

Appendix F – Design Process

Implementation Process Planning and Design Guidelines (Deliverable dates to be added by TRRP)

Design Team Meeting Schedule

- Full two day meeting. Review and make recommendations on concepts for initial Phase II project sites. Discuss development of Design Guide by HVT
- Full two day meeting. Conceptual Design reports for Phase II project sites due with formal presentation from each design group and Phase II Float
- Full two day meeting. Discuss VE Study results, Riparian Designs, and design workshop
- Full two day meeting. Draft Engineering Design reports for Phase II project sites due with formal presentation from each design group and design workshop. Discuss and distribute the next phase II project sites to design groups

Initial Site Evaluations and Recommendations – All Design Team Members and Program Partners (DT)

1. Site selection
2. Multi-Disciplinary Design Groups members identified / selected for each site
3. Identify baseline existing topography to be used and areas of concern
4. Identify baseline hydraulic model to be used and additional data needs.
5. Identify known infrastructure and Archeological constraints, bedrock, and valley confinement from air photo. It is important to identify project stopping hurdles early on.
6. Bureau of Reclamation data collection needs
 - a. Right of Entry (ROE) based on potential site access and extend of Environmental Study Limit (ESL)
 - b. Test pit and piezometer locations indicated on air photo
 - c. Primary survey control locations identified

Existing Conditions Data Collection – BOR

1. Landowner Rights of Entry (ROE) to access their property for surveys and other data collection needs, including any important instructions for access. Completed by BOR
2. Archeological clearance for the project site. Completed by BOR
3. Primary survey control point values to establish vertical and horizontal control during design data collection. Completed by DWR.
4. Existing conditions topography from 2009 LiDAR DTM and other existing conditions base layers. Completed by BOR and contractor.
5. Geological Investigation report including information on substrate characteristics, bedrock elevation, groundwater elevation, and piezometer locations. Completed by BOR.

- Design Process for each Multi-Disciplinary Design Group -

Conceptual Design Phase

1. On-Site Planning and Reconnaissance

- Collect existing on-site data using conventional survey or GPS equipment to locate wells, culverts, fences, pipelines, and other existing components and infrastructure.
- Map location of proposed design features and organize into areas of In-Channel (IC), Riverine (R), Upland (U) and Construction (C) areas.
- Field validate existing topographic Digital Terrain Model (DTM) at key design locations including proposed entrances of side channels, grade controls, etc to determine overall design feasibility.
- Initial identification of potential save trees – digitized and provided to Design Groups
- Jurisdictional wetlands delineated and provided to Design Groups by CEQA contractor

2. Conceptual Design Report

- Written project summary including: existing information, proposed design features, overall project goals and objectives, and anticipated evolution of each design component.
- Report will contain appendix of the following information (maps and drawings will be AutoCAD format using supplied TRRP design template):
 - Plan maps of existing features (topography, aeriels, and existing components)
 - Plan maps of proposed design features (IC, R, U, and C areas)
 - Existing condition profiles and cross-sections through proposed design features, utilizing existing topographic DTM.
 - Initial quantity calculation (area x average depth) summary information
 - Digital information disc of all data including: field survey/GPS data, AutoCAD files, GIS shapefiles, PDF map files, and digital copy of conceptual report)

3. Conceptual Design Phase Deliverables

- Deliver conceptual design report in electronic and hard copy format using three ring binder with appendices and digital information disc to the TRRP office.
- Formal presentation of conceptual design report at the TRRP Design Team meeting.

Multi-Disciplinary Review & Value Engineering Phase

1. Conceptual Design Reports will be reviewed by program partners and potentially other technical experts.
2. Conceptual Design Reports and review comments will be provided to a value engineering study consultant.
3. Value engineering study will be performed and the accountability report will be prepared by the Implementation Branch Chief in consultation with applicable designers.
4. If there are any unresolved issues or concerns at this point, a dispute resolution consultant will be brought in to resolve them.

Initial Engineering Design Phase

1. Refine concepts

- Incorporate into initial design all TRRP partners formal comments after two week review period. Only comments received in writing will be accepted.
- Incorporate into initial design all comments and findings after formal Value Engineering (VE) study is completed by multi-disciplinary review team.
- Design Team meeting to discuss VE Study results and BOR Accountability Report.

- Develop recommendations for Riparian Designs

2. Topographic Surveying

- Perform topographic survey of project site using survey grade GPS or conventional survey equipment. Utilize established primary control point locations and values set by the California Department of Water Resources (DWR). Surveys will be conducted in California State Plane, Zone 1, NAVD88 or Geoid09 Datum.
- Concentrate topographic survey data collection in areas where the 2009 LiDAR DTM is inaccurate. Perform validation ground truthing of existing topographic data obtained from 2009 LiDAR DTM to check topographic accuracy.
- Collect enough survey data including breaklines at key features in order to develop an accurate one contour map of the existing ground surface, based on the designer discretion.

3. Surface Model Development

- Build existing ground surface model using both point cloud data from 2009 LiDAR and on-site topographic surveys. Surface model will have the accuracy of generating one ft contour map of the project site. Surface model will be developed using AutoCAD Civil 3D TIN (Triangulated Irregular Network) format.
- Develop initial design surface model of approved conceptual design features. Build conceptual design features into a three dimensional surface using grading tools to daylight into the existing ground surface model. Surface model will be developed using AutoCAD Civil 3D TIN format.

4. Hydraulic Validation and Analysis

- Perform field validation of flood frequency flows at project site using staking or realtime surveying methods to establish an elevation of inundation at key hydrograph flow benches. On-site validation data of various flows will to help calibrate the existing conditions hydraulic model.
- Develop both existing conditions and initial design conditions one dimensional hydraulic models of the project reach. Use modeled TIN surfaces to generate both existing and initial design condition cross-sections to develop hydraulic model.
- Perform initial hydraulic analysis using HEC-RAS software to determine if initial design surface will raise or lower the base flood elevation of the FEMA 100 year flood event by more than one ft.

5. Quantity Calculations

- Utilize existing and design surface models to perform prismatic volume calculations to determine initial design cut and fill quantities using AutoCAD Civil 3D software.
- Perform iterations of balance calculations between excavated and upland features as not to exceed footprint area, elevation, or hydraulic constraints.
- Separate fill quantities into two separate volume categories: clean course sediment gravel (half a ft below summer baseflow elevation) and raw fill (all materials half a ft above the summer baseflow elevation)
- Generate quantity calculation report with volume summary table and calculation methodology

6. Engineering Drawing Package

- Development of engineering drawing package using AutoCAD supplied TRRP design template including the following information:
 - Plan maps of existing features (topography, aeriels, and existing components)
 - Plan maps of refined design features (IC, R, U, and C areas) including design contours, access roads, staging areas, spoils, etc.
 - Plan maps should be plotted to proper scale for overview representation and detailed views using approximately 50 scale or similar
 - Existing and design condition profiles and cross-sections through initial design features, utilizing developed surface models through AutoCAD Civil 3D.
 - Large Woody Debris (LWD) or Engineered Log Jam (ELJ) location map
 - Salvaged material such as willow clumps and large wood and installation location maps
 - Other important figures or design details/typicals

7. Draft Engineering Design Report

- Written project summary including: existing information, hydraulic analysis, refined design features, overall project goals and objectives and prediction of design component evolution.
- Report will contain an appendix with the following information:
 - Construction drawing package
 - Hydraulic analysis report
 - Quantity calculation report
 - LWD or ELJ quantity, bouncy, and structural calculation report
 - Correspondence report detailing conversations between program partners, landowners, or other important design input, including formal design comments.
 - Digital information disc of all data including: field survey/GPS data, AutoCAD files, GIS shapefiles, PDF map files, and digital copy of conceptual report)

8. Initial Design Phase Deliverables

- Deliver draft engineering design report in hard copy format using three ring binder with appendices and digital information disc to the TRRP office.
- Formal presentation of initial design report at the TRRP Design Team meeting.

Final Engineering Design Phase

1. Provide comments or input on other TRRP Design Team's Draft Engineering Reports, as applicable
2. Respond to TRRP Design Team and landowner review comments
 - Incorporate into final design or respond to TRRP partner's formal comments after two week review period.
 - Incorporate into final design all comments and findings after formal discussions and negotiations with private and public landowners.
3. Topographic Surveying
 - Collect additional survey data as needed
4. Surface Model Development
 - Refine existing surface model as needed

- Refine design surface model based on formal comments received during comment period
5. Hydraulic Validation and Analysis
 - Refine existing or design conditions hydraulic models as needed based on any changes to the surface models
 - Develop FEMA certification letter with PE stamp certifying base flood elevation.
 6. Quantity Calculations
 - Refine quantity calculations as needed based on changes to the surface models
 7. Engineering Drawing Package
 - Refine engineering drawing package as needed based on comments received during comment period and any changes to the surface models.
 8. Final Design Report
 - Refine initial design report to include all comments received during comment period and changes to the underlying calculations or models.
 9. Final Design Phase Deliverables
 - Deliver final design report in digital and hard copy format using three ring binder to the TRRP office.

Final Revegetation Design and Report

1. Final CAD Drawings
2. Addendum to Final Design Report
 - Final plant counts for each design area
 - Figure showing distance from design surface to summer/fall low water

