

December 16, 2010

Kevin Stewart, P.E.
Manager, Information Systems & Flood Warning Program
Urban Drainage and Flood Control District
2480 W. 26th Ave, Suite 156B
Denver, CO 80211

RE: Scope of Services for updating the Boulder Creek real-time Hydromodel to determine the increase in potential flood impacts as a result of the Fourmile Canyon fire.

Dear Mr. Stewart:

Leonard Rice Engineers, Inc. is pleased to present this Scope of Services for modeling the effects of the Fourmile Canyon fire on the Boulder Creek watershed. The District has identified the following tasks to be included within the scope of services:

I. SCOPE OF SERVICES

Task 1 – Identify design points.

- Talk with District staff to determine new design points and the spatial extent of the analysis to determine the increase in potential flood impacts as the result of the Fourmile Canyon fire.

Task 2 – Model and document pre-fire hydrology and flood potential using the existing Boulder Creek Hydromodel at established design points from Task 1.

- Model and document results of the May 15, 2003 storm.
- Model and document results of up to 20 rainfall inputs of varying depth, duration, frequency, and intensity determined by the District.
- Model and document results of the 10yr-6hr storm used in the Fourmile Emergency Stabilization Burned Area Report (FEST) report.

Task 3 – Refine Boulder Creek Hydromodel to show the impacts of the Fourmile Canyon fire.

- Area weight SCS curve numbers for basins affected by the fire to correctly account for the change in rainfall/runoff volumes. Curve numbers will be based on documented post fire values and/or information from FEST, USGS, or District staff.
- Incorporate area weighted SCS curve numbers into the existing Boulder Creek Hydromodel.

Task 4 – Model and document post-fire hydrology and flood potential using the revised Boulder Creek Hydromodel at established design points.

- Model and document results of the May 15, 2003 storm.
- Model and document results of up to 20 rainfall inputs of varying depth, duration, frequency, and intensity determined by the District.
- Model and document results of the 10yr-6hr storm used in the FEST report.

Task 5 – Review and compare pre and post-fire hydrology and determine the increase of flood potential at established design points.

- Compare pre-fire and post-fire peak flow estimates and timing of the May 15, 2003 storm.
- Compare pre-fire and post-fire peak flow estimates and timing from modeled rainfall inputs of varying depth, duration, frequency, and intensity defined by the District.
- Compare pre-fire and post-fire peak flow estimates and timing at established design points to the FEST report for pre-fire and post-fire peak flow estimates.

Task 6 – Divide fire affected basins into additional sub-basins, refine basin characteristics, calibrate using original unit hydrographs, and determine channel routing

- Develop additional sub-basin unit hydrographs using CUHP based on revised basin geometry and characteristics.
- Model sub-basins in aggregate and calibrate to match the original pre-fire basin unit hydrographs.
- Import into SWMM and develop routing for each sub-basin.
- Document sub-basin unit hydrographs, basin parameters, and routing parameters.

Task 7 – Update the Boulder Creek Hydromodel to include additional sub-basins

- Incorporate additional sub-basins (unit hydrographs) into Boulder Creek Hydromodel.
- Revise weighted rainfall and for each sub-basin.
- Incorporate sub-basin routing.
- Model pre-fire 1-hr design storms to confirm results from Task 2
- Revise weighted SCS curve numbers for burned and unburned sub-basins
- Model post-fire 1-hr design storms to confirm results from Task 4

Task 8 – Model and document post-fire hydrology and flood potential using the updated Boulder Creek Hydromodel with additional sub-basins at established design points.

- Model and document results of the May 15, 2003 storm.
- Model and document results of up to 20 rainfall inputs of varying depth, duration, frequency, and intensity determined by the District.
- Model and document results of the 10yr-6hr storm used in the FEST report.

Task 9 – Review and compare pre and post-fire hydrology and determine the increase of flood potential using the revised Boulder Creek Hydromodel at established design points

- Compare pre-fire and post-fire peak flow estimates and timing of the May 15, 2003 storm.
- Compare pre-fire and post-fire peak flow estimates and timing from modeled rainfall inputs of varying depth, duration, frequency, and intensity defined by the District.
- Compare pre-fire and post-fire peak flow estimates and timing at established design points to the FEST report for pre-fire and post-fire peak flow estimates.

Task 10 – Deliverable

- The deliverable will be a DVD with an electronic copy of the final report, pre and post-fire hydromodels, sub-basin CUHP/SWMM model, shapefiles, and all other model related files.

Total Estimated Cost: \$33,000.00

II. TIME REQUIRED

We can begin the proposed services as soon as we receive authorization to proceed. We estimate the services under Part I can be completed in 3 months.

Delays caused by major changes in the project plans or by circumstances beyond the control of the engineer could extend the time of completion.

III. PAYMENT

Payments for our services, like other professional services, are based on the actual time spent on your behalf and are measured by standard hourly rates. For those assigned to your team, those rates range from \$175–\$235 for principals and associates, \$90–\$200 for engineers and hydrologists, and \$55–\$120 for technicians, draftsmen and computer operators. Individuals are assigned to a project based on the type of services involved and the experience and expertise of the individual.

Routine expenses such as telephone and copies are included in the rates above. Outside expenses such as laboratory analysis, obtaining aerial photos, or other special services incurred directly in connection with the project are billed at cost plus 5 percent to cover handling and administration. If the \$1,000,000 Limitation of Liability clause described below is selected, the handling and administration fee for outside expenses will be 10 percent. Reimbursable expenses billed at cost include airfares, automobile rental, and other travel or per diem costs for projects more than 100 miles from the office site. Subconsultants to Leonard Rice Engineers, Inc. (LRE) are billed at cost plus five percent. We will also bill for a one-time liability insurance fee on our first invoice if the District selects the *\$1,000,000 Limitation of Liability clause*.

The scope described under Part I represents our estimate of the services required based on the information provided. As the project proceeds and additional facts are developed, it may be necessary to undertake additional services and some items described may not be needed. For these reasons we can provide only an estimate of the time and cost of completing the services.

We believe the services described above can be accomplished for \$33,000.00. Invoices are submitted monthly for time and expenses incurred. Terms of payment are net 30 days. Overdue accounts are subject to an interest charge of 1.5% per month and services will stop whenever payment is overdue more than 75 days.

IV. LIMITATION OF LIABILITY AND LIABILITY INSURANCE FEE

In recognition of the relative risks and benefits of the Project to both the District and LRE, the risks have been allocated such that the District agrees to limit the liability of LRE to either \$100,000 or \$1,000,000 by choosing (at the signature blocks) whether to accept the limits in paragraph 1 or paragraph 2, below. If the District chooses the higher limit in paragraph 2, the District agrees to pay to LRE a liability insurance fee in the amount of \$250 which will be billed on the first invoice.

1. In recognition of the relative risks and benefits of the Project to both the District and LRE, the risks have been allocated such that the District agrees, to the fullest extent permitted by law, to limit the liability of LRE and its officers, employees and sub-

consultants, to the District and all of the District's contractors and consultants, for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of LRE to the Districts shall not exceed the total amount of \$100,000 or the amount of LRE's total fee for the services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

2. In recognition of the relative risks and benefits of the Project to both the District and LRE, the risks have been allocated such that the District agrees, to the fullest extent permitted by law, to limit the liability of LRE and its officers, employees and sub-consultants, to the District and all of the District's contractors and consultants, for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of LRE to the District shall not exceed the total amount of \$1,000,000 or the amount of LRE's total fee for the services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

V. SPECIAL SERVICES

Services in addition to those described under Part I will be performed or obtained for the client's account upon request and approval at rates currently in effect. Special services may include, but are not limited to, expert testimony, appearances at public meetings, soil investigations, topographic and land surveys, including establishment of boundaries, well drilling, well and aquifer testing, electric logging, water quality sampling and analysis, preparation of construction drawings and specifications, material testing ,and environmental permitting.

Acceptance of this proposal and authorization to proceed with the services can be indicated by signing one copy and returning it to us for our files. The terms of this proposal will be honored for a period of 30 days.

We look forward to discussing this proposal with you and will be contacting you in the next few weeks. If you have any questions or concerns about the services offered in the proposal before then please call me at 303-455-9589.

Thank you for providing us the opportunity to present this proposal to the District.

Very truly yours,

LEONARD RICE ENGINEERS, INC.

For: _____
Contracting Agency

R. Gregory Roush, P.E.
President

By: _____
Authorized Signature/Title

K. Kelly Close
Senior Project Hydrologist

RGR/MJM/mkj

Date: _____

Limitation of Liability agreed to is (please initial one of the following):

- 1) _____ \$100,000 or total fees, whichever is greater.
- 2) _____ \$1,000,000, and the liability insurance fee of \$[Fee] will be billed with the first statement.