



## Physical Anthropology Section – 2003

### H54 Advances in Surveying and Presenting Evidence From Mass Graves, Clandestine Graves, and Surface Scatters

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This presentation will describe methods of surveying complex graves and associated environments and demonstrate advances in the visual display of this surveyed data developed during field operations for UN ICTY 1997-2000.

Mass graves, clandestine graves, and surface scatters consist of numerous, complex, and layered pieces of evidence which are often distributed in their environment in a way that limits conventional photography and planning of all associated relationships. Use of electronic surveying equipment and computer software allows a variety of explanatory images to be produced from one data set for report, courtroom, and non-expert use showing evidence association in two and three dimensions.

Use of electronic surveying equipment, such as EDM's (electronic distance meters) for surveying and mapping archaeological excavations has increased greatly in the last ten years. Their application to police work developed in many agencies worldwide through automobile accident survey. Their use in war crimes and human rights work developed in Rwanda and the Former Yugoslavia with PHR. The use of EDM's and computer software to map graves and crime scenes for ICTY field investigations continued from 1997. Accuracy, speed, large area coverage, non-interference with other site activity, and flexibility of data use are main factors that make such survey suitable for these types of excavations.

Excavation of mass graves in Bosnia revealed the need to plan evidence and map locations from several different perspectives:

1. Two-dimensional area plans to allow site location of a grave or crime scene on published maps, aerial photographs, and within a given physical locality.
2. Two-dimensional contour plans to show the topographical features of a site area and topographical properties of graves.
3. Two-dimensional plans to show distribution of different evidence types across a grave/crime scene.
4. Three-dimensional contour plans showing the topographical properties of graves and crime scenes. Images showing the distribution and association of evidence in three dimensions.

A single set of survey points taken on topographical features such as houses and roads, on ground surfaces, and on evidence locations can be used to produce different plans which can be viewed from any direction.

Many gravesites in Bosnia were also execution sites. Hundreds of pieces of surface evidence such as fragmentary bone and tissue can rapidly be mapped using an EDM in a single day. This is particularly useful when the evidence may be layered or cannot be located and collected at one time such as densely distributed shell casings in grass and topsoil.

Excavation of complex mass graves has often necessitated the removal of grave walls to allow access to bodies. Survey of visible grave dimensions before destruction allows plan reconstruction of the grave topography in three dimensions including areas 'lost' to removal.

Mass graves excavated in Bosnia and elsewhere often contain multiple intertwined bodies. Photography cannot show the relationship and position of these bodies because complete exposure of all remains at one time is usually impossible. Conventional planning from a base line or fixed grid is slow and interferes with other site operations such as movement of heavy machinery. Use of EDM survey allows recording of a body position even when all of a body is not visibly exposed at one time. The surveyed points of a single body taken at different times can be reunited on computer.

For ICTY exhumations bodies were mapped by recording points on the head and joint locations to produce a simple 'stick man' image. The data collected was processed through a series of software programs called Bodrot developed by Professor Richard Wright. This allowed the position of all bodies in a grave to be displayed as a rotatable three-dimensional image in a software program called Rotate developed by Marijke van Gans. Viewing grave contents in this simple form helps to understand its complexity in a variety of ways:

1. Revealing the method of disposal of bodies.
2. Demonstrating separate episodic disposal events, resulting in spatial separation between layers of bodies.
3. Revealing the pattern of arrangement of bodies that may indicate disposal methods such as bulldozing a mass of bodies to the end of a trench or dumping batches of bodies from trucks.
4. Demonstrating that shell cases, and other objects, are uniformly or non-uniformly distributed among the bodies in a grave or on surfaces.
5. Supporting evidence that there has been tampering with a grave, with partial removal of bodies, demonstrating the association of incomplete bodies and body parts with disturbed areas that intrude into the original grave.

Rotate images are small, computer files that are simple to operate and can be attached to documents on floppy disks or CDs for distribution. The various types of plans and images described have been used in reports



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and as courtroom evidence of exhumations and surface scenes in successful prosecution cases for ICTY. The use of EDM survey and threedimensional images may have wider applications for evidential viewing in police work, mass disaster or terrorist events such as air crashes and explosions.

**Survey, Mass Graves, Visual Imagery**