

**WEST VIRGINIA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
DESIGN DIRECTIVE**

<b>406</b> <b>EARTHWORK FACTORS</b> <i>February 26, 1998</i>
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The following values are to be used as a guide in computing earthwork volumes for a project:

Soil	15% shrinkage
Shale	5% swell
Limestone or Sandstone	15% swell

The Designer shall use his judgment on intermediate values other than those listed above.

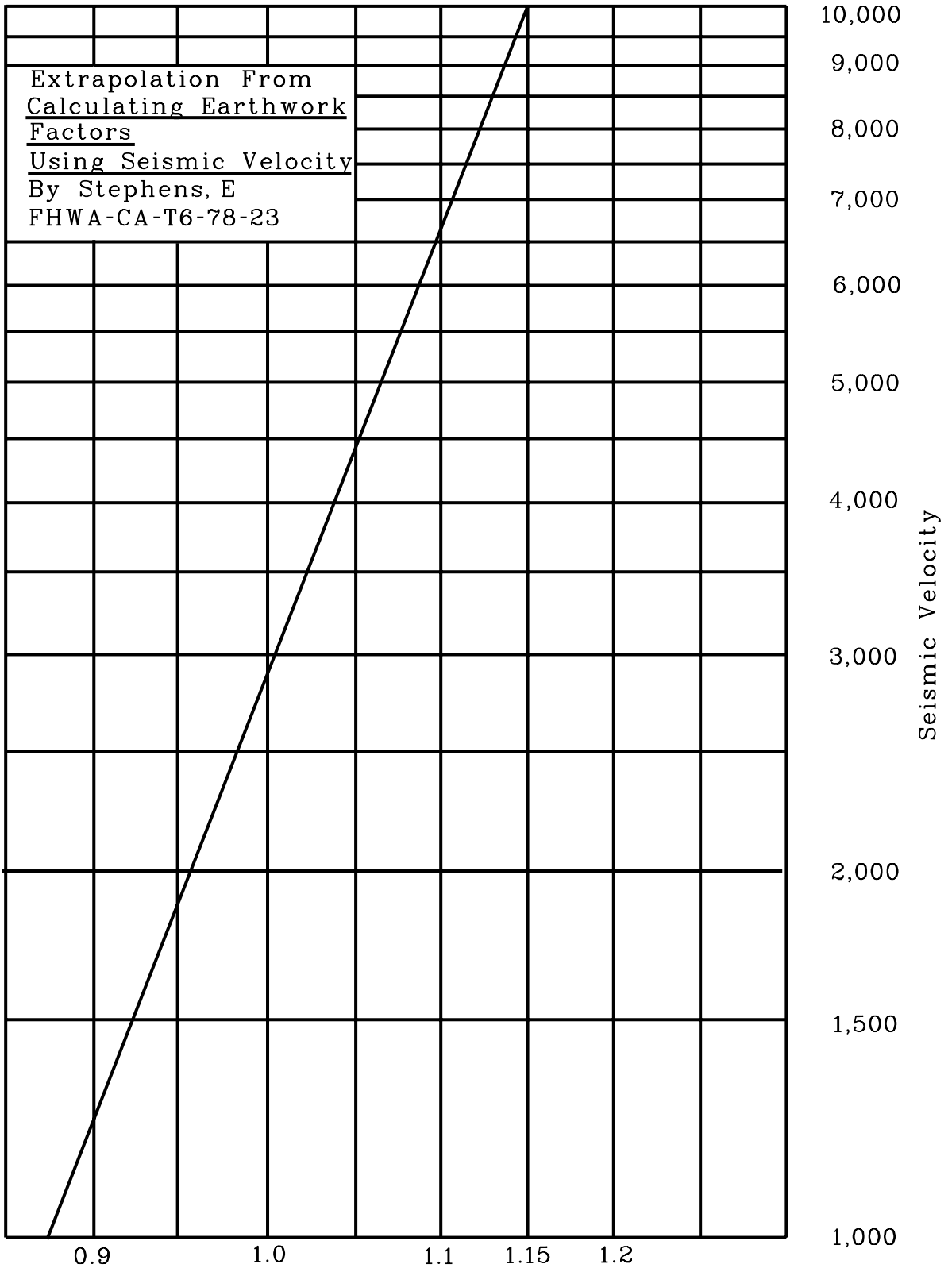
For example, where hard shale is found, possibly 10% swell could be used.

When it is necessary to compute a more accurate earthwork volume and the cost can be justified, the earthwork factors could be determined for soil and bedrock as follows:

1. Soil - Density tests of the soils could be taken in the field and these results compared to AASHTO T99 test results obtained from laboratory testing.
2. Bedrock - Refractory seismic wave velocities of the bedrock could be obtained and these values used to estimate an earthwork factor from the attached graph.
3. Individual factors for each cut shall be used in lieu of an average value for the entire project if data is available indicating such.

Volumes of the materials with different earthwork factors will be calculated and then adjusted earthwork volumes computed. These adjusted volumes will then be summed to obtain a total earthwork volume for the project.

Attachment



Extrapolation From  
Calculating Earthwork  
Factors  
Using Seismic Velocity  
By Stephens, E  
FHWA-CA-T6-78-23

Earthwork Factor For Sedimentary Bedrock W.VA.