February 16, 2012

Project: Inundation Mapping for the Colorado River District

Vendor: Colorado River District.; P.O. Box 1120, Glenwood Springs, CO 81602
Phone: (970) 945-8522
c/o Mr. Ray Tenney, P.E.

Consultant: W. W. Wheeler and Associates, Inc.; 3700 South Inca Street; Englewood, CO 80110
Phone: (303) 761-4130
c/o Mr. Stephen Jamieson, P.E.

CWCB funding source: Severance Tax Trust Fund Operational Account

SCOPE OF WORK

W. W. Wheeler and Associates, Inc. (Consultant), at the direction of the Colorado Water District (Vendor), will perform a dam breach modeling study and flood inundation mapping for Ritschard Dam. The study shall be in accordance with the latest Breach Guidelines published by the Colorado Dam Safety Branch. The level of analysis shall be "Simple," as defined in Table 1 of the Guidelines for both the breach modeling and flood inundation mapping. Flood routing models and inundation mapping shall be based on USGS 10-meter Digital Elevation Model (DEM) or best available topographic mapping. Field measurements of bridges and culverts at critical sections shall be incorporated into the model as necessary. The limits of the dam breach flood mapping shall extend from reservoir/dam, downstream to the location where breach flood impacts become negligible.

The downstream limit of the inundation mapping for Ritschard Dam is expected to extend downstream to a point along the Colorado River. The location of that point will be determined in the preliminary analysis.

The inundation limits shall be prepared in UTM coordinates (NAD 83, Zone 13 – meters) which shall be overlaid on base mapping that includes color aerial imagery (2009 or newer). The inundation map shall be printed in color on a minimum sheet size of 11"x 17". The inundation extents shall be clearly illustrated and include peak discharge estimates, peak flood wave arrival times and peak flood wave depths at critical locations. Roads, highways and critical infrastructure (schools, hospitals, fire stations, etc.) shall be annotated and any roads expected to be overtopped by the flood wave shall be identified. The map shall include a legend noting the dam, DAMID, north arrow and a graphic scale.

PROPOSED METHODOLOGY

The Consultant shall perform a dam failure analysis based on a maximum reservoir water surface associated with a Probable Maximum Flood (PMF) of the dam and route the resulting outflow hydrographs downstream using HEC-HMS. Breach parameters shall be estimated in accordance with methodologies recommended by the Office of the State Engineer, Dam Safety Branch. Hydraulic parameters, including width of flow, depth of flow and velocity at critical locations shall be estimated using the Corps of Engineer's HEC-RAS computer modeling software. A steady-state water surface profile resulting from peak flow rates at various locations shall be generated. Topographic information

for the floodplains shall be based on USGS 10-meter DEMs from the National Elevation Dataset (NED) elevation data.

For the Preliminary analysis the Consultant shall contact pertinent local, county and state jurisdictions to obtain information regarding bridge opening dimensions and roadway elevations at potentially critical locations. Consultant shall present preliminary water surface profile modeling and inundation mapping results to the Colorado Division of Water Resources to determine the critical locations that require field measurements. Field verified survey data at these locations shall be utilized in the final modeling and mapping results.

DELIVERABLES

The Vendor shall provide the CWCB the following: a final report for the inundation mapping analysis stamped by a licensed Colorado professional engineer; digital files of the inundation limits, maps and supporting spreadsheets; and hydraulic/hydrologic models.

SCHEDULE

Work may initiate on the date of the State's Purchase Order and delivery of the final product is due no later than June 30, 2012.

BUDGET

The estimated cost for completing the project is $15,000 based on Consultant's current rate schedule and projection of effort. The estimate is summarized in the attached Table(s). The Consultant shall invoice Vendor on a Time and Materials basis for services performed.

PAYMENT

The State shall pay Vendor up to $8,000 for Consultant's project related invoices following receipt of final deliverables. The Vendor is responsible for all expenses in excess of the State's contribution. Any overages or increases in project costs shall be the responsibility of the Vendor.

Estimated Project Cost Sharing:

Company	$ 7,000
CWCB Grant	$ 8,000
TOTAL	$15,000

CWCB shall issue payment following receipt and processing of Vendor's Request for Payment submittal. The Request for Payment must include: a summary of Consultant's labor effort and direct costs in accordance with the attached estimate, copies of corresponding invoices from Consultant, and identification of any major issues with proposed or implemented corrective actions. All products, data, and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of project documentation prior to CWCB issue of payment.