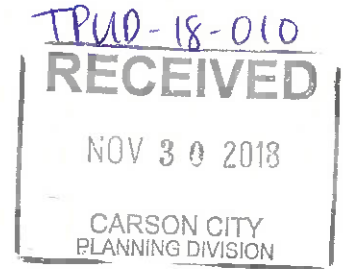




**House Moran Consulting, Inc.**  
*Water Resources and Environmental Engineering*



November 30, 2018

Robert D. Fellows, P.E.  
Chief Stormwater Engineer  
CRS, Floodplain & NPDES Manager  
Carson City Public Works  
3505 Butti Way  
Carson City, NV 89701

**RE: Floodplain Management Mitigation Plan  
Lompa Ranch East – Carson City, Nevada**

Dear Mr. Fellows:

This letter provides a summary of the floodplain mitigation plan for the Lompa Ranch East project. This plan is intended to demonstrate that the proposed development will meet the city's floodplain management requirements. The plan relies on previous studies/plans (e.g. FEMA LOMR of Kings Canyon Creek, NDOT US 395 drainage improvements, Lompa Ranch North SPA Drainage Master Plan) and our review of these studies/plans. Further hydrologic and hydraulic analysis will be required to during the technical/final design phase of the project to demonstrate that the final design meets all the requirements in the city's flood damage prevention ordinance and the Lompa Ranch North Specific Plan Area. These requirements include no increase in base flood elevations (i.e. "No-Rise"), mitigation for floodplain storage reductions at a 1:1 ratio, and minimizing increases to base flood velocities.

### **Existing Floodplain**

The Lompa Ranch East development is located north of Kings Canyon Creek and east of Goni Canyon Creek (see **Figure 1**). Goni Canyon Creek was recently modified by the Nevada DOT during the construction of US 395 and is now contained within a large box culvert within the NDOT Right-of-Way. The box culvert outfalls at the southwest corner of the Lompa Ranch East development. Although outflow from the Goni Canyon Creek culvert contributes runoff to the floodplain, the 1% annual chance flood elevations (i.e. Base Flood Elevations (BFE)) are controlled by the King's Canyon Creek floodplain. The BFE is 4628.7 at the upstream end of the property (US 395) and 4628.5 at the downstream end of the property (Airport Road). The proposed fill is also outside of the regulated floodway on King's Canyon Creek.



### **No-Rise Analysis**

The effective FEMA hydraulic model for the site is the LOMR that was completed in 2017 for King's Canyon Creek. The LOMR model (HEC-RAS version 4.1) was updated with detailed topography from the site. This update did not change the BFEs for existing conditions. A proposed conditions scenario was created by modifying the HEC-RAS cross sections to reflect the proposed grading in the left overbank of King's Canyon Creek. The base flood elevations were not increased between existing and proposed conditions due to the proposed fill being located within the fringe area of the floodplain that is modeled as ineffective flow. The ineffective portion of the floodplain are shown in **Figure 2** and the attached HEC-RAS cross sections. Our review of the effective, existing, and proposed conditions HEC-RAS models concludes that they accurately model the flood elevations in each of these scenarios due to the following explanation.

The proposed fill for the development is located within a “conveyance shadow” of the Kings Canyon Creek floodplain. The “conveyance shadow” is created by the floodplain construction at the us 395 bridge upstream of the site and the natural ground elevation just upstream of Airport road. The floodplain flow is expanding downstream of the US 395 bridge and contracting upstream of Airport Road as shown in Figure 1. Therefore, all of the current floodplain on the property is classified as “ineffective flow area” in the FEMA hydraulic model (HEC-RAS). Ineffective flow areas do not provide active conveyance as they are in a backwater condition that has a net velocity of close to zero feet per second. Fill within an ineffective flow area will increase the base flood elevations in the HEC-RAS models.

### **Floodplain Storage Mitigation**

The City's flood damage prevention ordinance also requires no loss of flood storage volume. The latest grading plan prepared by RED Ltd proposes fill of the shallow floodplain for most of the site but maximizes available open space for use as flood storage volume. Some additional modifications to further increase the flood storage volume on-site will be evaluated further in the technical design phase, including:

- Replace the existing culvert under the maintenance road and replace at a lower invert elevation of to provide more storage volume on-site. The existing culvert is the entrance and exit from the development for flood water from the King's Canyon Creek floodplain.
- Some floodplain storage could be provided in the streets within the development. Some roads could have a couple of inches above the crown of the road in the base flood. A dry lane is required on some roads so that there is an exit for all homes. Lowest floor elevations need to be 2 feet above BFE but open space could be below the BFE.

Additional off-site flood storage mitigation has been investigated and several opportunities are available. The developer's engineer will evaluate the following potential options for increasing



the flood storage capacity off-site, along King's Canyon Creek. The developer will work with City staff to identify a mutually agreeable floodplain mitigation area, which may include:

- Construction of the Channel Restoration Project between Kings Canyon Creek, Butti Way, and the Carson City Public Works building. Carson City has completed the design. The city estimates approximately 40,000 cubic yards of cut from this project that is currently within the FEMA Zone AE floodplain. The dirt will need to be screened and construction debris taken to land fill. The Channel Restoration Project includes grading of new flood control channel in the northern overbank of King's Canyon Creek. It is outside of the creek and should not require U.S. Army Corps of Engineer's permitting. Project components include: flood control channel, stabilized maintenance access road, 24" CMP culvert, revegetation (seeding), perimeter fencing/gate, erosion control BMPs, clean obstructions to 2' below final grade, and haul construction debris to C&D landfill (or recycle). City may waive tip fees. No easement required for construction as project is located completely on city-owned property. The haul route from the site to the Lompa Ranch East site will need further evaluation to minimize impacts to existing roads and pavement.
- Improvements to the stream crossing at Airport Road. Additional capacity, such as an added pipe culvert may reduce flood elevations upstream and reduce the flood storage volume that needs to be mitigated by the proposed development. This option requires additional floodplain/hydraulic analysis.
- Provide additional floodplain storage through excavation of the NDOT property south of the maintenance road and west of Airport Road.
- Provide additional flood storage in the upstream watershed by dredging Linear Ditch, which is located west of US 395 and south of 5<sup>th</sup> Street.

### **Off-Site Drainage/Flood Runoff**

The future technical drainage study will evaluate drainage from the existing neighborhood to the northeast of the site as identified in the Lompa Ranch North SPA Drainage Master Plan. Stormwater runoff from the upstream neighborhood currently causes flooding issues along Airport Road. The upstream drainage area will be analyzed to quantify the peak flows for storm events up to the 100-year event. The onsite drainage system will be designed to convey this off-site runoff along with on-site runoff through the proposed development so that flood levels are not increased and existing off-site flooding issues are improved.

### **Conclusion**

This floodplain mitigation plan includes the analysis of the existing and proposed floodplain for the Lompa Ranch East development. An important fact for the proposed site is that all of the proposed fill is located in an ineffective flow area. This location within the overall floodplain results in no loss of flood conveyance capacity and no increase in base flood elevations (i.e.




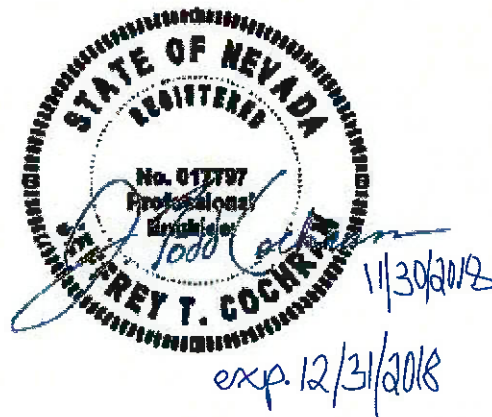
BFEs) between existing and proposed conditions. The proposed project will improve the flooding issues along Airport Road that are currently caused by runoff from the upstream neighborhood. The plan will also add additional floodplain storage within the effective floodplain along King's Canyon Creek.

If you have any questions, please contact Jeff House at 775-293-4000 or Todd Cochran at 404-569-1695.

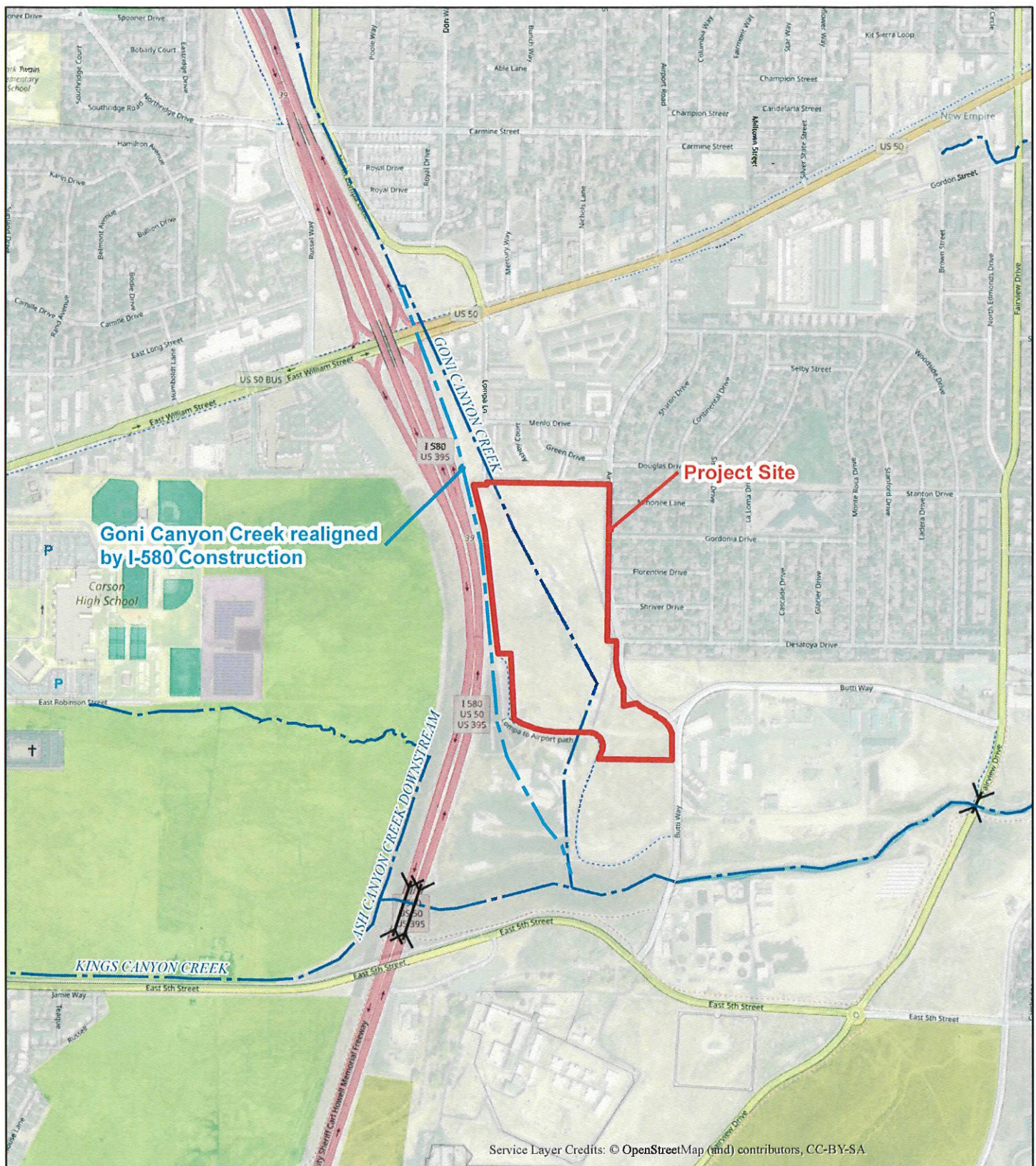
Sincerely,

**HOUSE MORAN CONSULTING, INC.**  
*Nevada PE Firm No. 23484*

  
J. Todd Cochran, PE, CFM  
Senior Vice President







**Figure 1. Location Map**

**Legend:**

- Property Boundary
- - - Profile Baselines

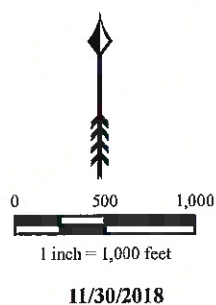
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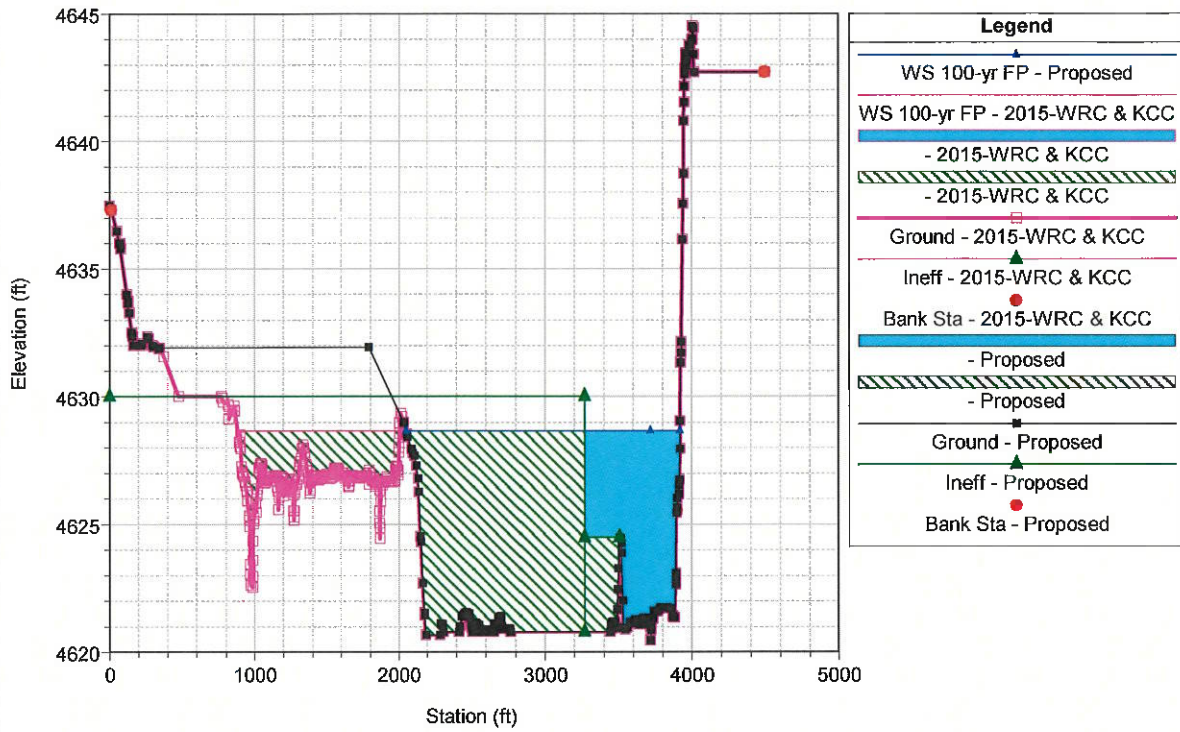




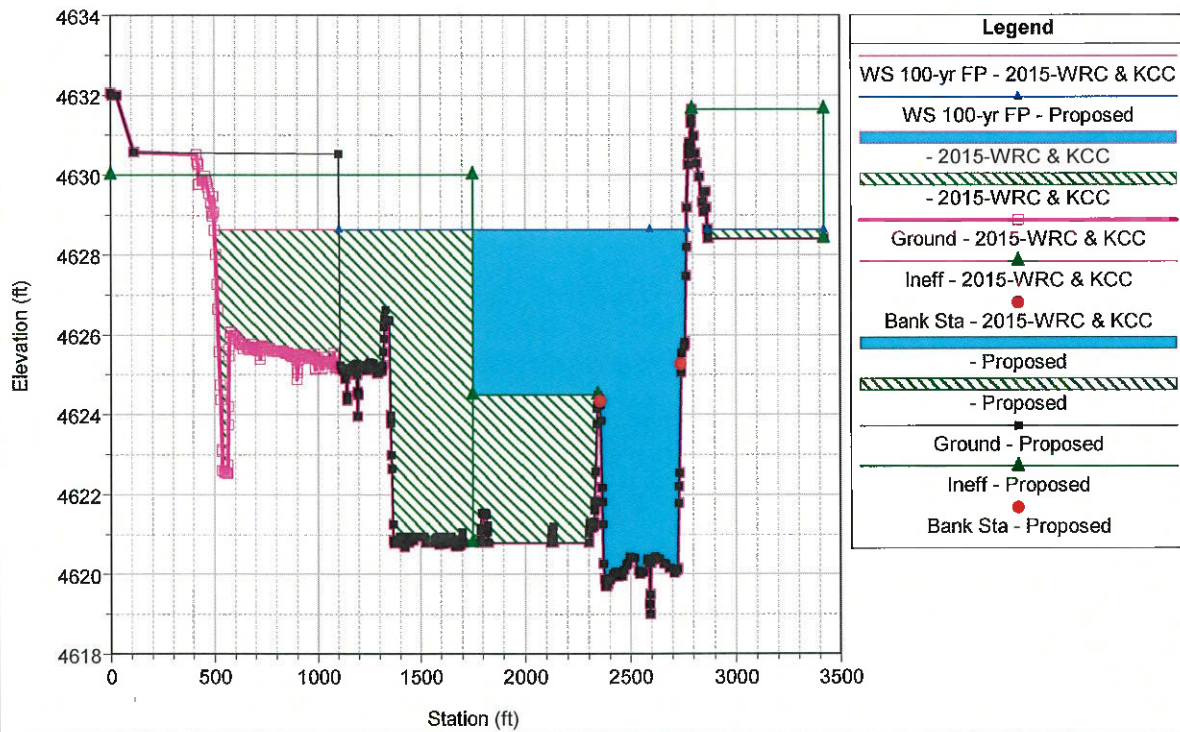




Proposed Conditions Plan: 1) Proposed 2) 2015-WRC & KCC  
RS = 5179.23



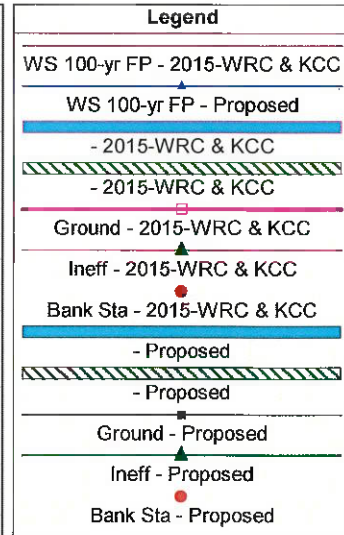
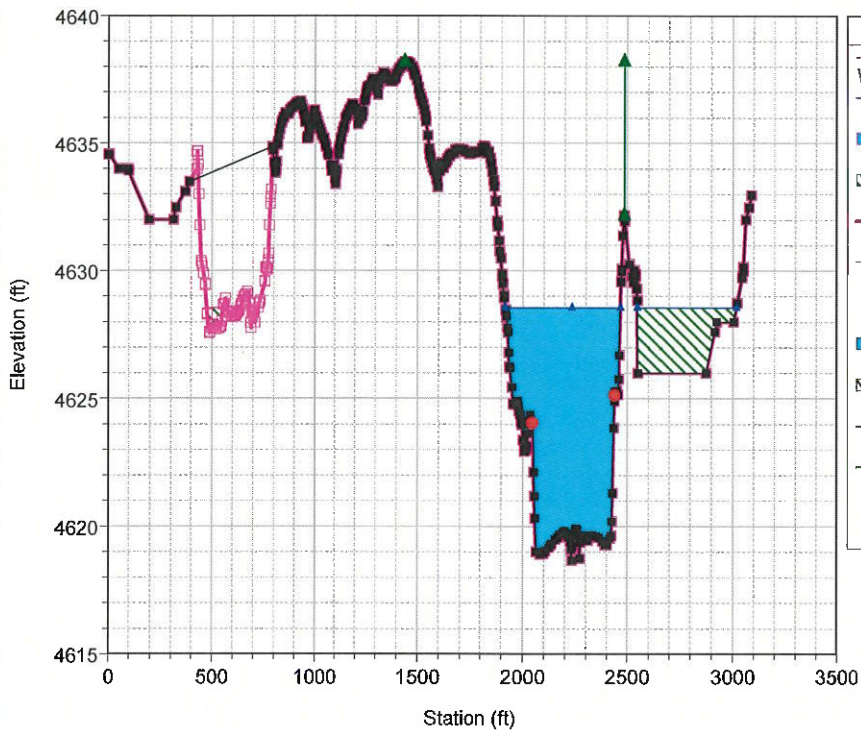
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RS = 4715.834



Proposed Conditions

Plan: 1) Proposed  
RS = 4309.763

2) 2015-WRC & KCC



Proposed Conditions

Plan: 1) Proposed  
RS = 3923.687

2) 2015-WRC & KCC

