MILL VALLEY

October 26, 2018

Scott McMorrow
Area Engineer, Marin County Flood Control Zone 3
3501 Civic Center Drive, Room 304
San Rafael, CA 94903

Re: Additional Funding Request to Upgrade the Stetson Phase 2 Conceptual Flood Reduction Measures on Arroyo Corte Madera del Presidio Flood Model to Unsteady State HEC-RAS model to be used for the Flood Control and Drainage Study Master Plan

Dear Mr. McMorrow,

In February 2018 Schaaf & Wheeler requested additional funds in the amount of $45,000 to update the existing steady state model completed by Stetson Engineers for the Arroyo Corte Madera del Presidio (ACMDP) HEC-RAS model into an unsteady, two dimensional (2D) HEC-RAS model. Schaaf & Wheeler has been working diligently since February to update the model and provide more detailed graphics and information using 2D modeling. Unfortunately, throughout this process, Schaaf & Wheeler has encountered challenges with the provided model and has done extensive de-bugging and modifications to the model to get it to run in unsteady HEC-RAS. This request is based on the work that was done to get the model to run, and to revise the deliverable based on the model limitations. The model had problems running primarily based on the numerous roadway crossings (more than 50). The work done by Schaff & Wheeler will make the model functional and it can now be a useful tool in future studies.

The City is requesting that our funding agreement be amended to include the additional cost of $68,920 incurred to convert the existing steady state model to a new unsteady state model. County Flood Control staff is supportive of the upgrade to the unsteady state HEC-RAS 5 model with 2D visualization and its benefits as previously done in Ross Valley.

Please let us know when this can be presented to the Flood Zone 3 Advisory Board for its recommendation to the Board of Supervisors.

Thank you for your consideration.
Sincerely,

Elisa Sarlatte
City of Mill Valley
Public Works Engineering Manager

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

870 Market Street, Suite 1278
San Francisco, CA 94102-2906
t. 415-433-4848
f. 415-433-1029
rlee@swsv.com

UPDATED SCOPE MEMO

TO:	Elisa Scarlett and David Eshoo City of Mill Valley	DATE:	October 18, 2018
FROM:	Dan Schaaf and Robin Lee Schaaf & Wheeler	JOB#:	MIVA.01.17
SUBJECT:	Updated Scope/Fee Request - Two Dimensional Creek Modeling		

In February 2018 Schaaf & Wheeler submitted a scope and fee to update the existing steady state model for the Arroyo Corte Madera del Presidio (ACMDP) HEC-RAS model into an unsteady, two dimensional (2D) HEC-RAS model. Schaaf & Wheeler has been working diligently since February to update the model and provide more detailed graphics and information using 2D modeling. Unfortunately, throughout this process, Schaaf & Wheeler has encountered challenges with the provided model and has done extensive de-bugging and modifications to the model to get it to run in unsteady HEC-RAS. This memo is meant to provide an updated scope based on the work that was done to get the model to run and revise the deliverable based on the limitations that the model has primarily based on the numerous roadway crossings (more than 50) and the fact that the model task approximately two hours to run. The additional tasks are detailed below and the additional fee is discussed thereafter.

Task 2A – Data Requests for Topography and Manipulation

Schaaf & Wheeler spent time requesting the LiDAR data that was flows by Stetson for the initial study. When the data was finally received, Schaaf & Wheeler had to manipulate the elevation data to connect the creek surveyed cross sections into the surface data to ensure the cross sections connected to the surface and moved the lateral structures to the appropriate locations. LiDAR data generally does not capture creek inverts as well as on the ground survey, so it was deemed necessary to ensure that the LiDAR was updated to reflect the on ground cross section survey data.

Task 3A – De-Bug Unsteady Model

When the steady state model was changed to unsteady flow by adding in a hydrograph instead of a peak flow rate, the model crashed at every scenario possible, even the smallest of flows would crash the model. De-bugging began with removal of the upper reaches that have capacity, then the time step was manipulated down to 1 second to remove instability from the model. In addition, the bridges were not coded into the model for unsteady flow so they had to be edited significantly in order to run in the unsteady model. Finally, the bridges were removed and analyzed to see if the soffit of the bridge was within the water surface. Bridges that cleared the water surface were added back in and 18 of the 23 bridges that significantly restrict the flow were added back into the model. The model runs are now around 2 hours to complete, over the 1 minute steady state model runs.

Task 3B – Channel Capacity Model

Using the model with all the bridges removed, Schaaf & Wheeler will analyze the capacity of the creek channel without any restrictions from the bridges. Two dimensional videos will be developed to show the

spills from the channel. This model will analyze the highest flow rate possible. The spill model described below in Task 3C will analyze lower flows.

Task 3C – Channel Spill Model

Schaaf & Wheeler will develop a spill model that added back as many bridges as possible without having the model crash. Schaaf & Wheeler will prepared a spreadsheet that gives all the details of the bridges and identifies the bridges with the model impact on the creek. This model will be used to develop 2D simulations of the spills from the channel. This model will only run flows that are lower than the channel capacity model developed in Task 3B as the model will not handle higher flows that the capacity of the channel. It is unlikely that the 100-year flow will be able to be run in this model.

The remainder of our scope, Tasks 4-9 remain unchanged.

Updated Fee Estimate

Table 1 below shows the breakdown of hours per task and associated fees for the initial request in black and the added additional tasks in red. The anticipated budget was $45,010. We are now requesting an additional fee of $68,920 which brings the total project budget to $113,930.

Table 1 – Updated Fee Estimate

TASK	HOURS	FEE
1. Hydrograph Development	10	$ 2,100
2. Hydraulic Model QA/QC	18	$ 3,580
2A. Data Requests and Topo Manipulation	40	*$ 7,720*
3. Unsteady Model Development	10	$ 2,050
3A. De-Bugging Unsteady Model	140	*$ 26,700*
3B. Creek Capacity Model	80	*$ 15,400*
3C. Creek Spill Model	100	*$ 19,100*
4. Two Dimensional Existing Model Development	50	$ 10,030
5. Existing Condition Flood Maps	26	$ 4,930
6. Model Improvements	60	$ 11,600
7. Improvement Flood Maps	26	$ 4,930
8. Documentation	14	$ 2,920
9. Coordination	14	$ 2,870
INITIAL FEE ESTIMATE	**228**	**$ 45,010**
ADDITIONAL FEE REQUEST	**360**	**$ 68,920**
UPDATED TOTAL PROJECT BUDGET	**588**	**$ 113,930**