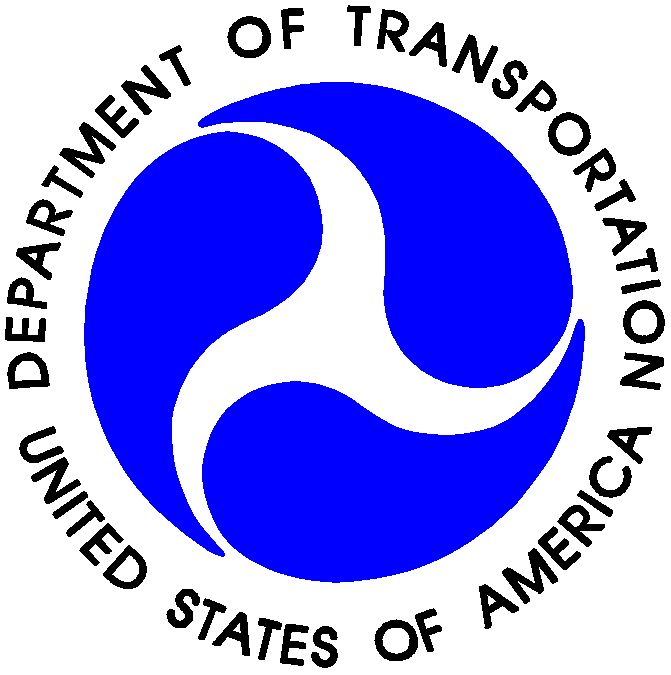
SCOPE OF WORK

PROJECT NAME

ROUTE AND NUMBER

Preliminary Design/Final Design



Federal Highway Administration

Central Federal Lands Highway Division

A/E Consulting Engineering Contract

Engineering Services

FIRM NAME

Task Order Number: 6982AFXXD000000/T-0X-0XX

Modification Number

June 15, 2022

CFL Internal Projects: Delete all blue text

A/E Delivered: Delete all green text

Hidden Text: To turn on/off select ¶ from the Home tab to toggle  
Will not print unless Hidden Text is turned on (File/Options/Display/check Hidden Text)

**\*\*\*\*\*\*Delete this text box prior to finalizing SOW\*\*\*\*\*\*\***

# GENERAL INFORMATION

## INTRODUCTION

Guideline: Provide a general description of work included with only enough detail for the Consultant/Designer to recognize generally what is included. Text below is sample only. KEEP IT SHORT!

*Sample:* This Scope of Work (SOW) is to perform engineering, hydraulic, geotechnical, pavement design, and project management services towards delivery of a final set of plans, specifications and estimate for the Federal Highway Administration, Central Federal Lands Highway Division (CFLHD) for proposed improvements to Kolob Terrace Road.

## PROJECT SUMMARY

Guideline: Describe the background, location, and overall goal of the project. Provide enough historical information so the Consultant/Designer can understand the requirements and how this SOW supports the overall project goal. Identify any previously completed work that has been completed that will assist the consultant in understanding the project, including work on the environmental document. Describe the location well enough so that the Consultant/Designer can plan how to get to the project and where to stay. Also include where the project starts and stops, if applicable. Text below is sample only.

*Sample:* Zion Route 12 and 14 also known as Kolob Terrace Road begins at the intersection with Utah State Route 9 and proceeds northerly ending at Kolob Reservoir. Kolob Terrace Road is located within Washington County in southwestern Utah. Two sections of the road are located within Zion National Park and are owned and maintained by the NPS. The remaining route is owned and maintained by Washington County.

This task order is for the final design of the portions of Kolob Terrace Road that are located within Zion National Park. Kolob Terrace Road South is between milepost 6.7 to 10.7 and Kolob Terrace Road North is between milepost 13.2 to 19.0. The total project length is 9.84 miles.

# WORK REQUIRED

Remove following two paragraphs for internal work

The work shall be performed by Consultant (referred to as the A/E) or its approved designated representative. The A/E work shall be performed and/or directed by the key personnel identified in the A/E proposal. Any changes in the indicated key personnel or the A/E officer-in-charge of the work, as identified in the A/E proposal, shall be subject to review and approval by FHWA.

Subconsultants not identified in Contract DTFH68-0X-D-0000X will require approval by the FHWA Acquisitions office prior to beginning work. These subconsultants will be required to submit the same information regarding their firm as those identified in the original contract.

## PROJECT DEVELOPMENT PLANNING (P6 Activity P1)

No work under this task order. Project Development Planning activities provided under previous task order.

## PROJECT MANAGEMENT

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

Project Management will continue throughout the duration of the project. It includes, but is not limited to, all work necessary to manage production efforts, coordinate with CFLHD, administer this contract and monitor progress.

While performing the work described under this task order, discussions with people from other agencies (i.e., USFS, NPS, FWS, and other personnel or consultants) as well as other CFLHD employees will be required. Participate freely in these discussions, answer questions and respond to requests for information. Maintain records of these discussions and keep the COR informed of any pertinent information. However, do not accept any direction or take additional work that is beyond the scope of this task order. During discussions with partner agencies do not suggest performance of additional work that is beyond the scope of this task order. The FHWA Contracting Officer is the only representative that has the authority to revise or add work under the requirements of this task order.

### Project Management (P6 Activity PM)

1. Project Management oversight. Typical activities include, but are not limited to, the following:

* Identify the project requirements and determine complexity of the work, technical activities, schedules, and resources
* Administer project contract and monitor progress
* Discuss and coordinate project requirements with the Contracting Officer’s Technical Representative (COR) and designated project team contacts
* Prepare and maintain project design files & supporting documentation for correspondence, reports, design details and calculations of quantities that are included in the plans.
* Update Project Development Plan (PDP), when needed

1. Develop and maintain a CPM Project Schedule (such as Microsoft Project CPM)

* Identify the deliverable item due dates, milestones, reviews, and meetings, that ensures meeting the completion date objective
* Identify all critical tasks in meeting the completion date
* This schedule will be used to coordinate activities, meetings, and delivery dates

1. Contact the CFLHD COR by phone at least every two weeks to discuss status and progress, if no meetings are scheduled within the timeframe

* Prepare and submit discussion notes within seven days if requested.

1. Submit monthly progress reports providing a summary of:

* Previous month’s accomplishments and activities
* Overall progress achieved toward completion of the task order
* Future month expectations
* Any issues or action items that need to be resolved or addressed with CFLHD or partner agencies
* All activities that will be undertaken during the succeeding month
* Submit a progress report with each invoice.

1. Using the Standardized Scope of Work Sections provided by FHWA, develop a draft outline for the next Scope of Work

* Add project specific requirements as necessary and develop a blank Task Order Fee Estimate spreadsheet following FHWA and Standard Task Order format
* Submit the *DRAFT Scope of Work* and blank fee estimate spreadsheet to FHWA for review
* Following FHWA review, incorporate all comments and submit the *FINAL Scope of Work* and blank fee estimate spreadsheet to the FHWA COR.

Include Step 6 for Task Orders on IDIQ contracts where the subconsultant handling fee is included in level of effort for each Task Order and verify that this step is included in the AE IGE fee spreadsheet. Delete Step 6 for Task Orders on IDIQ contracts where the subconsultant management is paid by a % fee.

1. Subconsultant contract management

* Procure, administer and closeout each subconsultant contract.

#### Deliverables for Project Management

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Meeting Minutes
* Initial CPM Schedule and Revised Schedules
* Discussion Notes
* Monthly Progress Reports and Invoices
* DRAFT Scope of Work and blank Estimate
* FINAL Scope of Work and blank Estimate

### Project Management During Acquisitions (P6 Activity PMA)

1. Project Management support during acquisition. Typical activities include, but are not limited to, the following:

* Coordination with acquisitions
* Respond to bidder questions

## ENVIRONMENT

*The intended use of this Environmental Scope of Work is for categorical exclusions only. EA and EIS documents follow a difference process and require significant changes to this document.*

The A/E Contractor will be responsible for performing environmental tasks under the direct oversight of FHWA personnel. FHWA will be engaged in all elements of NEPA compliance, including planning of required studies and level of effort, review and acceptance of reports, and final approval of the NEPA action. FHWA maintains authority as lead agency on all project environmental decisions and consultation activities, unless another federal agency has the lead agency role as specified in the assumptions below.

Guideline: Develop the SOW for project specific needs. State assumptions both in the SOW text and in the activity assumptions section.

Assumptions to consider for E0 are:

• who will lead NEPA and consultations

• how involved will agencies be

• what type of document is proposed and why

• what meetings will be necessary and where

• how many/often will the CFT meetings be held

### Environmental Scoping (P6 Activity E0)

The Environmental Scoping task includes environmental scoping and coordination with stakeholders and agencies involved with the project and specialists for studies, as well as development of the draft purpose and need statement and project description.

#### Assumptions for E0 Activity:

* Include assumption(s) for each agency involved
* Specify level of effort for public scoping
* Include assumption for kick-off meeting and other early coordination meetings
* Include assumption(s) for CEQA requirements and lead agency; consider joint reports and processes (CA projects only)
* If EA or EIS and doing joint CEQA document, adjust all scope items as applicable (CA projects only)
* See table below for specific resource-based assumptions to support the scope in other tasks

1. Conduct Partner Agency Coordination and Research

* Create project contacts list for environmental activities
* Define environmental roles and responsibilities
* Review scoping report and other background documents
* Compile resource documents, data, and references
* Obtain environmental documents and studies from other agencies, as able, for similar and nearby projects
* Obtain information on potential issues to address and applicable data or studies from resource agencies
* Identify potential resources issues and anticipated impacts
* Assumptions for key resources are identified below
* Update resource assumptions table as appropriate
* Assess state or local requirements specific to each resource topic
* For CA projects, review the CEQA Environmental Checklist to cover other applicable environmental topics

Guideline: Use the scoping report to help identify key assumptions, and some initial research may be necessary to complete the table. Include initial assumption of level of effort necessary to evaluate the resource impacts. Make sure the assumptions match the steps for this and other tasks.

|  |  |
| --- | --- |
| Resource | Action or Assumption |
| Air Quality |  |
| Coastal Areas |  |
| Cultural Resources |  |
| Farmlands |  |
| Floodplains |  |
| Geology/Soils |  |
| Hazardous Substances |  |
| Land Use |  |
| Noise |  |
| Recreation |  |
| Section 4(f) Properties |  |
| Section 6(f) Properties |  |
| Social and Economic Resources |  |
| Special Land Use Designations (e.g., wilderness, wild and scenic rivers) |  |
| T&E and Sensitive Species |  |
| Transportation/Traffic |  |
| Utilities |  |
| Vegetation and Noxious Weeds |  |
| Visual Quality |  |
| Water Quality/Storm Water |  |
| Waters of the US |  |

1. Develop Draft Purpose and Need Statement and Project Description

* Draft purpose and need statement
* Develop based on project documents, scoping visit, and internal and partner agency input
* Distribute (internally to FHWA and externally upon FHWA approval) for review and comment
* Draft project description to be studied
* Only the proposed action will be described; no alternatives are considered for CEs
* Coordinate with design team on project details and assumptions
* Describe all aspects of the project (design, construction, maintenance, right of way)
* Assess design-related regulatory requirements (e.g., stormwater BMPs, post-construction BMPs, drainage improvements)
* Leave placeholders for information that is not yet available
* Distribute (internally to FHWA and externally upon FHWA approval) for review and comment
* Establish study area boundary
* Set limits for project design in coordination with design team
* Include all areas of potential disturbance, including access, staging areas, and road and drainage disturbance footprints, and an appropriate buffer
* Provide study area as GIS shapefile in appropriate coordinate system to match design data
* Prepare general location map

1. Initiate Public Coordination

* Develop plan for public outreach
* May be informal discussion with CFLHD team or formal plan for more involved public outreach
* Establish public/stakeholder mailing list
* Initiate public outreach
* Prepare and send project information letters to public/stakeholders
* CFLHD Project Manager will review and sign letters
* Mail letters using certified mail or other traceable delivery service (if needed)
* Arrange for appropriate media notification, and prepare newspaper and other appropriate advertisements
* Coordinate and attend public information meetings (agenda, handouts, exhibits, etc.)
* Prepare minutes/trip report/action items
* Compile comments and input from public and discuss with partner agencies and team

1. Develop Task Order(s) or Agreements for Studies

* Acquire A/E services (Prepare SOW, TO, IGE, etc.)
* Develop Agreements (Reimbursable, Grant, etc.)
* Identify land owners, access requirements, and permit needs for field surveys

#### Deliverables for E0 Activity:

* Environmental contact list
* List and/or table of all resource areas with initial impact assessments (if necessary)
* Draft purpose and need statement (may combine with project description)
* Draft project description
* Map and GIS data depicting study area
* Public mailing list
* Public information letter
* Minutes from public meeting(s)
* Media notifications (newspaper, advertisements, web page(s))
* A/E contract documents including: SOW, IGE, purchase request
* Reimbursable Agreement and grant documents including: SOW, IGE, purchase request

### Environmental Compliance Studies (P6 Activity E1)

The Environmental Compliance Studies task includes technical studies and coordination with responsible agencies and tribes.

#### Assumptions for E1 Activity:

* Include assumption(s) for required studies and who delivers, as well as templates to use or follow
* Identify study area size, species to consider, extent of cultural surveys, cultural site recording and evaluation assumptions, tribal outreach expectations, any background research assumptions, and agency responsibilities
* Include assumptions on who will obtain permission to enter (partner, CFLHD, or A/E) and modify language/steps below as appropriate
* Include assumptions on coordination meetings, such as pre- and post-fieldwork or for report comment discussions

1. Perform Cultural Study

* CFLHD will be responsible for the following items:
* Establish the APE for direct and indirect (e.g., visual, auditory) effects in coordination with the design team and A/E firm
* Provide APE shapefile to A/E firm
* Confirm/obtain/facilitate property access for field surveys from property owners
* Coordinate with other agencies and tribe(s), as appropriate, on cultural investigation and consultation expectations
* Provide guidance and technical oversight to A/E firm
* Review, finalize, and send letter to tribes to obtain information and determine if they want to be consulting parties
* Review cultural resource report
* Distribute cultural resource report to others, as appropriate
* Make determinations on eligibility and effects
* Ensure commitments from study are incorporated into design and are feasible for project
* The A/E firm will be responsible for the following items:
* All aspects of the cultural investigation not identified above
* Provide APE boundary as GIS shapefile in appropriate coordinate system to match design data
* Compile a list of tribes that may have an interest in the project
* Prepare draft letter to tribes; include CEQA (AB 52) requirements in tribe letter if applicable (CA projects only)
* Conduct background research and records searches through appropriate venues
* Confirm/obtain/facilitate property access for field surveys from property owners
* Obtain survey permit(s) if necessary
* Conduct a pedestrian survey of the APE, once adequate background research has been conducted and the APE is defined
* Record information on all cultural resources encountered during the field survey, including previously and newly recorded resources, and collect geographic positioning system (GPS) data on locations
* Convert GPS data to GIS-compatible format for mapping purposes
* Provide final GIS data of recorded cultural resources to CFLHD
* Compile field memo if necessary to meet survey permit requirements
* Provide written recommendations of eligibility, addressing significance criteria and integrity, as applicable, for all identified cultural resources in APE in report (include CRHR eligibility for CA projects only)
* Provide discussion of potential effects to eligible sites per NHPA in report, focusing on the potential for the project to affect site eligibility
* Prepare cultural resources report and appropriate site forms to meet applicable State requirements or other guidance provided by CFLHD
* Assume draft and final reports
* A/E attendance at consultation meetings is not anticipated

1. Perform Biology Study

* CFLHD will be responsible for the following items:
* Provide/Confirm study area boundary
* Confirm/obtain/facilitate property access for field surveys from property owners
* Coordinate with other agencies on biology study and consultation expectations
* Review biology reports
* Distribute biology reports to others, as appropriate
* Provide oversight to A/E firm throughout task
* Confirm effects determinations for listed species
* Ensure commitments from study are incorporated into design and are feasible for project
* The A/E firm will be responsible for the following items:
* Establish list of species to evaluate from FWS, NMFS, and other sources
* Confirm/obtain/facilitate property access for field surveys from property owners
* Obtain survey permit(s) if necessary
* Conduct field survey to characterize habitat and assess special-status species
* Record information on habitat conditions, species observations, noxious weeds, and other biological topics
* Record location data for sensitive or key resources using GPS
* Assess need for BA based on fieldwork and design
* Prepare BA with essential fish habitat assessment, if needed, to meet FWS and NMFS requirements and guidance and define action area
* Coordinate with CFLHD during preparation to discuss analysis and need for mitigation measures
* Prepare biological technical memorandum for other biological topics (e.g., agency Sensitive species, migratory birds, noxious weeds, state-listed species) or prepare biological resources report for CA projects
* Prepare applicable figures to support reports
* Assume draft and final reports
* Provide final GIS data and field photographs to CFLHD

1. Perform Aquatic Resources Delineation

* CFLHD will be responsible for the following items:
* Provide/Confirm study area boundary (same as for biology studies)
* Confirm/obtain/facilitate property access for field surveys from property owners
* Review delineation report
* Coordinate with permitting agencies, as appropriate
* Provide oversight to A/E firm throughout task
* Distribute report to others, as appropriate
* The A/E firm will be responsible for the following items:
* Prepare field maps and draft figures using study area data for biology reports
* Compile available data on waters and wetlands for the area
* Compile base data (aerial photography, survey data, etc.)
* Review background information on the area (e.g., soils, vegetation) and requirements for delineations prior to fieldwork
* Confirm/obtain/facilitate property access for field surveys from property owners
* Obtain survey permit(s) if necessary
* Conduct field survey to delineate aquatic resources
* Delineate coastal wetlands, riparian areas, and waters of the State if applicable (CA projects only; discuss with CFLHD how to document results—in biological report or as separate section in delineation report)
* Collect information and data on all streams and potential wetlands using GPS units
* Complete wetland and/or OHWM data sheets for data points; use paired data points for wetlands
* Follow applicable USACE methodology for delineations in the region
* Verify the need for an Approved Jurisdictional Determination with CFLHD and the USACE and discuss report requirements with CFLHD before compiling the delineation report
* Prepare delineation report that meets USACE standards
* Prepare figures for report using GPS-collected data converted to GIS-compatible format
* Provide final GIS data and field photographs for aquatic resources to CFLHD
* Assume draft and final draft reports
* Compile aquatic resources spreadsheet for potential waters of the U.S.

1. Perform Other Environmental Studies

* CFLHD will be responsible for the following items:
* Provide input on methodology and expectations for studies
* Review report(s)
* Coordinate with regulatory agencies, as appropriate
* Provide oversight to A/E firm throughout task
* The A/E firm will be responsible for the following items:
* Conduct research and field work
* Review survey data for adequacy, completeness, and for inclusion into environmental document
* Prepare draft and final reports, incorporating CFLHD comments as appropriate
* Coordinate findings with CFLHD and design team for incorporation into plans

#### Deliverables for E1 Activity:

* Access permission list(s)
* Draft and final letters to tribes
* Survey Data: Photos, records forms, GIS data, survey limits, maps
* Draft and Final Resource Report(s): Cultural report, biological assessment, biological technical memorandum, biological resources report (CA projects), aquatic resources delineation, and/or other

### Document Preparation (P6 Activity E2)

The Document Preparation task includes consultations under federal laws and preparation of the FHWA CE documentation.

#### Assumptions for E2 Activity:

* Include assumption(s) for appropriate CE and consultations under federal laws

1. Prepare Draft Environmental Document

* If CEQA compliance required, prepare preliminary environmental checklist using Appendix G of the CEQA Guidelines and provide to CEQA lead agency (CA projects only; coordinate with CEQA lead agency to confirm need for this)
* Compile draft document
* Location, project, and other appropriate maps
* Purpose and need and project description
* Resource list and brief analysis
* Tables of environmental commitments
* Agency and tribe consultation letters (if available)
* Coordinate with CEQA lead agency on CEQA process (e.g., State filing requirements, timing of CEQA document, who will prepare it) and mitigation measures (CA projects only)
* Coordinate need for mitigation measures with Design and Construction
* Coordinate mitigation measures with partner agencies, affected resource agencies, and tribes, as applicable
* Compile additional information if needed to support stormwater permitting (e.g., draft NOI, calculations)
* Submit draft document to CFLHD for review
* Distribute draft document internally for review

1. Conduct Consultation per Section 106 of the NHPA

* Respond to request for consultation from tribe(s)
* Provide project information and cultural resources report to tribe(s) if requested
* Conduct conference call(s) and meetings to discuss project with tribe(s) if needed
* Make effects determination for overall project (not individual historic properties)
* Prepare and send letter to State Historic Preservation Officer to consult and provide copy of cultural resources report
* Correspond with State Historic Preservation Officer to respond to questions and information requests

1. Conduct Consultation per Section 7 of the ESA

* Verify level of consultation expected based on effects determinations for listed species
* Prepare and send letters to FWS and NMFS to consult and provide copy of biological assessment
* Correspond with FWS and NMFS to respond to questions and information requests
* Review letters of concurrence or biological opinions from FWS and NMFS once received

#### Deliverables for E2 Activity:

* Final purpose and need statement and project description (in environmental document)
* Draft and final letters to tribes and resource agencies
* Preliminary environmental checklist for CEQA if needed (CA projects only)
* Draft environmental document for NEPA with environmental commitment tables
* Draft environmental document for CEQA (CA projects only; CEQA lead agency should provide)

### Environmental Document Approval (P6 Activity E3)

The Environmental Document Approval task includes finalizing the environmental document and obtaining the appropriate signatures.

Guideline: Activity guidance, considerations, assumptions:

The external draft document review may be concurrent with the internal review as appropriate additional document updates, amendments, preparation, and finalization is necessary for EA and EIS documents.

The assumption for a CE is that there is typically no Public Involvement

Public hearings may be necessary if there is public involvement.

#### Assumptions for E3 Activity:

* Include assumption(s) for level of design and status of consultations from E2
* Coordinate on CEQA process to obtain final CEQA document and mitigation monitoring and reporting plan before finalizing environmental document (CA projects only)

1. Finalize Environmental Document

* Distribute draft CE for review by CFLHD team, partner agencies, and others as appropriate
* Address and respond to comments
* Compile consultation documentation (if not included with draft document)
* Review CEQA document and mitigation measures and incorporate into environmental document, as applicable (CA projects only)
* Review project-specific SCRs
* Obtain signatures for environmental document
* Provide copy of final environmental document to partner agencies

#### Deliverables for E3 Activity:

* Draft document comment responses and revisions
* Signed environmental document (CE memo)
* Input on SCRs for environmental requirements
* Environment section of milestone Design Technical Memorandum
* Project record files (saved in project file)

### Reevaluation and PE Notebook Support (P6 Activity E4)

The Reevaluation and PE Notebook Support task includes a brief reevaluation of the environmental compliance documents and process and preparation of environmental materials to support the PE Notebook, such as the construction handoff commitment table.

Guideline: Activity guidance, considerations, assumptions:

Step 1 Reevaluation will vary with level of effort mostly based upon time passed since document approval.

Reevaluation should address all resources and permit status

Evaluate new/updated survey and/or report needs

#### Assumptions for E4 Activity:

* Include assumptions for level of effort of reevaluation

1. Review Project for Changes

* Evaluate environmental document, conditions, and design
* Review mitigation measures and/or commitments
* Document brief reevaluation as necessary

1. Prepare Construction Handoff Environmental Commitment Table

* Review environmental commitments and additional measures imposed by agencies during consultations and in permits
* Evaluate design and SCRs to ensure commitments are appropriate
* Compile summary table to track all environmental commitments for PE Notebook

#### Deliverables for E4 Activity:

* Construction handoff environmental commitment table (for inclusion in PE Notebook)
* Input on revisions to design or SCR concerns
* Memo to file for a quick reevaluation (if needed)

### Environmental CFT Support (P6 Activity CFT)

Provide support to CFT after environmental document is complete.

* Provide support to CFT.
* Provide Designer with Environment section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## PERMITS

### Permit Requirements and Approach (P6 Activity EP1.0)

The Permit Requirements and Approach task includes identification of applicable environmental permits that CFLHD or a contractor must apply for prior to construction, coordination on design requirements to ensure compliance with permits, and initial coordination with permitting agencies as appropriate.

Guideline: When Task Orders are split for preliminary and final design, include EP1.0 in the 0-30% Task Order.

#### Assumptions for EP1.0 Activity:

* Include assumptions for anticipated permits (e.g., Clean Water Act Sections 401, 402, and 404) and agencies involved; consider state and local requirements in addition to federal
* Include assumption for contractor responsibility for obtaining permits
* Include assumption for permit memo details

1. Identify Permit Requirements

* Review project design, environmental documents, applicable general permits, stormwater pollution prevention plan template for the state, and notice of intent or application templates for the general permits
* Verify all permit requirements for environmental compliance, such as for discharging dredged or fill, working in waters, altering streams, stormwater, or other requirements, as applicable
* Identify preliminary impacts to support permitting (e.g., waters of the U.S. discharges, total area of disturbance and initial erosivity and risk level (CA projects) calculations for stormwater permitting)
* Confirm permitting needs (e.g., special waters nearby, SWPPP submittal requirements, unique NOI details)
* Coordinate with CFT and other agencies on design needs (e.g., post-construction BMPs, culvert designs) and permit requirements
* Write memo to file to document permitting needs and expectations (e.g., no permits, non-notify, special permit considerations)

#### Deliverables for EP1.0 Activity:

* Memo to file documenting permit needs and expectations

### Develop and Submit 404/401 Permit Applications (P6 Activity EP1.1)

The Develop and Submit 404/401 Permit Applications task includes preparation of the necessary permit applications and submittal of the applications to permitting agencies for compliance with sections 401 and 404 of the Clean Water Act. This activity may also include certain state stream discharge or alteration of permits that are obtained by CFLHD.

#### Assumptions for EP1.1 Activity:

* Include assumptions for level of effort for permit applications and agencies involved

1. Pre-Construction Notification or Application for Section 404 Permit

* Obtain final (or mostly final) design plans from Design team
* Design team will prepare cross-sections and plan views to support applications
* Design team can calculate quantity of fill material in cubic yards
* Complete pre-construction notification (if determined necessary)
* Consultation documentation and reports
* Impact calculations and figures
* Final delineation report
* Property owner information
* Mitigation or restoration plan, if proposing on-site mitigation (see Step 4)
* Other required information (e.g., Excel spreadsheets)
* Include request for PJD in letter to Corps (if necessary)
* Prepare letter to Corps requesting permit coverage
* Submit notification

1. Water Quality Certification Application for Section 401 Permit

* Compile information needed for application
* Appropriate application form
* CEQA documentation (for California)
* Use 404 application/notification for supplemental information (avoid duplication of effort)
* Prepare pre-filing letter to agency and second letter requesting certification
* Submit draft application with pre-filing letter
* Submit final application with letter requesting certification

1. Other Permit Applications

* Compile information needed for application(s)
* Prepare letter(s) for transmitting to the permitting agency
* Submit application(s)

1. Develop Conceptual Mitigation Plan(s)

* Determine mitigation plan requirements
* On-site vs off-site mitigation
* Regulatory agency approvals
* Level of mitigation and monitoring approach
* Coordinate preliminary mitigation estimate needs with CFLHD Project Manager
* Prepare conceptual drawings of mitigation
* Finalize mitigation plan(s) in coordination with regulatory and land management agencies
* Determine Method of Delivery (In-house, Partner, or A/E)
* Acquire A/E Services (Prepare SOW, TO, IGE, etc.)
* Develop Agreements (Reimbursable, Grant, etc.)

#### Deliverables for EP1.1 Activity:

* Permit application(s)
* Conceptual mitigation plan(s), if needed
* Letters to permitting agencies

### Obtain 404/401 Permits (P6 Activity EP1.2)

The Obtain 404/401 Permits task includes coordination with permitting agencies and reviewing the permits received from the agencies.

#### Assumptions for EP1.2 Activity:

* Include assumptions for level of coordination with permitting agencies after submittal

1. Review received permits

* Coordinate with CFT and permitting agencies, as needed, to provide requested information
* Review permits
* Transmit permits to FHWA PM, designer and A/E staff for inclusion in construction contract, SCRs and PE notebook/construction handoff environmental commitment table
* Discuss permit requirements with FHWA PM, designer and A/E staff

#### Deliverables for EP1.2 Activity:

* Responses to permitting agencies, as needed
* Copies of permit(s) (scan hard copies)
* Permit terms and conditions to PM and designer for inclusion in PE notebook and/or construction contract

## SURVEY

### Initial Survey and Mapping (P6 Activity S1)

Perform initial survey work to establish control and initial data for mapping and Right-of-Way

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Mobilize and reconnaissance of project site

* Meet with agency contact or representative
* Perform reconnaissance of project site
* Identify safety, traffic and private property concerns
* Formulate a *Work Plan*

1. Control Network – Set monuments, determine coordinates & elevations of primary control points

* Research and recover existing NGS, CFLHD or other horizontal and/or vertical control points
* Set control monuments in accordance with the *Work Plan*
* Perform the required measurements
* Analyze and adjust measurements
* Create and submit a *Control Report* and *Control Data Sheet* according to the requirements shown under Deliverables

List assumed utilities

1. Locate and map utilities according to ASCE Standards (ASCE 38-02);

* Contact locate service to identify utilities to be mapped
* Perform the required measurements to locate the utilities relative to the CFLHD control network
* Review, edit & submit files according to the requirements shown under Deliverables

1. Locate cadastral and private property monuments and other evidence

* Identify aliquot, right of way, property and other monumentation and evidence of possession to be mapped
* Perform the required measurements to locate the evidence relative to the CFLHD control network
* Review, edit & submit files according to the requirements shown under Deliverables

1. Field Reports

* Submit progress reports
* Submit *Final Report*

1. Field Mapping

* Map area as identified in *Work Plan*
* Review, edit & submit files according to the requirements shown under Deliverables

1. Office Mapping

* Prepare and submit TIN, map and contour files according to the requirements shown under Deliverables

Remove remote sensing step if not necessary.

1. Remote Sensing

* Coordinate control and panel locations to provide sufficient control for the remote sensing mission
* Prepare and submit TIN, map and contour files according to the requirements shown under Deliverables
* See CFLHD Remote Sensing standards and specifications

#### Deliverables for S1 Activity

All services, data and deliverables shall be to CFLHD standards and specifications. Data to be provided in the applicable digital format, when possible. The final submittal of all files shall be delivered via approved media, labeled with the Project Designation, Project Name and Final Submittal, i.e. “CA PFH 112-1(1)”, South Fork Smith River, Final Submittal”.

Provide an interim submittal of the Control Report, TIN, map and contour files as soon as completed via approved media. All file names shall begin with the Project Designation. The remaining characters of the file name shall be descriptive of the data contained in the file.

* Control Report,
* Control Data Sheet files (.xls and .dgn),
* ORD Terrain File (including contours, mapping features, other survey or utility elements),
* Current camera calibration report,
* Digital photo index TIFF format with one hard copy plot of the index provided,
* Orthophoto mosaic of the Rectified Digital Imagery at 0.2’ pixel size for the entire photo covered area,
* All files needed to accurately set and compile 3-D planimetric mapping from the supplied digital imagery in approved format; and
* An ASCII, text file listing the softcopy photogrammetric data.

The following data is to be retained by the A/E unless requested by the COR:

* Primary Control Point data:
* Raw, unedited field data files in ASCII format,
* A report of the 3D least squares analysis and adjustment of the observations made to establish coordinates for the Primary Control Points,
* The final adjusted coordinates, elevations, and descriptions for the Primary Control Points in an ASCII file formatted as follows: Point Number, Northing (Y), Easting (X), Elevation (Z); Description/Comment.
* Field Topographic Mapping Survey data and materials covering the project area:
* Mapping data files shall have one point per line, utilizing the following ASCII format: “Point Number, Northing (Y), Easting (X), Elevation (or numeric placeholder), Mapping P-Code and Connect Codes; Description/Comment,”
* All raw observations (GPS vector data, slope distance, zenith angle, horizontal angles and instrument and target heights) made to establish the control points and existing control checks in digital format.
* The first line of each file shall be a header describing each field within the file,
* The data fields shall be separated with a comma (,) the Connect Code field and the Description/Comment field shall be separated by a semi-colon (;).
* Remote sensing data and materials covering the project area:
* Two sets of color contact prints,
* One set of black and white prints to be annotated with control and planimetric features.

### Survey CFT Support (P6 Activity CFT)

Provide support to CFT after Initial Survey is complete (not including supplemental survey).

* Provide support to CFT
* Provide Designer with Survey section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

### Alignment Staking for XX% Field Review (P6 Activity SCXX)

Stake the Alignment for the XX% Field Review.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard PrimaveraTemplate Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Mobilize and Reconnaissance of Project Site

* Meet with agency contact or representative
* Perform reconnaissance of project site
* Identify safety, traffic and private property concerns
* Formulate a Work Plan

Work with the designers and COR/PM to determine the appropriate number of centerline stakes required for each field review. Typical staking includes stakes at 50 feet (20 m) (25 feet and 10 m in tighter curves) along with all PC’s and PT’s. A reduced number of stakes may be appropriate for certain projects.

1. Stake Centerline Alignment

* Perform the required measurements to confirm existing CFLHD control points
* Set points on the alignment as directed
* Compare elevations between set centerline points and existing TIN file
* Review, edit & submit files according to the requirements shown under Deliverables

1. Perform measurements to confirm topography

* Identify areas to be confirmed
* Perform the required measurements relative to the CFLHD control network
* Review, edit & submit files according to the requirements shown under Deliverables

#### Deliverables for SCXX Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

All services, data and deliverables shall be to CFLHD standards and specifications. Data to be provided in the applicable digital format, when possible. The final submittal of all files shall be delivered via approved media, labeled with the Project Designation, Project Name and Final Submittal, i.e. “CA PFH 112-1(1)”, South Fork Smith River, Final Submittal”. Progress submittals shall be submitted via approved media. All file names shall begin with the “Project Designation”. The remaining characters of the file name shall be descriptive of the data contained in the file. The first line of each file shall be a header describing each field and/or the contents within the file.

* Staked centerline coordinates data in ASCII format as follows:
* Point Number,Northing,Easting,Elevation,PCode;Point Descriptor
* The file shall be comma delimited and have a header record that defines the fields,

The following data is to be retained by the A/E unless requested by the COR:

* All raw observations (GPS vector data, slope distance, zenith angle, horizontal angles and instrument and target heights) made to establish the supplemental control points and existing control checks in digital format.
* A report of the 3D least squares analysis and adjustment of the observations made to establish coordinates for the Primary Control Points,
* Legible copies of all field notes

## HIGHWAY DESIGN

Some projects do not require 15% and 50% activities. If these activities are needed, include them in the SOW.

#### Assumptions for Design Activities:

* Include assumptions for design (i.e. assume no major drainage structures, contractor developed SWPPP, XX parking areas, no right of way anticipated, no utilities identified, etc.)

### Initial Design Support (P6 Activity D0)

1. Provide Initial Design Support

### Develop 30% Design (P6 Activity D2)

Develop and distribute the 30% design. See 30% Development Checklist for more specific details.

1. Roadway Design

* Review survey information (contour and mapping files)
* Develop the Typical Sections for each alternative
* Develop horizontal and vertical alignments
* Develop planimetric design features (widenings, roadside ditches, guardrail, etc.)
* Incorporate countermeasures identified in the Crash Data Analysis Report, as appropriate
* Develop roadway cross sections
* Develop 3D Surface Models

1. Secondary Roadway Design

* Develop all geometric design for approaches, major intersection plans, cross sections and intersection safety
* Develop pullout and parking area design
* Develop utility resolution/conflict plans. Compare the horizontal and vertical alignments with available utility information and determine any locations for potential conflict.

1. Preliminary Drainage Design

* Develop preliminary drainage basins and hydrologic computations
* Develop preliminary major drainage design (coordinate design of major cross culverts with Hydraulics; develop cross sections layouts)

1. Preliminary Stormwater Design

* Obtain, review and analyze soil conditions, topography, ground cover, and adjacent areas
* Consider, evaluate, select, and document Best Management Practices
* Develop conceptual Stormwater Site Design (i.e. scheduling ground disturbing activities during dry season, minimizing impervious areas, fitting roadway to terrain/minimizing impacts, using natural drainages, locating retention/detention basins)
* Develop preliminary permanent erosion and sediment control (riprap, seeding/mulching, structural devices, possible check dams, etc.)

1. Develop preliminary temporary traffic control design for unique or major items.

* Identify potential detours and road closures
* Identify possible construction phasing.

Discuss need for IHSDM with PM and CFT

1. Use Interactive Highway Safety Design Module (IHSDM) to evaluate the 30% design. Analyze the generated reports and include a narrative explaining the results
2. Plan Production

* Print and assemble the 30% plan package accordance with the CFLHD CADD Manual and the 30% Development Checklist. The plan package may be numbered by hand.

Check the boxes of the sheets that are planned for each milestone.

* A Sheets

Title Sheet

Conventional Plan Symbols and Abbreviations

Site Map

Typical Sections

Miscellaneous Typical Section Details

* B Sheets

Summary of Quantities (using EEBACS)

Drainage Summary

Grading Summary

Mass Haul Diagram

Miscellaneous Summary Tables for Major Items

* C Sheets

Mainline Plan and Profile

* D Sheets

Major Intersecting Road Plan and Profile

* E Sheets

Do not include if using contractor developed temporary erosion control.

Erosion Control Standards and Details

* F sheets

Embankment Benching Detail

* G sheets

Placed Riprap Details

* S Sheets

Preliminary Bridge TS&L Sketch(s)

* T sheets

Pipe Culvert Standards

Drop Inlet Specials

Underdrain Details

Guardrail Standards

Fence and Gate Details

Cattleguard Standards

Widening for Cattleguard and Gate Detail

Temporary Traffic Control Standards

* X sheets

Mainline Cross Sections

* Z sheets

Culvert Pipe Cross Sections

1. Cross Functional Design Support

* Provide highway design support for preliminary structural design and layout.
* Provide highway design support for hydraulics design.
* Provide highway design support for geotechnical design.
* Provide highway design support for the environmental process.
* Review the current environmental documents for the project
* Become familiar with the policy, impacts, and issues associated with the project
* Incorporate mitigation measures and commitments from the environmental document into the design
* Assist permit specialist.
* Coordinate conceptual Stormwater Design, BMPs, and information needed for permit requirements with permit specialist/CFT.
* Determine both existing and preliminary proposed impervious areas, and total disturbance area.

1. Engineer’s Estimate – using EEBACS

* Develop cost estimate for all identified items for each alternative. Calculate quantities and unit price analysis for all identified pay items. Include a contingency for unknown items. Prepare cost estimate in accordance with the CFL Engineer’s Estimate Manual.

1. Construction Schedule

* Identify the major construction bid items, develop the production rates/durations and develop the construction schedule’s calendar.

1. Project Documentation

* Develop *Highway Design Standards Form*
* Prepare *30% Design Technical Memorandum*
* Complete the design sections of the Risk and Opportunity Management Plan
* Update Designer’s Notebook
* Complete the 30% Development Checklist
* Update the electronic file tracker

### Design Peer Review & Update 30% Design (P6 Activity D2PRE)

Delete this activity on A/E projects.

Peer Review Activity is for CFL Internal Projects only. This activity is for a peer review by design and does not involve other disciplines.

1. Peer Review and Update 30% Design

* Assemble, print, and distribute 30% package for peer review. Conduct review and incorporate review comments into the 30% package
* Distribute 30% Plans and Estimate package for an in-office review by the CFT

### 30% External Review (P6 Activity D2PR)

This Activity/Step is for the distribution of the plans and estimate. The Activity/Step for the CFT to review the plans and estimate is in Section N. Meetings and Reviews.

1. External Review

* Print and distribute the 30% package to external agencies
* Prepare draft responses to external reviewers

#### Deliverables for D2 Activities

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

#### Peer Review Distribution Deliverables

* 30% Plans and Estimate for Internal FHWA Distribution
* 30% Design Support Documents
* Draft CPM Construction Schedule
* Draft Unit Price Analysis
* Risk and Opportunity Management Plan
* Draft copy of quantity calculations
* Draft Highway Design Standards Form
* Draft 30% Design Technical Memorandum

#### Internal Distribution Deliverables

* 30% Plans and Estimate for Internal FHWA Distribution
* 30% Internal FHWA Distribution Design Support Documents
* 30% Development Checklist
* CPM Construction Schedule
* 30% Unit Price Analysis
* Risk and Opportunity Management Plan
* Copy of quantity calculations and supporting documentation
* Draft Highway Design Standards Form
* Design Technical Memorandum
* IHSDM Report and Narrative

#### External Distribution Deliverables

* 30% Plans and Estimate for External FHWA Distribution
* 30% External Distribution Design Support Documents
* CPM Construction Schedule
* 30% Internal Distribution Comments and Responses. Comments and responses may be documented using either the CFLHD Comments and responses form or Bluebeam files (summary files are not acceptable) with the approval of the PM/COR.
* Draft Highway Design Standards Form
* Updated Design Technical Memorandum

### Develop 70% Design (P6 Activity D3)

Develop and distribute (70%) detailed plans specifications and estimate (PS&E) package. See 70% Development Checklist for more specific details

1. Post 30% Field Review

* Produce master redline plan set with field review comments
* Document comments and responses for all comments received (including both redlined plan comments and type written comments). Final responses are not required at this time. Comments and responses may be documented using either the CFLHD comments and responses form or Bluebeam files.
* Produce trip report, including decision and action register. Submit a draft report to FHWA/CFT for comment. Incorporate comments and finalize and distribute the 30% Trip Report.

1. Roadway Design

* Finalize the Typical Sections
* Complete horizontal and vertical alignments
* Complete planimetric design features (widenings, roadside ditches, guardrail, etc.)
* Complete roadway cross sections
* Complete 3D Surface Models

1. Secondary Roadway Design

* Complete all geometric design for approaches, major intersection plans, cross sections and intersection safety
* Complete pullout and parking area design
* Update utility resolution/conflict plans

1. Drainage Design

* Complete drainage basins and hydrologic computations
* Complete drainage design (include all culverts, and drainage features)

1. Stormwater Design

* Develop project specific BMPs (Layouts, Details, Specials, SCRs, etc.)
* Complete stormwater site design with final BMPs incorporated (construction limits, vegetated areas, pre-treatment devices, storm sewers, retention basins, etc.)
* Complete permanent erosion and sediment control (riprap, seeding/mulching, possible check dams, etc.)

Use if Design will develop Temporary Erosion Control. Delete if using contractor developed Temporary Erosion Control.

* Develop preliminary temporary erosion and sediment control plans

1. Permanent and Temporary Traffic Control

* Update permanent traffic control signing and striping design
* Update construction phasing and/or detour plans
* Update temporary signing, striping, and traffic control plans

1. Plan production

* Update/refine plan and profile sheets
* Complete plan quantities, summaries and tabulations.
* Verify/update all applicable FLH Standard Plans and CFLHD Details to current version
* Complete project specific details and plan sheets including title and site plan sheets
* Print and assemble the 70% plan package accordance with the CFLHD CADD Manual and the 70% Development Checklist. *The plan package may be numbered by hand.*

Check the boxes of the sheets that are planned for this milestone.

* A Sheets

Title Sheet

Conventional Plan Symbols and Abbreviations

Survey Control Point Listing including Supplemental Control Points

Site Map

Typical Sections

Miscellaneous Typical Section Details

* B Sheets

Summary of Quantities (using EEBACS)

Drainage Summary

Grading Summary

Mass Haul Diagram

Surfacing Summary

Miscellaneous Summary Tables

* C Sheets

Mainline Plan and Profile

* D Sheets

Major Intersecting Road Plan and Profile

Parking Area Plan and Detail Sheets

Retaining Wall Layout Sheets

Box Culvert Layout Sheets or Other Large Culverts needing Headwalls or Special Details

* E Sheets

Do not include if using contractor developed temporary erosion control.

Erosion Control Layout Plan Sheets

Erosion Control Standards and Details

* F sheets

Embankment Benching Details and Specials

Subexcavation Details

* G sheets

Placed Riprap Details

CFLHD MSE Retaining Wall Details

* S Sheets

Bridge Plan Sheets

* T sheets

Concrete Headwall Details

Pipe Culvert Standards

Drop Inlet Specials

Underdrain Details

Spillway and Pipe Anchor Typical Details

Guardrail Standards

Fence and Gate Details

Cattleguard Standards

Widening for Cattleguard and Gate Detail

Masonry Specials

Revegetation/Landscaping Plans and Details (Typical Details and Initial Layouts)

Signing and Striping Plans

Signing and Striping Details and Specials

Temporary Traffic Control Plans

Temporary Traffic Control Standards

* X sheets

Cross Section Plan Set Cover Sheet

Mainline Cross Sections

* Y Sheets

Approach Road Cross-Sections

* Z sheets

Culvert Pipe Cross Sections

1. Cross Functional Design Support

* Provide highway design support for structural design and layout
* Provide highway design support for major culvert design
* Provide highway design support for geotechnical design
* Provide highway design support for environmental mitigation design and commitments.
* Support all permits and requirements
* Coordinate stormwater design changes/updates with CFT
* Provide required PS&E documents and stormwater management design information (through the PM) to environment for the permit submittal
* Provide alignments for field review staking
* Coordinate 70% field review with agencies involved
* Prepare travel and draft field review agenda

1. Engineer’s Estimate – using EEBACS

* Prepare cost estimate in accordance with the CFL Engineer’s Estimate Manual.

1. Construction Schedule

* Update CPM construction schedule, production rates/durations for all construction items, update calendar, and written narrative discussing critical schedule elements

1. Specifications

* Update the Special Contract Requirements (SCR’s). Include all appropriate up-to-date SCR’s from the Library of Specifications. Use the Track Changes feature to highlight or redline project specific requirements to facilitate FHWA review

1. Project Documentation

* Complete Highway Design Standards form
* Update the Design portions of the Risk and Opportunity Management Plan
* Prepare 70% Design Technical Memorandum
* Update Designer’s Notebook
* Complete the 70% Development Checklist
* Update electronic file tracker

### Design Peer Review & Update 70% Design (P6 Activity D3PRE)

Delete this activity on A/E projects.

Peer Review Activity is for CFL Internal Projects only. This activity is for a peer review by design and does not involve other disciplines.

1. Peer Review and Update 70% Design

* Assemble, print, and distribute PS&E package for peer review. Conduct peer review and incorporate review comments into PS&E package
* Distribute 70% Plans, Specifications, and Estimate package for an in-office review by the CFT

### 70% External Review (P6 Activity D3PR)

This Activity/Step is for the distribution of the plans and estimate. The Activity/Step for the CFT to review the plans and estimate is in Section N. Meetings and Reviews.

1. External Review

* Print and distribute the 70% package to external agencies
* Prepare draft responses to external reviewers

#### Deliverables for D3 Activities

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* 30% Field Review Trip Report

#### Peer Review Distribution Deliverables

* 70% Plans, Specifications and Estimate for Internal FHWA Distribution
* 70% Design Support Documents
* 30% Comments and responses. Comments and responses can be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the PM.
* 30% Field Review Master redlined plan set (no copy, available for meeting review only)
* Draft CPM Construction Schedule
* Draft Unit Price Analysis
* Risk and Opportunity Management Plan
* Draft copy of quantity calculations
* Draft Highway Design Standards Form
* Draft 70% Design Technical Memorandum

#### Internal Distribution Deliverables

* 70% Plans, Specifications and Estimate for Internal FHWA Distribution
* 70% Internal FHWA Distribution Design Support Documents
* 70% Development Checklist
* 30% Comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM
* Updated CPM Construction Schedule
* 70% Unit Price Analysis
* Risk and Opportunity Management Plan
* Copy of final quantity calculations and supporting documentation
* Final Highway Design Standards Form
* Updated 70% Design Technical Memorandum
* Electronic Files and Tracking Sheet (Design files profile at centerline and cross sections. Updated survey topo/planimetric files when applicable.)

#### External Distribution Deliverables

* 70% Plans, Specifications and Estimate for External FHWA Distribution
* 70% External Distribution Design Support Documents
* CPM Construction Schedule
* 70% Internal Distribution comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM
* Final Highway Design Standards Form
* Updated 70% Design Technical Memorandum

### Develop 95% Design (P6 Activity D4)

Develop and distribute the final design and preparation of the 95% PS&E package. See 95% Development Checklist for more specific details. Hours for incorporating 70% comments into the plans are in included in applicable items below.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Post 70% field review

* Produce master redline plan set with field review comments
* Document comments and responses for all comments received (including both redlined plan comments and type written comments). Final responses are not required at this time. Comments and responses may be documented using either the CFLHD comments and responses form or Bluebeam files.
* Produce trip report, including decision and action register. Submit a draft report to FHWA/CFT for comment. Incorporate comments and finalize and distribute the 70% Trip Report.

1. Roadway Design

* Finalize the Typical Sections
* Finalize all horizontal and vertical alignments
* Finalize all planimetric design features
* Finalize all roadway cross sections
* Finalize 3D Surface Models

1. Secondary Road Design

* Finalize all geometric design for approaches, major intersection plans, cross sections and intersection safety
* Finalize pullouts and parking area design
* Finalize utility relocation and conflict plans

1. Drainage Design

* Finalize drainage basins and hydrologic computations
* Finalize drainage design (includes all culverts and drainage features)

1. Stormwater Design

* Finalize stormwater site design (construction limits, vegetated areas, pre-treatment devices, storm sewers, retention basins, etc.)
* Finalize permanent erosion and sediment control (riprap, seeding/mulching, possible check dams, etc.)

Use if Design will develop Temporary Erosion Control. Delete if using Contractor Developed Temporary Erosion Control. For Contractor Developed Temporary Erosion Control separate, blank E-sheets will be developed and included in the PE Notebook.

* Finalize temporary erosion and sediment control

1. Permanent and Temporary Traffic Control

* Finalize permanent traffic control signing and striping design
* Temporary Traffic Control
* Finalize construction phasing and/or detour plans
* Finalize temporary signing, striping and traffic control plans

1. Plan production

* Standards, Details, Specials and project specific plan sheets
* Verify/update all applicable FLH Standard Plans and CFLHD Details to current version
* Finalize project Special Drawings and project specific plan sheets
* Finalize Plan and Profile sheets
* Finalize all plan quantities, summaries and tabulations
* Print and assemble the 95% plan package according to the CFLHD CADD Manual and the 95% Development Checklist.

Check the boxes of the sheets that are planned for this milestone.

* A Sheets

Title Sheet

Conventional Plan Symbols and Abbreviations

Survey Control Point Listing including Supplemental Control Points

Site Map

Typical Sections

Miscellaneous Typical Section Details

* B Sheets

Summary of Quantities (using EEBACS)

Drainage Summary

Grading Summary

Mass Haul Diagram

Surfacing Summary

Miscellaneous Summary Tables

* C Sheets

Mainline Plan and Profile

* D Sheets

Major Intersecting Road Plan and Profile

Parking Area Plan and Detail Sheets

Retaining Wall Layout Sheets

Box Culvert Layout Sheets or Other Large Culverts needing Headwalls or Special Details

* E Sheets

Do not include if using contractor developed temporary erosion control.

Erosion Control Layout Plan Sheets

Erosion Control Standards and Details

* F sheets

Embankment Benching Details and Specials

Subexcavation Details

* G sheets

Placed Riprap Details

CFLHD MSE Retaining Wall Details

* S Sheets

Bridge Plan Sheets

* T sheets

Concrete Headwall Details

Pipe Culvert Standards

Drop Inlet Specials

Underdrain Details

Spillway and Pipe Anchor Typical Details

Guardrail Standards

Fence and Gate Details

Cattleguard Standards

Widening for Cattleguard and Gate Detail

Masonry Specials

Revegetation/Landscaping Plans and Details (Typical Details and Initial Layouts)

Signing and Striping Plans

Signing and Striping Details and Specials

Temporary Traffic Control Plans

Temporary Traffic Control Standards

* X sheets

Cross Section Plan Set Cover Sheet

Mainline Cross Sections

* Y Sheets

Approach Road Cross-Sections

* Z sheets

Culvert Pipe Cross Sections

1. Cross Functional Design Support

* Provide highway design support for final structural design and layout
* Provide highway design support for final hydraulics design
* Provide highway design support for geotechnical design
* Finalize/support environmental mitigation design and commitments
* Support/finalize all permits and requirements

1. Engineer’s Estimate – using EEBACS

* Finalize the unit prices for all pay items and cost estimate for each bid schedule (if more than one). Prepare cost estimate in accordance with the CFL Engineer’s Estimate Manual.

1. Construction Schedule

* Finalize CPM construction schedule, production rates/durations for all construction items, update calendar, and written narrative discussing critical schedule elements

1. Specifications

* Finalize the Special Contract Requirements (SCR’s). Include all appropriate up-to-date SCR’s from the Library of Specifications. Use the Track Changes feature to highlight or redline project specific requirements to facilitate FHWA review
* Evaluate and identify potential sole source items and develop a Brand Name Justification memo for all items identified.

1. Project Documentation

* Finalize Highway Design Standards Form
* Prepare 95% Design Technical Memorandum
* Update the design portion of the Risk and Opportunity Management Plan
* Update Designer’s Notebook
* Complete the 95% Development Checklist
* Update electronic file tracker
* Prepare a draft Project Engineer’s Memo (PE Memo) with input from CFT

### Design Peer Review & Update 95% Design (P6 Activity D4PRE)

Delete this activity on A/E projects.

Peer Review Activity is for CFL Internal Projects only. This activity is for a peer review by design and does not involve other disciplines.

1. Peer Review and Update 95% Design

* Assemble, print, and distribute PS&E package for review. Conduct peer review and incorporate review comments into PS&E package.
* Distribute 95% Plans, Specifications, and Estimate package for an in-office review by the CFT

### 95% External Review (P6 Activity D4PR)

This Activity/Step is for the distribution of the plans and estimate. The Activity/Step for the CFT to review the plans and estimate is in Section M. Meetings and Reviews.

1. External Review

* Print and distribute the 95% package to external agencies
* Prepare draft responses to external reviewers
* Attend external review meeting (if separate from site visit)

#### Deliverables for D4 Activities

* 70% Field Review Trip Report

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

#### Peer Review Deliverables

* Draft 95% Plans, Specifications and Estimate for Review
* 95% Design Support Documents
* 70% Comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the PM
* 70% Field review Master redlined plan set (no copy, available for meeting review only)
* Draft CPM Construction Schedule
* Draft Unit Price Analysis
* Risk and Opportunity Management Plan
* Draft copy of quantity calculations
* Draft Highway Design Standards Form
* Draft Design Technical Memorandum

#### Internal Distribution Deliverables

* 95% Plans, Specifications and Estimate for Internal FHWA Distribution
* 95% Design Support Documents
* 95% Development Checklist
* 70% Comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM
* Final CPM Construction Schedule
* Final Unit Price Analysis
* Risk and Opportunity Management Plan
* Copy of quantity calculations
* Final Highway Design Standards Form
* Final 95% Design Technical Memorandum
* Draft Project Engineer’s memo

#### External Distribution Deliverables

* 95% Plans, Specifications and Estimate for External FHWA Distribution
* 95% Design Support Documents
* 95% Development Checklist
* 95% Internal Distribution comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM
* Final CPM Construction Schedule
* Final Highway Design Standards Form
* Final 95% Design Technical Memorandum
* 95% External Distribution comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM

### Develop 100% Design and Contract Development (P6 Activity P2)

Includes revisions to the PS&E as a result of partner agency reviews and approval comments. This is 100% design. See 100% Development Checklist for more specific details.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Finalize PS&E

* Incorporate comments and print, compile, and deliver the final PS&E package to FHWA
* Ensure the Engineer’s Estimate is finalized and marked as complete in EEBACS

1. Develop procurement documents and checklists

* PS&E Advertisement Checklist
* Procurement Request (PR) & 1240
* Complete 100% Development Checklist

1. Stamp final PS&E and prepare electronic files (PDF format)

Peer Review Activity is for CFL Internal Projects only. This activity is for a peer review by design and does not involve other disciplines.

### Design Peer Review and Finalize 100% Design (P6 Activity P2PRE)

1. Peer Review and Finalize 100% Design

* Assemble, print, and distribute PS&E package for review. Conduct peer review and incorporate review comments into PS&E package.
* Distribute Final Plans, Specifications, and Estimate package for an in-office review by the CFT and incorporate review comments into PS&E package.

#### Deliverables for P2 Activities

Add/delete deliverables to correspond to the tasks above. Coordinate number of hard copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* 100% Plans, Specifications and Estimate for Internal FHWA Distribution
* 100% Design Support Documents (electronically and printed, where appropriate)
* 100% Development Checklist
* 95% comments and responses. Comments and responses may be documented either using the CFLHD comments and responses form or using Bluebeam files (summary files are not acceptable) as approved by the COR/PM
* Final CPM Construction Schedule
* Final Unit Price Analysis
* Copy of quantity calculations
* Designer’s Notebook
* Risk and Opportunity Management Plan
* Final Highway Design Standards Form
* Final Project Technical Memorandum
* Draft Project Engineer’s memo
* Final Electronic File Tracker
* All Excel design files
* All ORD design files, including the model
* ORD Reports
* Contact Distribution List
* Final electronic Plans
* PS&E advertisement checklist
* Provide all files in one location for easy access and notify the PM when complete

### PS&E Check-in and Project Engineer’s Package (P6 Activity D5)

Attend PS&E Check-in Meeting and assemble Project Engineer’s Design Package. See Project Engineer’s Notebook checklist for more specific details.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Attend PS&E Check-in Meeting
2. Complete the Project Engineer’s Notebook

* Complete checklist. See the Project Engineer’s Notebook checklist for more information
* Finalize Project Engineer’s memo
* Assemble Project Engineer’s Notebook according to the PE notebook checklist including project documentation.

#### Deliverables for D5 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Final PE memo
* Project Engineer’s Design Package, including two complete hard copies and an electronic copy of the Staking data

## RIGHT OF WAY

### Preliminary Right of Way Studies (P6 Activity R1)

Perform preliminary right of way research.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Assemble preliminary boundary map.

* Use available fieldwork and preliminary research, compile, geo-reference and reconcile field evidence with title information.
* Show existing road and utility easements.
* Show the boundaries between public and private land.
* Show the boundaries of individual private parcels.
* Show major PLSS subdivision lines.

1. Prepare exhibits.

* Develop monument descriptions and search coordinates for field crews.

1. Compile preliminary *ROW Summary Report*.

* Identify existing ROW and preliminary ROW acquisition costs.

1. Determine the method for ROW acquisition.

* Performed by Internal Agency Resources, Reimbursable Agreement, CFL, or Task Order.

#### Deliverables for R1 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* R1 ROW Preliminary Research Checklist
* Documentation obtained from research
* Preliminary boundary map in MicroStation format
* Monument descriptions and search coordinates for additional fieldwork
* Preliminary ROW Summary Report

The following data is to be retained by the A/E unless requested by FHWA:

* GLO and BLM cadastral plats
* Land management agency plats
* Any deeds obtained during research

### Boundary Mapping (P6 Activity R2)

Compile the title information and property ties into boundary plats, supplemental fieldwork, research, and ownership updates.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Update the preliminary boundary map.

* Integrate supplemental fieldwork/monument ties into boundary exhibit.
* Prepare a Property Owner Spreadsheet listing property owners and associated data.

1. Obtain preliminary title reports. Title reports should include, but is not limited to:

* Research title history to 1947.
* Research federal agencies land records.
* Research private property records including court decisions and county road records.
* Research easements to patent.
* Research the basis and limits of prescriptive rights for the road.
* Update property owner information including contacts and associated data.
* Research all the encumbrances, including easements for roads and utilities within the project limits.

1. Compile the title information into final boundary map.

* Prepare a property owner spreadsheet to organize contact information, preliminary area of right of way acquisition, title citations and possible issues affecting acquisition.
* Resolve property boundary locations based on both the record information and field ties to property evidence.
* Update the summary report - include ambiguities and conflicts.
* Recommend areas that may require additional title research and field ties or resolution by the Local Public Agency or State DOT.

1. Update the ROW Summary Report.

* Include ambiguities, conflicts, etc.

1. Land Owner Consultation

* Prepare exhibits as necessary and arrange meetings
* Meet with land owner(s)

1. Prepare the R2 *ROW Boundary Compilation Checklist*

#### Deliverables for R2 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Boundary map in MicroStation format
* Property owner list with contact information and parcel identifier and information to identify the location of the record in the county data base used to graphically place the parcel in the map
* Summary report of the boundary compilation, including how boundaries were determined, any unresolved boundaries or significant difficulties in resolving boundaries
* ROW section of milestone Design Technical Memorandum
* Electronic submittal of title information in electronic format
* R2 *ROW Boundary Compilation Checklist*

The following data is to be retained by A/E unless requested by the COR:

* Updated county tax maps and property owner data obtained during R1
* Updated GLO and BLM cadastral plats obtained during R1
* One set of title records.

One copy of each parcel file, in separate folders.

* Federal land management agency documents pertinent to the project

### Final Right of Way Plans (P6 Activity R3)

Produce all documents necessary for the acquisition of right of way.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Coordinate with acquiring agency for document/recordation requirements.

* Size and format
* Type of land description
* Drafting standards

1. Prepare ROW plans.

* Prepare right of way plans in accordance with CFL standards.
* Project proposed right of way lines based on final design, project requirements and samples provided by CFL.
* Project proposed right of way lines to accommodate construction and maintenance.
* Develop uniform corridor as much as possible.
* Develop easements to construct and maintain road including temporary access for construction.
* Review with PM, designer, and cooperators to assure adequate right of way and the need for permanent rights for maintenance.

1. Prepare land descriptions.

* Prepare temporary construction easement descriptions based on station/offset relative to the design alignment.

1. Complete the R3 *Right of Way Documents Checklist*.
2. Confirm the method for ROW acquisition.

* Performed by Internal Agency Resources, Reimbursable Agreement, CFL, or Task Order.

#### Deliverables for R3 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Final documents, including R3 ROW Documents Checklist
* Land Descriptions
* Copies of transmittals of documents to affected agencies or entities
* Electronic files of all ROW documents

### Right of Way Acquisition (Non Federal) (P6 Activity R4)

Collaborate with the Cross Functional Team (CFT), acquiring agency, and landowners to develop considerations and accommodations, design modifications, and/or revisions to the right of way documents.

#### Assumptions:

* FHWA will perform the following tasks on all projects:

1. Transmit right of way documents to the acquiring agency.
2. Coordinate revisions based on considerations, accommodations, and/or design modifications.
3. Provide support and oversight to the acquiring agency regarding acquisition matters.

* Attend landowner meetings if needed
* Monitor progress

1. Receive ROW certification (Level 1 or Level 2)

#### Deliverables for R4 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* CFL Right of Way Certification signed by the acquiring agency
* Supporting documents including:
* Appraisals
* Appraisal waivers and value finding documentation
* Offer and acceptance letters
* Summary of status of acquisitions
* Documentation of contacts with landowners and acquiring agencies.

### Letter of Consent (P6 Activity R5)

Collaborate with the CFT, acquiring agency, and governmental agency to develop considerations and accommodations, design modifications, and/or revisions to the right of way documents.

#### Assumption:

* FHWA will perform the following tasks on all projects:

1. Transmit ROW documents and requests for Letter of Consent.

* Include a request for rights of entry pending the execution of the Department of Transportation (DOT) easement deed.
* Include a draft DOT easement deed, description, and exhibit for the route or project for review.
* Request any stipulations from the federal agency.

1. Coordinate design modifications and/or revisions to documents.
2. Negotiate terms and stipulations.

* Coordinate with the acquiring agency regarding acceptance of the deed and specific stipulations requested by the federal agency.

1. Monitor progress for receiving the Letter of Consent.
2. Prepare highway easement deed (HED) for review and execution.

#### Deliverables for R5 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Letter of Consent with stipulations and statement allowing right of entry to construct

### DOT Highway Easement Deed (P6 Activity R6)

*Note – This is a CE Activity*

#### Assumptions:

* FHWA will perform the following tasks on all projects:

1. Coordinate with local public agency (LPA) on signature process.

* Prepare the final deed and exhibits that will be recorded and determine the signature process required by the grantee.
* Request a statement of legal sufficiency from an attorney licensed in the state where the deed will be recorded (typically the County Attorney).

1. Finalize the HED and internal memo for signature.

* Route the deed through the CFL Division Counsel for review and to the Division Engineer for signature.
* Include the statement of legal sufficiency, environmental clearance and the Letter of Consent.

1. Transmit the signed deed to the LPA for signature and recordation.

* Include a self-addressed envelope with postage paid.
* Request a copy of the signed recorded instrument.

1. Receive a copy of the recorded documents for archiving and send a copy to the federal agency that administers the underlying fee.

#### Deliverables for R6 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Fully executed DOT Highway Easement Deed

### ROW CFT Support (P6 Activity CFT)

Provide support to CFT after other ROW activities are complete.

* Provide support to CFT
* Provide Designer with ROW section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## UTILITIES

Refer to CFLHD Utility process and documents on the FLH Webpage.

### Identify and Research Utilities (P6 Activity U1)

Identify the type and location of existing utility facilities within the project limits legal rights or cost liability and the recommended certification level of the information as defined by the CFL Utility Data Quality Matrix. Conduct early coordination with the cooperators and utility owners to identify potential conflicts between utilities and the project.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific reqruiements.

Revise the list below to include known (or assumed) utilities within the project limits.

Discuss with FHWA PM and Utility Coordinator the desired level of research and mapping. If R or S activities are not included they can be performed under the U1 Activity (Mapping and research of utilities).

It is assumed that the following utilities are located within the project limits:

* (List known names or types of utilities- see Project Scoping Report)

Revise steps 1 & 2 to complete this work under U1 if R1 and S1 are not included in the scope.

1. Support the research of existing utility facilities, types and interests completed under the R1 activity.

* Identify type of facility- include all physical utilities: underground, surface and aerial utilities, within the project area.
* Determine cost liability to relocate the facilities (who is responsible for paying to relocate).

1. Initiate early coordination with CFL cooperator, client agency and utility interests to begin identification of facilities, rights and potential conflicts.

* Organize and attend utility/cooperator meetings to identify facilities and issues.
* Develop a list of contacts for each utility that can represent each company regarding location, design accommodation, relocation and cost liability issues associated with their facility.

1. Certify utilities at the recommended CFLHD Utility Data Quality Level.

* Discuss with CFT additional field investigation or research of utilities that would certify the presence and position of utilities at a higher data quality Level.

If meetings are required, put them in Section M. Meeting and Field Reviews

1. Provide information necessary to facilitate design modifications to accommodate utilities, as much as practical, to avoid or reduce utility impacts and relocation. Support the development of initial drawings of potential utility conflicts (Completed under the D activity).
2. Prepare utility summary report containing the following:

* Contact list for each utility showing name, address, phone, email address, and area of responsibility.
* Utility coordination meeting (if applicable) minutes and action item list.
* Cost liability issues.

#### Deliverables for U1 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Copies of documents (as-built plans, third party mapping, GIS, permits, easements, agreements, etc.) obtained during research
* CFLHD Utility Data Quality Level Certification
* Utility summary report

### Support Utility Coordination (P6 Activity U2)

Coordinate with design and the utility companies to begin development of a Utility Resolution Plan that addresses these conflicts. This activity may also include additional research and investigation to elevate the Quality Level.

Add utility meeting if required under Section M. Include cost for travel if necessary.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard PPrimavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

1. Perform additional research, as needed.
2. Support Design to identify utility/design conflicts, develop or revise utility conflict drawings, based on intermediate design and field reviews.
3. Coordinate with cooperators and each utility company:

* Identify associated requirements.
* Support PM to resolve cost liability issues.
* Support PM in preparation of the Utility Resolution Plan and Utility Agreements.

1. Support the development of construction plan sheets for the PS&E addressing each utility issue, treatment, relocation or installation that is to be constructed directly under the CFLHD contract.
2. Assist in the development of Special Contract Requirements (SCR’s), specifications, quantities and cost estimates for all construction related work and coordination required for the project.
3. Prepare Utility Data Quality Level Certification signed by the designated project specific official.

#### Deliverables for U2 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Copies of additional research
* Updated Utility Data Quality Level Certification of utilities at appropriate quality level based on additional data collected.
* Utility Certification signed by designated project specific official
* Utility section of milestone Design Technical Memorandum
* Utility related SCR appendices including:
* Utility agreements
* Utility Data Quality Level Certification
* Meeting minutes and action item list from conference calls

### Utility CFT Support (P6 Activity CFT)

Provide support to CFT after Utility activities are complete.

* Provide support to CFT
* Provide Designer with Utilities section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## GEOTECHNICAL

### Preliminary Geotechnical Recommendations (P6 Activity G1)

Conduct a preliminary geotechnical investigation, including visual inspection and/or limited surface/subsurface investigations, pertaining to general roadway or bridge condition surveys, geotechnical hazards, anticipated excavations and structures, material borrow sources, and general constructability issues.

#### Assumptions for G1 Activity:

* List assumption(s) here: including background information expected, type of investigation (office vs. field), sampling methods (test pit, hand auger, shovel excavation, etc.), site access, phasing of investigation, number of structures, wall types, etc.
* Typically, if preliminary investigation is limited to an office study, the Step 1 tasks are performed during the P1 Activity and no Step 2 or Step 3 tasks are included in the project.

1. Collect background information. This includes but is not limited to the following:

* Review available site information, including project scoping reports, as-built plans, maintenance records, preliminary design criteria, etc.
* Determine project setting, including regional and local geology, soil/rock depths and conditions, annual precipitation, frost depths, seismicity, surface and groundwater conditions, potential for soil liquefaction, etc.
* Collect mapped geotechnical/geological features, including historical roadway work, existing structures, potential landslide/failed areas, seismic features, etc.
* Evaluate poor-condition retaining walls for inclusion in the project.  On National Park Projects, collect Wall Inventory Program (WIP) database information. Download park specific reports from the following link: ([https://fhfl15gisweb.flhd.fhwa.dot.gov/NpsNavigator/](https://fhfl15gisweb.flhd.fhwa.dot.gov/NpsNavigator/Default.aspx#/Home) )

1. Conduct preliminary field investigation

* Characterize existing conditions including the roadway, pavement, structures, and culverts.
* Investigate and tabulate existing conditions including slope ratios, slope/foundation materials (soil and rock), shrink/swell, ditch dimensions, surface water and seep observations, etc.
* Identify geotechnical repair areas and geological hazards.
* Acquire material samples from pertinent areas for laboratory tests. Methods typically include bulk samples, relatively undisturbed hand samples, hand auger samples, grab samples, etc. Log, photograph, and locate exploration locations.
* Compile field notes, photos, sketches, etc.
* Communicate findings of the preliminary investigation to the CFT and PST in writing either through emails or memorandum. Attend project related meetings, post scoping meeting, regularly scheduled, and post field review meetings, as required.

1. Prepare *Summary of Preliminary Findings* documenting findings from the preliminary investigation. Submit the written document to FHWA for review and comment. Address FHWA comments and provide final document. The document should provide specific preliminary recommendations for, but not limited to, the following:

* Subsurface drainage issues
* Cut and fill slope ratios, station to station
* Suitable/unsuitable soils and aggregates by location
* Soil and rock shrink/swell properties, station-to-station
* Roadway repair locations and general requirements
* Anticipated structure types and foundation requirements
* Preliminary constructability issues

1. Coordinate preliminary Geotechnical Findings with the project team.

#### Deliverables for G1 Activity

Add/delete deliverables to correspond to the tasks above. Typically, electronic copies of the DRAFT report and of the FINAL report are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Summary of Preliminary Findings

### Geotechnical Investigation (P6 Activity G2)

Conduct surface/subsurface investigations for earthwork estimation, structure/embankment foundation design, landslide assessment and mitigation, material source viability, stormwater features, etc.

#### Assumptions for G2 Activity:

* List assumption(s) here:
* Number of structures, wall types, cuts/fills, material variability, etc. to be investigated
* Site access and clearances
* Phasing of investigation
* Combining or coordinating with pavements, hydraulics, and/or environment,
* Type of investigation (borings, test pit, geophysical surveys, Cone Penetrometer Tests (CPT), instrumentation, etc.). For example:
* Borings – type and size of drill rig, drilling methods, sampling methods and frequency, number of borings, locations, total linear feet of drilling, method of groundwater detection, traffic control, etc. Include summary in table below.
* Geophysics – type, methods, number and length of lines, locations, etc.
* Surface investigations such as rock slope mapping, cut slope logs, or other site reconnaissance.

|  |  |  |  |
| --- | --- | --- | --- |
| Sampling / Data Collection | Depth(s)/ Length(s)1 | Total1 | Location |
| Borings | 40’ | 2 | Sta. 120+00 RSS |
| Cores |  |  |  |
| Test Pits |  |  |  |
| Geophysical Surveys |  |  |  |
| Rock Slope Mapping |  |  |  |
| Other (i.e. traffic data, subgrade percolation tests, etc.) | Monitoring Well | 2 |  |

1Actual quantities or number of samples may go up or down based on field conditions encountered. The task order will be modified, as necessary, to account for changes to the estimate.

1. Develop a *Comprehensive Geotechnical Investigation Plan* and include all assumptions

* Submit a copy of the plan to FHWA two weeks prior to investigation

1. Prepare for field investigation by obtaining all required permits and services

* Obtain necessary Right-of-Entry, drilling/excavation permits (e.g., U.S. Forest Service Special Use Permit), utility clearances, environmental clearances, etc.
* Procure investigation services, including auger/core drilling, test pit excavation, geophysical surveys, traffic control, etc. Provide traffic control for investigations as needed and acceptable to the local road agency and in conformance with the MUTCD

1. Conduct a comprehensive subsurface investigation in accordance with FHWA Guidelines.

* Include cuts, fills, structures and material sources
* Acquire samples, as needed, for laboratory testing
* Reclaim all borings and excavations to a condition acceptable to the property owner

Revise the step below based on the anticipated readings on the instrumentation

* Log, stake and/or survey all exploration/sampling locations
* Compile field notes, field boring/test pit logs, photos, sketches, etc.
* Photograph all sites of investigation, including the drill rig set up on each hole, and include photographs of all rock core and/or soil samples
* Draw a cross-sectional sketch showing exploration locations relative to the ditchline, centerline, or other geographical location, and a generalized subsurface profile, including water observations

1. Procure soil/rock lab testing for culverts, cut/fill materials, material sources, and structures. Include tests for USCS and AASHTO classification, and material suitability for slopes, fills, walls, foundations, general earthwork, materials, and pavements, as needed. Conduct electrochemical testing for design of MSE walls, culverts, anchors, or other buried structures. Anticipated testing is summarized in the table below.

| Tests / Analysis | Selected Test(s) | Estimated Number of Tests2 |
| --- | --- | --- |
| In-Situ Soil Density/Consistency  -SPT  -CPT  -Plate Dilatometer  -Shear Vane  -Pocket penetrometer | SPT | 16 |
| Soil Classification & Gradation  -AASHTO M 145  -ASTM 2487  -AASHTO T 27 | Classification, Gradation, LL, PI | 8 |
| Moisture Content of Soil (in situ)  -AASHTO T 255 or T 265 | T 255 | 8 |
| Moisture-Density Relation  -AASHTO T 99, method C  -AASHTO T 180, method D |  |  |
| Soil or Rock Strength  -Direct Shear  -Unconfined Strength  -Triaxial Shear |  |  |
| Soil Volume Change:  -Consolidation  -Time-Consolidation  -Swell/Consol (“Denver Swell”) |  |  |
| Other Testing – (i.e. soil corrosivity testing, organic content, subgrade testing when no Pavements Investigations) | pH and Resistivity | 4 |

2Actual quantities or number of tests may go up or down based on field conditions encountered. The task order will be modified, as necessary, to account for changes to the estimate.

1. Finalize boring logs, summarize field exploration program, results of laboratory testing, and compile site photographs.
2. Install geotechnical instrumentation and conduct initial and scheduled readings. It is anticipated that the following number of readings will be required:

* Example: Inclinometer – 4 readings (January, March, May, July)

1. Issue *Summary of Interim Findings* summarizing preliminary findings regarding the field investigation, structure foundations (e.g., soil/rock profiles), constructability issues, etc., as needed.
2. Coordinate interim Geotechnical Findings with the project team

#### Deliverables for G2 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Comprehensive Geotechnical Investigation Plan
* Boring logs
* Summary of Interim Findings

### Draft Geotechnical Report (P6 Activity G3)

Conduct geotechnical analyses and prepare a draft final geotechnical report with recommendations for earthwork, structure foundations, landslides and slopes, material sources, special construction requirements, etc.

#### Assumptions for G3 Activity:

* List assumption(s) here: including anticipated analysis, design methods, Peer-to-Peer exchange projects, coordination with local or state standards, number of structures/walls/cuts fills, level of evaluation (e.g. rock cuts evaluated with ODOT charts or based on field mapping investigation), variation of the site, partner or A/E training on technical issues (e.g. GRS-IBS, RSS, etc.) etc.
* When no subsurface investigation is performed and total document length is estimated to be less than 20 pages, prepare a Memorandum Report rather than a full report.

1. Develop Geologic Profile

* Include type and location of contacts, correction of field values, soil and rock strength parameters, soil moisture conditions, groundwater, etc.
* Distinguish between factual and interpretive information as well as project assumptions used in geotechnical analyses.

1. Conduct geotechnical analyses for slopes, cuts, fills, structures, landslides, etc., as required.

* Conduct landslide and slope stability analyses and develop/evaluate slide mitigation and slope design alternatives.
* Conduct rock slope and rockfall analyses and develop/evaluate excavation and mitigation alternatives.
* Conduct global and external stability analysis for retaining walls and structures (sliding, bearing, overturning, and slope stability).
* Develop and evaluate wall selection alternatives.
* Develop temporary excavation, shoring, and dewatering alternatives for structure excavations as needed.
* Conduct shallow foundation and embankment bearing capacity and settlement analyses, and develop/evaluate design alternatives. Develop and evaluate alternatives to eliminate or minimize excessive settlement in areas of compressible soils.
* Conduct deep foundation and settlement analyses. Develop and evaluate foundation alternatives in collaboration with the project cross functional team. Coordinate with Hydraulics Engineer, Environmental Specialist, and Bridge Engineer for evaluation of structure selection (Bridge Selection Report).
* Evaluate constructability issues pertaining to geotechnical features within the project, and develop alternative construction options in collaboration with the project cross functional team, as needed.

1. Prepare and issue a *DRAFT Final Geotechnical Report* incorporating the following:

* Relevant findings per the G1 Summary of Preliminary Findings, G2 *Summary of Interim Finding*, V1 Pavements Report, and other geotechnical information sources.
* Summary of findings from G2 field investigations
* Specific recommendations based on G3 analyses:
* Present an interpretation of the regional and local geology, seismic conditions, and geographic setting (precipitation, frost depths, etc.). Prepare figures and engineering geology sheets, as needed.
* Present details of the investigation plan procedures, methods, and results, including drilling/test pit logs and laboratory testing. Develop interpretive tables and figures to present the field exploration and lab test data, and how the data were interpreted for analysis and design.
* Present interpreted drilling/test pit explorations and geophysical results on plans, profiles, and sections.
* Provide annotated site photographs, general project location maps, and investigation location maps.
* Present the types and methods of analyses conducted, including tabled input values, criteria, and findings, and append relevant examples.
* Provide a statement of limitations describing the potential for material type and properties variation between exploration locations, and that explorations were conducted for design purposes only. Draw distinctions between factual and interpreted data and findings.
* Provide specific recommendations for the following:
* Suitable/unsuitable soils and aggregates by location (including wasting options/locations)
* Soil and rock shrink/swell properties, station-to-station
* Rock rippability
* Drainage – surface seepage area mitigation and subsurface drainage
* Soil corrosivity and required culvert/structure materials
* Distinguish between roadway subex, deep patches, shoulder stabilizations, and deeper embankment corrections (e.g. MSE and RSS)
* Deep patch and shoulder repair locations and designs
* Excavation requirements, including blasting and shoring
* Cut and fill slope ratios, erosion control, and construction requirements
* Embankment foundation preparation and construction specifications
* Structure foundation type, capacity, and construction/testing specifications
* Liquefaction mitigation requirements to address settlement, pore pressure dissipation, and lateral spread
* Seismic mitigation requirements
* Geologic hazard mitigation requirements
* Landslide mitigation requirements
* Rockfall mitigation requirements
* Geosynthetic selection (coordinate with pavements and hydraulics for consistency)
* General constructability requirements for all geotechnical features

Only include the Interim Geotechnical Memoranda and Geotechnical Baseline Report in scope when required.

1. Provide interim recommendations, as needed, for development of roadway design.

* Attend project related meetings; include regularly scheduled, pre/post field review meetings, conference calls, as required. Contribute to milestone Design Technical Memorandums, as needed.

1. Issue draft Special Contract Requirements (SCR’s) and Geotechnical Plan Advisories for the PS&E package.

* Address constructability issues, specific field-testing locations and numbers, and project-specific issues not addressed in the Standard FP Specifications and FHWA or CFLHD Standard Drawings, template drawings, or special drawings, as needed.

In general, this section needs to provide enough information to (1) support the development of an Independent Government Estimate of planned work activities, (2) ensure the required scope of the project is being adequately addressed, and (3) provide a means to measure planned work performance under this task.

#### Deliverables for G3 Activity

Add/delete deliverables to correspond to the tasks above. Typically, electronic copies of the DRAFT FINAL report are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule. Also determine need/use of electronic copies.

* Geotechnical section of milestone Design Technical Memorandum
* SCR’s and Geotechnical Plan Advisories
* DRAFT Final Geotechnical Report

### Final Geotechnical Report (P6 Activity G4)

Update, revise and issue the FINAL Geotechnical Report and associated Geotechnical Advisories.

#### Assumptions for G4 Activity:

* List assumption(s) here:

1. Update and Issue Final SCR’s, *Geotechnical Plan Advisories* for the final PS&E package.
2. Update and issue the *FINAL Geotechnical Report*, incorporating the latest geotechnical findings and recommendations CFLHD review comments, and external agency/partner/ stakeholder comments.

#### Deliverables for G4 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies and delivery formats with the COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* FINAL SCR’s and Geotechnical Plan Advisories
* FINAL Geotechnical Report

### Geotechnical CFT Support (P6 Activity CFT)

Provide support to CFT after Final Geotech Report is completed.

* Provide support to CFT
* Provide Designer with Geotech section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## PAVEMENTS AND MATERIALS

### Preliminary Pavement and Materials Recommendations (P6 Activity V1)

Complete project initiation, field investigation, materials testing, analysis, and determination of cost effective pavement, aggregate surfacing, material, design, and rehabilitation recommendations (as applicable). Communication between the A/E and the CFLHD pavement engineer throughout this activity is essential for successful completion.

In addition to the mainline roads, pavement and material recommendations for pullouts, parking lots, trails, and overlooks within the project must be included. These pavement recommendations may vary from the mainline road because existing conditions and features may vary (i.e. parking lots may have curb and gutter or may require a porous pavement design).

#### Assumptions for V1 Activity:

* List project assumptions in bulleted format as related to pavement & materials. Examples include routes/parking lots to be investigated, feasibility of recycling, allowance for elevation increases to profile, commitments from road-owner, traffic data, leveraging of existing data to minimize scope, and unique challenges or concerns.

1. Project Initiation

* Refer to Section H in the Scoping Report and project folders for existing reports and information (archived reports/files, as-builts, scoping reports, PMS data, maintenance records, traffic data, climate data, etc).
* Refer to Section H in the Scoping Report and finalize the *Field Investigation Plan* including the scope, sampling, testing, schedule, and budget. When appropriate, coordinate sampling and evaluation needs with Geotech team representatives. Submit the plan, schedule, and budget to FHWA four weeks prior to the investigation for review and approval.
* Coordinate investigation, coring, and drilling access with the FHWA and the appropriate land owning/management agency. Obtain needed permits or clearances for accessing the site and completing subsurface and/or other investigative activities. This includes completing utility locates, if necessary.
* Assume the following sample and data collection methods for this project:

Not all of the following sampling and data collection methods will be needed on projects. Use only the methods appropriate for the project scope.

|  |  |  |  |
| --- | --- | --- | --- |
| Sampling / Data Collection | Depth(s) | Interval (total)1 | Offset or Location |
| Borings |  |  |  |
| Cores |  |  |  |
| FWD2 | N/A |  |  |
| DCP |  |  |  |
| Test Pits |  |  |  |
| Other (i.e. traffic data, subgrade percolation tests, etc.) |  |  |  |

1Actual quantities or number of samples may go up or down based on field conditions encountered. The task order will be modified, as necessary, to account for changes to the estimate.

2Refer to FLH FWD Testing and Analysis Guidelines.

* Assume the following tests/analyses for this project:

| Tests / Analysis | Selected Test(s) | Estimated Number of Tests3 |
| --- | --- | --- |
| Soil Strength / Stiffness  -R-Value (AASHTO T 190)  -CBR (AASHTO T 193)  -Resilient Modulus (AASHTO T 307)  -Backcalculation of FWD Data4  -Correlation of DCP Data (ASTM D 6951) |  |  |
| Soil Classification & Gradation  -AASHTO M 145  -ASTM 2487  -AASHTO T 27 |  |  |
| Moisture Content of Soil (in situ)  -AASHTO T 255 or T 265 |  |  |
| Moisture-Density Relation  -AASHTO T 99, method C  -AASHTO T 180, method D |  |  |
| Soil Stabilization (evaluate feasibility, application rate, and structural value)  -Lime, Cement, and/or fly ash |  |  |
| Cold In-Place Recycling (CIPR) or Full-Depth Reclamation (FDR): Preliminary Mix Designs (evaluate feasibility, application rate, and structural value) |  |  |
| Other Testing / Analysis – (i.e. soil corrosivity testing, percolation testing for porous pavement design (ASTM D 3385), etc.) |  |  |

3Actual quantities or number of tests may go up or down based on field conditions encountered. The task order will be modified, as necessary, to account for changes to the estimate.

4Refer to FLH FWD Testing and Analysis Guidelines.

* Obtain additional investigative services (traffic control, drilling rigs, etc.).
* Provide traffic control as needed and acceptable to the local road agency and in conformance with the MUTCD.
* Include material source investigations at designated sites, if not included in the geotechnical scope.
* Include evaluation of soil corrosivity properties for culvert and concrete type material recommendations, if not included in the geotechnical scope.

1. Complete field investigation

* Assure all necessary subsurface utility clearances have been completed prior to commencing investigations.
* Perform field investigation per the standards and guidance of the PDDM and supplements. This includes but is not limited to: sampling and logging (including photos); surveying pavement condition and distresses (including photos); identifying potential material sources; identifying special pavement issues (i.e. frost heave); identifying areas for subexcavation, pavement drainage, or other spot repairs; identify obstacles for construction or rehabilitation (i.e. suitability of existing shoulder/bench for minor widening of the roadway).
* Upon completion of the field investigation, submit a brief E-mail to FHWA that summarizes the investigation.

1. Post Investigation Activities

* Review and compile field notes, logs, photos, etc.
* Evaluate and submit samples/data for testing and analysis.
* Assure submitted samples are an adequate representation of project conditions.
* Evaluate results from lab testing, field investigation, and engineering analysis. Determine if additional investigation, testing, or analysis is necessary.
* Coordinate additional work with the FHWA

1. Develop *Preliminary Pavement Recommendations Technical Memo*. This technical memo should include, but not be limited to, the following:

* ESALs for the design life of the pavement
* Effective soil resilient modulus
* Pavement and/or aggregate surface structural design
* Design multiple alternatives, especially on pavement rehabilitation projects
* Economic and cost analysis on design alternatives and include a recommended/preferred alternative
* Material recommendations
* Special recommendations, spot repairs, or other pertinent information (i.e. porous pavement design and materials recommendations, subexcavation locations, constructability issues, local material availability, material haul distances, pavement depth variability, steep grades, recommended follow-up investigation, etc.).
* Submit to FHWA for review and comment.

1. Coordinate preliminary Pavement Recommendations with project team.

#### Deliverables for V1 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Field Investigation Plan
* Field Investigation Summary E-mail
* Preliminary Pavement Recommendations Technical Memo

### Final Pavement and Materials Recommendations (P6 Activity V2)

Finalize the pavement and materials recommendations within a comprehensive report.

1. Identify and/or develop needed SCRs related to materials and pavements.

* Notify FHWA of needed SCRs or suggested edits to construction specifications.
* Write SCRs using format and grammar approach (active voice and imperative mood) of the current FP.
* Coordinate effort with the pavement and materials PST representative.

1. Develop a *DRAFT Pavement Report* per the PDDM and supplements. The activity includes, but is not limited to, the following:

* Finalizing the following:
* Pavement rehabilitation and/or structural design
* Materials recommendations
* Spot repair or special recommendations, including use of porous pavement if applicable
* Use of potential material sources
* Development of a comprehensive report that documents all information, assumptions, and calculations that were gathered and completed during the V1 and V2 tasks
* Completing a QA review
* Submit to FHWA for review and comment

1. Prepare *FINAL Pavement Report*

* Address comments by project team
* Submit to FHWA

#### Deliverables for V2 Activity

Add/delete deliverables to correspond to the tasks above. Typically 5 copies of the DRAFT report and 8 copies of the FINAL report are submitted. Also an electronic copy (pdf) should be provided. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* DRAFT Pavement Report
* FINAL Pavement Report
* Pavement section of milestone Design Technical Memorandum

### Pavements and Materials CFT Support (P6 Activity CFT)

Provide support to CFT after Final Pavement Report is completed.

* Provide support to CFT
* Ensure recommendations are properly incorporated into PS&E
* Provide Designer with Pavements section for PE Memo, as appropriate.
* Provide pavement and materials notes, clarifications, and/or advisories for inclusion in the PE notebook
* Provide support during advertisement for questions, clarifications, or amendments

## HYDROLOGY/HYDRAULICS

#### Assumptions for Hydraulics:

* Include additional assumption(s) here and edit below assumptions
* Hydraulic design criteria established during scoping
* Preliminary data collection conducted during scoping activities
* Survey completed prior to start of H1
* Site visit conducted prior to start of H1
* Number of minor culverts (less than 48”) to be evaluated:
* Number of major culverts (48” or larger) to be evaluated:
* Number of Aquatic Organism Passage Crossings:
* Number of bridges to be evaluated:
* Bridge alternatives per site to be evaluated:
* Potential Floodplain Impacts:
* Floodplain permitting required?
* Other hydraulic design elements to be evaluated:
* Include other assumptions as necessary to support Preliminary Engineering budget

### Preliminary Hydraulics Analysis (P6 Activity H1)

Preliminary hydrology/hydraulics analysis to determine the preliminary drainage structure requirements and water resources impact.

1. Verify existing drainage related data, reports, studies, and other pertinent information gathered during scoping. Gather additional data as necessary. Typical sources include:

* Local and County agencies
* State agencies
* Federal agencies, including applicable land management plans
* FEMA to determine if FEMA floodplain mapping covers the project

1. Verify potential floodplain encroachments, channel stability issues, and stormwater requirements identified during scoping.

* Identify adverse floodplain impacts with respect to applicable regulations.
* Identify the type of floodplain permit needed for project (local floodplain development permit, “no-rise” certification, CLOMR/LOMR). Verify impacts to scope, schedule, and budget were communicated to project team during scoping.
* Identify analysis/documentation requirements from local/State water boards or other permitting agencies. Coordinate this effort with Environment.

1. Provide support to the NEPA process. Support may be required in the following areas:

* Water quality
* Floodplains
* Wetlands
* Fish passage
* Stream restoration
* Stormwater management

1. Verify Hydrologic and Hydraulic Criteria and Computational Methods established during scoping.

* Confirm criteria and computational methods established during scoping to be used for the hydrologic and hydraulic analyses of ditches, culverts, bridges, and stormwater management, including appropriate design standards and flood frequency.
* Communicate to CFLHD for review. Address comments.

1. Perform preliminary hydrologic and hydraulic analysis of existing conditions

* Perform drainage basin delineations for all hydraulic design elements. Calculate peak discharges based on the design criteria and methods.
* Conduct existing conditions hydraulic analysis for return periods established in the hydraulic design criteria.

1. Perform preliminary hydraulic analysis of proposed conditions

* Conduct proposed conditions hydraulic analysis for return periods established in the design criteria.
* Recommend rehabilitation (e.g., lining), replacements, and extensions, as appropriate, considering culvert condition, hydraulic performance, and cost.
* Design the preliminary type, size, and location of the minor cross culverts. Use HY8 or equivalent for hydraulic analysis/design for minor culverts in critical situations such as high likelihood of ice or debris, high tailwater, low culvert barrel slope, increased risks to upstream properties, or other site-specific conditions. Minor culverts in non-critical situations may be designed using HY8 or equivalent, or inlet control equations.
* Design the preliminary type, size, and location of all crossing locations. Use HY8 or equivalent for hydraulic analysis/design. Recommend appropriate end treatments.
* Provide preliminary designs for grade control structures.
* Provide preliminary design recommendations for other hydraulic design elements identified during scoping
* Provide preliminary designs for roadside ditches, including temporary/permanent linings to prevent erosion.
* Analyze and provide recommendations for alternatives to mitigate floodplain impacts, if practical.

1. Perform preliminary bridge waterway analysis for proposed bridge designs (TS&L).

* Perform drainage basin delineations for all bridge crossing locations. Calculate peak discharges based on the design criteria and methods.
* Conduct existing conditions hydraulic analysis using SRH-2D or equivalent for return periods established in the hydraulic design criteria. Make capacity design recommendations for design alternatives.
* Characterize bed and bank materials in the vicinity of proposed bridge piers and abutments from available geotechnical data and reports. Perform pebble counts in non-cohesive materials to complete the characterization.
* Identify need for bridge scuppers and storm drain.

1. Attend CFT meetings
2. Prepare Preliminary Hydraulics Recommendations include, but not limited to, the following:

* Documentation of approved criteria and methods
* Documentation of data collection and site investigation
* Examination of overall site
* Existing streams and ditches
* Existing culverts (size, location, and condition)
* Identification of floodplain encroachment, channel stability issues and stormwater requirements
* Environmental support findings in the areas of water quality, wetlands, fish passage, and stream restoration
* Hydrologic and Hydraulic Criteria and Computational Methods
* Preliminary recommendations for type, size, and location of proposed crossings including energy dissipation, aquatic organism passage, inlet/outlet treatment, etc.
* Preliminary recommendations for other hydraulic design elements including grade control structures, roadside ditches, floodplain encroachments, etc.
* Submit to CFLHD for review. Address comments and resubmit if necessary.

1. Coordinate preliminary Hydraulics Recommendations with the project team

#### Deliverables for H1 Activity

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Preliminary Hydraulics Recommendations
* Electronic design files for review (i.e. GIS, WMS, HY-8, Hydraulics Toolbox, SMS-SRH2D, etc.)

### Draft Hydraulics Report (P6 Activity H2)

Hydrology/Hydraulics evaluation to support development of 30% PS&E.

1. Perform draft roadway hydraulic analysis of proposed conditions

* Design the type, size, and location of all crossings. Design end treatments.
* Design the type, size, and location of the minor cross culverts
* Provide designs for outlet energy dissipation for all culverts
* Support preparation of culvert cross-sections, including ensuring sufficient cover is provided
* Provide designs for grade control structures and channel stability measures
* Provide designs for roadside ditches, including temporary/permanent linings to prevent erosion
* Provide design recommendations for other hydraulic design elements.

1. Perform bridge waterway analysis for proposed bridge designs (TS&L).

* Update modeling of bridge hydraulics and freeboard for proposed bridge design alternatives.
* Assess abutment and pier scour at bridge locations for the appropriate return periods as identified in HEC-18, Table 2.1 including the overtopping event if less than the return period selected for the design or check flood.
* Make foundation and scour countermeasure design recommendations following the guidance of HEC-18, HEC-23, and associated Technical Briefs.
* Finalize bridge scuppers and storm drain recommendations.

1. Provide support for permitting

* Determine the ordinary high water (OHW) level and extent if needed.
* In the absence of site-specific guidance, use the 2-yr event for this determination

1. Perform preliminary floodplain analysis and delineation

* Evaluate the effects of encroachment
* Model proposed conditions for the 100-yr event
* Make design recommendations to mitigate adverse impacts

1. Develop preliminary designs for special hydraulic features

Modify list below based on project specific conditions.

* Aquatic organism passage
* Storm drains and curb/gutter
* Temporary construction related drainage features
* Stormwater (detention/retention) management and/or water quality measures
* River training/stabilization design(s)
* Stream restoration and/or wetland mitigation plans in coordination with environmental specialist

1. Attend CFT meetings
2. Prepare a Draft Hydraulics Report. The report will provide the necessary hydrologic and hydraulic analysis to complete the preliminary (30%) design. Contents of the report shall follow the guidance in the PDDM. In addition, the report shall include:

* Maps indicating the general and specific project location including the stream channel(s) to proposed structure locations and drainage basin boundaries
* Discussions, documentation, and summaries of all analysis and design activities (including any assumptions made, discussion of variables including n values) and results
* Detailed hydraulic design recommendations and conclusions including appropriate tables, figures etc. in the text
* Appendices containing copies of any hand or spreadsheet calculations and electronic files of input and output data from any computer models used
* Maps and/or exhibits showing the location and orientation of all cross-sections and cross section plots for all locations

#### Deliverables for H2 Activity

Add/delete deliverables to correspond to the tasks above. Typically, 3 copies of the Preliminary Hydraulics Report are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Draft Hydraulics Report
* Electronic design files for review (i.e. GIS, WMS, HY-8, Hydraulics Toolbox, SMS-SRH2D, etc.)

### Final Hydraulics Report (P6 Activity H3)

Hydrology/Hydraulics evaluation to support development of 70% PS&E.

1. Perform final roadway hydraulic analysis

* Design the final type, size, and location of all crossings. Finalize design of end treatments for culverts
* Design the final type, size, and location of the minor cross culverts
* Provide final designs for outlet energy dissipation for all culverts
* Support preparation of final culvert cross-sections, including ensuring sufficient cover is provided
* Provide final designs for grade control structures and channel stability measures
* Provide final designs for roadside ditches, including temporary/permanent linings to prevent erosion
* Provide final design recommendations for other hydraulic design elements.

1. Finalize bridge waterway analysis for proposed bridge designs

* Finalize modeling of bridge hydraulics and freeboard for proposed bridge design
* Finalize capacity design recommendations
* Finalize scour assessments and foundation and countermeasure design recommendations
* Finalize bridge scuppers and storm drain design

1. Continue floodplain permitting coordination

* Finalize floodplain modeling
* Prepare floodplain development permit, “no-rise” certification, or CLOMR application package as applicable.
* Submit application package to applicable regulatory entity (NFIP community for local permits, FEMA for CLOMR)

1. Finalize designs for special hydraulic features

Modify list below based on project specific conditions

* Aquatic organism passage
* Storm drains and curb/gutter
* Temporary construction related drainage features
* Stormwater (detention/retention) management and/or water quality measures
* River training/stabilization structures
* Stream restoration and/or support wetland mitigation plans in coordination with environmental specialist.

1. Update the Draft Hydraulics Report to develop the Draft Final Hydraulics Report that includes all updates to the maps, discussions, documentation, assumptions, summaries, recommendations, conclusions, and appendices. Submit to CFLHD, and other stakeholders upon request, for review.
2. Attend CFT meetings
3. Incorporate CFLHD review comments, and comments from other stakeholders, and submit a Final Hydraulics Report.

#### Deliverables for H3 Activity

Add/delete deliverables to correspond to the tasks above. Typically 3 copies of the DRAFT report and 5 copies of the FINAL report are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Floodplain permit application package
* Draft Final Hydraulics Report
* Final Hydraulics Report
* Hydraulics section of milestone Design Technical Memorandum
* Electronic design files for review (i.e. GIS, WMS, HY-8, Hydraulics Toolbox, SMS-SRH2D, etc.)

### Hydraulics CFT Support (P6 Activity CFT)

Provide support to CFT after Final Hydraulics Report is complete.

* Provide support to CFT
* Provide Designer with Hydraulics section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## BRIDGE

### Structural Layout (P6 Activity B2)

Determine structural width, length, type, location, alternative types, typical structural section and any special details or client requests. Structures included in this activity are bridges and concrete cantilever, soil nail (including SMSE), soldier pile and tieback retaining walls. List the assumed number of alternatives to be studied at both the conceptual and preliminary layout stages and the design specifications to be used.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

#### Structure Selection

1. For Bridge site(s) identified in the Scoping Report, prepare a *Bridge Selection Repor*t or Memo with supporting drawings, tables, and discussion as needed. Incorporate recommendations from *Preliminary Hydraulic Recommendations* and *Preliminary Geotechnical Investigation*. Incorporate 30% plan and profile from Roadway Design. Include the following:

* Review the structure site data to determine the requirements that will control the structure size, layout, and type.
* Propose recommended superstructure and substructure alternative(s). Propose foundation alternative(s). Determine the structure length, width, and span configurations that satisfy horizontal and vertical clearance criteria. Consider hydraulic opening and potential scour requirements.
* Propose recommended rehabilitation alternative(s) if applicable. Consider continued use of all or parts of existing structures.
* Consider the effects of staged construction versus realignment.
* Consider environmental constraints.
* Consider restrictions due to site access and transport limitations, and local material availability.
* Recommend proposed adjustments to profile alignment and grade necessary to accommodate bridge location and freeboard requirements.
* Include discussion on major items or issues such as future maintenance that might affect the selection of a preferred alternative.
* Recommend a structure layout, type and rehabilitation alternative(s) as applicable. . State criteria used to evaluate each alternative.
* Include a list of references of available reports, investigations, and technical memorandums used in preparation of the *Bridge Selection Report*.
* Obtain acceptance by CFLHD of the *Bridge Selection Report* prior to beginning work on *Bridge Preliminary Layout (TS&L)*.

1. Prepare a bridge conceptual TS&L drawing for each bridge alternative recommended. Incorporate recommendations from *Preliminary Hydraulic Recommendations* and *Preliminary Geotechnical Investigation*.
2. Prepare bridge preliminary cost estimates for each alternative(s) based on square foot costs.
3. For retaining wall site(s) identified in the design plans, prepare wall conceptual drawing(s). Incorporate recommendations from Preliminary Hydraulic Recommendations and Preliminary Geotechnical Investigation.

* Review the available wall site data to determine the requirements that will control the wall size, layout, and type.
* Prepare conceptual drawings for each wall alternative showing proposed wall type and foundation alternatives.

1. Prepare preliminary cost estimates for each wall alternative based on wall face square foot costs.

#### Structure Preliminary Layout

1. For each approved alternative(s) identified in the *Bridge Selection Report* prepare a *Bridge Preliminary Layout (TS&L)*. Incorporate recommendations from *Preliminary Hydraulic Report* and *Preliminary Geotechnical Investigation*. Incorporate 30% plan and profile from Roadway Design.

* See the *Federal Lands Highway Bridge Office (FLHBO) Bridge Plan Checklist*, specified in Section III, for information to be included on the *Bridge Preliminary Layout (TS&L)* drawing(s).
* Obtain acceptance by CFLHD on the *Bridge Preliminary Layout (TS&L)* prior to beginning work on Task B3 - Structure Design and Check.

1. Prepare revised bridge preliminary cost estimate for each approved alternative based on square foot costs.
2. For the approved retaining wall alternative(s) prepare typical section drawings. Incorporate recommendations from *Preliminary Hydraulic Report* and *Preliminary Geotechnical Investigation*.

* Evaluate wall alternatives and propose recommended wall type.
* Consider application of FHWA CFLHD standard typical sections and details for cantilever retaining walls, soil nail walls (including SMSE), soldier pile and tieback walls.
* Prepare wall typical sections and details, including structural railing and aesthetic treatments.

1. Prepare revised wall preliminary cost estimate based on wall face square foot cost.

#### Deliverables for B2 Activity

Add/delete deliverables to correspond to the tasks above. Typically 4 copies of the DRAFT report, 4 copies of the FINAL report, 4 copies of the DRAFT TS&L and 4 copies of the FINAL TS&L are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* Bridge Selection Report or Memo
* Bridge Conceptual TS&L drawings and preliminary cost estimates (include in 30% package)
* Wall Conceptual Drawings and preliminary cost estimates (include in 30% package)
* Bridge Preliminary Layout (TS&L) and preliminary cost estimate (include in 30% or 70% package, as appropriate)
* Wall typical section drawings and preliminary cost estimate (include in 30% or 70% package, as appropriate)
* Bridge section of milestone Design Technical Memorandum

### Structural Design and Check (P6 Activity B3)

Structural analysis, design, and check of the structure. Draft contract plans, prepare special contract requirements, and the engineer’s estimate. Structures included in this activity are bridges, and concrete cantilever, soil nail (including SMSE), soldier pile and tieback walls. List the assumptions for bridge type, span configuration, geometric considerations, foundation type and/or wall types to be designed. State whether a load rating is required by the owner agency and whether there is a specified software requirement and electronic input files to be provided.

#### Design Criteria

1. For the approved *Bridge Preliminary Layout (TS&L)* prepare a Structure Design Criteria document and include as an attachment to the Highway Design Standards for signature by owner agency.

* Follow the template referenced in Section III.
* Provide references for key criteria. Provide key decisions made by owner agency representatives including the date of the decision and responsible person.
* Obtain acceptance by CFLHD of the Structure Design Criteria prior to beginning work on Step 2 - 70% Structure Design.
* Incorporate recommendations from *Preliminary Hydraulic Report*, *Draft Geotechnical Report*, and *Geotechnical Memoranda*, as available.

1. For concrete cantilever retaining walls prepare a Structure Design Criteria document and include as an attachment to the Highway Design Standards for signature by owner agency.

* Follow the template referenced in Section III.
* Provide references for key criteria. Provide key decisions made by owner agency representatives including the date of the decision and responsible person.
* Obtain acceptance by CFLHD of the Structure Design Criteria prior to beginning work on Step 2 - 70% Structure Design.
* Incorporate recommendations from *Preliminary Hydraulic Report*, *Draft Geotechnical Report*, and *Geotechnical Memoranda*, as available.

#### 70% Structure Design

1. Provide calculations for the structural design of the bridge superstructure. Annotate design calculations with specific references to the applicable design specification. Perform calculations for all elements of the superstructure including:

* Girders/beams
* Deck
* Endwalls and wingwalls (where part of superstructure)
* Bearings and connections
* Expansion joints

1. Provide calculations for the structural design of retaining walls. Annotate design calculations with specific references to the applicable design specification. Incorporate recommendations from *Final Hydraulics Report*, *Draft Geotechnical Report*, and *Geotechnical Memoranda* as issued. Include calculations for the following elements:

* Internal stability and structural design of concrete cantilever retaining walls
* Facing design of soil nail walls
* Soldier pile and tieback wall structural components

#### 70% Structure Drawings (For projects without 70% this will be referred to as “Interim Design Review”)

1. Prepare plan sheets for the bridge superstructure. Follow the format in the FLHBO Bridge Plan Checklist specified in Section III. Incorporate recommendations from Final Hydraulics Report, Draft Geotechnical Report, and Geotechnical Memoranda as issued. Provide plan sheets for the following:

* Plan and elevation
* General notes and estimate
* Summary of boring logs (from Geotechnical Investigation)
* Stage construction sequence
* Endwalls and wingwalls
* Girders/beams
* Bearings and connections
* Typical section
* Deck
* Expansion joints
* Aesthetic treatments
* Railing and transition railings
* Approach slabs

1. Prepare plan sheets for the retaining walls. Follow the format in the FLHBO Bridge Plan Checklist specified in Section III. Incorporate recommendations from *Final Hydraulics Report*, *Draft Geotechnical Report*, and *Geotechnical Memoranda* as issued. Provide plan sheets for the following:

* General plan
* General notes and estimate
* Plan and profile
* Typical sections
* Expansion/contraction joint details
* Drainage details
* Aesthetic treatments
* Excavation/backfill details
* Shoring and min. setback/depth requirement details
* Railing and transition railings

#### 70% Structure Independent Check

1. Prepare independent design calculations for the bridge superstructure. Check the structural design of all elements of the superstructure as detailed in the 70% Structure Drawings. The independent check will verify design methods, functional requirements, and conformance to the Structure Design Criteria. Check calculations shall be annotated with specific references to the applicable design specification sections.
2. Prepare independent design calculations for the retaining walls as detailed in the 70% Structure Drawings. The independent check will verify design methods, functional requirements, and conformance to the Structure Design Criteria. Check calculations shall be annotated with specific references to the applicable design specification sections.
3. Check the 70% Structure Drawings for completeness and accuracy.

#### 70% Structure Quantities and Itemized Cost Estimate (Not required for projects without 70% - do not provide for Interim Design Review)

1. Prepare bridge plan item quantity calculations and document itemized cost estimate
2. Prepare wall plan item quantity calculations and document itemized cost estimate
3. Check the 70% Structure Quantities and Itemized Cost Estimate for completeness and accuracy

#### 70% Structure Special Contract Requirements (Not required for projects without 70% - do not provide for Interim Design Review)

1. Prepare Bridge Special Contract Requirements.

* Review Structure Special Contract Requirements provided by FHWA.
* Prepare unique Structure Special Contract Requirements required by the design.

1. Prepare Retaining Wall Special Contract Requirements.

* Review Structure Special Contract Requirements provided by FHWA.
* Prepare unique Structure Special Contract Requirements required by the design.

1. Check the 70% Structure Special Contract Requirements for completeness and accuracy.

#### 95% Structure Design

1. Provide calculations for the structural design of the bridge substructure. Annotate design calculations with specific references to the applicable design specification. Incorporate recommendations from *Final Geotechnical Report* and *Final Hydraulics Report*. Perform calculations for all elements of the substructure including:

* Abutments
* Abutment foundations
* Piers
* Pier foundations

1. Perform bridge load rating (for NPS projects, and, if applicable, other agencies)

* Provide calculations, notes, and assumptions necessary to complete the load rating.
* Complete the FHWA Load Rating form, specified in Section III.

1. Provide calculations for revised wall sections, not provided for in the 70% retaining wall design. Incorporate recommendations from *Final Geotechnical Report* and *Final Hydraulics Report*. Annotate design calculations with specific references to the applicable design specification.

#### 95% Structure Drawings

1. Prepare complete set of plan sheets for the bridge. Follow the format in the FLHBO Bridge Plan Checklist specified in Section III. Incorporate recommendations from *Final Geotechnical Report* and *Final Hydraulics Report*. Include plan sheets for the following:

* Revised 70% structure drawings as necessary
* Foundation layout
* Slope protection
* Abutments
* Piers
* Reinforcing bar lists
* Existing bridge plans

1. Prepare complete set of plan sheets for the retaining walls. Follow the format in the FLHBO Bridge Plan Checklist specified in Section III. Incorporate recommendations from *Final Geotechnical Report* and *Final Hydraulics Report*. Include plan sheets for the following:

* Revise 70% structure drawings as necessary

#### 95% Structure Independent Check

1. Prepare independent design calculations for the bridge substructure. Check the structural design of all elements of the substructure as detailed in the 95% Structure Drawings. The independent check will verify design methods, functional requirements, and conformance to the Structure Design Criteria. Check calculations shall be annotated with specific references to the applicable design specification sections.
2. Prepare independent load rating of the bridge.

* Provide independent calculations, notes, and assumptions necessary to complete the load rating.
* Verify the results of the FHWA Load Rating form, specified in Section III.

1. Prepare independent design calculations for the retaining walls as detailed in the 95% Structure Drawings. The independent check will verify design methods, functional requirements, and conformance to the Structure Design Criteria. Check calculations shall be annotated with specific references to the applicable design specification sections.
2. Check the 95% Structure Drawings for completeness and accuracy.

#### 95% Structure Quantities and Itemized Cost Estimate

1. Revise 70% bridge plan item quantity calculations and itemized cost estimate.
2. Revise 70% wall plan item quantity calculations and itemized cost estimate.
3. Check the revised Structure Quantities and Itemized Cost Estimate for completeness and accuracy.

#### 95% Structure Special Contract Requirements

1. Revise 70% Bridge Special Contract Requirements.
2. Revise 70% Wall Special Contract Requirements.
3. Check the revised Structure Special Contract Requirements for completeness and accuracy.

#### Deliverables for B3 Activity

Add/delete deliverables to correspond to the tasks above. Typically 1 copy of the site visit trip report, 1 copy of the DRAFT design criteria, and 1 copy of the FINAL design criteria, are submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* 70% Structure Design Criteria, Design Calculations, Quantity Calculations, and Independent Check
* Load Rating Calculations, Load Rating form, and input files (if applicable)
* 70% Structure PS&E
* 95% Structure Final Design Criteria, Design Calculations, Quantity Calculations, and Independent Check
* 95% Structure PS&E

#### Deliverables for Interim Design Review (P6 D3PRI Activity)

Delete this section if there is no Interim Design Review.

* 70% Structure Drawings

### Structural PS&E Revisions (P6 Activity B4)

Complete any necessary revisions to the Structure 95% PS&E package.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard Primavera Template Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

#### 100% Structural PS&E Supporting Data

1. Complete any necessary revisions to the 95% Structure Design. Provide calculations and independent check calculations for the 100% Structural Design.

#### 100% Structural PS&E

1. Revise 95% Structural Drawings.
2. Revise 95% Structural Special Contract Requirements.
3. Revise 95% Structure Quantities and Itemized Cost Estimate.

#### Deliverables for B4 Activity

Add/delete deliverables to correspond to the tasks above. Typically 1 copy of the 100% structural PS&E supporting data is submitted. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* 100% Structural PS&E Supporting Data
* 100% Structural PS&E
* CADD Drawings (See Section III)

### Bridge CFT Support (P6 Activity CFT)

Provide support to CFT outside of above activities.

* Provide support to CFT
* Provide Designer with Bridge section for PE Memo, as appropriate
* Provide support during advertisement for questions, clarifications, or amendments

## SAFETY

### Crash Data Analysis (P6 Activity SAF1)

Work consists of collecting and assembling crash data, analyzing data, and summarizing the analysis results. The complete data set should include 10 years of data; with minimum of 5 years of data.

The following list of typical tasks is based on and supplement the documents referenced in Section V of this SOW and the CFLHD Standard PrimaveraTemplate Activities. However, it may be appropriate to add, delete, or modify tasks to meet project specific requirements.

This activity is typically deleted from ERFO projects.

#### Assumptions for SAF1 Activity:

* Describe the available crash data
* Describe the anticipated deliverable (for projects with limited crash data available, the crash analysis summary would be a short paragraph; for projects with a significant amount of data, the report would be more detailed)

1. If not completed during the scoping phase, collect and assemble crash data from State DOTs, local agencies, or FLMA agencies.

* Analyze the crash data and summarize the analysis results in the Project Technical Memorandum (for projects with limited crash data available) or in a Crash Analysis Report (for projects with more detailed crash data available).
* Include a discussion on anecdotal crash information provided by local agencies, and any evidence of crashes noted during site visits. Provide an overall summary of observations and conclusions. Describe the potential safety countermeasures to target analysis findings (hot spots and systemic).

#### Deliverables for SAF1 Activity:

* Summary of Crash Analysis (either in the Tech Memo or a separate report)

## MEETINGS AND FIELD REVIEWS

### Design Meetings, Plan Reviews, and Field reviews

1. Project Support Team (PST) Progress Meetings (A/E Projects Only)

* Assume xx meetings at FHWA’s Lakewood office lasting xx hours each.
* Assume xx personnel from the A/E shall attend each meeting.
* Discuss project status, progress and share information
* Review the design activities and plan set status
* The A/E should be prepared to present current technical information and overall task order status
* Transmit any documents to be reviewed by FHWA at least one week in advance of the meeting
* Produce Project Support Team meeting minutes for review, approval, and distribution by the Government of all meetings. Provide meeting minutes to CFLHD within seven days listing all new information, action items and decisions for review. Make all changes as directed and return the minutes within 7 days of review. Respond in a timely manner to all inquiries, concerns and questions. (A/E projects only)

1. Attend the Scoping Meeting and Site Visit with the CFLHD Project Manager. The Consultant Project Manager and Design Engineer are required at the Scoping Meeting. It is anticipated that the Scoping Meeting will last X days including travel. The consultant is responsible for making all travel arrangements for their staff including airfare, rental car and hotel. (P1SV Activity)
2. 30% Internal CFT Review and Update (D2PRI Activity)
3. 30% PST/CFT Review Meeting (D2PRI Activity)
4. 30% Field Review. It is anticipated that the field review will last X days including travel (D2SV Activity)
5. 70% Internal CFT Review and Update (D3PRI Activity)
6. 70% PST/CFT Review Meeting (D3PRI Activity)
7. 70% Field Review. It is anticipated that the field review will last X days including travel. (D3SV Activity).
8. 95% Internal CFT Review and Update (D4PRI Activity)
9. 95% PST/CFT Review Meeting (D4PRI Activity)

### Environmental Meetings and Field Reviews

1. Attend Interdisciplinary Team Meeting and Field Review

* Assume xx days including travel for each meeting
* Assume xx meetings

1. Attend Public Meeting

* Assume xx days including travel for each meeting
* Assume xx meetings
* Set up meeting room in appropriate format (i.e., open house style, presentation style, sign-in table, court reporter location, exhibits/displays, etc.)
* Ensure all A/V equipment operating
* Ensure all staffing personnel know their roles and Exhibits to staff
* Conduct close out review of PH meeting with Interagency Team (what we heard, any possible problem areas, etc)

#### Deliverables for Meetings and Field Reviews

Add/delete deliverables to correspond to the tasks above. Coordinate number of copies with COR/PM. Number of copies and submittal dates shall be shown in Section IV, Deliverables and Schedule.

* PST/CFT Meeting Minutes

## QA/QC (A/E Projects ONLY)

Evidence that the QA/QC processes have not been performed, may initiate a Quality Assurance Audit (QAA) of the A/E’s QA/QC processes and procedures by CFLHD. CFLHD will determine the need for a QAA based on the type and volume of deficiencies discovered. The CFLHD Project Manager will coordinate the audit with the A/E Project Manager in the event a QAA is necessary to confirm that the required QA/QC checks and reviews have been accomplished. The A/E will be responsible for taking action to correct the specific deficient item or condition, and taking action to prevent recurrence of the deficiencies, with the focus on prevention, not correction. The A/E Project Manager will assemble all checking documents and a copy of all deliverables for the QA audit. Randomly scheduled quality assurance audit(s) to review QA/QC documents will also be conducted to verify compliance with the established QA/QC procedures. It will be necessary for the A/E to furnish a facility and assistance to facilitate the audit(s). When requested, provide QA/QC documentation for CFLHD review, including check plans, checked computations, ORD files and reports, and design notes to substantiate compliance with the QA/QC process.

Delete the highlighted paragraph for task orders under IDIQ’s where the subconsultant management is paid on a task order basis. Keep the following paragraph for task orders under IDIQ’s where subconsultant management is paid on a % fee.

Verify that work produced by subconsultants meet the needs of the client, complies with regulatory and contractual requirements, and that work is consistent with the design intent and can be integrated into the broader project, balancing risk between project constraints and good engineering judgment. Provide for back checking by the subconsultant of project deliverables to assure that the technical recommendations reflect the evolution of the project and reflect the intent of the recommendations.

1. Ensure that all work is performed in accordance with the established QA/QC plan, as supplemented by a Project-specific Quality Plan (PQP)

* Include a process whereby all documents and supporting calculations submitted for review are fully checked by a qualified individual other than the Originator before being released. Do not release any document that does not meet an acceptable level of quality. Complete QA/QC reviews as required to comply with the established QA/QC procedures. Use the approved plan for the duration of the task order to ensure that all products adequately conform to accepted CFLHD design practices, comply with all CFLHD design standards, are accurate and of high quality.
* Mark all QC review documents with a tracking stamp to create a record of the date and responsible person(s) completing the review.
* Furnish a Quality Assurance Certificate of Compliance for each product released. The “Quality Assurance Certificate of Compliance” for all deliverables is to contain the statement “This is to certify that the documents submitted have been produced in accordance with established QA/QC procedures and meet an acceptable quality level.” The certification shall be signed by the Responsible Engineer (Originator), Reviewer(s), Project Manager, and approved for distribution by a management level Approving Official. Subconsultants shall submit Certificates of Compliance meeting the same requirements as the consultant for all documents prepared by them. The A/E firm is responsible for the formulation, implementation, and administration of their QA/QC program.

1. Develop a Project-specific Quality Plan establishing the requirements for preparation, performance, and maintenance of project specific quality activities. The PQP in conjunction with the QA/QC plan govern project quality.

* Provide for a QC activity schedule that lists the significant QC activities, including; reviews, management audits, QC milestones; duration of each activity; where in the process it occurs; a description of the QC activity; list of the individual(s), including title, who are assigned as reviewers of those tasks; and the persons responsible for quality assurance, including who has the authority to sign certificates of compliance. Provide resource hours for each reviewer.
* List subconsultants and specialists employed during execution of the task order and the QA activities necessary to ensure compliance with contractual requirements.
* Define the technical aspects vital to the quality of the project and analyze the level of risk associated with those efforts. Include a narrative describing the impacts for each activity identified as having a high level of risk and the measures taken to mitigate the risks.
* Reference any written procedures for quality applicable to the project, including quality requirements defined in the various sections of task orders.
* Provide for periodic review and updating of the QC activity and resource schedules to address changes in personnel, quality activities, and dates.

Delete step 3 for task orders under IDIQ’s where subconsultant management is paid on a % fee. Keep step 3 for task orders under IDIQ’s where the subconsultant management is paid on a task order basis and verify that the step is included in the AE IGE fee spreadsheet.

1. Verify subconsultant work meets QA/QC requirements.

* Verify that work produced by subconsultants meet the needs of the client, complies with regulatory and contractual requirements, and that work is consistent with the design intent and can be integrated into the broader project, balancing risk between project constraints and good engineering judgment. Provide for back checking by the subconsultant of project deliverables to assure that the technical recommendations reflect the evolution of the project and reflect the intent of the recommendations.

#### Deliverables for QA/QC

* Project-specific Quality Plan
* Quality Assurance Certificate of Compliance for each deliverable

## PROCUREMENT AND ACQUISITIONS (CFL Internal Projects Only)

### Project Acquisitions (P6 Activity AQ1)

1. Pre-advertisement. Procurement acquisition, pre-advertisement tasks and preparation such as synopsis & presolicitation
2. P&A Advertisement. Amendments, receipts of questions from bidders, coordination of questions, response to questions
3. P&A Closeout. Procurement and acquisition award of bid and final close-out of bid activities

# FHWA FURNISHED PROPERTY/DATA

CFLHD will provide the following to facilitate successful completion of the project. The Consultant shall notify the COR of apparent errors and omissions discovered in the data supplied.

#### General Data:

* Design Scoping Report Outline – FLH Webpage
* Design Technical Memorandum Example - FLH Webpage

#### Survey Data:

* Aluminum caps for Control Points.

#### ROW Data:

* Sample r/w documents:
* R-O-W plan set
* Legal descriptions
* R1, R2, and R3 Checklists found on FLH Webpage
* Sample right-of-way plans and legal descriptions

#### Highway Design Data:

* Project Engineer (PE) Notebook Checklist
* CFLHD Highway Design Standards Form
* CFL’s Engineer’s Estimate Manual is located on the FLH Webpage.

#### Bridge/Structure Data:

* FLH Bridge Office Standards are located on FLH Webpage
* FLH Bridge Office Plan and TS&L preparation guidelines are located on FLH Webpage
* FLH Bridge Office Load Rating form is located on FLH Webpage
* Structure Design Criteria template is located on FLH Webpage

# DELIVERABLES AND SCHEDULE

|  |  |
| --- | --- |
| Milestone Activity Schedule | |
| Milestone | Completion Date |
| 30% Field Review |  |
| 70% Field Review |  |
| 95% External Review |  |
| 100% Final PS&E |  |
|  |  |

# WORK PERFORMANCE SPECIFICATIONS, QUALITY STANDARDS AND REPORTING REQUIREMENTS

The proposal should include the information described under Section C, Article II.D and E of the contract, including a fee proposal itemized for activities listed under II. Work Required, and a discussion of methods used to accomplish any work element that is not fully understood or not adequately described in this Scope of Work (SOW).

This Task Order does not include payment for errors and/or omissions by the Consultant in the course of performing the work herein. Such errors and omissions are to be corrected at the Consultant’s expense.

Each product is expected to meet an Acceptable Quality Level (AQL) with respect to the thoroughness and appropriateness of the data collection, analysis and recommendations, the clarity of presentation, and the accuracy of the completed products. Work conducted according to guidelines recommended in the PDDM and documents referenced below, and satisfying any specific requirements of this SOW, will meet the thoroughness, appropriateness and clarity criteria of the AQL. Where the Standard of Practice within CFLHD currently differs from the PDDM, work should follow the current Standard of Practice. The A/E contractor should assure work products are accurate and of high quality through an established and documented quality control and assurance (QA) process. CFL staff will be responsible for evaluation of the quality of work throughout this project. CFL Staff will participate in correspondence, meetings, site visits, and review of products. CFL review is not QA of the Consultant’s work; the purpose is to understand the product and to impart CFL institutional experience with the site, customer, project features and potential construction contractors. Also, CFL review is to evaluate the level of risk taken by the government (which is implied by the type of investigation and analysis conducted, the selected design criteria, and the quality of the A/E contractor’s products) and to evaluate if that level of risk is consistent with other similar CFL projects and/or is planned for.

All public-facing electronic products developed must be accessible to persons with disabilities, including those with vision, hearing, cognitive, and mobility impairments.

Applicable Standards include:

* [Appendix A to Part 1194 – Section 508 of the Rehabilitation Act: Application and Scoping Requirements](https://www.access-board.gov/ict/)
* [Appendix C to Part 1194 – Functional Performance Criteria and Technical Requirements](https://www.access-board.gov/ict/)

Anticipated documents that need to comply with Section 508 include:

Written documents to be provided to FHWA related to this project will be delivered in electronic and hard copies. Documents will be provided in the following software formats unless specifically amended otherwise by the COR in writing:

|  |  |
| --- | --- |
| Application | Software |
| Word Processing | Microsoft Word |
| Spreadsheet | Microsoft Excel |
| CADD | MicroStation |
| Highway Design | ORD Connect |
| Engineer’s Estimate, Bidding, Award and Construction System | EEBACS(1) |

(1) Complete and electronically submit “EEBACS User Account Form” (Form EEBACS 001) for each individual requiring EEBACS access. EEBACS User Account Forms and User Guide can be found on the FLH website: <https://flh.fhwa.dot.gov/resources/estimate/eebacs.htm>

#### Geotechnical:

* Electronic versions of geotechnical documents, if available, can be found on FLH Webpage
* FHWA-HI-97-021: Geotechnical and Foundation Engineering Module 1 - Subsurface Investigations
* FHWA-NHI-00-043: Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines, 2001
* FHWA-SA-97-070: Micropile Design and Construction Guidelines – Implementation Manual, 2000
* FHWA-IF-03-017: Geotechnical Engineering Circular No. 7 – Soil Nail Walls, 2003
* FHWA-IF-99-015: Geotechnical Engineering Circular No. 4 – Ground Anchors and Anchored Systems, 1999
* FHWA Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications on FLH Webpage.

#### Pavements:

* Specific Technical and Reporting Requirements - FLH Webpage
* AASHTO Guide For Design of Pavement Structures (1993 edition)
* Basic Asphalt Recycling Manual, 2001 Edition, FHWA NHI 01-22
* Techniques for Pavement Rehabilitation, FHWA-HI-98-033
* Pervious Concrete, ACI 522R (latest edition)
* Porous Asphalt Pavements with Stone Reservoirs, FHWA-HIF-15-009

#### Highway Design:

* Manual on Uniform Traffic Control Devices (MUTCD). DOT, FHWA, Latest Edition, including all errata. <http://mutcd.fhwa.dot.gov/>
* A Policy on Geometric Design of Highways and Streets, AASHTO, Latest Adopted Version
* Roadside Design Guide, AASHTO, Latest Edition

#### Bridge/Structure Design:

* AASHTO LRFD Bridge Design Specifications – 7th Edition, 2014, with current interim revisions.
* AASHTO Standard Specification for Highway Bridges - 17th Edition, 2002
* The Manual for Bridge Evaluation, 2010, with current interim revisions.
* Submit the following items in a bound format other than D-ring binders:
* Structure selection report
* Design Criteria Document
* Design notes
* Independent check notes
* Load rating
* Structural quantities and unit cost analysis
* Provide CADD bridge drawings electronically. Provide drawings with true scales on 11x17 size sheets, reference files detached, and with A/E contractor logo and PE stamp on all plan sheets.

#### General:

* Latest Federal Lands Highway Project Development and Design Manual (FLH PDDM) - FLH Webpage
* CFL division procedures available via CFLHD Home Page - FLH Webpage
* CFL’s Engineer’s Estimate Manual is located on the FLH Webpage.
* CFLHD Sample Plans - FLH Webpage
* Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects, FP-14
* CFLHD Guidance for Sealing and Signing Documents is on the FLH Webpage. A/E Contractors shall sign and seal engineering work per these Guidelines. The Professional Engineer shall be licensed in the state where the project is located.

While this list is not all-inclusive, the publications listed will provide the consultant with enough information to understand this scope of work.

# PERIOD OF PERFORMANCE

Work will begin immediately after award of the task order to the A/E and all work will be completed by Month, Date, Year.

# CONTRACTING OFFICER’S TECHNICAL REPRESENTATIVE & CROSS FUNCTIONAL/PROJECT SUPPORT TEAM

Close and continuous coordination with the COR and other FHWA personnel with special expertise will be required. All communications affecting the project will be through the COR.

The COR for this task order will be Mr./Ms. . Mr./Ms. can be reached at the following address:

FHWA-CFLHD, HFPM-16  
12300 W. Dakota Ave., Suite ###  
Lakewood, CO 80228  
(720) 963-3###, FAX (720) 963-3###  
Email: [tgbudd@road.cflhd.gov](mailto:%20tgbudd@road.cflhd.gov) first.last@fhwa.dot.gov

FHWA-CFLHD Cross Functional/Project Support Team

* Project Manager:
* Utilities:
* Environment:
* Survey:
* ROW Documents:
* Geotechnical:
* Pavements:
* Hydraulics:
* Highway Design:
* Bridge Design:
* Construction
* QA/QC:
* Safety:

# PAYMENT

Payment will be made on a firm-fixed-price basis in accordance with ARTICLE V, CONSIDERATION AND PAYMENT, covered under contract 6982AFXXD000000.

Payment will be made 30 days after the designated billing office receives a proper invoice and progress report from the contractor.

Before final payment, or before settlement upon termination of this TO, and as a condition precedent thereto, the contractor shall execute and deliver to the CO a **release of all claims (DOT Form 4220-4)** against the government arising under or by virtue of this contract, other than any claims that are specifically exempted by the contractor from the operation of the release, in amounts stated in the release.

Submit invoices to:

The Department of Transportation utilizes the Delphi e-Invoicing web-portal for processing invoices.  Submit invoices via Delphi e-Invoicing which is accessed and authenticated via [www.login.gov](https://gcc02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.login.gov%2F&data=04%7C01%7CJill.Locken%40dot.gov%7Ca93c6c23defc4bdec6b108d9aa079a9d%7Cc4cd245b44f04395a1aa3848d258f78b%7C0%7C0%7C637727771900607761%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=6uigC8HrO4JbBMFAs5ITeXowD%2FuoSBrofsENHpvmUAw%3D&reserved=0)

**FHWA reserves the right to terminate this contract for the convenience of the Government at any time.  Reasons for termination may include, but are not limited to, Federal Lands Transportation Program (FLTP) changes which result in no further funding for the project, a NEPA decision resulting in a no-action alternative or loss of project support from partner agencies.**