THE ROLE OF PHOTOGRAMMETRY IN SURVEYS OF WORKS OF ART ENDANGERED BY EXTENSIVE PUBLIC WORKS

Unfortunately I come before you today not to report the success of photogrammetry in Turkey but to express the enthusiasm of a novice for the hope it offers Turkey and other developing nations of recording an endangered historical heritage. Unfortunately, I say, because much irreparable damage has already occurred through the competing claims of development and modernization, as well as human inadequacy and negligence, let alone the world-pervasive work of natural forces. Photogrammetry, however, presents the possibility of being able to confront the modern technologies of destruction with an equally efficient modern technique of recording especially appropriate to the difficulties of developing countries.

These difficulties are manifold and none of them can be solved by conventional methods in time to cope with the situation before most of the damage is done. The dilemmas of limited technical personnel, diverse organizations and public apathy at best can be solved by gradual administrative change and a generation of planning and education. Meanwhile, society overlooks its traditional past and the monuments reminding it of this past and sees development primarily in the symbols of modernity - broad express - motor-ways, whole quarters reconstructed for high-rise buildings, and hydroelectric dams etc... Certainly, past civilizations have destroyed and built anew, but never has man's power to destroy and construct been so complete, so efficient in terms of the time required and so vast as it is today. One cannot deny the necessity of modern public works, especially those on which is hinged the impetus for economic growth, but there is often room for compromise. In any event, even when protection is not feasible, proper recording can preserve this cultural heritage for the world at large and for future generations.

Photogrammetry appears to be able to accomplish this task most accurately and rapidly while using only a minimum of trained personnel and investment. Moreover it can free the few architect-restorers and archaeologists from most

of the time-consuming work of traditional measured drawings, give superior documentation on which to base decisions, and thus effect an immediate improvement in the quality and scope of the projects undertaken. Finally, it can introduce standardized system of documentation unifying the research of varied government and academic institutions.

Today photogrammetry is at an embryonic stage in Turkey. During the summer of 1967 the Austrian team excavating at Ephesus acquired Zeiss equipment and held a seminar for archaeologists and technicians on the application of photogrammetry to recording and analysing the progress of archaeological excavations. The Department for the Restoration of Historic Monuments at the Middle East Technical University, which is training graduate architect-restorers, has been building a photogrammetric centre for education and research purposes since 1966. When in operation it is expected to contribute to the expansion of the University's archives on historic monuments and sites, and to be available to government offices and scholars for research and the solution of technical difficulties.

The formation of this centre and its intended propagation of a wider application of photogrammetry come too late to help record the invaluable historic monuments and sites destroyed by public works in the past few decades. Dams and urban planning are the two salient areas where irreparable damage has already occurred and where photogrammetry holds exceptional promise for turning the tide of cultural loss.

During the past twenty years the nation's total production of electric power has increased six and a half times. Although Turkey exhibits the highest growth rate among European nations in the production of electric power, its net production per capita is still by far the lowest. As it has exploited only about 2 per cent of its potential, dams will inevitably expand and are a prerequisite of economic growth. Even presuming the substitution of atomic for hydroelectric power, dams will still be required for multiple development projects.

As in the past this will have to be largely at the expense of vast areas flooding containing visible historic monuments from the Roman through the Ottoman periods, as well as unrecorded and unexcavated prehistoric and antique sites. In 1956 the Seyhan Dam, for instance, flooded the whole Roman city of Augusta. The Department of Antiquities had only fifteen days to reconnoitre the site, barely enough to plead its importance, much less begin to document the treasures which were to disappear. Two years later an unrecorded Roman bridge was lost under the lake of the Kemer Dam and recently one of the earliest-known examples of a Caravanserail in Turkey was submerged, undocumented, by the Altinapa Dam.

Similarly, in 1970 an area of 680 square kilometres will lie under the waters of the Keban Dam at present under construction on the Euphrates. This is the first case in Turkey where preliminary surveys have aroused public concern and fostered a joint national-international campaign to undertake the recording of the area's historic sites and the removal of a selected few structures from the flood area. Hopefully, it will also be the first instance where photogrammetry will aid in coping with an overwhelming effort in the scant two seasons remaining.

This remote area of Turkey had not received deserved attention, in spite of its prominent rôle in past civilizations, because of its inaccessibility in recent years. In the fall of 1966 the newly-founded Department for the Restoration of Historic Monuments at the Middle East Technical University carried out a twoweek field survey to identify the historic monuments of the area. Primarily intended as an exercice for graduate students, it nevertheless revealed a wealth of unrecorded monuments from the Byzantine, Seljuk and Ottoman periods which were photographed and measured with conventional methods as far as possible during the brief fifteen days available. This inventory was prepared for the university archives and published in a booklet, Doomed by the Dam. A combined team from Istanbul University and the University of Chicago also identified 52 unexcavated prehistoric mounds whose visible upper layers and surface findings suggested dates beginning in 3000 B.C. and perhaps extending to much earlier periods. This evidence of a network of close settlements of exceptional antiquity on the Upper Euphrates is without precedent, and a critical chapter in the history of man will remain forever obscure unless efficient archaeological surveys can be accomplished in these two years. Photogrammetry can help realize this otherwise impossible undertaking and document the delicate earthen structures which are usually obliterated by winter rain.

Urban planning is an equally challenging front for photogrammetry in the service of historic recording. Modernization in Turkey has been accompanied by the neglect or sacrifice of traditional structures which have lost their past functions. Broad highways slash through the concentrated complexes of monuments at the core of the cities, Ottoman markets resting on Roman ones are replaced by modern shopping centres, and historical houses, konaks, yalis, give way to multi-storey apartments. The organisations responsible for preparing urban master plans show little awareness of the opportunities for integrating traditional and modern structures into an attractive functional whole. Moreover, there is virtually no communication between the offices preparing master plans and those responsible for monuments and sites. Consequently, the Department

of Antiquities or the Vakiflar is informed too late to undertake effective action or even document the site.

This process is going on throughout Turkey from the metropolis of Istanbul to the towns of Anatolia. It is estimated that Turkey has more than 12.000 monuments of distinction requiring protection. 2.120 ancient settlements are known by name and approximately 400 of these are fairly large and impressive cities almost completely at the mercy of the destructive forces of man, nature, and vandals. On the other hand, over half of the 1526 cities and towns eligible for master plans have had plans prepared and implemented. In the absence of legal measures, administrative cooperation, and trained personnel, photogrammetry is a means both of recording and of convincing the authorities concerned of the need for protective measures.

Two small examples may illustrate the magnitude of the difficulties at hand. An extensive modern hospital, medical school, and university are now under construction at the very heart of Ankara's ancient centre. Within the construction site are situated noteworthy residences from the late eighteenth century, lately fallen into disrepair but worthy of recording. Below the surface may lie a necropolis and structures dating from the Roman period. Only the application of photogrammetry can immediately document the site before all remaining structures are razed and the new campus completed.

The town of Göynük, located on the ancient Byzantine and Ottoman military highway joining Istanbul and Ankara, demonstrates how this process has affected even the smallest towns of Anatolia. Once a thriving wayside stop with a distinctive local culture, historic monuments of the fifteenth century, and remarkably early and outstanding examples of domestic architecture, the town had remained much as it was in the eighteenth century until recent natural disasters, neglect, and modernization, destroyed many structures and altered the whole scale of the town. A master plan prepared in 1950 drove a broad modern highway through the very centre of the town, directly past the Fifteenth Century tomb of Aksemseddin, the teacher of Mehmet The Conqueror, an Ottoman bath and mosque, and two residences believed to be of the same period. An earthquake in August of last year condemned more of the fine local architecture, and a student-faculty team from the Middle East Technical University could hardly do more than sketchily record the passing of this evidence of Ottoman Anatolia.

Such earthquakes, just as much as the demands of modernization, lead to the extensive public works in Turkey which threaten monuments and sites. The earthquake belt runs east-west the length of the country and north-south throughout the Aegean Coast. Ironically, the nation's most valuable cultural sites, both from an artistic and touristic point of view, are embraced by this belt. The Ottoman capitals of Istanbul, Edirne, and Bursa, all the Ionian cities, Ephesus, Pergamum, Halicarnassus, and, in the east ancient Armenia and the lands of the Urartu - to mention only a few - fall within the danger zone. Ancient construction systems produced monuments remarkably resilient to tremors. Nevertheless, an earthquake diaster brings large-scale public intervention which inadvertently carries away historic elements with the debris of the quake and promotes renovation, often at the expense of cultural property.

If Turkey's rich historical heritage is to be catalogued, institutions must do far more than simply document monuments threatened by imminent loss. With existing methods, even attention to a select few is beyond the capabilities of the combined staff of about fifteen architects, and engineers, and about twenty technicians, under the Department of Antiquites and the Vakiflar. The Austrian experience suggests that a well-conceived and implemented photogrammetry service can accomplish in a single month architectural surveys over one hundred times as extensive as those carried out in a year employing painstaking classical methods. This promises a hitherto inconceivable improvement in the activities of the above offices. First priority may be given to those monuments and sites immediately threatened with destruction by public works and natural elements. Simultaneously, areas liable to be endangered in the near future may be anticipated, and more thorough building surveys accomplished without the pressure of competing construction activities. Vast areas such as the Seventh-to Thirteenth-Century rupestrian churches in Cappadocia may even be considered for the proper recording that limited staff and funds have kept out of reach. Once under way, photogrammetry may introduce a common means of communication for all interested in the protection and maintenance of Turkey's works of art.

Speaking only as a deeply concerned educator, this common language of documentary expression appears to me to be perhaps the most significant contribution photogrammetry can make on an international level in the service of cultural property endangered by extensive works. The International Council of Monuments and Sites is in a position to establish a standard system for the presentation of archival recordings based on photogrammetric surveys. These standards should be pressed on participating nations not simply as an archival method but as the basis for the regular publication of national architectural surveys. If adopted by all member nations, govern-

ment offices and scholars alike would possess a superior reference source for historic monuments and sites similar to the Corpus Vasorum Antiquorum so indispensable to the classical scholar and archaeologist.

Dr. Cevat ERDER

Chairman,
Department of Restoration,
Middle East Technical University
Ankara, Turkey