CDBG-DR 30% DESIGN GUIDELINES FOR PLAN DEVELOPMENT

To: DOLA, CWCB
From: DOLA/CWCB Stream Recovery Technical Assistance Team
Re: 30% Design Guidelines for Plan Development
Date: May 22, 2015

CDBG-DR watershed planning grants are requesting 30% design as a deliverable [(1)]. The Technical Assistance Team has been asked to assist in developing 30% design guidelines for DOLA/CWCB, watershed coalitions (Coalitions), and project consultants to ensure that CDBG-DR planning and implementation grants result in consistent deliverables. The Technical Assistance Team defines 30% design as the development of a plan set to a level of sufficient detail to evaluate major design features prior to advancing to the design/build phase or construction drawings. The Team acknowledges that individual components of a 30% design will vary depending on the reach/site and project goals, however, the CDBG-DR program dictates that 30% designs will provide clear direction for detailed project engineering and specifications to be completed in the future. In order for the projects to be eligible for funding in future CDBG-DR implementation grant cycles, the design work must 1) describe the science-based risk analysis it has employed in its design, and 2) identify resilience performance standards that can be applied to the projects upon completion of construction (See Federal Register, Vol. 79, No. 106, June 3, 2015). The following outline should be used as guidance.

ASSESSMENT

Project assessment may or may not have been completed as part of the Master Plan. If it has not been completed or is incomplete the following topics should be researched and addressed as part of the planning process.

Project Goals Statement

- Clear definition of project goals and objectives (developed in collaboration with Coalition and stakeholders).

Watershed and Site Assessment

- Review of geology, ecology, hydrology, geomorphology, soils, water quality conditions
- Riparian assessment and wetland delineation
- Photo documentation (e.g., pre-project, pre-flood, post-flood, historical)
- Basemap development including but not limited to:
    - Political/property boundaries
    - Infrastructure and utility locations
    - Topographic survey (1’ contour development from LIDAR and traditional survey methods)
    - Supporting GIS/CAD layers

Hydrology and Hydraulics

- Watershed hydrology - evaluated for peak, low, and pertinent stage/duration flows as necessitated by the design goals. Data obtained from CWCB, gage data, StreamStats, and/or other appropriate sources.
- Hydraulic model development for existing conditions. Water surface elevations, stream velocity, shear stress and stream power shown in relation to stage and discharge through the reach. Hydraulic modeling should be developed on a publically available and non-proprietary software that will allow for any follow-up studies or projects to utilize the same files without significant software acquisition fees.
- Hydraulic model development for proposed alternatives. Water surface elevations, stream velocity, shear stress and stream power shown in relation to stage and discharge through the reach.
- No-rise analysis for work within regulatory floodways or other areas of local applicability

Geomorphology

- Identification of existing and proposed stream style or type, bedform, planform, and channel evolution stage Discussion of erosive or depositional processes and analysis of cause(s) of instability
- Channel and floodplain dimensions including low-flow, bankfull, and various flood stages
- Reference reach data
- Identification of vertical and lateral channel controls Geotechnical analysis
- Inclusion of Erosion Hazard Zone if mapped during the Master Plan process

Sediment Transport Analysis (if applicable)

- Shear stress, velocity and stream power as a function of stage and/or discharge
- Preliminary sediment transport capacity analysis to estimate bed aggradation or degradation over time if designing an alluvial (mobile bed) channel [(2)]
- Preliminary incipient motion analysis at design flows if designing a threshold channel [(2)]
- Preliminary scour depth calculations for design floods

Aquatic, and Terrestrial Species Habitat Requirements (if applicable)

- Species of concern and habitat needs evaluation
- Fish passage requirements (burst speeds, depth, velocity, cover)
- Define seasonally appropriate floodplain, lateral and longitudinal connectivity requirements
- Riparian vegetation target community
- Evaluation of existing and potential invasive species
- Consideration of construction windows for sensitive species

Alternatives Analysis

This may be optional if the Master Plan or previous efforts have already identified a desired plan

- Preliminary/Concept plans with appropriate alternatives (2-3) given the site conditions and restoration potential
- Define evaluation criteria and decision-making process
- Evaluation of alternatives and selection of preferred alternative.

30% DESIGN FOR PREFERRED ALTERNATIVE

Project Design

- Typical channel dimensions including low-flow, bankfull, and various flood stages as well as typical floodplain grading/roughness
- Channel alignment and river corridor/floodplain alignment
- Channel profile
- Identification of project limits
- Location of in-channel and floodplain structures
- Location of fish passage structures and features
- Other elements as identified in the project goals and multiple objectives, as applicable
- Preliminary engineering typical drawings for all structure types- preliminary size calculations, use, and location explained

Opinion of Probable Cost

- Itemized with specific cost breakdown (provide range of expected costs - low/high/median)
- Budget narrative

Draft Planting Plan (if applicable)

- Identify existing/on-site species and desired plant community
- Identify potential revegetation needs with species and estimate quantities
- Suggest if amendments and/or other supporting supplies are needed
- Develop preliminary re-vegetation timeline

Draft Monitoring Strategy

- Identify parameters and protocols that will be monitored
- Draft timeline and responsibilities table (including pre-project monitoring responsibility)
- Monitoring map identifying proposed sites
- Description of how parameters monitored will provide information to support understanding of success/failure of project goals and/or aid in adaptive management and maintenance of the project

Preliminary Permit Work (identification of all permits needed - suggestions/materials/indexing for how to develop the final permit request)

- ACOE 404
- CDPHE stormwater management plan and permit
- County/Town floodplain development permit
- Roadway permits
- Other local and state permits as appropriate
- *Environmental Review including NEPA/SHPO (will be done by DOLA contractor AEGIS)*

Proposed Timeline

- Proposed timeline through construction with key milestones (Include identification of steps to bring project to Final Design)

DELIVERABLES

- Preliminary Basis of Design Report -- explains and documents hydrology, hydraulics, sediment transport, geomorphic features, and ecology and provides support for the selection, layout, and size of each design component. Typically includes:
    - Hydrology/Hydraulics data: preliminary models, results, and supporting electronic files (models, AutoCAD, and GIS)
    - Geomorphological data: cross-sections, pebble counts, photos
    - Sediment Transport Analysis: preliminary results and supporting data

- 30% Plan Set:
    - Existing conditions plan (base map)
    - Proposed conditions plan
    - Channel profile and cross sections
    - Detail drawings

Additional Supporting Documents including:

- Draft Planting Plan: Planimetric map, spreadsheet estimate of plants and quantities
- Permit Plan: Summary of permits, contacts, and estimated schedule
- Draft Monitoring Plan: monitoring parameters/methods/frequency/responsible party timeline, suggested monitoring locations map.
- Opinion of probable costs
- Next steps

The next step, Final Design, finalizes plans for permitting and construction. Budget and scope for determining how to bring a project from 30% to final design will be on a case by case basis and should be outlined in detail to the extent possible in a 30% design. Additional design needs and adjustments to bring a project to final design are based on a technical review of 30% designs and public and stakeholder input. It is likely that 30% designs that are more specific and define a clear pathway towards final design and construction will be more competitive for additional funding requests. In some cases, less than final design may be appropriate for construction for the purpose of allowing intentional flexibility in the construction process and the intended ability to field-fit certain final details during the construction process.

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(1) - From *Colorado Resilience Planning Grant: Program Guidelines*

"Watershed Coalition Plans, Studies, and Analyses:
These planning funds can be used for watershed coalitions to address critical and time- sensitive recovery needs to further develop and/or prepare future projects for implementation, and to develop longer- term plans that are multi- objective, seek to integrate existing plans with the Watershed Master Plan or develop integrated projects. Examples of plans, studies and analyses may include, but not be limited to: drainage studies, geomorphic assessments, flood studies, environmental assessments, watershed assessment plans, riparian conditions assessments, aquatic/terrestrial habitat condition assessments, river restoration reports, watershed coalition master plans, sediment transport modeling, hydraulic modeling, erosion hazard zone mapping, sewer and water system analyses, and wildlife habitat preservation plans. Studies that address areas such as stream restoration or enhancement, land use, economic development, green infrastructure, recreation and community connectivity to the river, hazard mitigation, and infrastructure (e.g., utilities and roads) are also eligible. Broad, regional/multi- jurisdictional planning projects and studies will be highly competitive. Planning and conceptual design projects that achieve multiple objectives and maximize community- wide benefit by further developing prioritized watershed master plan projects will make Watershed Resilience project implementation applications more competitive in later rounds of funding.

Typically engineering and design for a specific project is not eligible. These funds may be spent on conceptual design, but as a general rule are to not exceed 30% of project design work. Additionally the funds may be spent to study and analyze a recovery concept further, such as resilience scenario planning (including rough cost estimate development)."

(2) For the purposes of these guidelines, threshold and alluvial channels are defined as follows:

- Threshold channels are those designed to have an armored bed which mobilizes at a specified design discharge (e.g., some moderate, above-bankfull flood event). Threshold channels tend to have smaller sediment load from upstream and/or route finer bed material through due to a steeper slope. They are designed using various incipient motion type design procedures as outlined, for example, in Chapter 8 of Part 654 of the NRCS National Engineering Handbook, *Stream Restoration Design* (2007).

- Alluvial channels are those that tend to have finer beds (e.g, sand to gravel range) and/or shallower slopes. Depositional features such as point bars are more prevalent due to shallower slopes and/or a greater supply of sediment. Alluvial channel design requires consideration of sediment transport capacity and continuity of the incoming sediment load as stable channel dimensions (e.g., no net aggradation or degradation over time) are much more sensitive to sediment supply factors. An example of these types of analyses are outlined on pages 9-28 to 9-48 in Chapter 9 of Part 654 of the NRCS National Engineering Handbook, *Stream Restoration Design* (2007).