

## 5. Topographic Maps

- A. **General.** Topographic maps should cover an area that will accommodate all expected arrangements or alignments of facilities and rights-of-way (existing and proposed), existing facilities and areas which may affect design, cut and fill slopes, and areas concerning control and disposal of drainage at the site. In addition to the items listed under surveying, topographic maps should show the following:
- (1) Underwater contours (bathymetric chart) for design of structures in and adjacent to a body of water such as dams, bridge piers and abutments; pumping plant intakes; powerplant tailrace areas; and river and outlet works features.
    - (a) Location of river thalweg.
    - (b) Channel modifications (existing and proposed).
    - (c) For bridges and other structures, topography should typically extend 100 feet upstream, 100 feet downstream, and 100 feet beyond the ends of the structure. However, the extent of topography will depend on the size and arrangement of all features and should be extensive enough to cover all alternative alignments being evaluated.
  - (2) Indicate general drainage of the vicinity.
  - (3) Critical spot elevations at edges and corners of existing structures, elevations along dropoffs, swales, and changes in topography.
- B. **Horizontal Scale and Contour Interval.** The topographic data should allow the simple and direct creation of CAD model and drawing files with the horizontal scale and contour interval required for the designs. Tables 1 and 2 show horizontal scales and contour intervals that are commonly used by Reclamation for feasibility and specifications designs, respectively. Consideration should be given to acquiring the most stringent requirements at the feasibility stage in order to prevent duplicating the effort at specifications design.

Table 1. Specifications topography (horizontal scale and contour interval)

Item	Horizontal scale <sup>1</sup>	Contour interval (maximum) <sup>1</sup>
Large dams and large structures	1 inch = 100 feet	5 feet
Moderate and small dams, tunnel portals, and structures (visitor centers, power and pumping plants, recreation facilities, general purpose buildings, switchyards, fish facilities, and major canal structures)	1 inch = 50 feet	2 feet
Large reservoirs	1 inch = 2,000 feet	10 feet
Small reservoirs	1 inch = 400 feet	5 feet
Small structures (small buildings and many pipeline and canal structures)	1 inch = 20 to 50 feet	2 feet
Tunnels <sup>2,4</sup>	1 inch = 400 feet for long tunnels 1 inch = 200 feet for short tunnels	5 feet
Drains	1 inch = 200 feet	2 feet
Canals <sup>2,3,4,5</sup>	1 inch = 200 feet (strip topography)	2 feet
Pipelines, pumping plant discharge lines <sup>2,3,4</sup>	1 inch = 100 to 400 feet (strip topography)	2 feet
Roads <sup>2,4,5</sup>	1 inch = 400 feet	2 feet
Bridges	1 inch = 20 feet	2 feet
Wetlands	1 inch = 50 feet	1 feet

<sup>1</sup> The scale, contour interval, and detail should be based on the conditions and needs at each particular site. Variations from scale or contour interval requirements in the table may be required (increases or decreases) to clearly show alignment, earthwork, delivery water surface elevations, and related details. Smaller contour intervals may be more practical in flatter terrain. Also, if the project area is small or flat, a contour interval of 1 ft. may be desired. Where a 5-foot contour interval is not available it is suggested that topography be developed from aerial photography or some other method. Away from the structures, larger contour intervals may be acceptable.

<sup>2</sup> Topographic map or strip topography: Strip topography should consider width required for construction. Where strip topography is provided, separate topographic maps at structure sites may be required where large or complicated structures are planned, unusual conditions exist, or judgment dictates that more information will be required for review or design.

<sup>3</sup> Minimum strip width should be 200 feet for pipelines and canals.

<sup>4</sup> The scale of linear facilities, such as canals and pipelines, may be up to 1 inch equals 400 feet for large facilities or much smaller for small facilities.

<sup>5</sup> If necessary, topography for culverts under canals or other features can be augmented with sufficient data to show the requirements of allowable inlet pondage.

Table 2. Feasibility - topography (horizontal scale and contour interval)

Item	Horizontal scale <sup>1</sup>	Contour interval (maximum) <sup>1</sup>
Large dams and large structures	1 inch = 100 feet	5 feet
Moderate and small dams, tunnel portals, and structures (visitor centers, power and pumping plants, recreation facilities, general purpose buildings, switchyards, fish facilities, and major canal structures)	1 inch = 50 feet	2 feet
Large reservoirs	1 inch = 2,000 feet	10 feet
Small reservoirs	1 inch = 400 feet	5 feet
Tunnels <sup>2,5</sup>	USGS 7-1/2 minute quad sheets can be used	
Small structures (small buildings and many pipeline and canal structures)	1 inch = 20 to 50 feet	2 feet
Drains	USGS 7-1/2 minute quad sheet can be used	
Canals (strip topography) <sup>3,4,5,6</sup>	1 inch = 200 to 400 feet survey	2 feet
Pipelines and pumping plant discharge lines. Site topography or strip topography <sup>3,5</sup>	USGS 7-1/2 minute map or 1 inch = 100 to 400 feet survey	2 feet
Roads <sup>3,5</sup>	1 inch = 400 feet	2 feet
Bridges	1 inch = 20 to 50 feet for smaller areas	2 feet
Wetlands	1 inch = 50 feet	1 feet

<sup>1</sup> The scale, contour interval, and detail should be based on the conditions and need at each particular site. The contour interval may be increased in steeper (hilly or mountainous) terrain. Smaller contour intervals may be more practical in flatter terrain. Also, if the project area is small or flat, a contour interval of 1 ft. may be desired. Where a 5-foot contour interval is not available it is suggested that topography be developed from aerial photography or some other method. Away from the structures, larger contour intervals may be acceptable.

<sup>2</sup> Smaller scale maps of tunnel portal areas are useful if available. In the absence of portal area topography, photographs of the portal area will aid the designer in determining conditions and design problems.

<sup>3</sup> Use of site topography or strip topography - Strip topography should consider width required for construction. Where strip topography is provided, separate topographic maps at structure sites may be required where large or complicated structures are planned, unusual conditions exist or judgment dictates that more information will be required for review or design.

<sup>4</sup> Minimum strip width should be 200 feet for pipelines and canals.

<sup>5</sup> The scale of linear facilities such as canals and pipelines may be up to 1 in. equals 400 ft for large facilities or much smaller for small facilities.

<sup>6</sup> If necessary, topography for culverts under canals can be augmented with sufficient data to show the requirements of allowable inlet pondage