Montana
Engineering Practice Planning and Design Guide
for
Stockwater Pipeline System

		References	✓
RESOURCE INVENTORY		NPM 506.10	
(You may use the Stockwater Pipeline Resource Inventory Worksheet MT-ENG-20 to document the inventory.)		MSPM Ch. 2	
1.	What is the annual grazing period?		❒ ×
2.	Whether or not pipeline will need to operate in freezing weather.		❒ ×
3.	Types and maximum number of livestock using system.		❒ ×
4.	Type of grazing system to be used. How will water development better distribute grazing?	FOTG 556	❒ ×
5.	Define and measure area to be serviced by the pipeline.		❒ ×
6.	Location and details of existing water sources in the area to be serviced by the pipeline.		❒ ×
7.	Reliability and quality of existing water sources.		❒
8.	Details concerning wells and pumps, including yield, condition, depth-to-water surface, and elevation.		❒
9.	Availability and cost of getting electric power to site, if a factor.		❒
10.	Characteristics of water source that is proposed for use as supply for the pipeline system.		❒ ×
11.	Initial topographic information for the service area. This often can be accomplished by study of USGS Quadrangle maps, altimeter surveys, or aerial photos.		❒ ×
12.	Geologic considerations which will effect pipeline route including location of shallow bedrock, unsuitable soils, coarse gravel subsoils, old slide areas, swampy areas, sharp breaks in the slope, etc.		❒
13.	Property line and ownership considerations which will effect the pipeline route.		❒
14.	Management factors:		
	▪ How frequently are livestock checked?		❒ ×
	▪ Can livestock be quickly moved if the pipeline system fails?		❒ ×

		References	✓
DEVELOPING AND EVALUATING ALTERNATIVES			
1.	Determine minimum flow requirements during the period of peak stockwater use.	FOTG 614 FOTG 516 MSPM Ch. 2	❒ ×
2.	Determine desirable drinking tank locations. Standards set maximum distance between drinking locations.	FOTG 516	❒ ×
3.	Determine minimum water storage requirements.	FOTG 516 FOTG 614	❒ ×
4.	Determine drinking tank-type and capacity.	MSPM Ch. 8	❒ ×
5.	Determine storage tank-type and capacity.	MSPM Ch. 8	❒ ×
6.	Design the pipeline system alternative alignments and tank sites based on all known factors.	MSPM Ch. 9	❒ ×
7.	Determine type of system (automatic pressure, timed, gravity or combination).	MSPM Ch. 3	❒ ×
8.	Select a pipe-type and bury depth based on all known factors.		❒ ×
9.	Preliminary design of pump and gravity inlet facilities.	MSPM Ch. 8	❒ ×
10.	Preliminary design of drinking and storage tanks, including types, locations and preliminary sizes, and elevations.	MSPM Ch. 8	❒ ×
11.	Perform preliminary hydraulics to set size and grades. (You may use IPIPE, or other approved computer programs to aid with calculations.)	EFH Ch 3 MSPM Ch 9 MSPM App B	❒ ×
IMPLEMENTING DECISIONS			
<u>Collect Final Data for Design</u>			
1.	Additional detailed engineering surveys which were not obtained during initial planning. A profile should be run just for the accuracy necessary for a particular installation. This may involve detailed bench level, transit, EDM, altimeter or simply a close study of 7-1/2 minute USGS maps, depending on the installation.	TR62 EFH Ch. 1 MSPM Ch 4	❒
<u>System Design</u>		FOTG 516 MSPM	
1.	Detailed hydraulics which were not done previously. (Use approved computer programs to aid in calculations.)	EFH Ch 3 MSPM Ch 9	❒ ×
2.	Pressure tank size requirements.	MSPM Ch 8	❒
3.	Pressure, surge and air control features.	MSPM Ch 6, 8	❒ ×
4.	Pump size and pressure requirements.	MSPM Ch 8	❒ ×
5.	System accessory design.	MSPM Ch. 8	❒

		References	✓
6.	Quantity calculations (if needed for cost share, bidding, or other reasons).		
	▪ Schedule of pipe sizes, type and rating.		❒
	▪ Schedule of drinking tank types, sizes and locations.		❒
	▪ Schedule of valve types and sizes.		❒
Compliance Checking		EFH Ch. 17	
1.	When quantity measurement of pipeline must be made for payment purposes, measurement should be made on the ground based on actual laid length of pipe.	MSPM Ch. 10	❒
2.	Make sure water bars are properly in place and that any needed critical area seeding has been properly completed. Explain to the cooperator the need to watch for trench settlement and erosion and to fill settled areas.	EFH Ch. 17 MSPM Ch. 11	❒
	Go through all elements of the O & M plan with the operator.		❒ ×

× This activity or documentation is usually required on each job.