



CDOT FRONT RANGE NPS - REGION 4 RIVERINE DESIGN AND ANALYSIS SCOPE OF WORK

PURPOSE AND INTENT

CDOT Region 4 encompasses the following Colorado counties: Boulder, Broomfield, Larimer, Logan, Morgan, Phillips, Sedgwick, Washington, Weld, Yuma, Lincoln, Elbert, Kit Carson, and Cheyenne. The following non project specific (NPS) contract shall apply to Region 4 services within the Region only, though it may require occasional collaboration with other Regions at CDOT under the supervision of the Hydraulics Unit Team Lead or his/her designee, herein identified as the point of contact (POC) for services.

Region 4 Hydraulics Unit staff provide services to internal CDOT customers including internal analysis and design, design review, maintenance support, permitting, and local agency review and coordination. Service to external customers is directed through local agency coordination and support, stakeholder engagement, and policy development and implementation.

This task order provides Riverine Design and Review services through hydraulic and hydrologic (H&H) analysis and design, and fluvial geomorphologic assessment. Application for services is largely focused on riverine applications, but may also require local drainage project assistance. The primary clientele consists of internal CDOT staff and personnel in Region 4. External support and coordination shall remain the purview of Hydraulics Unit staff and are not included in this NPS contract except in a support capacity to staff.

TYPES OF SERVICES

Day to day management of the Hydraulics program will be performed by the consultant who will coordinate directly with CDOT Region 4 Hydraulics Unit lead, also identified herein as the point-of-contact (POC). A description of the types of services required under this task order is described below.

1. **Project Management** - the consultant shall communicate project needs with the POC through the planning, execution and closure processes on all projects and activities. Consultant responsibilities will include the following:
 - Contract Management
 - Invoice preparation and progress reporting
 - Schedule monitoring
 - Coordination with CDOT R4 personnel to discuss the specific project information, including location, drainage and flooding history, fluvial geomorphologic functions, maintenance efforts, and other agency interactions.
 - Needs assessments of permits from local, state and federal jurisdictions.
 - Field reconnaissance of various sites with CDOT Region 4 personnel.



2. Fluvial Geomorphologic Assessment - the consultant will provide written field assessments of fluvial geomorphologic functions on waterways within Region 4 that will inform design and maintenance functions, and may serve to inform hydraulic analyses, scour and revetment design, and river meander migration management functions. Consultant responsibilities will include the following:
- Apply the principles of Chapters 16 & 17 of the CDOT Drainage Design Manual (DDM, 2004) to analysis, design and maintenance of transportation infrastructure improvements in CDOT Region 4
 - Acquire requisite permits associated with the same (above).
 - Develop design and maintenance features to protect public infrastructure using methods outlined in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular Number 18 (HEC-18), HEC-20, HEC-23, and reports published and distributed for the Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP).
 - Provide recommendations and design concepts to support hydrologic and hydraulic analysis and design at later phases of projects and maintenance functions.
 - Integrate river restoration features into standard procedures for protecting public infrastructure and maintaining ecological viability of natural assets adjacent to the same.
 - Provide innovative and unique design concepts to support CDOT Hydraulics, Environmental, and Maintenance operations in Region 4.
3. Hydrologic Analysis - the consultant will provide hydrologic analysis services to estimate a range of peak flow conditions in a steady state and unsteady state environment. Consultant responsibilities will include the following:
- Apply the principles of Chapters 7 & 12 of the DDM to analysis, design and maintenance of transportation infrastructure improvements in CDOT Region 4.
 - Acquire requisite permits associated with the same (above).
 - Perform analyses using WMS, HEC-HMS, SWMM, CUHP and other hydrologic analysis software platforms.
 - Develop peak discharge estimates from stream gage, Log-Pearson III flood frequency, rational method, regression, TR-55, SCS Unit Hydrograph, Snyder's unit hydrography and CUHP analyses.
 - Quality control and quality assurance (QA/QC) of hydrologic assessments prepared by staff at CDOT Region 4.
 - Prepare hydrology reports to summarize findings, compile background information, and convey conclusions and recommendations on infrastructure improvements, process efficiency, and public safety and welfare.
4. Hydraulic Analysis & Floodplain Management - the consultant will provide hydraulic analysis, design services and floodplain management services using 1-D and 2-D technology in steady and unsteady flow conditions. Consultant responsibilities will include the following:
- Apply the principles of Chapters 8-10 & 13 of the DDM to analysis, design and maintenance of transportation infrastructure improvements in CDOT Region 4.
 - Acquire requisite permits associated with the same (above).
 - Perform analyses for open channel systems using SMS, HEC-RAS (1-D and 2-D), Flo-2D, HY-8, and other hydraulic analysis software platforms.
 - Perform close-conduit or mixed analyses using HY-12, StormCAD, HEC-22 procedures, and other software platforms.



- Develop design and maintenance features to protect public infrastructure using methods outlined in the FHWA's HEC-15, HEC-18, HEC-22, HEC-23, and reports published and distributed for the Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP).
 - Quality control and quality assurance (QA/QC) of hydraulic analyses and designs prepared by staff at CDOT Region 4.
 - Prepare hydraulic reports to summarize findings, compile background information, and convey conclusions and recommendations on infrastructure improvements, process efficiency, and public safety and welfare.
 - Prepare floodplain reports for construction and maintenance work in regulatory floodplains and floodways for local agency permitting, including no-rise certification and FEMA letter of map change (LOMC), as required by the local agency or Colorado Water Conservation Board (CWCB).
5. Erosion, Scour and Degradation Countermeasure Design - Text:
- Apply the principles of Chapters 10-11, 13, & 17 of the DDM to analysis, design and maintenance of transportation infrastructure improvements in CDOT Region 4.
 - Acquire requisite permits associated with the same (above).
 - Develop design and maintenance features to protect public infrastructure using methods outlined in the FHWA's HEC-15, HEC-18, HEC-22, HEC-23, and reports published and distributed for the Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP).
 - Quality control and quality assurance (QA/QC) of revetment and scour countermeasure design prepared by staff at CDOT Region 4.
 - Services for new construction, retrofitting and maintenance may be required in both riverine condition applications and local drainage applications in and near CDOT infrastructure assets.
6. CAD and GIS Analysis - the consultant will be expected to prepare standard CDOT plans and specifications for design features associated with all design and analysis functions previously mentioned. Consultant responsibilities will include the following:
- Develop plans and specifications in accordance with standard CDOT practice and technical standards.
 - Utilize Bentley software (MicroStation & InRoads) for all drafting and plan set development, and be familiar with ProjectWise for archiving and document control.
 - Support the current CDOT effort to integrate GIS into regular practice, and serve as experts to support CDOT staff in developing systems that can be accessed and functional across all Regions.
7. Reporting, Archiving and Document Control - all deliverables must be digital; the consultant shall provide a final memorandum or report to close out all task orders. Level of reporting shall be commensurate with the level of effort determined in collaboration with the POC at the scoping phase of task order development. All in-house procedures will be utilized, and workflows will be developed and refined for efficiency, accuracy and transparency. Final products shall be delivered digitally as first preference, and in paper as required and identified during task order scoping.
8. Survey -- provisions to support riverine analysis, design activities and construction support will require the assistance of a professional land surveyor. Survey crews, teams and support will assist with acquisition of ground topography, bathymetric information, LiDAR data, field features



and recorded property information. Survey professionals will be required to certify materials submitted to local agencies, federal agencies, CDOT and other state agencies, and will provide other support to team members as required on a project-by-project basis.

9. Landscape Architecture -- provisions to support riverine analysis, design activities and construction will require the assistance of an ecological services group. Ecological support will be needed for river restoration, habitat enhancement, fluvial geomorphological assessments, biostabilization, and other vegetation management practices associated with analysis, design and construction processes for riverine services. Ecological resource professionals may also provide permitting assistance and other support to team members as required on a project-by-project basis.
10. Geotechnical Engineering -- services to support riverine analysis, design activities and construction support will require geotechnical engineering services. This may include in-situ soil analysis, laboratory analysis, support for hydraulic revetment design and construction, and support for fluvial geomorphological assessments. Drilling services may be required, along with other support to team members as required on a project-by-project basis.

COST BASIS

Actual project costs will depend on final details of the effort and dates of the work. Percent of task order spent versus percent of work completed will be evaluated and audited regularly. If actual costs are exceeding projected costs, the POC will be notified and Consultant will re-evaluate the H&H Design and Review contract with the POC and amend as necessary. The Consultant will initiate the category of exploration and deliverables at the mutually agreed time with the CDOT POC.

