scenario which would not trigger a variance requirement.

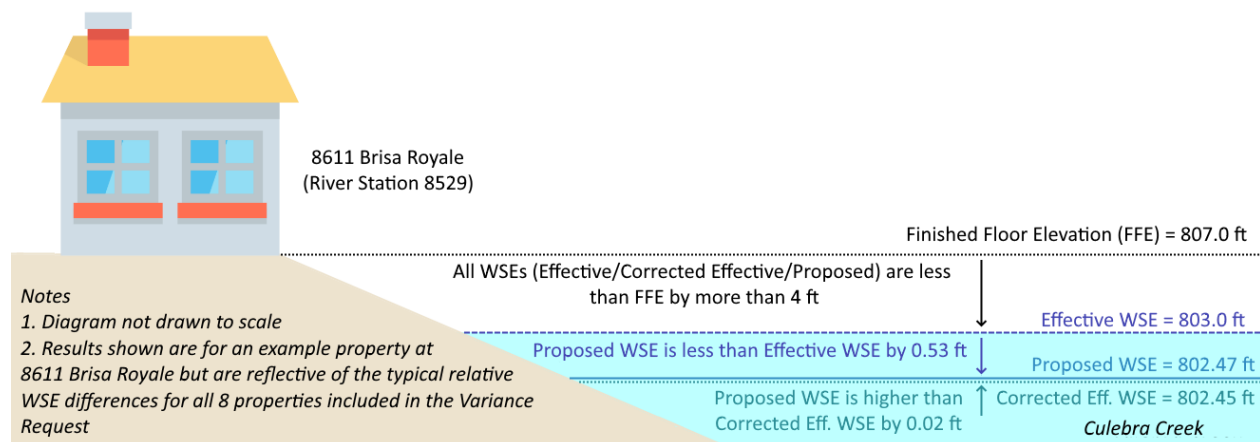
outputted from the main channel hydraulic model). From these comparisons, the structure finished floor elevations were found to be consistently higher than the adjacent proposed 1% AC WSEs by 2 to 5 feet despite the Proposed model WSE increases of 0.02 to 0.03 feet. Given that the magnitude between the Corrected Effective WSEs and Proposed WSEs (0.02-0.03 feet) is only about 1% of the typical elevation differences between the FFEs and Proposed WSEs (2-5 feet), it can be concluded that *the structure finished floor elevations are well above the modeled main channel WSE rises of the project.*

Among the structures evaluated through this analysis, three properties – 8603 Brisa Royal, 8602 Brisa Royal, and 8603 Culebra Rd – are offset from the main creek and are located in an effective FEMA Zone A approximate floodplain. Although this flood zone has not been modeled in detail with FEMA rainfall for the proposed improvements, it is primarily caused by Culebra Creek flood water spilling out of the creek banks upstream of Timber Path Bridge and flowing east along Culebra Road. Since the Zone A floodplain is dependent on the amount of flow spilling from Culebra Creek, the proposed project – which reduces spills from Culebra Creek – would likely result in a reduction of the Zone A WSEs, including a WSE reduction for the three properties listed above (which would not trigger a variance requirement). However, since the additional detailed modeling is not readily available, these three properties have been included in the Variance Request to demonstrate that they are above the proposed WSE increases from the Culebra Creek main channel, regardless of the potential Zone A WSE decreases.

Moreover, the proposed minor WSE increases only occur when comparing the Proposed hydraulic model to the Corrected Effective hydraulic model. By contrast, as depicted in Figure 2 below, when comparing the Proposed model to the Effective FEMA model, the Proposed model actually shows reductions in WSEs of 0.4 to 0.6 feet for the reach between river stations 8718 and 7743. This indicates that the channel improvements may in fact benefit the eight properties in question by reducing their financial flood insurance requirements once the FEMA regulatory floodplain is updated by a LOMR following the completion of project construction.

Based on these considerations, it was concluded that the Proposed model's WSE increases do not reflect measurable differences to the adjacent floodplain or present an adverse impact to the adjacent structures. Accordingly, a CLOMR may not provide additional benefit to the City of San Antonio and would instead result in additional cost and schedule impacts to the project. A design variance is therefore requested to secure an approved City of San Antonio floodplain development permit with the stated WSE rises and without the submission of a CLOMR. Completion of a LOMR following construction of the project is still planned.

Figure 2. Example Structure WSE Comparison



## Summary of Hardship

The following responses are provided in accordance with the Variance Request hardship standard outlined in the revised December 19, 2019, Information Bulletin 124 AEVR memorandum:

- *If the applicant complies strictly with the provisions of these regulations, he/she can make no reasonable use of his/her property*

The subject property (the property in which the channel will be constructed) is inundated by a FEMA regulatory floodplain. As such, any other developed use of the site would be difficult to accomplish. In addition, a majority of the floodplain inundation area is contained within the main conveyance area of the creek, while other areas reserved and protected from development due to easements.

- *The hardship relates to the applicant's land, rather than personal circumstances*

The subject property is encumbered by the mapped FEMA floodplain and will be improved to increase channel conveyance and reduce flood risk to surrounding properties. As such, the hardship is not a personal circumstance, but rather one that applies to the subject property.

- *The hardship is unique, or nearly so, rather than one shared by many surrounding properties*

The mapped 1% annual chance floodplain impacts the subject property and adjacent residential and commercial properties. The hardship is unique to the subject property and these adjacent properties and does not extend to any additional properties beyond those within the floodplain inundation area.

- *The hardship is not the result of the applicant's own actions*

The City of San Antonio is a participating community in FEMA's National Flood Insurance Program (NFIP) and is required to maintain floodplain mapping information that meets FEMA's requirements, at a minimum. This hardship is due to the subject property conveying flows for the mapped FEMA floodplain area to mitigate community flood risk and not due to the applicant's own actions. The proposed floodplain is derived from standard approaches and methods used within the engineering community which do not attempt to estimate the flood risk in an overly simplistic nor overly complicated manner.

- *The granting of the exception/variance will not be injurious to other properties and will not prevent the orderly subdivision of other property in the area in accordance with these regulations*

Despite the potential minor WSE rises modeled approximately 600 to 800 feet downstream of the project area, these rises do not adversely impact the adjacent properties as demonstrated by the comparison of structure elevations. The project will increase the flood conveyance capacity of Culebra Creek, reducing flood risk for an estimated 169 adjacent structures including structures in the Culebra Crossing and Westover Elms subdivisions.

- *The variance is the minimum necessary, considering the flood hazard, to afford relief.*

Construction of the channel improvements will not require any additional variances related to the floodplain.

- *There is good and sufficient cause.*

The Culebra Creek channel improvements project was designed for the City of San Antonio Public Works Department as a bond-funded project. The project will provide benefits of flood risk reduction and reduced insurance premiums to adjacent properties. Therefore, the public interest appears to be served with no measurable adverse impacts if this variance is granted.

- *The granting of the exception/variance will not result in increased flood heights, cause an additional threat to public safety, result in extraordinary public expense, or conflict with existing local laws or ordinances.*

The variance will not result in an increase to regulatory flood heights compared to the current mapped floodplain since the proposed project is estimated to reduce WSEs compared to the Effective flood heights by 0.4 to 0.6 feet between river stations 8718 and 7743 where the eight structures in question are located. The project's purpose is to mitigate flood risk for these structures along with other properties in the Culebra Crossing and Westover Elms communities, leading to an overall reduced risk of flood damages.

## Conclusion

In summary, it is AECOM's opinion that this variance request will not be contrary to the spirit and intent of the UDC sections noted above due to the following reasons:

- The proposed WSE increases have been limited by all practicable measures to minimize impacts on the public health, safety and public welfare. The increases are less than 0.03 feet (0.4 inches) and result in water surface elevations between 2 to 5 feet lower than the adjacent structures' finished floor elevations. As such, the proposed increases do not reflect measurable differences to the adjacent floodplain or pose an adverse impact to the structures in question.
- When comparing the proposed floodplain to the Effective FEMA floodplain (i.e., for the purposes of assessing the properties' financial flood insurance requirements), the proposed WSEs are decreased by the channel improvements and may provide a reduction in the properties' flood insurance requirements upon project completion.
- Since no adverse impacts have been noted, a CLOMR may not provide additional benefit to the City of San Antonio and would instead result in additional cost and schedule impacts to the project. It is desired to construct this project as soon as possible in order to implement the flood control benefits the project is expected to provide.
- The proposed channel improvements are estimated to remove approximately 169 structures from the floodplain, including structures in the Culebra Crossing and Westover Elms subdivisions. As such, the proposed variance will in fact benefit the greater public interest by leading to overall reductions in flood risk with no measurable adverse impacts to other properties.

In our professional opinion, the proposed Variance Request remains in harmony with the spirit and intent of the UDC as it will not adversely affect the health, safety, or welfare of the public. We appreciate your consideration of this request.

Sincerely,



Bryan Blaisdell, PE, GISP, CFM  
AECOM

cc: Bobby Mengden, PE, CFM (AECOM)

## Exhibits/Attachments:

Exhibit 1 – Project Area Map

Exhibit 2 – Floodplain Comparison and Structure Elevations

Attachment A – Excerpts from 100% Culebra Creek Hydraulic Design Report

**For Office Use Only:** AEVR #:

Date Received:

**DSD – Director Official Action:**

☐

APPROVED

☐

APPROVED W/ COMMENTS

☐

DENIED

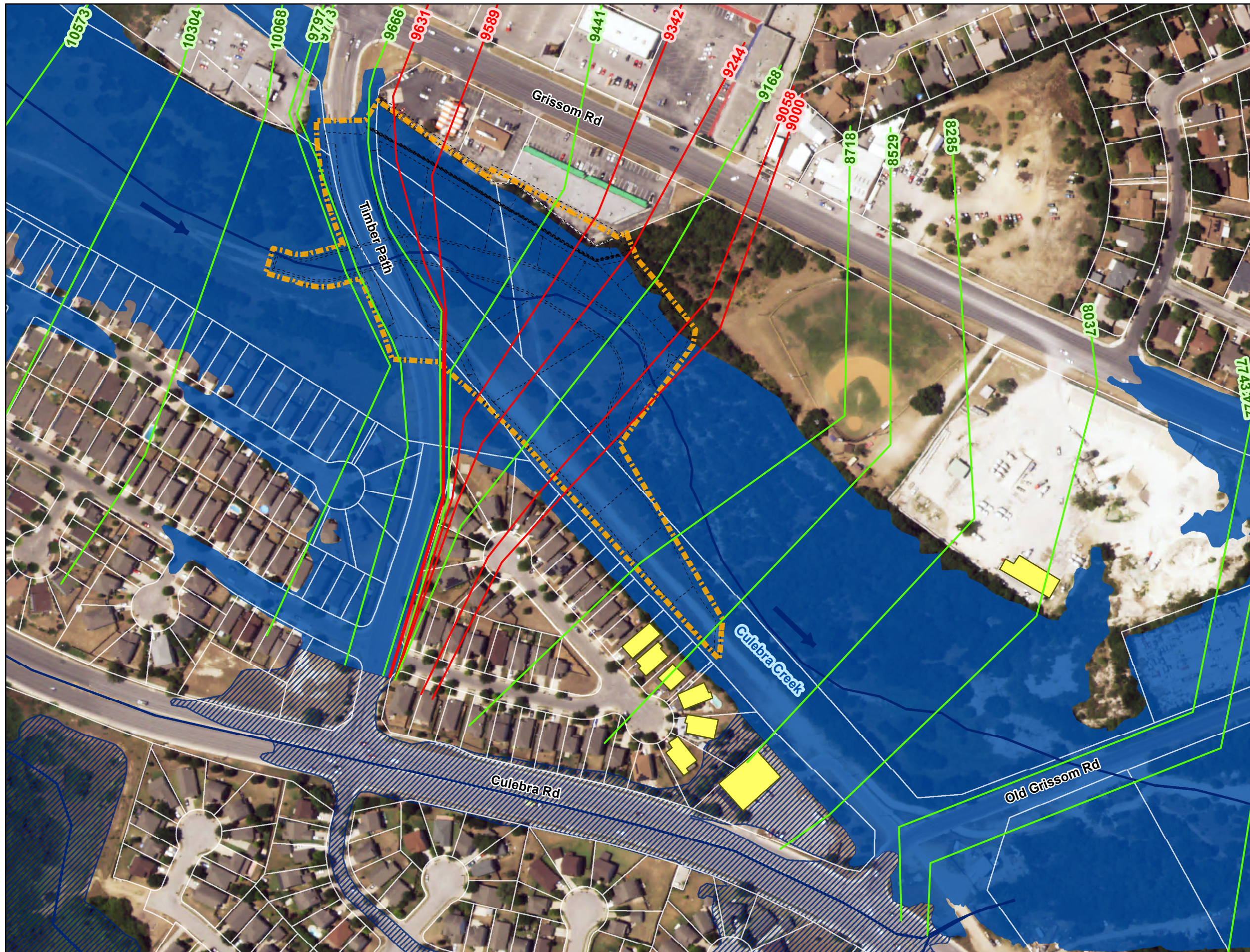
Signature:

Date:

Printed Name:

Title:

Comments:



**Legend**

- FEMA Stream Line
- FEMA Cross Section
- Added Cross Section
- Proposed Channel Improvements
- BCAD Parcels
- 100% Design Project Area
- Variance Request Structures

**Effective Floodplain**

- 1% Annual Chance (Zone AE)
- 1% Annual Chance (Zone A)

N

0 100 200 Feet

1 inch = 200 feet

**Culebra Creek  
Variance Request  
Exhibit 1**

**Project Area Map**





## Attachment A

## Attachment A – Excerpts from 100% Culebra Creek Hydraulic Design Report

### Section 3.3– Hydraulic Results

#### 3.3.2 Proposed-DFIRM vs. CE-DFIRM Flow and Water Surface Comparison

When comparing the proposed model to the Corrected Effective (CE) model for the 1% AC (100-year) storm event with DFIRM flows, the proposed improvements result in WSE reductions ranging between 0.2 ft (at Culebra Road bridge) and 2.8 ft (at Timber Path bridge).

Downstream of Timber Path bridge, proposed flows are noted to increase compared to the CE model by approximately 386 cfs (0.7% of the CE model DFIRM flow rate), since the proposed model lowers the WSE in the channel causing less flow to leave the system temporarily in the form of overbank flooding via lateral weirs.

Throughout the project reach downstream of Timber Path bridge (from river station 9631 to river station 8718), the proposed channel improvements compensate for these small flow increases with significant reductions in channel flow area and WSE. However, minor 1% AC WSE rises of less than 0.03 ft between CE and Proposed models are noted immediately downstream of the project improvements area where the proposed cross section geometries are unchanged from the CE model yet convey slightly higher flows due to the reduced overbank spill at Timber Path (river stations 8529, 8285, and 8037 [highlighted in dark gray in Table 8]). Section 3.7 provides further investigation of these WSE rises and their potential impacts.

The Proposed-DFIRM and CE-DFIRM 1% AC WSEs converge within a negligible difference further downstream, after HEC-RAS reach station 7340, where the flows that left the system upstream via lateral weirs are added back into the Culebra Creek main stem.

The 1% AC WSE and flow comparisons between the CE-DFIRM and Proposed-DFIRM hydraulic models are shown in Table 8 and Figure 8.

**Table 8. Flow and WSE Results Comparison for 1% AC CE-DFIRM and Proposed-DFIRM Scenarios**

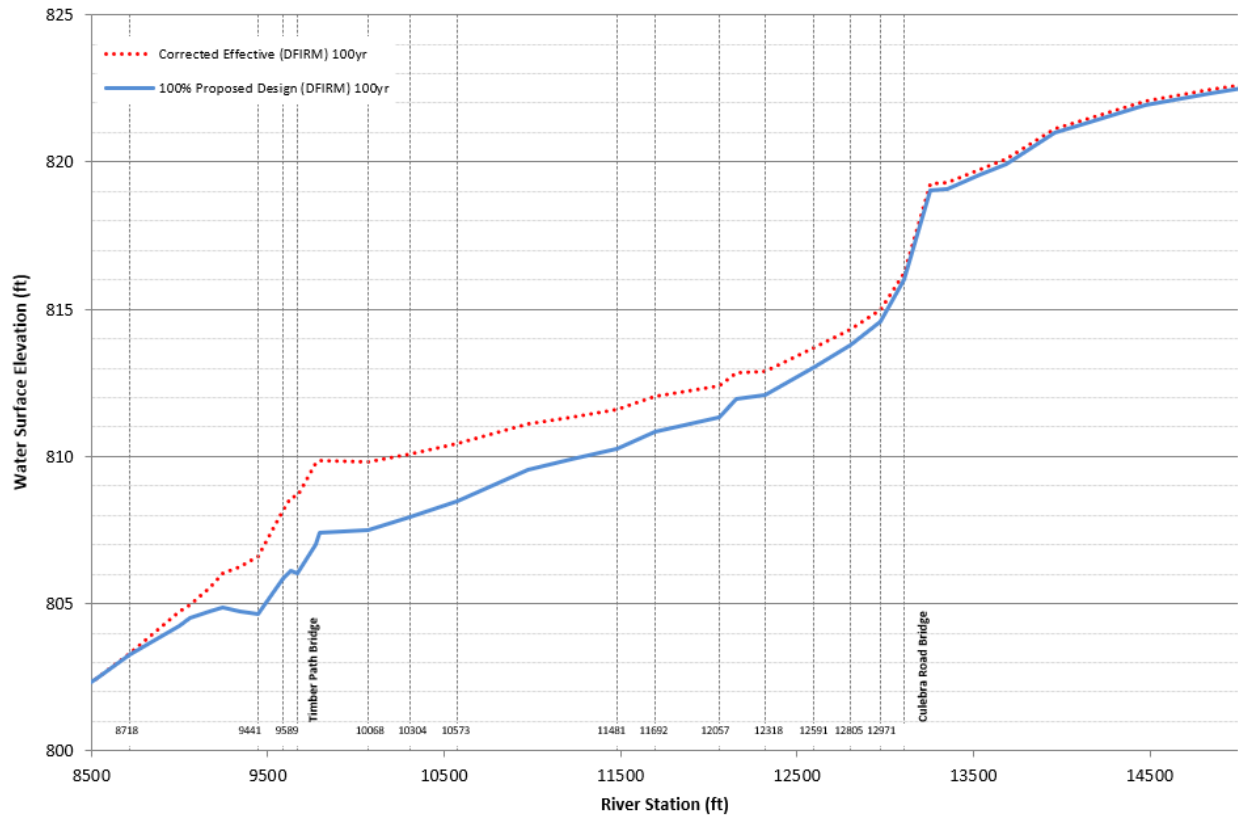
| HEC-RAS<br>Reach<br>Station | CE-DFIRM<br>Flow   | PR-DFIRM<br>Flow | Flow<br>Difference<br>(PR - CE) | CE-DFIRM<br>WSE | PR-DFIRM<br>WSE | WSE<br>Difference<br>(PR - CE) |
|-----------------------------|--------------------|------------------|---------------------------------|-----------------|-----------------|--------------------------------|
| ft                          | cfs                | cfs              | cfs                             | ft              | ft              | ft                             |
| 15208                       | 57791              | 57791            | 0                               | 822.79          | 822.7           | -0.09                          |
| 15205                       | Lateral Structure* |                  |                                 |                 |                 |                                |
| 14844                       | 57791              | 57791            | 0                               | 822.46          | 822.35          | -0.11                          |
| 14476                       | 57791              | 57791            | 0                               | 822.05          | 821.94          | -0.11                          |
| 14108                       | 57791              | 57791            | 0                               | 821.39          | 821.26          | -0.13                          |
| 13961                       | 57791              | 57791            | 0                               | 821.14          | 821             | -0.14                          |
| 13688                       | 57757              | 57779            | 22                              | 820.12          | 819.93          | -0.19                          |
| 13538                       | 57757              | 57779            | 23                              | 819.75          | 819.55          | -0.20                          |

| HEC-RAS<br>Reach<br>Station | CE-DFIRM<br>Flow    | PR-DFIRM<br>Flow | Flow<br>Difference<br>(PR - CE) | CE-DFIRM<br>WSE | PR-DFIRM<br>WSE | WSE<br>Difference<br>(PR - CE) |
|-----------------------------|---------------------|------------------|---------------------------------|-----------------|-----------------|--------------------------------|
| 13349                       | 57757               | 57779            | 23                              | 819.3           | 819.07          | -0.23                          |
| 13259                       | 57726               | 57748            | 23                              | 819.26          | 819.04          | -0.22                          |
| 13208                       | Culebra Road Bridge |                  |                                 |                 |                 |                                |
| 13109                       | 57726               | 57748            | 23                              | 816.25          | 816.01          | -0.24                          |
| 13108                       | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 12971                       | 57726               | 57748            | 23                              | 814.98          | 814.58          | -0.40                          |
| 12805                       | 57726               | 57748            | 23                              | 814.31          | 813.78          | -0.53                          |
| 12591                       | 57726               | 57748            | 23                              | 813.67          | 813             | -0.67                          |
| 12318                       | 57726               | 57748            | 23                              | 812.91          | 812.06          | -0.85                          |
| 12157                       | 57760               | 57760            | 0                               | 812.83          | 811.93          | -0.90                          |
| 12057                       | 57760               | 57760            | 0                               | 812.38          | 811.35          | -1.03                          |
| 12056                       | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 11692                       | 57760               | 57760            | 0                               | 812.04          | 810.86          | -1.18                          |
| 11481                       | 57760               | 57760            | 0                               | 811.58          | 810.25          | -1.33                          |
| 11222                       | 57760               | 57760            | 0                               | 811.34          | 809.88          | -1.46                          |
| 11221                       | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 10977                       | 57760               | 57760            | 0                               | 811.11          | 809.54          | -1.57                          |
| 10573                       | 57760               | 57760            | 0                               | 810.42          | 808.49          | -1.93                          |
| 10572                       | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 10304                       | 57760               | 57760            | 0                               | 810.09          | 807.95          | -2.14                          |
| 10068                       | 57760               | 57760            | 0                               | 809.81          | 807.5           | -2.31                          |
| 10067                       | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 9797                        | 57760               | 57760            | 0                               | 809.85          | 807.42          | -2.43                          |
| 9773                        | 57416               | 57760            | 344                             | 809.77          | 807.01          | -2.76                          |
| 9704                        | Timber Path Bridge  |                  |                                 |                 |                 |                                |
| 9666                        | 57416               | 57760            | 344                             | 808.67          | 806             | -2.67                          |
| 9664                        | Lateral Structure*  |                  |                                 |                 |                 |                                |
| 9631                        | 57377               | 57760            | 383                             | 808.63          | 806.13          | -2.50                          |
| 9589                        | 57375               | 57760            | 385                             | 808.19          | 805.85          | -2.34                          |
| 9441                        | 57374               | 57760            | 386                             | 806.63          | 804.65          | -1.98                          |
| 9342                        | 57374               | 57760            | 386                             | 806.25          | 804.73          | -1.52                          |
| 9244                        | 57374               | 57760            | 386                             | 806.05          | 804.89          | -1.16                          |
| 9168                        | 57374               | 57760            | 386                             | 805.52          | 804.76          | -0.76                          |
| 9058                        | 57374               | 57760            | 386                             | 804.97          | 804.51          | -0.46                          |
| 9000                        | 57374               | 57760            | 386                             | 804.72          | 804.27          | -0.45                          |
| 8718                        | 57374               | 57760            | 386                             | 803.31          | 803.27          | -0.04                          |
| 8529                        | 57374               | 57760            | 386                             | 802.45          | 802.47          | 0.02                           |
| 8285                        | 57374               | 57760            | 386                             | 801.47          | 801.5           | 0.03                           |

| HEC-RAS Reach Station | CE-DFIRM Flow            | PR-DFIRM Flow | Flow Difference (PR - CE) | CE-DFIRM WSE | PR-DFIRM WSE | WSE Difference (PR - CE) |
|-----------------------|--------------------------|---------------|---------------------------|--------------|--------------|--------------------------|
| 8037                  | 57374                    | 57760         | 386                       | 800.62       | 800.64       | 0.02                     |
| 7743                  | 57374                    | 57760         | 386                       | 799.19       | 799.19       | 0.00                     |
| 7740                  | Old Grissom Road Culvert |               |                           |              |              |                          |
| 7587                  | 57374                    | 57760         | 386                       | 799.28       | 799.27       | -0.01                    |
| 7340                  | 57760                    | 57760         | 0                         | 797.7        | 797.69       | -0.01                    |
| 7160                  | 57760                    | 57760         | 0                         | 797.24       | 797.24       | 0.00                     |
| 6903                  | 57760                    | 57760         | 0                         | 796.85       | 796.85       | 0.00                     |
| 6635                  | 57760                    | 57760         | 0                         | 796.25       | 796.25       | 0.00                     |
| 6369                  | 57760                    | 57760         | 0                         | 795.64       | 795.64       | 0.00                     |
| 6118                  | 57760                    | 57760         | 0                         | 794.51       | 794.51       | 0.00                     |
| 5873                  | 57760                    | 57760         | 0                         | 792.66       | 792.66       | 0.00                     |

\* Flows from lateral weirs re-enter Culebra Creek downstream at cross sections 12157 and 7340.

Figure 8. WSE Profiles for 1% AC CE-DFIRM and Proposed-DFIRM Scenarios



### *Section 3.7 – Adverse Impact Analysis*

As discussed in Section 3.3.2, minor rises in WSE were noted at the downstream end of the model between river stations 8529 and 8037 when comparing the Proposed and CE DFIRM flow models. These rises were found to be due to reduced lateral spills upstream of Timber Path bridge as a result of increased channel capacity and reduced WSE from the project improvements causing a slight increase in flows downstream in the Proposed scenario (0.7% of the CE model DFIRM flow rate). These rises were confirmed to only occur when running the CE and Proposed models with the flow optimization option enabled, further indicating that the small rise is caused by the redistribution of flows during HEC-RAS flow optimization and not due to project fill or differences between CE and Proposed channel geometry within the area of the rise.

Within the modified project reach, the proposed improvements compensate for these minor flow increases with significant reductions in channel flow area and WSE. However, minor 1% AC WSE rises of less than 0.03 ft between CE-DFIRM and Proposed-DFIRM models are noted immediately downstream of the project improvements area where the proposed cross section geometries are unchanged from the CE model yet convey slightly higher flows due to the reduced overbank spill at Timber Path. Similar patterns were observed when comparing the Proposed and CE Atlas 14 model runs.

Despite the minor increases in flow and WSE, these increases were mapped and found to have no measurable effect on the floodplain width or flood risk to structures. Additionally, when compared to the DE model, the minor proposed WSE rise results in a proposed elevation that is less than the effective FEMA water surface elevation by 0.2-0.5 ft at the same location. However, while no adverse impacts to structures were noted due to the modeled rises, a City UDC code Variance Request for Section 35-F124(c) and Section 35-F133(c)(2) (pertaining to WSE increases and CLOMR requirements) will be required to obtain a floodplain development permit for the project.