The Double Ditch State Historic Site is situated on a high loess terrace overlooking the Missouri River near Bismarck, North Dakota. It was occupied from ca AD 1450 to 1781 by the Mandan Indians, Plains Villagers who exhibited a systematic and deliberate pattern of earth-moving behavior. In addition to borrowing earth from discrete borrow basins to be used as covering for earthlodges or as fill in mounds, the occupants practiced planar borrowing, where earth was obtained from shallow excavations throughout the site. A crucial factor in developing a timeline of cultural activity is to understand the earth-moving activity.

A soil coring program was conducted with transects both within the village and in an adjacent area of similar, relatively undisturbed soil which served as a control. An underlying, contiguous paleosol (Early Holocene) is below the depth of anthropogenic activity and is used as a stratigraphic reference to determine the relative degree of volume of earth borrowed or removed, and of earth used as fill in mounds.

Utilizing physical, chemical and spatial characteristics of the soil with reference to cultural features and the paleosol, a procedure was developed to assess the degree of planar borrow activity. To date it has been difficult to estimate the magnitude of planar borrowing due to its shallow nature and poorly defined margins. A model of the pre-occupation surface was created using elevation data obtained from soil cores; a Digital Elevation Model provided present-day surface elevations. Applying GIS software, it was possible to calculate the differences in elevation of the two surfaces and obtain values for volume of earth borrowed and in mound fill.

Planar borrowing accounted for approximately half of the volume of earth borrowed, indicating that this was a major activity. Volume of earth borrowed and earth in fill are approximately equal, therefor all earth in the mounds originated on site.

This behavior is unique to this important Mandan village and contributes to the importance of the site. A method was developed to estimate planar borrow activity that may be applied to other archaeological investigations.