SHPO Position on the Appropriateness of Boring Under Sites as an Avoidance Measure

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General Statement of Position

Historically, during the installation of pipelines, fiber-optic lines, telephone cables, and other subsurface linear projects, boring under historic-period linear properties (e.g., canals, railroads, roads, etc.) was often undertaken as an avoidance measure. The Arizona State Historic Preservation Office (SHPO) is now starting to get requests for boring under prehistoric sites in general and historic-period sites with standing architecture. It is currently the opinion of the SHPO that boring is an appropriate avoidance measure at sites that lack subsurface deposits or standing architecture. We believe that there is still much to be learned about this methodology and how successful it is as an avoidance measure, as well as what problems may be encountered.

For instance, even if an average depth of cultural deposits at a given site is approximated through testing or remote sensing, it cannot be guaranteed that all subsurface deposits will be avoided during boring. It is always possible that some remains at a site with subsurface deposits may be deeper, or may actually intrude into the sterile substratum. Also, vibrations resulting from the boring process may cause structural damage to standing architectural features. Thus, at this time, all requests for using boring as an avoidance technique are being reviewed on a case-by-case basis using the considerations below.

How to Assess the Appropriateness of Boring

<u>Boring is appropriate in the following situations:</u>

- **Most Linear Sites/Features.** Most, if not all, linear sites in Arizona that are appropriate for boring are historic in age. These types of historic-period sites include railroads, roads, trails, canals, and ditches. However, boring would also be acceptable for prehistoric trails and roads.

  In order for boring to be considered, the linear site/feature must have been adequately documented (photographed and mapped), with bore pits or *ingress/egress points* (see **Appendix A**) plotted on the map. *Ingress and egress points* must be placed well away (with appropriate buffer zone distance defined

by type of site—for example, if the site/feature is a historic-period canal, the points should be located well outside of the berms) from the feature. Also, any *appurtenance* associated with the points should be placed and/or shielded (with appropriate vegetation) so that visual impacts to the sites are not caused.

- **Surficial, Non-linear Sites/Features.** It is appropriate to bore under non-linear sites only if they are known to be surficial in nature and lack any standing architectural features. Examples of prehistoric sites that are generally characterized by only surface manifestations are quarries, agricultural features (e.g., fields, gardens, rock piles, terraces), trash scatters, and campsites. Examples of surficial historic-period sites include dumps, trash scatters, and campsites. <u>The lack of subsurface remains at a site must be verified by testing or remote sensing and clearly documented for a given site.</u>

  In order for boring to be considered, the sites must have been adequately photo-documented and mapped, with *ingress/egress points* plotted on the site map similar to linear sites. The sites should have been subjected to either a testing and/or remote-sensing program to ground truth their lack of subsurface deposits. A buffer zone for *ingress/egress points* should be defined by an archaeologist and designed to be located well outside of site boundaries. Any *appurtenances* needed for the points should avoid visual impacts to the site. Finally, monitoring by an archaeologist should occur to ensure that *ingress/egress points* are situated in appropriate, non-sensitive locations.

<u>Boring is not appropriate in the following situations:</u>

- **Prehistoric Linear Sites/Features.** Given the antiquity of prehistoric linear sites, such as canals and ditches, they are more likely to be buried, or partially buried, and thus subsurface remnants could be present.

- **Habitation Sites.** Habitation sites of any age could contain subsurface deposits, including human remains, and thus should generally not be bored. Because we do not have a clear understanding of when *frac-outs* might occur, boring under sites with subsurface deposits risks impacts.

- **Very Large, Non-linear Sites.** At sites of any age that are spatially large, it may be necessary for the boring equipment to surface prior to reaching the *egress point*. (This need depends upon the equipment being used, specifically the length of distance that the boring mechanism can travel before it reaches its end.) This "in-between" point would thus be within the site boundary and could impact surface features, artifacts, or artifact concentrations.

Need for Further Study

In the future, further research using remote sensing and ground-truthing or testing is needed in order to help the archaeological community better define situations

in which a broader applicability of boring as an avoidance measure would be appropriate. This research needs to involve intense collaboration with boring engineers and contractors to better understand optimal conditions (soils, stratigraphy, geology, depth, etc.) for boring that would allow its use as an avoidance measure at sites with subsurface remains or standing architecture.

APPENDIX A: Definitions

Ingress point. The entrance point at which the boring mechanism enters the ground. This activity results in at least one bore pit, and potentially two, at the beginning of the bore.

Egress point. The exit point at which the boring mechanism leaves the ground. This activity results in at least one bore pit, and potentially two, at the end of the bore.

Appurtenance. Any apparatus or equipment associated with the ingress and egress points that will be left in place either temporarily or permanently; these appurtenances often consist of pumps used for removing the liquid "mud" used in the boring process.

Frac-outs. Leaking of boring liquid/mud through cracks in subsurface soils during the boring process. These "leaks" cause a reduction in the pressure used during boring and can be detected by the boring engineers, but this detection cannot occur until the fluids have already escaped into the fissures. This leakage of fluids can cause subsurface displacement and contamination of soils and cultural deposits that can extend through strata all the way up to the present ground surface.

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