

# Montana

## General Engineering Planning and Design Guide

for

### Final Design and Implementation

	<u>References</u>	✓
<b>IMPLEMENTING DECISIONS</b>	NPM 506.10	
<b><u>Permits</u></b> Make sure all required permits are obtained before proceeding with detailed design and layout.	NPM 506.17 NPM MT506.17	<input type="checkbox"/> *
1. Water right permits, 310 permit, 404 permit, dam safety permit, floodplain development permit, 3A Authorization permit.	Guide to Stream permitting in Montana	<input type="checkbox"/> *
2. Permits to cross State or Federal land and easements to cross private land.		<input type="checkbox"/>
3. If utilities are identified in the area, send forms SCS-ENG-5 and SCS-ENG-6 to landowner.		<input type="checkbox"/>
<b><u>Engineering Surveys</u></b> (See Engineering Surveys section of this guide.)		
Make additional detailed engineering surveys which were not obtained during initial planning:	NEM 540.00 TR62 EFH Ch. 1	<input type="checkbox"/>
▪ Cross sections		<input type="checkbox"/>
▪ Profiles		<input type="checkbox"/>
▪ Topographic surveys		<input type="checkbox"/>
▪ Measurements and elevations on existing structures		<input type="checkbox"/>
▪ Physical features survey (i.e., ponds, trees, etc.)		<input type="checkbox"/>
<b><u>Geologic Investigations</u></b>		
Make soil borings as needed to determine details of subsurface conditions. Request help if needed.	NEM 531 EFH Ch. 4	<input type="checkbox"/>
<b><u>System Design</u></b>	FOTG 516 MSPM	
1. Detailed hydrology, hydraulics which were not completed previously.	EFH Ch. 2, 3	<input type="checkbox"/>
2. Detailed structure design.	EFH Ch. 6	<input type="checkbox"/>
3. Detailed system accessory design.	MSPM Ch. 8	<input type="checkbox"/>
4. Quantity calculations (if needed for cost share, bidding or other reasons).		<input type="checkbox"/>
5. All design calculations checked prior to implementation.		<input type="checkbox"/> *

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	<u>References</u>	✓
<b><u>Drawings and Specifications</u></b>	EFH Ch 5	
1. Prepare drawings (See Engineering Drawings section of this guide)	MT Draft. Guide	<input type="checkbox"/> x
▪ Use standard drawings when possible.	MT Std. Dng. Manual	<input type="checkbox"/>
2. Specifications	FOTG Sec IV	<input type="checkbox"/> x
▪ Standard Montana practice specifications should be used to the maximum extent possible.		<input type="checkbox"/>
▪ Prepare special provisions and make a part of the practice specifications, when needed.	NEM MT542.01 NPM MT506.31	<input type="checkbox"/>
3. Prepare materials list, bid schedule, cost estimate.		<input type="checkbox"/>
4. Get required technical review and approvals for design, drawings, specifications.	NEM Sec. 501	<input type="checkbox"/> x
<b><u>Operation and Maintenance Plan, Management Plan</u></b>	MSPM Ch 11 FOTG Sec.IV	
▪ Document all important aspects of management and operation in an Operation and Maintenance Plan (O & M Plan).		<input type="checkbox"/> x
▪ Include maintenance recommendations in the O & M Plan.		<input type="checkbox"/>
▪ Prepare a water management plan for irrigation jobs.		<input type="checkbox"/> x
▪ Review the operation and maintenance and management plans in detail with the cooperator. Make sure there is agreement on how things will be operated and maintained.		<input type="checkbox"/> x
<b><u>Review with Cooperator, Contractor</u></b>		
1. Review the plans and specifications in detail with the cooperator. Make sure he or she understands and agrees with all aspects of the plans and specifications.		<input type="checkbox"/> x
2. Get cooperator signature on drawings.		<input type="checkbox"/> x
3. If requested by the cooperator, go over the plans with the contractor. Visit site with contractor if necessary.		<input type="checkbox"/>
<b><u>Field Layout</u></b> (See Engineering Surveys section of this guide)	NEM 540.03 EFH Ch. 1 TR62	
1. Set permanent benchmarks (2 minimum).  (Firmly set benchmarks out of harms way, clearly describe in notes, show on drawings.)		<input type="checkbox"/> x
2. Record layout surveys in loose-leaf survey books or special forms in accordance with TR62 and/or Chapter 1 of Engineering Field Handbook.	NEM 540.02 TR62, EFH Ch. 1	<input type="checkbox"/> x

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<u>Compliance Checking</u>	<u>References</u>	✓
<p>1. Schedule adequate periodic inspection during construction. Frequent inspection during construction of most practices usually cannot be performed by the NRCS. We can make a point to view each contractor's work while the job is actually under construction at least once during the season. More frequent visits may be necessary when problems are encountered.</p> <p>Properly coached, the landuser can provide useful inspections during construction. Explain to the landuser what the drawings and specifications mean and what to look for as the job progresses. Have the landuser take pictures during construction.</p>	<p>NEM 512.33 NEH Sec 19 EFH Ch. 17</p>	<input type="checkbox"/> *
<p>2. Make final field check including enough field surveys to assure that specified lines, grades, elevations, lengths and dimensions specified in the plans have been met.</p>		<input type="checkbox"/>
<p>3. Make final measurement and calculate quantities for payment if necessary.</p>		<input type="checkbox"/>
<p>4. Prepare as-built drawings. (Make red mark changes on the file set of construction drawings).</p>		<input type="checkbox"/> *
<b><u>Complete Documentation</u></b>		
<p>The following documentation should be in the case file:</p>	<p>NPM 506</p>	
<p>1. Complete planner notes on Conservation Assistance Notes Form-SCS-CPA-6. Documentation of operator decisions should be complete.</p>		<input type="checkbox"/> *
<p>2. All original survey notes.</p>		<input type="checkbox"/> *
<p>3. Copy of all final calculations, initialed and dated by the person doing the work and the person checking the calculations.</p>		<input type="checkbox"/> *
<p>4. Copy of all drawings generated for the job.</p>		<input type="checkbox"/> *
<p>5. Specifications, either a copy of specs or list of specs with copy of signature sheet and special provisions.</p>		<input type="checkbox"/> *
<p>6. Copy of drawing sheet showing certification by operator that he or she has reviewed drawings and specifications.</p>		<input type="checkbox"/> *
<p>7. Notes about what was found during completion check.</p>		<input type="checkbox"/> *
<p>8. When underground utilities are located in the construction area, a copy of completed form SCS-ENG-5 and SCS-ENG-6 must be in the file.</p>		<input type="checkbox"/>
<p>9. Copy of required permits and easements or evidence that they are adequate.</p>		<input type="checkbox"/> *
<p>10. Completed Environmental Checklist MT-EVC-1 or adequate documentation on the SCS-CPA-6 describing environmental evaluation.</p>	<p>NPM MT505.21</p>	<input type="checkbox"/> *
<p>11. Cultural Resources Survey MT-CPA-8, if one is required.</p>	<p>NPM MT506.15</p>	<input type="checkbox"/>

\* This activity or documentation is usually required on each job.