

## ***Develop Hydrologic Data***

Scope: Contractor shall perform hydrologic analyses for approximately (insert number of stream locations) stream locations along the flooding source(s) identified in Table 1.7. Contractor shall calculate peak flood discharges for the 10-, 4-, 2-, 1- and 0.2- percent-annual-chance events (10-, 25-, 50-, 100-, and 500-year events) using the most appropriate methodology for the particular drainage basin of interest. Depending on the stream and location, preferred methodologies could include flood frequency analysis of existing stream gage data where sufficient gage records exist, rainfall-runoff modeling using a FEMA accepted model such as HEC-HMS or CUHP/SWMM, or regional regression equations published by the USGS or the Colorado Water Conservation Board (CWCB). It will be the responsibility of the Contractor to determine the most appropriate methodology for each stream of interest and to make a recommendation to the State for approval. Flood discharges developed as part of this scope will be used as the basis for subsequent Hydraulic Analyses. Preliminary discharges shall be compared to known or published data where possible as a reasonableness check. Contractor should incorporate peak flow information from the September 2013 flooding event. Peak flows may need to be estimated from high water marks. In addition, Contractor shall address all concerns or questions regarding the hydrologic analyses that are raised during the independent QA/QC review performed.

If GIS-based modeling is used, contractor shall document automated data processing and modeling algorithms, and provide the data to CWCB and the Colorado Department of Transportation (CDOT) to ensure these are consistent with FEMA standards. Digital datasets (such as elevation, basin, or land use data) are to be documented and provided to CWCB and CDOT for approval before performing the hydrologic analyses to ensure the datasets meet minimum requirements. If non-commercial (i.e., custom-developed) software is used for the analysis, then the contractor shall provide full user documentation, technical algorithm documentation, and the software to CWCB and CDOT for review before performing the hydrologic analyses.

**Table 1 – Summary of Hydrologic Analysis**

County and Flooding Source Name	Highway(s)	Location and Drainage Area
Larimer, Big Thompson River	Highway 34	Big Thompson River Below Lake Estes to West Loveland
Larimer, Little Thompson River	Highway 36	Little Thompson River Headwaters to Pinewood Springs
Boulder, St. Vrain River	Highways 7 and 36	St. Vrain Creek Headwaters (North, Middle, and South) to I-25
Boulder, Boulder Creek	Highway 119	Boulder Creek below Barker Reservoir to West Boulder
Weld, South Platte River	Highway 85 and 34	Big Thompson River confluence to Cache la Poudre River confluence
Jefferson, Coal Creek	Highway 72	Coal Creek Headwaters to Jefferson/Boulder County Line

Standards: All Hydrologic Analyses work shall be performed in accordance with the standards specified in the [Guidelines and Specifications for Flood Hazard Mapping Partners](#) (G&S) and the CWCB's floodplain and stormwater technical criteria manual.

Deliverables: In accordance with the G&S, the contractor shall make the following products available to CWCB and CDOT digitally.

Please note that data files must be organized in accordance with the draft August 2011 version of Appendix M.

- Digital copies of all hydrologic modeling (input and output) files for the 10-, 4-, 2-, 1- and 0.2-percent-annual-chance events;
- Metadata file;
- Digital Summary of Discharges Tables presenting discharge data for the flooding sources for which hydrologic analyses were performed;
- Digital versions of draft text;
- Digital versions of all backup data used in the analysis including work maps;
- Format Hydrology Database or Data Delivery consistent with the DCS—in the G&S of all return periods (see draft DCS language and coordinate with the Region regarding its appropriate use);
- For GIS-based modeling, deliverables shall include all input and output data, and GIS data layers;
- Where paper documentation is required by State Law for Professional certifications, the contractor may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the Regional and/or State representative to verify state reporting requirements; and
- Summary of the hydrologic analysis for each study area in Table 1.7 Summary of Hydrologic Analysis.

The contractor will be responsible for addressing any and all comments resulting from independent QA/QC, including re-submittal of deliverables as needed to pass technical review by the CWCB and CDOT.

- Review the submittal for technical and regulatory adequacy, completeness of required information, and supporting data and documentation. The technical review is to focus on the following:
  - Use of acceptable models;
  - Use of appropriate methodology(ies);
  - Correctly applied methodology(ies)/model(s), including QC of input parameters;
  - Comparison with gage data and/or regression equations, if appropriate; and
  - Comparison with discharges for contiguous reaches or flooding sources throughout the watershed.
- Verify that the data was submitted under the applicable HUC-8 folders;
- Maintain records of all contacts, reviews, recommendations, and actions and make the data readily available to CWCB and CDOT; and

- If data changed during review, then updated deliverables for previous tasks will be submitted at this time.

All QA/QC work shall be performed in accordance with the standards specified in the [Guidelines and Specifications for Flood Hazard Mapping Partners](#) (G&S).

In accordance with the G&S, the contractor shall make the following products available to the CWCB and CDOT digitally.

- A Summary Report that describes the findings of the independent QA/QC review.
- Recommendations to resolve any problems that are identified during the independent QA/QC review.
- Where paper documentation is required by State Law for Professional certifications, the Mapping Partner may submit the paper in addition to a scanned version of the paper for the digital record. Please coordinate with the Regional and/or State representative to verify state reporting requirements.