

**STATE ARCHAEOLOGIST'S MANUAL
FOR ARCHAEOLOGICAL PROJECTS
IN MINNESOTA**



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Mission Statement

The mission of the State Archaeologist is to promote archaeological research, share archaeological knowledge, and protect archaeological resources for the benefit of all of the people of Minnesota.

PREFACE: PURPOSE OF THE MANUAL

The purpose of this manual is not to create another layer of regulation, but to clarify existing state regulations, establish reasonable professional standards for state-licensed archaeological projects, and promote consistency in archaeological methods and reporting. The manual should assist agencies and contractors in carrying out their archaeological responsibilities on non-federal public lands for cultural resource management (CRM) purposes in compliance with Minnesota laws and requiring State Archaeologist oversight. State Archaeologist oversight is also required for research archaeology on non-federal public lands. This manual was developed in consultation with Minnesota agencies and archaeologists.

Part I of this manual outlines basic elements of how archaeology works in Minnesota, especially with regard to state laws and the State Archaeologist's responsibilities. Part II describes Office of the State Archaeologist (OSA) guidelines for completing state-licensed or OSA reviewed archaeological projects in Minnesota. Part III outlines reporting standards for the various types of archaeological projects.

The State Archaeologist has no official role in the federal environmental review processes such as the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) or the implementation or enforcement of federal laws such as the Native American Graves and Repatriation Act (NAGPRA) and the Archaeological Resources Protection Act (ARPA). The State Archaeologist has no jurisdiction on federal lands even with regard to human burials. For information concerning federal laws and regulations, consult with the pertinent federal agency or the Minnesota State Historic Preservation Office (SHPO). The State Archaeologist does use some federal guidelines and terminology with regard to evaluating site significance and assessing effects to significant sites.

The State Archaeologist has no jurisdiction on private lands in Minnesota except if legally unrecorded burials are involved, although the State Archaeologist can recommend archaeological surveys for developments on private land. Some state agencies (e.g., MnDOT, DNR) have their own archaeological practices and procedures for lands they manage or projects they fund or license. Archaeological standards for these agencies can exceed OSA requirements, but they cannot be less than OSA standards if the OSA has review authority, the land involved is publicly owned, or human burials are involved.

The Minnesota Historical Society (MHS) shares some legal responsibilities with the State Archaeologist for archaeological projects involving non-federal public lands under MS 138.31 - .42. The Minnesota State Historic Preservation Office (SHPO) also has a manual outlining archaeological standards and guidelines with particular emphasis on Section 106 of the National Historic Preservation Act.

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PART 1: INTRODUCTION

The Office of State Archaeologist

The Minnesota Field Archaeology Act (MS 138.31 - .42) established the Office of the State Archaeologist (OSA) in 1963. Initially, the Director of the Minnesota Historical Society (MHS) appointed the State Archaeologist for a four-year term and the State Archaeologist was required to be a staff member at the University of Minnesota. These requirements have been altered several times over the last 30 years with the position leaving the University in 1978 and officially homeless for almost 20 years. In 1996, the State Archaeologist became a civil service employee of the State of Minnesota and is now appointed by and works under the Commissioner of Administration.

Elden Johnson, an archaeologist and professor of anthropology at the University of Minnesota, was appointed the first State Archaeologist in 1963 and served until his resignation in 1978. Christy Hohman-Caine, a student of Johnson's and a staff member of the Anthropology Department at Hamline University, was appointed State Archaeologist in 1978 and served until her resignation in late 1992. Johnson and Hohman-Caine were not paid a salary for their service as State Archaeologist, thus it was necessary for them to maintain other employment. Hohman-Caine took a job with the Chippewa National Forest in northern Minnesota in 1980, so during most of her tenure the Minnesota State Archaeologist was a federal employee based outside of the Twin Cities area.

From December of 1992 through January of 1995, there was no State Archaeologist. Lobbying by developers, agencies, and archaeologists resulted in the Legislature appropriating funds for the State Archaeologist in FY 1995. Wisconsin-native Mark Dudzik was appointed State Archaeologist in February, 1995 and became the first to be paid a salary. Dudzik hired Bruce Koenen as the first full-time assistant to the State Archaeologist in June 1995.

Following Dudzik's resignation in July, 2005, Scott Anfinson was appointed Acting State Archaeologist in mid-August, 2005 and State Archaeologist in January, 2006. Anfinson had been the archaeologist for the Minnesota State Historic Preservation Office (SHPO) of the MHS from May, 1990 through December, 2005. Koenen continues to serve as the assistant to the State Archaeologist.

The State Archaeologist is an employee of the Department of Administration and resides within the Division of Geographic and Demographic Analysis (GDA). The OSA receives a biennial appropriation from the State Legislature for salaries and operating expenses. The OSA has two staff members, the State Archaeologist and an assistant. The OSA leases office space from the Minnesota Historical Society at the Ft. Snelling History Center.

Duties of the State Archaeologist

The principal duties of the State Archaeologist are assigned by two state laws, the Field Archaeology Act (MS 138.31-.42) and the Private Cemeteries Act (MS 307.08). The State Archaeologist is given additional duties in rules implementing Minnesota Water Law (MS 103) and the Minnesota Environmental Policy Act (MS 116D). Beginning in FY 2010, the State Archaeologist was appointed to the Oversight Board of the *Statewide Survey of Historical and Archaeological Sites* in legislation implementing the Minnesota Legacy Amendment (2008 Session Law, Chapter 151). In addition, the State Archaeologist carries out traditional duties that

have evolved since 1963. In all, the State Archaeologist has about 30 discrete duties under Minnesota law and about 10 traditional duties.

Field Archaeology Act (MS 138.31 – 138.42)

While the Field Archaeology Act has been revised 10 times since 1963, the duties of the State Archaeologist specified in that law have not changed. These duties can be summarized as:

- acts as the agent of the State to administer and enforce the act
- sponsors, engages in, and directs fundamental archaeological research
- cooperates with agencies to preserve and interpret archaeological sites
- encourages protection of archaeological sites on private property
- retrieves and protects artifacts and data discovered on public property
- retrieves and protects archaeological remains disturbed by agency construction
- helps preserve artifacts and data recovered by archaeological work
- disseminates archaeological information through report publication
- approves the licensing of archaeologists to work on public property
- formulates licensing provisions for archaeological work on public property
- issues emergency licenses for archaeological work on public property
- revokes or suspends archaeological licenses due to good cause
- approves curation arrangements of artifacts and data from state sites
- repossesses artifacts from state sites that are not being properly curated
- consults with MHS and MIAC regarding significant field archaeology
- completes annual reports summarizing OSA and licensees' activities
- reviews and comments on agency development plans that may affect state sites

Private Cemeteries Act (MS 307.08)

In 1976, the Private Cemeteries Act was amended and the State Archaeologist was given additional duties including the “authentication” of unrecorded cemeteries. This law has been amended eight times since 1976, most recently in 2007. The State Archaeologist’s duties under MS 307.08 are:

- grants permission for alterations or removals from non-Indian unrecorded cemeteries
- allows posting and approves signs for authenticated non-Indian cemeteries
- authenticates all unrecorded burial sites over 50 years old and sets boundaries
- maintains unrecorded and archaeological cemetery data
- provides burial sites data to MnGEO (formerly LMIC)
- determines the ethnic identity of burials over 50 years old
- helps determine tribal affiliation of unrecorded Indian burials
- determines if osteological analysis should be done on recovered remains
- helps establish provisions for dealing with unaffiliated Indian remains
- reviews development plans that may impact unrecorded burials

The State Archaeologist has developed standard procedures for dealing with MS 307.08 and these can be obtained on the OSA website (<http://www.osa.admin.state.mn.us/>).

Minnesota Water Law (MS 130) - Rules 6120.250, Subpart 15a

The State Archaeologist has one duty specified in Minnesota Water Law Rules, which implement MS 103. Under these rules the State Archaeologist can determine if sites are eligible

to the state or national historic registers, although under federal law formal eligibility for the National Register of Historic Places can only be determined by the Keeper of the National Register. Water law rules apply to the use of shoreland as governed by state and local agencies. Agency review of shoreland development must consider impacts to significant historic sites. Significant historic sites include archaeological sites listed in or determined eligible to the state or national historic registers. Unrecorded cemeteries are automatically considered to be significant historic sites (MR 6120.2500, Subp. 15a).

Minnesota Environmental Policy Act (MS 116D) – Rules 4110.1500

Responsible Governmental Units (RGUs) for Environmental Assessment Worksheets (EAW), Environmental Impact Statements (EIS), and Alternative Urban Areawide Reviews (AUAR) are required to provide a copy of these documents to the State Archaeologist. The State Archaeologist has 30 days to comment. RGUs make all the important decisions for these processes including their adequacy and the need for a full EIS. If the State Archaeologist recommends archaeological survey, testing, or mitigation for a project covered by an EAW, AUAR, or EIS, it is the RGU that makes the decision as to whether or not this is necessary.

Minnesota Legacy Amendment – 2008 Session Law, Chapter 151

In November, 2008, the voters of Minnesota approved a constitutional amendment that increased the state sales tax by three-eighths of one percent for 25 years with the revenue dedicated to four funds whose primary purpose is to preserve the natural and cultural legacy of the state. The amendment is officially titled the Clean Water, Land, and Legacy Amendment, but it is commonly referred to as just the Legacy Amendment. One of the four funds is the *Arts and Cultural Heritage Fund*, which receives 19.75% of this sales tax revenue and is dedicated to the preservation of the state's arts and cultural heritage. In May, 2009 the Minnesota Legislature allocated \$500,000 from the biennial budget of 2010 - 2011 *Arts and Cultural Heritage Fund* for a *Statewide Survey of Historical and Archaeological Sites*. This survey was to be accomplished by competitive bid contracts to conduct a statewide survey of Minnesota's sites of historical, archaeological, and cultural significance.

The law specified that the Office of the State Archaeologist, the Minnesota Historical Society, and the Minnesota Indian Affairs Council each appoint a representative to an Oversight Board that would select contractors and direct the conduct of the survey. The funds were allocated to the Minnesota Historical Society to act as the financial agent. Eight contracts were undertaken in the 2010-11 Biennium and it is expected that the survey will continue to be funded in successive biennia. The State Archaeologist not only serves on the Oversight Board, but takes the principal responsibility for developing Requests for Proposals (RFPs) and responding to Legislative inquiries regarding archaeological matters.

Traditional Duties

Besides performing the duties assigned by Minnesota law listed above, the State Archaeologist also carries out a number of traditional duties:

- designs archaeological site inventory forms and reviews completed forms
- assigns official state site numbers to archaeological sites
- maintains an archaeological site inventory both electronic and paper
- maintains archaeological research and report files

- organizes the annual Minnesota Archaeology Week
- consults with Indian tribes and federal agencies about archaeological activities
- works closely with MIAC to help develop Indian cemetery management procedures
- provides archaeological information for and reviews of private developments
- takes the lead in Legislative actions affecting archaeology

Summary of Duties

The most important function of the State Archaeologist is to act as the principal archaeologist for the State of Minnesota. On a day-to-day basis, this involves six major task areas:

- 1) approving professional qualifications for license applications in a careful yet timely manner and monitoring the activities of the licensees
- 2) reviewing site forms, issuing official inventory numbers, maintaining the inventory of known and suspected sites, and review of submitted archaeological reports
- 3) reviewing development plans submitted by government agencies and private entities to evaluate the potential for harm to archaeological sites
- 4) promoting and undertaking research in Minnesota archaeology
- 5) providing public education and answering archaeological questions from the public
- 6) ensuring historic burial sites protection through careful record keeping, development plan review, interaction with MIAC, consultation with experts, and doing fieldwork

OSA Interaction with Other Agencies and Indian Tribes

The State Archaeologist works with numerous state and local agencies, but is most closely involved with large development or land-management agencies like the Minnesota Department of Transportation (MnDOT) and the Department of Natural Resources (DNR). Both MnDOT and DNR fund archaeological staff to assist with cultural resources management responsibilities for their developments and land management. MnDOT has archaeologists, historians and a GIS-specialist in their Cultural Resources Division. Four divisions of DNR support full-time archaeological programs; State Parks, Forestry, Trails and Waterways, and Wildlife and Fisheries. DNR archaeological programs are carried out under contracts with the Archaeology Department of the Minnesota Historical Society.

The State Archaeologist also works closely with the Minnesota Historical Society (MHS). Although MHS is not a state agency (it is a public corporation), it is given a number of archaeological duties under state law such as issuing archaeological licenses, curating public archaeological collections, and reviewing certain state and local agency development projects. The State Historic Preservation Office (SHPO) in Minnesota is based at MHS and the Director of the Society serves as the State Historic Preservation Officer. The SHPO is the principal state contact for reviewing federal undertakings in Minnesota and maintains the official inventory of historic properties (both archaeological sites and standing structures) in Minnesota for federal purposes as specified in the National Historic Preservation Act (NHPA) and Minnesota Statutes 138.081.

Minnesota has seven federally recognized Ojibwe reservations and four federally recognized Dakota communities. Federal agencies are required to carefully consult Indian tribes at all stages of project development if an undertaking may affect a historic property that has religious or cultural significance to a tribe, even if the undertaking is outside reservation

boundaries. Non-federal agencies in Minnesota and non-federal projects do not have a formal tribal consultation requirement. For the purposes of state law, Indians in Minnesota are represented by the Minnesota Indian Affairs Council (MIAC). The State Archaeologist is required by statute to work closely with the MIAC with regard to Indian-related public archaeological sites and unrecorded historic Indian burials. The State Archaeologist is not required to consult individual tribes for these actions and relies on MIAC for tribal consultation, although the State Archaeologist often works directly with individual tribes. The State Archaeologist works closely with MIAC on any project involving possible Indian burial authentication.

OSA Record Keeping

OSA Archaeological Site File

Elden Johnson started a state archaeological site file at the University of Minnesota Department of Anthropology in 1957. Johnson began the file “to facilitate future problem-oriented research” (Johnson 1957:14). The file was kept on 5” x 8” cards organized by county and containing basic locational, descriptive, and reference information. Site numbers were assigned using the Smithsonian Institution’s trinomial system with a numerical prefix based on state alphabetical position (Minnesota was 21 in 1957), then a two letter county abbreviation (e.g., AN for Anoka), and finally a one-up unique number for each site in a county. The initial compilation of sites was based on the field notes of archaeologist Lloyd Wilford and the T.H. Lewis-surveyed mound sites contained in Newton Winchell’s *The Aborigines of Minnesota* (1911). Archaeologists who found previously unrecorded sites were asked to fill out a standard form and submit it to the University’s Archaeology Lab.

The University of Minnesota’s file became the official state site file with the appointment of Johnson as the first State Archaeologist in 1963. By the late 1960s, the focus of site file use changed from academic research to cultural resource management (CRM) mainly due to several new federal laws including the National Historic Preservation Act (1966) and the National Environmental Policy Act (1969).

A major change in site file record keeping occurred in the late 1970s with the initiation of the Statewide Archaeological Survey (SAS) by the Minnesota State Historic Preservation Office (SHPO) at MHS and the State Archaeologist (Hohman-Caine) taking a job with the U.S. Forest Service in northern Minnesota. SAS personnel made photocopies of the State Archaeologist’s site file cards and then created a separate folder for each site, organizing the folders in file cabinets by county and site number. Because hundreds of new sites were recorded by the SAS-sponsored surveys, the SAS took over assigning the official state site numbers from 1978 through 1981.

In 1981, the Minnesota Land Management Information System (MLMIS) at the State Planning Agency created a computerized version of SAS site file, although this “data bank” was never utilized for state planning purposes and was not readily available to archaeologists as it had to be accessed through a main-frame computer at the State Planning Agency. The MLMIS computerized data was not updated after 1981. With the demise of the SAS in late 1981, the assignment of official site numbers reverted to the State Archaeologist.

The first widely available computerization of the archaeological site file occurred in 1982 when the current State Archaeologist, then head of the MHS-based Municipal - County Highway Archaeological Survey, undertook an extensive literature search and review of the archaeological

site file. The purpose of the project was to compile a more comprehensive and accurate list of archaeological sites that were recorded in basic archaeological sources so potential effects to “known” sites (many officially unnumbered) could immediately be considered during highway construction plan review. A major result of the project was word processor files that included five major tables: Numbered Sites, Numbered Sites Corrections, Unnumbered Sites, Unconfirmed Sites, and Find Spots. The tables were compiled in a report that was submitted to the State Archaeologist in early 1983 (Anfinson 1983). The word processor files were then converted into a database file combining the various tables and a few new data fields. Under the *Site Number* field, unnumbered and unconfirmed site were assigned “alpha” numbers (e.g., 21ANa). Over the next decade, additional fields were added to the database mainly to foster Elden Johnson’s 1957 site file research goals.

When Anfinson became the SHPO archaeologist in May of 1990, his computerized database became the SHPO’s official archaeological site database. In 1994, MnDOT provided the SHPO with a grant to refine and augment the computerized site file. Under the direction of Homer Hruby, the SHPO completed the project in 1996. The project not only expanded and made corrections to the electronic site database, it cleaned-up and added materials to the SHPO’s hard copy folders and added folders for each “alpha” (officially unnumbered) site. Universal Transverse Mercator (UTM) locational fields using approximate site centers were added to the database to facilitate Geographic Information System (GIS) applications like MnDOT’s MnModel project that began in 1995 (www.mnmodel.dot.state.mn.us/).

A new database procedure was also implemented during the Mark Dudzik tenure as State Archaeologist. Field archaeologists submitted newly completed state site forms to the OSA. The OSA carefully reviewed the forms, assigned an official site number, and sent copies of the numbered forms to the SHPO. SHPO staff added the information to the master archaeological site database and filed the paper copy in their site file. The SHPO then provided a copy of the electronic database to the OSA. The database was also made available to appropriate state and federal agencies (e.g., MnDOT, DNR, NRCS).

On January 1, 2007, the OSA took over updating the master electronic archaeological site database. This means that the database is now quickly updated following the OSA review of new site forms and the assignment of new site numbers. The OSA provides copies of the database to SHPO and other appropriate government agencies.

The Archaeological Sites database contains basic information on all the recorded archaeological sites in the state. It includes all sites with official state site numbers and reported sites that have not been verified by archaeological survey or, in some cases, for which an official state site form has not been completed (alpha sites). The database contains locational information utilizing County, City, Section-Township-Range, and UTM formats. It includes management information such as Level of Archaeological Examination, Site Condition, and National Register status. There are also research fields including Historic Context association, Ceramic and Lithic types, and Landform Classification.

It should be stressed that the site database maintained by the OSA is not entirely accurate or consistent with respect to certain fields of information. There are five common sources of error: 1) the original data reported on the site form are inaccurate, 2) the data reported on the site form are a unique interpretation or have inconsistent interpretations by different archaeological investigators, 3) correct data from a site form have been incorrectly entered into the database, 4) different data input personnel have used inconsistent codes for the data, and 5) incomplete

information was obtained or reported from field surveys. An effort has been made by the OSA, the SHPO, and the MnDOT Cultural Resources Unit to ensure that the locational data is as accurate as possible, but fields such as Site Function and Cultural Context still have significant accuracy and consistency problems.

Besides the site database, the OSA also maintains extensive paper site files. There are several major differences between OSA and SHPO paper files besides the presence of unique data in each entity's folders. The OSA does not have individual folders for the alpha sites, although an intern project in 2007 began to make copies of the SHPO alpha files. These are filed in a single OSA folder for each county. The SHPO does not have most of the data contained in the OSA Burial Site files, and the OSA Burial Sites database is not shared with the SHPO, although this database does not include any burial sites not contained in the OSA Archaeological Site database. The SHPO also depicts both numbered and unnumbered sites on a set of 7.5' USGS maps, while the OSA depicts numbered site locations on a set of county maps. In 2007, the OSA began work to produce a set of USGS maps with site locations depicted and now puts newly recorded sites on a master set of USGS maps.

This OSA Manual, the *SHPO Manual for Archaeological Projects in Minnesota* (Anfinson 2005) and OSA/MHS licensing requirements specify that professional archaeologists must submit site forms when previously unrecorded sites are located or significant new information is obtained for previously recorded sites. OSA Assistant Bruce Koenen takes primary responsibility for the review of submitted site forms and assignment of official state site numbers. Site forms are required when sites are found by professional archaeologists on non-federal public or private land. Most federal agencies, with the exception of the two National Forests, regularly submit site forms even if the sites are located on federal land.

As of December 31, 2010 there were 17,652 total sites in the site database of which 11,013 (62%) were assigned official state site numbers and thus have hard-copy files at both the OSA and the SHPO. The majority of unnumbered sites (i.e., alpha sites) are federal-land sites in Chippewa and Superior National Forests that lack Minnesota site forms. Some alpha sites are also Post-Contact Period sites documented on early historic maps (e.g., Trygg, Andreas) or reported prehistoric sites that are as of yet unconfirmed in the field by professional archaeologists.

If we compare current site totals to previous years, in 1964 there were 1,160 archaeological sites (all numbered, all prehistoric) in the OSA files, and in 1983 there were 3,208 (2,999 numbered, some historic). The SHPO files in 1990 had 5,871 sites of which 3,838 were numbered. The current end of 2010 total of 17,652 sites represents a tripling of the database since 1990, some of which is due to the addition of National Forest sites (many unnumbered). An average of about 300 new site forms are submitted to OSA each year. The county with the most sites at the end of 2010 is St. Louis with 1,886 (1,103 numbered) sites and the county with the fewest sites is Red Lake with 24 (8 numbered) sites.

It is conservatively estimated that less than 1% of the total prehistoric archaeological sites in the state are known and contained in the site database. This estimate is obtained by multiplying 10 groups of people making 10 unique sites per year by 10,000 years, which equals 1,000,000 sites divided by the 10,000 currently numbered sites. If we add potential historical archaeological sites that are currently unnumbered, we could include over 200,000 early 20th century farmsteads and hundreds of thousands of house lots in cities that are depicted on various maps.

Total intensively investigated sites in 1963 were 170 (15% of the total numbered sites),

440 (14%) in 1983, 491 (8%) in 1990, and 1,574 (9%) at the end of CY2010 1,552 (429 Phase 3; 1,123 Phase 2-only). Intensively investigated sites include sites that have been the subject of university field school excavations or sites subjected to detailed archaeological work for CRM purposes, including both Phase 2 (Evaluation) and Phase 3 (Data Recovery) projects. Intensive investigation means formal units (e.g. 1x1 m) were excavated or other forms of intensive examination (e.g., controlled surface collection, detailed mapping) were used at the site.

There are about 300 Minnesota archaeological sites listed in the National Register of Historic Places (NRHP). Individual site nominations account for 105 of these listings with perhaps another 200 sites included within 18 archaeological districts. Archaeological sites account for only about 6% of the total NRHP-listed historic properties in Minnesota. Perhaps 10 times as many archaeological sites have been considered eligible to the NRHP through consensus determinations for the federal Section 106 process or state environmental review processes.

Minnesota also has a State Register of Historic Places established by the passage of the Historic Sites Act (MS 138.661 - 669) in 1965. There are 28 archaeological sites individually listed in the State Register (MS 138.664) of which 25 have official state site numbers. There are also 34 State Historic Sites (MS 138.662) that are owned or managed by the Minnesota Historical Society of which 17 are archaeological sites (all numbered). State Register sites and State Historic sites are both provided additional protection by MS 138.665, which requires state and local agencies to “protect” these properties (and properties listed on the National Register of Historic Places) if they are threatened by undertakings on agency land or by undertakings that agencies fund or license. Because some listed places have multiple sites, there are 63 archeological sites subject to the Historic Sites Act due to listing in MS 138.

OSA Burial Site File

State Archaeologist Christy Hohman-Caine started a separate OSA burial site file in the early 1980s. This file now contains detailed information on burial sites examined by or subject to inquiries by State Archaeologists Hohman-Caine, Dudzik, and Anfinson. It includes both numbered and unnumbered sites. The file also contains some information on unconfirmed burial sites that have been reported to the State Archaeologist over the last 30 years. These unconfirmed sites have either not been field checked by an archaeologist or field checked but not found. The Burial Site File is not open to the general public as the data are considered *security information* (see MS 13.37) as specified in MS 307.08, Subd. 11.

In the late-1990s, the OSA parsed burial site information from the master archaeological site database and created the separate Burials Site Database. This database does not contain information on all of the unconfirmed sites in the OSA’s paper burial site files, only those sites that have OSA-assigned official state site numbers or alpha numbers.

The OSA makes the Burials Site Database partially available to governmental agencies on a webpage maintained by the Minnesota Geospatial Information Office (MnGEO). This webpage went on-line in September 2003. At that time, a letter was sent to all county governments and assigned them a password to access the site. The site provides a graphic interface allowing local governments to determine if a burial site exists within a specific quarter-quarter section of land (40 acres). If a site does exist within the quarter-quarter, the agency can contact the OSA to get more specific information about a particular burial.

As of December 31, 2010, there were 2,924 burial sites listed in the OSA’s Burial Site Database. This includes about 12,500 prehistoric burial mounds in over 1,600 discrete sites. Over

350 of the non-mound burials date to post-1837, the beginning of intensive Euro-American settlement. There are 751 known or suspected burial sites that do not have an official site number, although a few of these may be duplicates of numbered sites. A compilation of cemeteries in Minnesota by Pope and Fee (1998) lists about 4,400 cemeteries, the majority of which are not contained in the OSA burials database. Many of the Pope and Fee cemeteries are officially recorded and are managed by active cemetery associations and thus are not under the jurisdiction of the State Archaeologist, but hundreds more are subject to MS 307.08 as they were never officially recorded. A Legacy-funded project ending in June, 2011 sought to compile a complete list of unrecorded, but known historic cemeteries in Minnesota.

OSA Archaeological Report Files

The OSA maintains a file of archaeological reports. Archaeologists conforming to the requirements of state licensing have submitted most of these reports. The SHPO also maintains an archaeological reports file that mainly includes reports that have been submitted as part of the federal Section 106 process. As not all SHPO-reviewed projects require state archaeological licensing and not all OSA-reviewed projects require SHPO review, the OSA and SHPO report files are far from identical, although there is significant overlap. Both the OSA and SHPO maintain databases of the reports they have on file. As of the end of December 2010, the OSA had 5,255 reports listed in its database.

The Archaeological Reports database is a list of survey or excavation reports done in Minnesota that are present in the OSA files. It does not contain journal articles, archaeological, theses and dissertations, or published books. Many of the fields are compatible with the National Archaeological Database (NADB). The Reports database contains locational fields similar to the Site database as well as fields for report titles, authors, level of survey, number of sites located, agencies involved, and Review and Compliance findings.

Since 1998, the OSA has published yearly (calendar) compilations of abstracts of reports submitted to the OSA. They are produced by Bruce Koenen, the OSA research assistant. They can be found on the OSA website (<http://www.osa.admin.state.mn.us/research.html>).

OSA – MHS Research Library

In 2006, the OSA and the MHS Archaeology Department established a Joint Research Area at the Ft. Snelling History Center. The core elements of this facility are the Elden Johnson Library, the Institute for Minnesota Archaeology (IMA) Library, the Minnesota Archaeological Society (MAS) Library, and the OSA Library. It also includes copies of Minnesota theses and dissertations, and journals to which the OSA subscribes. A number of file cabinets house manuscript collections that are organized by author or topic (e.g., Historical Archaeology). There is also a computer station with image scanning and image storage and retrieval capabilities.

The MHS also maintains a library at the Ft. Snelling History Center that contains archaeological and historical journals, archaeology books, and various other useful volumes. There is also a microfilm reader with microfilms of historic county atlases and the Lewis and Brower notes, although no facilities for photocopies are available for these microfilms. The MHS Ft. Snelling Library is technically not a public library and no materials can be checked out, but it is available to professional archaeologists and students of archaeology. Arrangements for any photocopying of materials from this library have to be made through MHS staff.

Archaeological Licensing and Professional Qualifications Standards

Licensing

As specified in MS 138.36, the State Archaeologist approves the qualifications of an archaeologist applying for a license and forwards approved applications to the Director of the Minnesota Historical Society (MHS). While the MHS technically “issues” the license under MS 138.36, the OSA is the entity that develops licensing procedures, reviews license applications, handles all correspondence with licensees and prospective licensees, and monitors the activities of the licensees.

Beginning in the 1960s, licenses were typically issued to qualified archaeologists on a project-by-project basis or as yearly licenses to large agency-specific survey programs such as the Trunk Highway Archaeological Survey (1968 – 1994). In response to public comments, newly appointed State Archaeologist Anfinson undertook a review of the licensing process in FY 2006. A revised licensing procedure was implemented in May of 2006, which issued yearly (calendar) licenses to individuals for the purposes of reconnaissance (Phase 1) or evaluative (Phase 2) archaeological surveys on non-federal public property. Licensees were required to notify the OSA of each project to be surveyed under their license, provide a separate report for each survey project, and provide a brief yearly summary of all archaeological work conducted under their license. Separate licenses were required for intensive excavation projects (Phase 3) on non-federal public land and for burial authentication work on public or private land.

In calendar year 2011, the State Archaeologist, after coordination with the Minnesota Historical Society, once again revised licensing procedures resulting in four types of licenses: 1) a yearly license for reconnaissance (Phase 1) surveys, 2) a site specific license for site evaluations (Phase 2), 3) a site specific license for major excavations (Phase 3), and 4) a site specific license for burial authentications. The reasons for separating the yearly reconnaissance license from evaluation activities are the increase in applications from out-of-state contractors who are not familiar with Minnesota historic contexts and field procedures, inappropriate evaluations by some prehistoric archaeologists of historic archaeological sites and some historical archaeologists of prehistoric sites, and inappropriate evaluations by some archaeologists unfamiliar with the particular Minnesota region or the specific historic contexts of some sites.

Projects that require archaeological licensing in Minnesota are:

- 1) Any project on non-federal public land where archaeological evidences are mapped, collected, or systematically sought or going on public land for any of these purposes.
- 2) Any attempt to assess potentials for unrecorded historic burials that involves significant soil disturbance on any non-federal land.

This includes all Phase 1, Phase 2, and Phase 3 archaeological projects on non-federal public land as well as all non-federal burial authentications. Non-federal public land includes land owned by cities, counties, and other public entities as well as the bottom-lands of all lakes and rivers below the average low-water mark including water within federal lands.

OSA Professional Qualifications Standards

The Minnesota Office of the State Archaeologist (OSA) requires that applicants for State Archaeological Licenses meet certain professional qualifications standards. These standards meet or exceed the Secretary of the Interior’s Standards. There are separate OSA standards for Reconnaissance (Phase 1) surveys, Evaluation (Phase 2) surveys, Excavations (Phase 3), and

Burial Site Investigations (*Authentications* under MS 307.08). Because the State Archaeologist only regulates archaeological projects on non-federal public land and burial authentications on all non-federal land, OSA can only require qualification standards for those types of activities, but professional archaeologists, agencies, and project sponsors are encouraged to apply these standards to all unlicensed archaeological activities in Minnesota where professional expertise is required. All Principal Investigators on state-licensed projects including co-principals must meet OSA professional qualifications standards.

Basic Professional Archaeological Qualifications: These five requirements apply to all types of archaeological projects and are all that are required for Principal Investigators on Reconnaissance/Phase 1 surveys:

- 1) A graduate degree with a specialty in archaeology, preferably North American archaeology.
- 2) One year's supervised experience doing archaeology.
- 3) Four months of supervised experience doing North American archaeology.
- 4) Demonstrated ability to carry research to completion.
- 5) One year's supervisory experience in either prehistoric or historic archaeology with at least 3 months of supervisory experience doing prehistoric archaeology in the Midwest. Some demonstration of familiarity with Midwestern historic period artifacts, features, and contexts is also expected.

Supervised experience means work under the direction of a person meeting basic professional qualifications standards. *Demonstrated ability to carry research to completion* means evidence of timely submittal of professional quality reports and other documents. *Supervisory experience* is defined as comprehensive *project* supervision, which means providing principal direction for all aspects of an archaeological project including planning, agency coordination, records search, fieldwork, artifact analysis, and reporting. *Supervisory experience* does not mean simply being a field supervisor, lab supervisor, or crew chief.

All experience must be explicitly documented in an attachment to the license application unless an applicant has been previously licensed by the Minnesota State Archaeologist at the same project level and on a similar project (region, context) with regard to Phase 2, Phase 3, and Authentication work. For supervisory experience, this documentation must include totals in days for each project when the individual was actively supervising a specific project. There are approximately 250 work days in a calendar year.

Evaluation/Phase 2 Surveys: This work usually involves limited excavation in formal units (e.g., 1x1 m) or other forms of intensive field examination. It is usually done for the purposes of evaluating the significance of an archaeological site associated with development projects or for obtaining sufficient information to construct a data recovery plan, writing a National Register nomination, or providing for the needs of formal interpretation. Significance evaluation is considered the same as assessment of National Register or State Register of Historic Places eligibility. In addition to meeting the above Basic Professional Qualifications, applicants for Evaluation/Phase 2 surveys must also meet these qualifications:

- 1) The applicant must clearly demonstrate familiarity with evaluating the historic contexts expected at the location.

- 2) The applicant must possess the appropriate regional, topical, and managerial experience to direct, analyze, and report the results of a complex archaeological investigation.
- 3) The applicant must have demonstrated experience with evaluation criteria of the State or National Register of Historic Places.

Excavation/Phase 3: This work usually involves extensive excavation in formal units (e.g., 1x1 m) or other forms of intensive field examination following a carefully developed research design known as a Data Recovery Plan. It is done for the purposes of academic research, institutional field schools, and/or activities associated with the mitigation/treatment of adverse effects for cultural resource management (CRM) projects. Included are projects involving over 10 square meters of excavation done in formal units at one particular numbered site or any project that significantly affects the integrity of an archaeological site. In addition to meeting the above Basic Professional qualifications, applicants for Excavations (Phase 3) must also meet these qualifications:

- 1) The applicant must have demonstrated experience designing and implementing data recovery plans.
- 2) The applicant must clearly demonstrate familiarity with the historic contexts known to exist at the site.
- 3) The applicant must clearly demonstrate the appropriate regional, topical, and managerial experience to direct, analyze, and report the results of a complex archaeological investigation.

Burial Authentication: This license only applies to archaeological burial assessment activities done for the Minnesota State Archaeologist. This work usually involves intensive examination of a specific locality utilizing methods that may physically disturb burials (e.g., intensive soil coring, shovel tests, formal excavation units, trenching, or monitoring machine excavation). It is done for the purpose of assessing the presence or absence of human burials in a specific locality. Only the State Archaeologist can actually authenticate unrecorded historic (older than 50 years) burials in Minnesota as specified in Minnesota Statutes 307.08 so the State Archaeologist will serve as co-Principal Investigator for most authentication activities. In addition to meeting the above Basic qualifications, applicants for Burial Authentication must also meet these qualifications:

- 1) The applicant must have demonstrated experience or training in dealing with human remains, identifying fragmentary human remains, and assessing soil conditions and features commonly associated with historic human burials.
- 2) If a suspected Indian burial is involved, the applicant should have demonstrated experience in consultation with tribal groups or the Minnesota Indian Affairs Council.

Archaeological Monitoring: This type of activity is done in conjunction with Phase 1 surveys, Phase 2 surveys, Phase 3 investigations, or Burial Authentications and will thus be subject to licensing and professional qualifications appropriate to the activity being performed. Monitoring should not be recommended unless well justified and consistent with management needs.

Professional Obligations and Ethics

Professional archaeologists have obligations that go beyond just fulfilling licensing, agency, and contractual requirements. They have ethical obligations to provide their clients with cost-effective archaeological services, yet still meet professional standards. When OSA or SHPO recommend archaeological surveys, it does not mean that the entire project area must be surveyed or that any part of it needs to be surveyed. It only means that the project area is thought to have some site potential based on known site locations or predictive models, but this assessment is usually based on office-only review. Occasionally, OSA may specify certain areas within a development parcel that have the highest site potential, but which areas to actually survey is usually left up to the discretion of the archaeologist in the field. Regardless of who recommends a survey, archaeologists should only survey those areas that they deem to have moderate to high site potential based on site locational modeling and land-use history and only areas that will be impacted unless the research design specifies otherwise or the agency or client so requests.

When conducting a survey, it is the responsibility of the field archaeologists to obtain landowner permission to enter private land or to obtain agency permission to enter public land. Archaeologists surveying non-federal public land in Minnesota must obtain a license from the Minnesota Historical Society and the Office of the State Archaeologist. Archaeologists surveying federal land must obtain an ARPA permit from the land management agency. Archaeologists are obligated to do their best to insure that any artifacts or other materials of archaeological value are curated properly. This means that materials are properly cared for and that they are reasonably available for examination by other archaeologists.

Principal Investigators are professionally obligated to complete written reports of their archaeological work and publicly report significant archaeological discoveries to a wider audience than just the sponsoring agency and the OSA. This reporting can involve the presentation of papers at professional conferences or the publication of articles in scientific journals or other periodicals. Significant discoveries include descriptions of intensive work carried out at important archaeological sites, radiocarbon dates, artifacts analyses of important collections, and regional or large-area survey data that can assist with site locational modeling.

State site forms must be filled out for all sites located during licensed surveys in Minnesota, but professional archaeologists are also ethically obligated to fill out and submit to OSA site forms or otherwise report sites located outside of project boundaries based on first-hand knowledge or informant reports. Archaeologists involved with privately sponsored research also should share site information critical to improving locational models, promoting site preservation, and understanding the past.

If a development project is cancelled prior to the completion of an archaeological report, but subsequent to the initiation of archaeological field survey, the Principal Investigator should minimally submit inventory forms to OSA for any located sites and ideally submit some form of report describing the location and methods of the survey. The OSA understands that legal contractual requirements occasionally restrict reporting options for a private development on private property, but if a state archaeological license has been issued, a condition of the license is to submit site forms and a report to the State Archaeologist regardless of the project status.

Professional archaeologists should adhere to professional standards, guidelines, and the ethical obligations of an archaeologist regardless of land owner, type of legal oversight, or type of project. This includes projects that are completed on private land or Indian reservations. It also includes work on culturally sensitive sites and burials.

PART 2: OSA GUIDELINES FOR DOING ARCHAEOLOGICAL PROJECTS

Archaeological projects in this manual are classified as five basic types: **Literature Searches, Reconnaissance/Phase 1 Surveys, Evaluation/Phase 2 Surveys, Excavation/Phase 3 Activities, and Burial Authentication.** Each type of project is dealt with in detail in its own section. Some general guidance applies to all archaeological projects, however, as outlined below. The Minnesota OSA requests that the terminology in this manual be used when referring to archaeological projects undertaken in Minnesota that are subject to OSA review or licensing. For example, do not use terms like “Class III CRM Inventory.”

In 1984, the Secretary of the Interior issued *Standards and Guidelines for Archaeology and Historic Preservation* (SISG) that were to be used by federal agencies and SHPOs. These guidelines have never been updated for archaeology and are fraught with confusing language and inconsistencies. There are basically four levels of archaeological projects in the SISG: *Identification, Evaluation, Documentation, and Registration.* The SISG divides *Identification* level surveys into "reconnaissance" and "intensive" categories based on the types of field methods employed and geographical scope of a project rather than management objectives, blending what this manual and most archaeologists consider to be Literature Searches and Phase 1 surveys. Reconnaissance surveys according to the SISG "result in the characterization of a region's historic properties" and intensive surveys "permit the identification and description of specific historic properties in an area." *Evaluation* surveys in the SISG are the same as Phase 2 surveys, while *Archaeological Documentation* is basically the same as Phase 3 projects. *Registration* is the nomination of archaeological sites to the National Register of Historic Places or local historic registers. This OSA manual does not deal with registration.

The Minnesota OSA Manual divides archaeological survey into phases by management objectives and standard archaeological practice. *Phase 1* surveys utilize basic reconnaissance techniques to locate sites within project areas. Effects to these sites may be avoided by development projects and this eliminates the need for most *Phase 2* surveys whose purpose is usually to evaluate the importance of the site and, if necessary, to better characterize the site for implementation of a data recovery plan done as *Phase 3* project.

General Guidance for All Archaeological Projects

Research Designs

Before an archaeological project can proceed, the Principal Investigator must prepare a research design. Briefly stated, a research design should define the objectives of the proposed work and carefully consider the methods to be used in both the field and the lab to obtain the objectives. The research design provides the focus for an archaeological project to ensure that the project efficiently and adequately fulfills management needs and research goals.

For any archaeological project, the research design, field procedures, laboratory analysis, and reporting must be clearly linked as a whole. The research design is critical to choosing the appropriate field methods. The materials gathered in the field must be analyzed in such a way as

to address the questions posed in the research design. Proper specialists must be employed to do the fieldwork and analysis. Reporting must describe the procedures in enough detail to demonstrate that the research design was properly followed, that the results are clearly applicable to the research questions posed, and management needs can be adequately addressed.

For Minnesota OSA purposes, research designs at all phases of archaeological work should contain the following:

Objectives. Research designs must address the objectives of an archaeological project usually outlined in a *scope of work* or a *request for proposals* (RFP). A research design must define clearly the project's research problems, the specific research questions to be addressed, and the management needs. The research questions should not simply be a generic list of potential questions, but include only *important* and *answerable* questions that focus the fieldwork, analytical methods, and staffing requirements to obtain necessary information. Questions should not be trivial, but anticipate answers that will add significant insight to our understanding of the past. Furthermore, research designs should not repeat questions already answered by previous investigations at a site unless these questions justifiably require validation. The objectives must also include a critical assessment of the relevant historic contexts and property types in the project area, the physical extent of the area to be investigated, and the amount and kinds of information to be gathered.

Methods. The project's research methods must be clearly related to the research question(s) identified in the Objectives section. Any proposed archival research, field techniques, or analytical methods should be carefully explained so that others using the gathered information can understand how and why the information was obtained. The methods selected should be compatible with the geographical area, historical contexts, and the kinds of properties most likely to be present. They should describe in detail field and laboratory methods such as the shovel test interval and soil processing. The type of personnel and their professional qualifications must also be carefully considered in order to insure that appropriate expertise is available to attain the objectives. Every state-licensed project must have a Principal Investigator who meets the OSA's Professional Qualifications Standards by project type.

The OSA generally does not pre-review research designs for Literature Searches or Reconnaissance/Phase 1 archaeological surveys unless the proposed methods deviate significantly from standard procedures outlined in this manual or the project is especially complex such as a large area survey where site locational modeling and stratified sampling is critical. Final reports for all archaeological projects, however, must contain a section clearly labeled "Research Design." Evaluation/Phase 2 surveys that are subject to state licensing need pre-reviewed research designs as do Excavation/Phase 3 research designs.

Once the project begins, investigators are expected to address the objectives and follow the methods outlined in the research design. Deviations from the research design should be discussed with or submitted to the State Archaeologist if OSA licensing or review is involved. Research designs should be flexible and anticipate changing field conditions and unexpected discoveries.

Field Procedures

Because field conditions and historical contexts vary greatly nationwide, there are no national guidelines for field methods. Archaeological field schools (which are usually run by academic institutions) and archaeological field method books (which are usually written by academics) tend to focus on large scale, site-specific excavations rather than CRM-related reconnaissance and evaluative surveys and they often reflect the preferred methods of a single individual or institution. Site types, geomorphology, and degree of soil exposure can also vary greatly by geographic area. Archaeological field methods used for CRM, projects therefore vary from state to state.

In 1977, the Council for Minnesota Archaeology (CMA) issued brief guidelines for CRM-focused field methods in the state. State agencies and private contractors generally followed these guidelines for 15 years, but the guidelines became inadequate to deal with complex situations and new methods of CRM archaeology, so in January of 1993, the Minnesota SHPO released an archaeological manual written by SHPO Inventory Coordinator Homer Hruby assisted by Bettina Arnold. A revised SHPO archaeological manual written by then-SHPO Archaeologist Scott Anfinson was released in June 2001 to clarify guidelines with regard to terminology, research designs, and reporting requirements, along with providing some new guidance on “special considerations” such as geomorphology, predictive modeling, and historical archaeology. The revised SHPO manual was also much shorter than the original SHPO manual, eliminating information that was readily available elsewhere. The 2001 SHPO manual was revised by Anfinson in 2005 and put on the SHPO’s webpage. The 2005 SHPO manual was used by both the SHPO and the Minnesota OSA through the end of June, 2011.

The Minnesota Department of Transportation (MnDOT) developed a set of recommended field procedures in the mid-1990s for use by its MnModel project and eventually to guide all MnDOT-sponsored archaeology. Some of these methods have applicability to the OSA manual, but others were explicitly focused on parcel surveys used to gather data for site locational modeling. The MnDOT manual can be found on MnModel website.

This first OSA archaeological manual presents a set of field procedures that are recommended for state-reviewed CRM and research archaeology projects in Minnesota. These methods cannot, however, anticipate every field situation so some innovation is expected. Field methods will vary by project scope, survey phase, environmental conditions, research objectives, and management needs.

Detailed guidance by survey phase is provided in the sections that follow. In general, field methods must be appropriate to address management needs and to answer the questions posed in the research design by project phase:

- *Phase 1* surveys attempt to determine the presence or absence of sites within a specific area and initially define site limits, so the field methods must reasonably but efficiently maximize the vertical and horizontal sampling of the project area without significantly harming site integrity.

- *Phase 2* surveys attempt to evaluate the importance of sites, refine site limits both vertically and horizontally, and provide enough understanding for developing and implementing Phase 3 research designs. Field methods must provide critical details with regard to the depositional setting, cultural contexts, site integrity, artifacts and feature

densities, and the potential of the site to answer *important* research questions without significantly harming site integrity.

- *Phase 3* projects gather enough data from important sites or portions of sites to mitigate adverse effects from development activities or fulfill research objectives by answering important research questions. Field methods must carefully but efficiently locate, define, and recover data from cultural horizons, use-areas, artifact concentrations, and features. Provenience data must be recorded in detail. Phase 3 research designs are often called *Data Recovery Plans*.

- *Burial Authentication* projects attempt to carefully determine if human burials are present in discrete areas that have been known to contain or have a good probability of containing human remains. Many of these locations are mound sites mapped by T. H. Lewis in the late 19th century. MIAC co-signs authentication licenses for suspected Indian burial sites. Authentication licensing is not needed for surface feature mapping, remote sensing, or limited small-diameter soil probing on possible burial features that were previously unrecorded in OSA files. Contact the OSA if there are any questions as to whether formal authentication is needed. Some expertise in soil science and previous work with human remains is expected for archaeologists applying for authentication work.

Monitoring can be thought of as another type of archaeological project, but it is used to perform one of the above four tasks so it will be discussed under these tasks. Monitoring can refer to archaeological observation of machine stripping of soil or of construction activities to discover sites or explore sites. Monitoring should not be recommended unless well justified and consistent with management needs. In most situations monitoring is not an appropriate reconnaissance, evaluation, or burial authentication field procedure in Minnesota except in instances where it is impractical to perform pre-construction sub-surface testing (e.g., beneath an existing building or parking lot) or if it is used to rapidly examine private land projects not subject to formal environmental review procedures or state licensing. Monitoring often does not allow for options such as project re-design or site preservation in place if an eligible site or burial site is uncovered, options that are essential to most environmental protection regulations.

Monitoring can be an appropriate part of a Treatment (Phase 3) activity (e.g., monitoring machine stripping of the plow-zone to expose features) or as a final check to make sure nothing important was overlooked by Phase 1, Phase 2, or Authentication surveys that used limited area hand-testing methods. Only qualified archaeologists should do archaeological monitoring. Archaeological monitoring does not include what is called *tribal monitoring* as the purpose of tribal monitoring is to evaluate construction impacts on non-archaeological aspects of the Indian-related cultural environment such as traditional cultural properties (TCPs).

Most archaeological fieldwork in Minnesota is undertaken during the warm season when the ground is not frozen and snow cover is absent. Winter fieldwork is occasionally necessary, however, but winter work is expected to follow the same standards as warm season work (i.e., sampling an adequate portion of the APE, soil screening through mesh ¼” or finer), although winter field methods may vary substantially from warm-season methods.

Carefully documenting fieldwork while it is in progress is critical for proper analysis and reporting. Documentation needs vary by the phase of the archaeological project, but daily logs describing archaeological work should be kept during all phases. Sketch maps should be prepared for all work carried out within archaeological sites; these maps should show known site boundaries, significant landforms/cultural features, and locations of excavation units. Maps should be tied into the real world through project stationing, addresses/legal locations, or GPS coordinates. Computer generated maps are generally less informative than hand-drawn maps. Photographs should be taken to document site conditions, field methods, and significant features. Photographic logs should record the subject, date, direction of view, and photographer.

For all phases of state-licensed research, *artifacts must be collected and retained* unless prior approval is obtained from the OSA. Artifacts are the keys to understanding site function, historical context, and research potential. Field personnel are often inadequately trained to undertake complex artifact analysis, especially when artifacts have not been properly cleaned or when comparative collections or experts are not readily available for consultation. Furthermore, artifacts are often the only physical evidence that a site exists and they may be needed to convince officials that additional work or site avoidance is required. Not all artifacts from surface surveys need to be collected and retained, however, as described on page 26 of this manual.

Artifacts collected on private property technically belong to the landowner, but every effort should be made to encourage private landowners to donate artifacts from professional surveys to public repositories or at least permit their temporary removal for analysis. Artifacts from federal land are federal property. Artifacts from non-federal public land in Minnesota are the property of the state. Archaeological materials collected from public sites should not be discarded without the approval of the land management agency and the OSA in the case of non-federal public land.

The Principal Investigator is responsible for obtaining landowner permission to enter land. It is against the law in Minnesota to enter private property without landowner permission. The Principal Investigator is also responsible for obtaining all required federal, state, and local permits and licenses to undertake archaeological work on public property. Principal Investigators also need to contact Gopher State One-Call and other appropriate entities if their field activities may encounter buried power-lines, pipelines, or other utilities.

Laboratory Analysis and Curation

The amount and type of artifact analysis will vary by the project phase. The methods selected should be consistent with the research questions identified in the project's research design. While a focused orientation should be addressed in the initial phases of the analysis, it should not preclude a flexibility of approach to the data as the project proceeds. In selecting analytical methods, the analyst should consider continuity of research by reviewing data resulting from previous work in the area. All phases of archaeological projects must classify and tabulate recovered artifacts. For example, basic prehistoric ceramic classification should include vessel portion (e.g., rim, body), temper, surface treatment, and historical index type if possible. A concise, tabular record of specimens and their provenience must be prepared during the analysis.

Artifact cleaning techniques should be used that are appropriate to the material and conform to curation facility guidelines. Care should be taken to not remove or destroy coatings or encrustations that may contain important information (e.g., pigment on ground stone tools, charred organic matter on sherds). Preservation of unstable or fragile materials must begin in the

field. If treatment in the field is not possible, preservation should be performed immediately upon conclusion of fieldwork. Care should be taken to avoid contaminating potential radiocarbon samples both in the field and the lab. Long-term curation of materials should be planned for in the research design and the requirements of the final repository should be considered before materials are processed. At a minimum, all materials must be stored in a manner that preserves provenience, ensures conservation, and allows access to other researchers.

A complete inventory must be maintained during the cataloging process. All written records, including field notes, must be curated at the same institution as the archaeological materials. Any significant data recorded on an electronic medium must also be printed and included with the other material. All photographic documentation must be catalogued in a manner appropriate for curation. Photos should be cross-referenced on both photo logs and site forms and on all pertinent field and laboratory records. Storage techniques for photographs must consider long-term curation; the OSA has detailed guidelines for digital photographic procedures available upon request. Laboratory records must also be maintained for materials requiring special or intensive analysis.

Before state-licensed archaeological projects can proceed in Minnesota, the contractor must arrange with an appropriate institution for the curation of the archaeological artifacts and the associated inventory information (notes, photographs, maps, catalogue sheets). Long-term curation responsibilities must be acknowledged and agreed upon in writing prior to the beginning of fieldwork. Approved curational institutions include the Minnesota Historical Society and the Science Museum of Minnesota.

Because private landowners retain ownership rights to artifacts from their land, archaeologists need to establish collection, retention, and curation policies prior to the initiation of fieldwork. It may be advisable to field document and leave in place surface artifacts that landowners wish to retain for their own collections. The widespread availability of digital cameras has made field documentation of surface artifacts more feasible. Be sure to include a scale if artifacts are field photo-documented and not retained. All artifacts recovered from excavation units including shovels tests and cores need to be retained on state-licensed projects.

The Minnesota Historical Society requires complicated curation training and charges fees for curating archaeological materials and the associated records; this complicates artifact retention policies. Most archaeological surveys generally do not recover large amounts of artifacts in terms of square feet so the artifact retention guidelines contained in this manual should not excessively inflate project costs even if the materials are curated at MHS. Furthermore, local museums may be able to curate materials if they meet OSA curation requirements. Materials recovered from Post-Contact archaeological sites or high-density lithic sites present the greatest challenges with regard to collecting policies.

If any human remains are discovered during analysis, the State Archaeologist must be immediately contacted and the remains set aside in a secure, respectful location. If the remains are thought to be Indian-related, the State Archaeologist will handle coordination with the Minnesota Indian Affairs Council (MIAC).

Site Inventory Forms

If an archaeological project is on non-federal land, Minnesota Archaeological Site Forms must be completed for each previously unrecorded site that is documented by the project and for all previously recorded sites where significant additional information is gathered (e.g., expanded site

limits, additional context definition, new artifact collections). If federal agencies want official Minnesota site numbers for sites on their property, they must complete a Minnesota site inventory form. The site form and instructions are on the OSA webpage.

Archaeological sites in Minnesota are defined as “any location containing evidence of past human activity that holds significance for most archaeologists.” A site can contain a single artifact or be just a surface or soil feature with no obvious artifacts. Inventory forms for all prehistoric/Precontact sites in a project area must be recorded on an OSA inventory form. An artifact from a single flake site should be examined by a lithics expert as some flakes, especially those in cultivated fields can be of non-prehistoric origin (e.g., plow-struck). Surface features such as possible ricing pits, mining pits, and pukaskwa pits should be designated as such only if their dimensions and locations are consistent with confirmed features of this type; there are many reasons for digging holes, some recent and some ancient. Animal bone finds will not be assigned site numbers unless significant non-bone artifacts are found with them or the bone shows clear signs of archaeologically significant human use or modification.

With regard to historical archaeological sites, the same inventory requirements are followed for Contact Period (1650-1837) sites as Precontact (prehistoric) sites so all such sites documented in the field must be inventoried on site forms. Site forms for Post-Contact Period (after 1837) archaeological sites should only be completed if one or more of the following conditions are met: 1) the site has already been subjected to intensive archaeological work (Phase 2 or 3), 2) the site will need additional and justifiable archaeological work, 3) the site is clearly potentially eligible for the National Register as an archaeological site, or 4) it is a historic human burial site not located in an officially recorded cemetery. If there is any doubt as to the importance of a historical archaeological site, fill out the site inventory form and the OSA will decide if it should receive an official site number.

Sites indicated by literature search alone will not be given an official site number by the OSA, although they may be assigned an alpha number. Surface scatters of late historic (post-1880) artifacts will not be given an official site number unless they are clearly linked to a significant surface feature (e.g., ruin, house depression) or to a significant activity or property through archival research. Historic properties (e.g., farmsteads) that are still represented by principal structural remains should be recorded on History/Architecture inventory forms rather than archaeological site forms unless significant archaeological work is done at the property.

All categories on the Minnesota site inventory form should be filled as completely and as accurately as possible. Contact the OSA if you have any questions concerning any of the categories. It is recommended that the *Additional Information* section at the end of the site form be filled-in with useful data in narrative form. This data is often critical to assessing the true nature of a site and its significance. For archaeological projects on federal lands, it is strongly recommended that state site forms be filled out and an official number be obtained from the OSA.

Site boundaries should contain multiple artifacts and/or features that are less than 100 meters apart or contained within distinct topographic features such as an island or a hilltop. Remember to include both legal locations (1/4, 1/4, 1/4-Section-Township-Range) and UTM designations for the site. For non-linear sites less than 10 acres in size, a single UTM point at the approximate site center is sufficient. For larger sites and sites with complicated boundaries (e.g., linear features like trails), multiple UTM points should define the site limits. Additional UTM points can be included in the *Other Locational Information* section of the site form. The method of determining the UTM coordinates should also be listed (GPS, USGS map manual plot, computer

conversion program). Either NAD 27 or NAD 83 datums can be used to determine UTM points, but the NAD date must be clearly listed on the site form. Accurate UTM data is essential to Geographical Information System (GIS) applications.

A photocopy of a 7.5' USGS map with the site boundaries clearly shown must be attached to the site form. The photocopy should be to the original map scale and should include more than one section of land. Sketch maps must be included if significant features are apparent or to indicate the location of test units. Sketch maps must be clearly linked to the USGS map or the real world and have north arrows, scales, and legends if appropriate. Computer generated sketch maps are generally less helpful than hand-drawn ones. If the inventory form is an update, the site number must be included on any sketch maps.

LITERATURE SEARCHES

A literature search examines standard references in order to summarize what has been written and what is known about a given area or topic without the necessity of fieldwork. Most literature searches are performed prior to undertaking fieldwork, but may be expanded during or after fieldwork. Literature searches can be used to help assess the need for survey and what methods should be employed, to develop site locational models, to determine areas of previous terrain disturbance or land-use, to provide historic context to help evaluate site significance, to provide background information for developing data recovery plans, and to provide sufficient information for National Register nominations or site interpretation. A literature search is synonymous with a records search or archival research, although literature searches can and, in some cases, should involve oral interviews with appropriate individuals such as landowners, local artifact collectors, and topical experts.

While a literature search is required as part of all survey and treatment activities, it can be a stand-alone document that by itself may fulfill all historic preservation needs for a particular project. It could demonstrate that an area or site has been sufficiently archaeologically documented by past work or that an area has little potential to contain significant archaeological resources and thus no survey is needed.

The Minnesota State Archaeologist does not set an absolute time limit as to how long a literature search is valid with respect to adequately assessing current land-use and the presence or eligibility of known sites within a project area. However, if a significant time period has passed within which additional sites were located in a project area, archaeological surveys were done in the general project vicinity, or pertinent new methods were developed, the literature search portion of an archaeological project might be deemed inadequate if considerable time passes before field work is undertaken or a project proceeds.

Basic Sources

Before an archaeological project is initiated, it is essential that the files located in the OSA and SHPO offices be consulted, in particular the databases for Archaeological Sites and Reports. As noted earlier, the OSA maintains the Archaeological Site Database and provides copies to the SHPO, but the OSA and SHPO Reports databases and paper site files are not the same and the OSA does not maintain a historic Standing Structures database. The OSA generally does not do database searches requested by contractors or researchers for archaeological projects in Minnesota, although the SHPO may complete small-area searches when requested by email.

Following examination of the Sites and Reports databases, pertinent site files, maps, or actual copies of archaeological reports should be examined. Paper site files contain not only site forms, but also any correspondence or additional information relating to the site. Phase 1 and Phase 2 archaeological reports provide details with regard to previous surveys in a given area. Phase 3 archaeological reports provide bibliographies, research questions, examples of artifact analyses, and regional culture histories. Do not rely exclusively on boundary depictions of sites on SHPO USGS maps or OSA site forms, but examine the original source if possible to examine boundary justifications based on field methods, extent of surveys, and field conditions.

Examining OSA files constitutes the *minimum* standard for literature searches on OSA reviewed, licensed, or sponsored archaeological projects in Minnesota. These files will document known sites and archaeological work that has been completed in the project vicinity. The files are updated almost daily, so each new project in a given area should involve a search of the *most current* information available in the OSA files. OSA office hours are normally from 8:30 – 4:30 Monday through Friday, but staff may be out, especially during the field season so call ahead.

Other Sources

The journal *The Minnesota Archaeologist* has been published since 1935 by the Minnesota Archaeological Society (MAS) and is available at most major Minnesota libraries. The MAS also had an occasional publication series with archaeological titles, as did the Minnesota Historical Society and the University of Minnesota's Anthropology Department. The *Minnesota Archaeologist* and the various occasional series publications form the core of Minnesota's synthetic archaeological literature. As of June, 2011, there is not a comprehensive overview book for Minnesota archaeology, although Guy Gibbon's is in press.

Information on the natural environment in Minnesota is widely accessible and detailed. Paleoenvironmental studies and quaternary geology studies are particularly abundant due to the leadership of Herb Wright at the Limnological Research Center at the University of Minnesota. These studies are available in numerous books and in journals such as *Quaternary Research*. Soils atlases are available for most counties in Minnesota, and more recent soil mapping information is available on-line. The OSA maintains a set of printed county soil surveys.

Important record repositories are the Minnesota Historical Society's Research Center in St. Paul, the University of Minnesota, and local facilities such as municipal libraries, county courthouses, and county historical societies. These repositories have county histories, government documents, manuscripts, research files, and maps. The University of Minnesota archaeological site files and artifact collections were transferred to the MHS Ft. Snelling History Center in 2000. Contact the MHS Archaeology Department to get access to these materials.

Maps are especially useful sources. Two key map references are the Trygg Maps based on the Government Land Office (GLO) survey notes/maps and the Andreas Atlas of 1874. Original GLO maps were placed on-line several years ago and are available at the MnGEO website. The GLO field notes are being digitized and should soon be available on-line. The MHS has an excellent map library that includes county atlases and a great variety of early Minnesota maps. For projects within cities, insurance maps and city atlases dating from the late nineteenth and early twentieth centuries are critical resources.

Aerial photographs are very useful for reconstructing land-use histories and even locating archaeological sites. Systematic aerial photographs were first taken of Minnesota in the mid-1930s. Copies of these early aerial photographs are available at the University of Minnesota's

Borchert Map Library in Minneapolis and some been made available on DNR's website. More recent aerial photos are available on-line at a variety of locations including MnGEO.

Literature searches are more than examinations of the written record. They should also include consulting knowledgeable groups and individuals such as local collectors, landowners, and topical experts. Any significant consultations should be noted in the report.

RECONNAISSANCE/PHASE 1 SURVEYS

Reconnaissance or **Phase 1 Surveys** determine if sites exist in a particular area and define the approximate vertical and horizontal boundaries of any sites within an area without significantly harming site integrity. The purpose of a Phase 1 survey is usually to determine if archaeological sites within a project area will be impacted by a development project or to characterize an area for archaeological research potential. Because an Area of Project Effect (APE) may not be contiguous with site boundaries, Phase 1 surveys often will not completely define the horizontal limits of archaeological sites that extend beyond the APE due to project need, agency guidelines, or lack of landowner permission. In these cases, project archaeologists are encouraged to provide a "best guess" estimate of *complete* site boundaries based on topography, although these limits can only be confirmed by field survey.

Phase 1 surveys can also make preliminary assessments as to a site's archaeological nature (e.g., context, function, condition, eligibility). Phase 1 surveys can involve the use of a great variety of archaeological field techniques including visual inspection, surface walkover (pedestrian survey), controlled surface collection, shovel testing, augering, coring, and electronic remote sensing. A Phase 1 survey provides enough information to allow consideration of *avoidance* if a site may be impacted by an undertaking and to gather enough information to allow for reasonable recommendations for more detailed work should it be necessary.

With respect to development projects reviewed by the OSA in compliance with state laws, the State Archaeologist rarely visits the areas he recommends for survey. OSA survey recommendations are often based on plotting the project area on USGS topographic maps. Because some USGS maps may be over 20 years old, the project area may have been dramatically altered by recent developments unknown to the OSA. It is the responsibility of the archaeological contractor to honestly re-assess the need for detailed survey based on reconstructing land-use history of the parcel and perhaps on a visual examination of the project area. (Some agencies and consultants refer to visual examinations as *Phase IA Surveys*, which are not subject to state licensing unless artifacts are collected or sought in a systematic manner.) If the land-use history or visual inspection clearly demonstrates the project area is so extensively disturbed that any archaeological sites would have been destroyed or damaged to the point of retaining sufficient integrity, the contractor should inform the project sponsor and the OSA of these findings so the need for detailed survey can be re-evaluated.

The horizontal extent and depth of proposed terrain disturbance also need to be considered. If project disturbance will be limited to a small area or is confined to an upper soil horizon with little archaeological potential (e.g., recent alluvium or fill), survey coverage generally need not include unaffected areas like undeveloped portions of the property or deeply buried strata. Adverse effects could include covering over a large portion of a rare archaeological site type in a manner that would unreasonably prevent future archaeological access to the site or placement of materials that may harm sensitive artifacts (e.g., organics for radiocarbon dates), so

any known sites or high potential areas in proposed fill sections need to be carefully assessed. Researchers also need to consider relative site potentials within large project areas.

Phase 1 Research Designs

OSA pre-survey review of research designs is not necessary for most Phase 1 archaeological projects. Phase 1 surveys answer basic and repetitive research questions, most importantly: “Is there an archaeological site within the Area of Potential Effect?” Research designs involve justifying methods to reasonably insure that sites were not missed, however, so Phase 1 surveys need to include formal research designs in the final report. In some instances on large or complicated projects, the Principal Investigator may want to submit a preliminary research design to the State Archaeologist for consultation to confirm that adequate strategies are being employed.

Determining the Area of Potential Effect (APE) is the first objective of research designs responding to development projects. As most archaeological sites will only be eligible under NRHP Criterion D (research potential), in most cases for archaeological assessments alone, the APE is assumed to be the project's construction limits. These limits need to be carefully defined, however, and should not be automatically equated with rights-of-way or project sponsor land ownership. Temporary slope easements, construction bypasses, equipment storage areas, utility construction, and temporary access roads can all harm sites. The integrity (e.g., setting, feeling) of sites eligible under National Register Criteria A, B, or C can be harmed by adjacent developments that do not physically disturb a site so these criteria should be considered, but only applied if clearly warranted.

The most complicated aspect of Phase 1 survey research designs is the development of site locational models to determine where field efforts will be focused. When designing site locational models for Phase 1 surveys, archaeologists need to be familiar with known site locations in the project vicinity and the results and methods of previous surveys in the region. The only time full-coverage surveys are performed on projects is when relatively small areas of land are involved, no deeply buried soils are present, and surface exposure approaches 100% (e.g., weathered agricultural fields plowed to till). Because pedestrian survey is relatively quick and inexpensive, limited survey in areas of low and moderate site potential with good soil visibility is easy to justify in order to test biases in site locational models. Shovel testing is labor intensive and expensive, so careful thought must be given to the extent of coverage even if it benefits modeling. Research designs for Phase 1 surveys need to give careful thought to transect spacing both in terms of the distances between transects and the frequency of subsurface testing along transects. How the soils removed from subsurface testing are examined also needs careful consideration; screening is generally the only acceptable practice.

Phase 1 Literature Search

The purpose of a literature search varies by the level of archaeological survey it is associated with. Literature searches are not undertaken just to provide bulk to a report, but to help refine the research design and to help answer questions posed by the research design. In the case of reconnaissance surveys, the literature search is aimed at helping to discover all sites in the project area by determining what kinds of sites are expected, where they tend to be located, and what field methods are most appropriate to find them.

Literature searches for reconnaissance surveys should follow the general guidelines previously described in this manual. In addition, they should examine standard culture histories for the Upper Midwest and archaeological studies within the project region including contract completion reports, articles on recent work at nearby sites, and up-to-date regional historic context overviews. Studies that include predictive models for site locations in the same region are of particular importance, especially on projects that involve large land areas or long horizontal corridors (e.g., roads, pipelines).

Archaeological investigators for Phase 1 surveys should also try to locate artifact collectors within certain localities and specifically ask landowners if they are aware of any artifacts or features that have been found in the project area. The OSA's Miscellaneous Information folders in the county site files often contain the names of local collectors.

Phase 1 Field Procedures

Adequate field methods for discovering terrestrial archaeological sites will vary according to the extent of soil exposure, the time of year, the geomorphic setting, and topographic factors such as degree of slope, amount of bedrock exposure, and presence of surface water. In general, pedestrian survey or shovel testing need not examine soils that are usually inundated or are located on slopes greater than 20 degrees. Areas of bedrock exposure should be examined for pictographs and petroglyphs and areas with bedrock cliffs should be examined for rockshelters, and caves. Submerged sites present special discovery problems and are discussed at the end of this section.

In general, shovel testing will be required if weathered soil exposure is less than 25% of the area being examined, the area has good to moderate potential to contain archaeological sites, and the upper 1 meter of soil has the potential to contain archaeological remains. Shovel testing is standard practice in non-cultivated areas of Minnesota and out-of-state archaeological contractors not accustomed to working in Minnesota should expect to utilize this technique where appropriate. If shovel tests cannot go deep enough to sample the entire Holocene soil column, such as areas where modern fill, alluviation, or colluviation has buried post-glacial soils, deep testing may be necessary. Removed soil should be screened through mesh no smaller than ¼", although in the case of coring a finer mesh is recommended.

Backhoes and other large earth-moving equipment should not be used as an initial Phase 1 site discovery method except under the following conditions: 1) Their use may be appropriate if geomorphological examination has demonstrated the presence of extensive modern fill, alluvium, or colluvium covering deeper layers and this upper layer has no potential to contain significant archaeological materials. 2) They can be employed if preliminary and sufficient small unit archaeological testing (e.g., augering) has failed to discover deeply buried archaeological materials and yet deep cultural horizons have a moderate to good possibility of being present. MnDOT has developed deep testing standards for their archaeological projects and these methods are in general conformance with OSA recommendations.

Winter fieldwork is expected to follow the same standards as warm season work, although methods may vary. If surface reconnaissance is the principal artifact discovery method, soil exposure should be adequate to document site presence/absence. If there is inadequate soil exposure due to snow cover, vegetational debris, or insufficient weathering, shovel or auger testing will have to be performed even in cultivated areas. Winter shovel test intervals and shovel test sizes should be the same as warm season work. Excavated soil must be screened through at

least ¼” mesh. If artificial heating methods are used to thaw *in situ* frozen ground, consideration should be given to the effect of such methods on near-surface artifacts and radiocarbon dates. If coring or augering is used, core/auger sizes should be as large as possible. Coring/augering intervals should be shortened and screen size reduced to maximize artifact recovery (e.g., finding micro-artifacts) if soil volume does not match standard shovel-testing soil retrieval amounts.

If low relief archaeological features are expected to be present in the survey area, a light snowfall often makes them more visible. Heavy snowfall will obscure low features, however, so surface reconnaissance will have to wait until after the snow has melted. This is especially important for suspected burial mounds where intrusive testing must be used with caution and only after OSA consultation. Human remains discovered during fieldwork should be left *in situ* and immediately reported to the State Archaeologist and local law enforcement authorities.

Field documentation should include daily log forms, photographic logs, and sketch maps of any sites. Detailed sketch maps do not have to be prepared for surveyed areas that were not determined to contain sites. Shovel test forms do not need to be completed for every shovel test in areas where the stratigraphy is relatively consistent and the area is located outside of archaeological site boundaries. Descriptions of soil columns should use standard techniques such as Munsell color charts and familiar texture/material/grain size compositions (e.g., % silt, clay, or sand). If GPS units are used to establish field locations, their type and accuracy should be noted in field logs and reports.

Surface Reconnaissance

Personnel experienced in recognizing all types of artifacts and regional surface cultural features should perform surface reconnaissance. Surface reconnaissance attempting to find artifacts should be conducted on exposed soils that have been washed by rainfall or that have been exposed for a long period of time. Artifact visibility in freshly plowed or recently graded soils is usually poor. Significant rainfall is the best method of increasing artifact visibility, although long-term exposure to wind in sandy or silty soils is also very beneficial. Soil features in freshly graded areas may only become visible after becoming wet or in some cases drying out.

Optimal times for surface reconnaissance in agricultural areas are early in the spring prior to crop emergence and late in the fall after fields have been plowed and rained on. Fields with row crops like soybeans and corn can also be examined at various times during the summer when adequate soil visibility is present, although this is becoming less viable as row crops are being more densely planted.

Transect spacing in high potential areas should insure that most of the entire exposed surface is scanned; five (5) meters is a reasonable minimal distance. In high potential areas containing row crops that have grown high enough to obscure wide scanning, spacing may have to be tightened. Spacing in areas of lower potential can extend to 10 or 15 meters or be limited to a single transect down the center of a narrow project corridor. In non-corridor surveys of areas of modest to low site potential, a single meandering or zigzag transect across the area may be appropriate. If convenient, some examination of low potential areas is always helpful to help test and refine site locational models. The use of All Terrain Vehicles (ATVs) for surface reconnaissance should be carefully described and justified in the research design.

When sites are encountered by surface reconnaissance, the amount of material collected and saved for laboratory analysis will be dependent on the artifact density, artifact variety, artifact type, land ownership, and related historic contexts. Sites intensively collected by local

artifact hunters will often have severely depleted amounts of particular artifact types such as ground stone tools or projectile points. For Precontact or Contact period sites, all obviously diagnostic artifacts (e.g., rim sherds, projectile points) and obviously formed tools (e.g., end scrapers, bone awls) must be collected and saved, as well as representative samples of lithic debitage, body sherds, animal bone, and other kinds of artifacts. For Post-Contact sites, careful judgment should be used when deciding how much and what kinds of artifacts are collected for analysis if curation costs or storage space are considerations and the fact that ferrous metals and organics may require costly treatment procedures prior to curation.

If a private landowner will not allow artifacts to be retained by approved curatorial institutions, a no-collect policy may be justified, but only after all reasonable attempts have been made to convince the land owner of the benefits of institutional curation. If artifacts are not collected, they must be thoroughly field documented by digital photography and perhaps piece plotting using sub-meter GPS units or other exact measuring tools.

Piece plotting the locations of individual artifacts is not necessary in a Phase 1 survey unless specified in the research design or due to no-collect policies, although areas of artifact concentration or artifact differentiation should be noted. Important surface features need to be mapped and the maps tied into easily re-located datums or recorded with sub-meter GPS.

Reconnaissance surveys in areas of exposed bedrock need to carefully examine rock surfaces for the presence of petroglyphs or pictographs. If rock art is discovered, care should be taken to avoid damaging the art by inappropriate documentation methods. Rubbings or application of highlighting materials should not be employed. Sketches and photographs are the most appropriate methods of recording rock art. Time of day is an important consideration for petroglyph visibility.

Shovel Testing and Augering

Shovel tests should be circular in shape between 30 - 40 cm (12"- 15") in diameter, should have approximately vertical sides to full-depth, and if possible should penetrate all post-glacial soil layers in settings where natural soils do not extend below one meter of the current ground surface. Soils deeper than one meter should be subjected to Deep Testing techniques (see below). Shovel tests should be regularly spaced along linear where possible and transects tied into a re-locatable datum. This is particularly important if any of the tests within a transect are positive for archaeological materials.

Shovel tests larger than 30-40 cm take more time to excavate and can inappropriately damage archaeological sites unless they are excavated in a controlled fashion like formal test units. Square as opposed to round shovel tests are more difficult and time consuming to excavate. The soil excavated from shovel tests must be screened through mesh not greater than ¼-inch square. Troweling back soils in lieu of screening is not an adequate site discovery method for Precontact or Contact period sites in Minnesota even in areas of clay-rich soils.

Shovel tests need to be individually numbered and the artifacts from positive shovel tests need to be specifically described. When shovel testing encounters archaeological materials, field notes should record the approximate depths of the materials and their stratigraphic context. Vertical control in positive shovel tests should be kept at a minimum of 20 cm levels. Typical profiles of some shovel tests in non-site areas should also be recorded. All shovel tests need not be profiled unless significant archaeological materials are encountered and no adjacent larger test units are excavated and profiled. Investigations that encounter extensive modern fill should not

assume the fill extends to glacial soils or bedrock. However, if the vertical disturbance caused by a project will be confined to existing fill, deep archaeological testing may be unnecessary unless related development activities (e.g., utility construction) will eventually penetrate the fill.

There is no hard and fast standard for the spacing between or orientation of shovel test transects within large areas or wide corridors, but enough units should be utilized to reasonably assess an area's site potential. For project corridors up to 15 meters (50') wide, a single transect down the middle of the corridor in areas of high to moderate site potential is usually sufficient unless a previously recorded site is in the immediate vicinity or the area has particularly high site potential. Shovel test transects in wide corridors need not follow a standardized spacing, but all areas having high to moderate site potential should be adequately sampled and the procedures need to be justified in the report. In large, polygon-shaped project areas, shovel tests should be concentrated in areas of highest site potential as identified in the research design.

Shovel test spacing along transects should not exceed 15 meters (50') in areas of high to medium site potential. If an area has particularly high site potential based on the literature search, informant reports, or regional predictive models, shovel test spacing of 10 meters or less may be appropriate. In areas of dense woods, intermittent bedrock, or other features that prevent regular shovel test spacing, irregular spacing is acceptable as long as overall total numbers of units remain about the same along a given transect and spacing between any two contiguous units does not exceed 20 meters in areas of medium to high site potential.

When a shovel test yields archaeological material, but the shovel tests on either side at 15-meter intervals do not, additional shovel tests should be excavated in the vicinity of the positive test preferably at regular intervals (5 or 10 meters) in the cardinal directions. This better defines site boundaries or artifact concentrations. The entire site should not be examined with close interval (e.g., 5 meter) shovel testing as this may inappropriately damage the integrity of the site and is unnecessary for the objectives of a Phase 1 survey.

If survey demonstrates a relatively high density of sites in the project area, locations initially thought to have only moderate or even low site potential should also be shovel tested if surface soil exposure in these locations is poor. The research design for a Phase 1 survey needs to carefully define and justify assignments of area site potential, especially when surface visibility is poor in the project area and expensive, time-consuming shovel testing in lieu of surface reconnaissance is required.

The use of coring or augering devices in lieu of shovel tests in shallow (< 1 meter), unfrozen soils is not often utilized in Minnesota as soil volumes are considerably less than standard shovel tests and vertical control in augered units is less exact. If these devices are used, a rotating post-hole auger (15 – 20 cm) rather than scissors-type auger or bucket auger is recommended as scissors augers can damage artifacts and most bucket augers are too small to adequately and efficiently sample an area. If augers are used, standard survey intervals must be reduced to 10 m in high potential areas. All removed soils must be screened and some attempt must be made to record typical sections of the stratigraphy. If archaeological materials are encountered, approximate cultural horizon depths should be determined.

All potentially useful artifacts recovered by shovel testing must be saved for analysis and curation so horizontal provenience needs to be carefully maintained. The exact locations of all artifact bearing shovel tests and adjacent negative shovel tests must be recorded and shown on sketch maps in the report. Global Positioning System (GPS) technology has greatly simplified

this, although small-unit GPS error can exceed 10 meters. Sketch maps showing unit locations need to include recognizable, re-locatable surface features and should be tied into project plans.

Deep Testing

Deep testing may be required if soils with high or moderate potential to contain significant archaeological materials exist below 1 meter and are located within an area that may be impacted by a project. The assessment of site potential should be based on known deeply buried sites in the project vicinity or landform suitability analysis such as that used by MnDOT's MnModel project reported on the MnDOT webpages. MnDOT also has guidance on deep testing on their webpage.

Techniques such as augering, coring, or machine excavation to penetrate overburden may be necessary as site discovery techniques. Auger holes or cores should be of sufficient diameter and spacing to approximate shovel test soil removal. The use of small diameter holes may require tightening intervals between samples. Excavated soils must be screened through ¼" or smaller mesh or scanned under low power magnification for micro-artifacts. As discussed earlier, if machine testing is used to remove overburden, care must be taken not to harm near-surface or deep sites that may be significant. It may also be necessary to consult a geomorphologist to confirm the fact that deeply buried soils may exist and at what depths. A geomorphologist should be part of an archaeological survey if complicated soil situations may be encountered.

Remote Sensing

The use of electronic remote sensing devices to document the presence of and extent of buried terrestrial archaeological sites during a reconnaissance survey is generally not acceptable in lieu of soil removal/screening except in soil conditions and site types where such techniques have proven reliable. For example, in the Anoka Sand Plain north of the Twin Cities, ground-penetrating radar has been demonstrated to find buried prehistoric features and artifacts as confirmed by subsequent excavation. Several types of remote sensing have been used to confirm the presence and extent of buried architectural features in urban settings and individual burials within historic cemeteries. Metal detectors can be very helpful in locating features and artifacts on Contact and Post-Contact sites. Reconnaissance surveys relying on remote sensing need to physically document the presence and character of archaeological materials if such are suggested and if they have bearing on management decisions.

Light Detection and Ranging (LiDAR) is one of the newest and most valuable archaeological remote sensing tools for surface features. These features include burial mounds, fortification ditches, and architectural features such as ruins, house depressions, or linear features (e.g. railroad grades). LiDAR can also be used to better topographically characterize an area to help determine what areas should be subject to survey. By the end of 2012, LiDAR data should be available for all of Minnesota, although it will be less useful in areas with significant amounts of coniferous trees due to the lack of full leaf-off conditions.

Construction Monitoring

If construction monitoring is used as a Phase 1 technique, it should only be done in situations where normal site discovery methods such as shovel testing and soil coring are not reasonably feasible. Examples of such situations include the presence of hard surfaces (e.g., parking lots) or deep burial by modern fill. In the case of federal projects, the use of monitoring

may need to be the subject of a Programmatic Agreement as discovery of an eligible site while construction is underway may limit preservation options. If monitoring is done during the winter when the ground is frozen, considerations have to be made for dealing with frozen soil, which tends to break off in large blocks, limiting visibility and cannot be screened unless thawed.

Underwater Surveys

All bottom-lands below lakes and rivers in Minnesota are considered property of the state including river bottoms and lake bottoms within federal lands (e.g., national forests). This means all archaeological surveys on bottom-lands must be licensed by the state and artifact removal is prohibited without a license. All artifacts recovered from bottom lands are property of the state.

In cases when archival research indicates the presence of or high potential for submerged cultural resources within a project area, an underwater reconnaissance using divers or a remote-sensing survey of the project area should be conducted. Divers are best employed when visibility is fair to good, the project area is relatively small, resources are likely not to be completely buried in sediments, and depths and water conditions permit safe diving practices (e.g., less than 100 feet deep). Inundated areas too shallow for diving can be examined using terrestrial sampling methods (e.g., shovel testing) or coring through frozen surfaces. Winter surveys through the ice can also be considered either for diving in deep areas or looking through clear ice at shallows.

Marine remote-sensing survey of the project area should employ dual instrumentation that will detect both buried and exposed cultural remains. In large bodies of water (e.g., Lake Superior), the following shipboard equipment is typically employed for underwater surveys: a accurate GPS positioning system, a depth recorder, and a marine magnetometer or a side-scan sonar. A shallow seismic (sub-bottom) profiler may be required where significant quantities of overburden are present in the project area.

Initial survey transects for underwater surveys should be spaced no greater than 50 meters for magnetometer survey and no greater than 150 meters for acoustic (side-scan sonar) survey. Intra-site delineation transects for magnetometer should be 15 meters or less (as required by anomaly size and duration). All analogue records should be manually annotated with position coordinates every 200 feet along a transect, unless remote-sensing/positioning data correlation is provided automatically through a shipboard computer interface.

Exposed underwater cultural remains located by remote sensing should be verified by visual inspection if safety and visibility conditions permit. Sub-bottom anomalies should be examined by manual or hydraulic probing, and if necessary, test excavation using induction dredge, airlift, or water jet, as appropriate to bottom conditions. Examination should include documentation by measured sketches, verbal description, and photography/video if feasible.

Phase 1 Laboratory Analysis

All recovered artifacts from Phase 1 surveys should be carefully examined and described in order to define site limits and to make a preliminary assessment of historic context and site function. Cleaning and labeling techniques should be pre-approved by the curational institution. Diagnostic artifacts used to suggest cultural-temporal affiliation should be classified according to standard historical index types or, in the case of historical artifacts, manufacturers or places of origin. Human remains discovered during analysis should be immediately reported to the OSA.

EVALUATION/PHASE 2 SURVEYS

For CRM purposes, **Evaluation** or **Phase 2 Surveys** can incorporate two basic objectives: to assess the importance/eligibility of a site and to gather detailed site information to help design an adequate and efficient data recovery plan should mitigation be necessary. Phase 2 surveys can also better define the vertical and horizontal limits of a site or gather other information for a National Register of Historic Places (NRHP) nomination or formal site interpretation. Evaluation Survey requires intensive fieldwork that usually involves the excavation of formal units (1x1 m or larger) with close provenience control and a level of analysis beyond reconnaissance surveys.

The OSA requires that NRHP criteria be used to evaluate a site's importance. This means that a site must be evaluated under one or more of the four NRHP significance criteria (A, B, C, D) and NRHP integrity aspects. The OSA does not require that an NRHP form be filled out to evaluate eligibility, although this can be helpful if eligibility is problematic.

In order to evaluate eligibility, a representative sample must be obtained from the site or at least within the limits of the site within the project area. This does not mean, however, that the entire site or project area must be tested utilizing intensive recovery techniques. If the Phase 1 survey, as well as the site topography and land-use history, suggests that a relatively uniform pattern of artifact distribution and integrity exists throughout much of the site, a limited number of test units may serve to evaluate a large site as well as a small site. More units may be needed, however, to characterize the site sufficiently to construct an appropriate data recovery plan. In general, Evaluation testing on state-licensed projects should not exceed 10 square meters unless approved by the State Archaeologist.

Although any archaeological survey on possible human burial sites needs to be carefully coordinated with the State Archaeologist and, in the case of Indian burials, with the Minnesota Indian Affairs Council, burial sites potentially affected by federal undertakings must also be assessed for National Register eligibility. These assessments must take care to limit disturbance of any burials so detailed literature searches, land-use histories, and field method selection are especially important for these types of sites.

If a site is determined to be *Not Eligible* or if effects to an *Eligible* site can be completely avoided by a development project, then there is no need to better characterize the site for the purposes of a data recovery plan. If a potentially eligible site cannot be reasonably avoided by a project or if not enough information has been gathered for completing a NRHP nomination or for doing adequate site interpretation, additional archaeological work may be necessary to properly characterize the site. In rare cases, the characterization survey may produce enough information to mitigate the adverse effects caused by a project. If there is any question as to the eligibility of the site following the evaluative stage of the Phase 2 survey, the agency and the OSA should be consulted prior to the characterization stage.

If a characterization survey of an eligible site suggests that preservation in place is clearly warranted due to the extreme importance of the site or because the site is eligible under criteria A, B, and/or C, project alternatives may be explored. This may also be the case if data recovery would be unreasonably expensive. If a site is determined to be eligible, the preferred management recommendation is almost always avoidance of adverse impacts.

It is usually inappropriate to recommend archaeological monitoring of an archaeological site during construction activity as a site evaluation or site characterization technique. If standard survey methods fail to justify a site's eligibility prior to construction, then the review process is at

an end and the project can proceed if there are no other non-archaeological objections. If unanticipated archaeological materials are encountered during construction projects, the sponsoring agency should consider the importance of these materials and treat them accordingly. Most large construction projects have Unanticipated Discovery Plans included in contracts.

Phase 2 Research Designs

Significance Evaluation

The first objective of most Phase 2 archaeological surveys is to evaluate a site's importance with respect to National Register eligibility. Eligibility is based on a combination of the site's inherent significance and its current integrity. Without carefully examining both these factors, eligibility cannot be assessed. If a researcher is willing to declare a site eligible for the National Register, that researcher should be able to write a National Register nomination for the property.

Ideally, the entire site should be assessed for eligibility, not just the portion in the project area. This often causes difficulties when a project's APE does not include the entire site and the sponsoring agency is unwilling to fund survey of any areas outside of the APE, especially off its property. If survey of the entire site is not possible and important areas of the site are suspected to exist in unsurveyed areas, assume that the entire site may be eligible if the portion in the APE is eligible unless integrity has been severely and obviously compromised in the unsurveyed areas. If the surveyed portion of the site is clearly not within an eligible site boundary, treat the surveyed portion as a non-eligible portion of an eligible site rather than suggest the entire site is not eligible unless this is obvious based on integrity factors. *Contributing* and *non-contributing* are terms reserved for discussing entire sites within districts.

Any researcher investigating the eligibility of a site must be familiar with National Register criteria of significance, the seven aspects of integrity (see below), and all applicable National Register bulletins. The researcher should also be aware of applicable Minnesota Multiple Property Documentation Forms (MPDFs) and context studies. MPDFs define historic contexts, property types, and registration requirements. The Minnesota SHPO has completed MPDFs for Precontact Earthworks, Native American Rock Art, Shipwrecks, and Logging properties. MnDOT has completed a draft MPDF for Woodland Period sites and a context study of Farmsteads in Minnesota.

Evaluation of an archaeological property is most efficiently done using the following sequence: 1) classify the property as a district or a site; 2) determine the associated historic context(s) of the property; 3) determine if the property is significant within Criteria For Evaluation A, B, C, and/or D; 4) determine whether the property retains sufficient integrity consistent with applicable significance criteria; and 5) determine if the property represents a type of property usually excluded from the National Register because of Criteria Considerations (e.g., cemeteries). If a property has obvious and considerable integrity problems, however, the other steps in the evaluation process can be bypassed.

Significance cannot be determined without considering the site's historical or thematic contexts and without having a firm understanding of the regional environment, the regional cultural/historical sequence, traditional historical index artifact types, previous archaeological work in the vicinity, the general number of sites of the same historic context and type, and National Register requirements for specific property types.

Generally, archaeological properties are found significant under just National Register Criterion D (research potential). Certain kinds of archaeological sites like type sites or well-known historic sites can also be considered eligible under Criterion A (historical events or patterns). Sites associated with the Post-Contact Period should also consider Criterion B (important person). Criterion C (design) is rarely used with Precontact archaeological sites, but notable exceptions are sites containing earthworks or rock art. Different significance criteria can lead to different effect assessments and treatment options.

If Criterion D is used to justify eligibility, it is not enough to state that a site has research potential. The site must *clearly* contain *recoverable* information necessary to answer *important* research questions. In order to frame the research topics, the investigator should consider: What kinds of information is the site known to contain? How could this information be used to answer important research questions? Can archaeological examination recover a sufficient quantity and quality of information to answer important research questions? On historical archaeological sites, can the questions be more easily and effectively answered by using non-archaeological methods (e.g., literature search, oral interviews)?

If Criterion A is used to justify eligibility, the investigator must be especially familiar with Minnesota's historic contexts. A single component Precontact site is often more valuable to archaeology than a multiple component site because extensive bioturbation in most areas of the state tends to vertically mix artifacts so it is difficult to ascribe particular artifacts to their original context. Where bioturbation is not a major problem, multi-component sites can be invaluable for determining regional cultural-historical sequences and relative dating of components.

A Precontact site lacking ceramics and other temporally diagnostic artifacts, could indeed have been left by Paleoindian or Archaic inhabitants of Minnesota, but without datable materials or temporally definitive artifacts there is little support for declaring the site eligible for the National Register unless it possesses exceptional qualities such as extensive exotic raw materials or an especially high density of artifacts. If a reasonable effort has been made to archaeologically examine a site and the site cannot be firmly assigned to a historic context or time period and does not represent a rare property type, then additional work at the site cannot be justified for environmental review purposes even if it will be destroyed by a development project.

Even sites that can be assigned to a historic context are not inherently eligible to the National Register. If the site will only produce redundant information or if preliminary research has suggested that the materials or features needed to answer important research questions are simply not present, then the site should not be considered eligible.

The evaluation of **integrity** is somewhat subjective, but it must be grounded in an understanding of a property's physical features and how they relate to its significance. The retention of integrity is fundamental for a property's ability to convey its significance. The seven kinds of integrity are: 1) location; 2) design; 3) setting; 4) materials; 5) workmanship; 6) feeling; and 7) association. To retain sufficient integrity to be eligible a property must possess several, and, in some cases, most of these qualities. With regard to archaeological sites significant under Criterion D, the most critical aspects are location, materials, and association. For Criteria A, B, and C, setting and feeling are also important.

In general, eligible archaeological sites need diagnostic artifacts, features, and intact cultural horizons where artifacts and features retain some vertical and horizontal locational integrity. A surface site could be eligible if it was associated with a rare property type or poorly understood context, especially if original horizontal patterning was still evident. This patterning

could be demonstrated by a controlled surface collection. The impact of past surface collecting by avocational archaeologists should also be considered especially with respect to the removal of diagnostic artifacts.

For more common property types and better-known contexts, sites lacking features are less likely to be eligible than sites with recognizable features. Precontact features that are especially valuable are hearths with datable charcoal, trash pits with diverse and abundant materials, and post-molds suggesting structures. For most Post-Contact sites, features such as wall ruins tend to have little research value and are better assessed under Criterion A.

Once significant archaeological materials with sufficient integrity have been found at a site then detailed *important* and *answerable* research questions can be framed. These questions are developed by considering how the site data could contribute to the general understanding of the history or prehistory of the United States, Minnesota or a particular locality, how these data might contribute to the resolution of research questions suggested by the historic preservation plans, or how detailed examination of the site could make a significant contribution to the study of archaeology.

Characterization

If the purpose of the Phase 2 survey is to better characterize an eligible site in order to develop a treatment strategy, complete a National Register nomination, or aid formal interpretation, the research design should focus on the following aspects:

1. What areas of the site will yield the best archaeological information? (i.e., what are artifact densities vertically and horizontally, where are features located)
2. What recovery methods will yield the best information and be cost effective? (e.g., unit sizes, screen mesh sizes, numbers of units, specialized techniques)
3. What types of *important* research questions can be most effectively addressed? (e.g., subsistence, seasonality, cultural affiliation, chronology, technology)
4. What difficulties will treatment activities encounter? (e.g., deeply buried horizons, difficult to screen soils, high water table, utility lines, etc.)

Phase 2 Literature Search

Literature searches for evaluation surveys should follow the general guidelines previously discussed in this manual. As previously noted, the purpose of a literature search is to help frame and answer the questions posed by the research design. In the case of evaluation surveys, the literature search is aimed at helping to discover the site's significance and its ability to convey that significance through its integrity. Because significance is based on context association, an evaluative literature search should examine standard culture histories for the region as well as contract completion reports and articles on recent work at local or regional sites. Studies that include other site evaluations in the same region should be of particular importance. Evaluation surveys must use and cite the appropriate National Register bulletins, Multiple Property Documentation Forms, and Minnesota Statewide historical contexts.

Characterization of eligible sites for the purposes of constructing a data recovery plan, completing an NRPH nomination, or aiding interpretation usually needs to expand the scope of the literature search as well as expanding the scope of the fieldwork. Previous data recoveries in the region should be examined to help determine appropriate field methods and research questions.

Phase 2 Field Procedures

Phase 2 surveys usually require the use of formal test units that allow the investigator to better assess the soil stratigraphy, types of artifacts present, vertical artifact densities, potentials for features, site extent, and site condition. The minimal test unit size is generally one meter square. Controlled surface collections of sites with sufficient soil exposure to discover horizontal patterning, remote sensing survey to find features, and coring to better document deeply buried horizons are also standard field techniques on intensive surveys. If more than 10 square meters of formal units are proposed for evaluation alone, this must be carefully justified and the OSA must approve the research design prior to the initiation of fieldwork.

The use of tight-grid ($\leq 5\text{m}$ interval) shovel testing should also be carefully considered and justified in the research design because it can inappropriately damage the integrity of a site. This is especially true if the purpose of the intensive survey is just to assess eligibility. Shovel testing generally does not allow for precise vertical control or discerning particular types of features. During the characterization phase of an intensive survey or a data recovery, however, tight-grid shovel testing may be needed to locate features or find artifact concentrations. It may be advisable to use square, fairly large (30 x 30 cm) shovel tests in this instance to maintain better vertical control or use small, augered units to do less damage and maintain better volumetric consistency.

The number of test units will vary by the contextual association of the site, size of the site, the site's condition, and the survey objective. A single 1x1 m unit may be enough to determine a site eligible if that unit clearly demonstrates a site's research potential and the site appears to possess sufficient and uniform integrity. In general, however, most archaeological sites will need multiple formal test units to assess eligibility. Additional units may be necessary to characterize the site for the purposes of developing a data recovery plan. Characterization surveys need to fully assess the kinds, quantity, and quality of archaeological materials a site is capable of yielding. If soil samples are removed, they should be processed using fine screening and flotation to determine if small animal bones and plant remains are present. All artifacts must be retained and curated.

Test units must be mapped with respect to a datum that can be readily re-established if preservation in place or additional excavation is considered. The datum should be located outside of the construction limits and it should be tied into a permanent local landmark, construction plans, or a sub-meter GPS fix. The datum's relationship to the test units must be clearly described in field notes and it must be clearly depicted on sketch maps.

No heavy equipment should be used to evaluate or characterize a state site without consultation with the OSA. Inappropriate testing of a site will be considered an adverse impact on the site. Excavators must also be aware of OSHA regulations with regard to the safety of deep test units and when heavy equipment is being used.

Field documentation should include daily log sheets, photographic logs, and sketch maps. Soil profiles should be recorded for each formal test unit and include color, texture, and structure. Level forms can be used to record information on each arbitrary or natural level in formal units and recovered artifacts should be placed in provenience labeled bags by unit and level or feature. Feature forms should describe features within formal units.

If construction monitoring is used as a Phase 2 technique, it should only be done in situations where normal site evaluation or characterization methods such as formal units are not reasonably feasible. Examples of such situations include the presence of hard-shell surfaces or deep burial by modern fill. If monitoring is done during the winter when the ground is frozen,

considerations have to be made for dealing with frozen soil, which tends to break off in large blocks and cannot be screened unless thawed.

Human remains discovered during Phase 2 fieldwork should be left *in situ* and immediately reported to the State Archaeologist and local law enforcement authorities.

Phase 2 Laboratory Analysis

Cleaning and labeling techniques should be pre-approved by the designated curatorial institution. Individual artifact numbering and physical artifact reconstructions (e.g., gluing sherds together on ceramic vessels) should be avoided unless permitted by the curation facility.

The level of artifact analysis depends on the objectives stated in the research design and whether or not the purpose of the intensive survey is to assess the eligibility or to characterize the site for possible treatment. All recovered artifacts should be carefully examined in order to make an accurate assessment as to site context and function. Diagnostic artifacts (e.g., rim sherds, projectile points) used to determine cultural/temporal affiliation should be classified according to standard historical index types or in the case of historical artifacts, manufacturers or places of origin. Lithic raw material types based on source locations should be suggested. Preliminary examinations of floral and faunal material need not attempt to identify each species, but suggest what general categories are present (e.g. large mammals, small mammals, fish, birds, mussels) and the state of preservation. Analysis for characterization purposes should go into more detail with regard to types, quantity, and quality of artifacts at the site.

EXCAVATION/PHASE 3 ACTIVITIES

For the purposes of CRM, a large scale site excavation or a site mitigation is considered to be the same as a **Phase 3** archaeological project or what is often called a *treatment activity*. It can also be referred to as a *data recovery project*. Treatment of archaeological sites usually involves intensive excavation or other forms of intensive field examination following a carefully developed plan. Treatment can also include non-fieldwork alternatives such as preservation easements and National Register nomination, but these options are not discussed in this manual. Treatment involving intensive fieldwork is generally only done for sites eligible under Criterion D.

Archaeological Phase 3 investigations are usually carried out to examine a site in detail and recover extensive data in order to mitigate the adverse effects of a construction project. Such investigations most often involve excavating extensive formal units, employing fine-scale recovery techniques, and subjecting recovered artifacts to detailed analysis. Phase 3 work can also include completing controlled surface collections when only horizontal integrity remains at an eligible site. Archaeological monitoring of construction activities at eligible sites can be part of a treatment activity if called for in a data recovery plan.

Phase 3 Research Designs/Data Recovery Plans

Data Recovery Plans (DRPs) for treatment activities are usually stand-alone documents that are submitted by the sponsoring agency to the OSA prior to the initiation of fieldwork. This is often specified in a Memorandum of Agreement (MOA) that is required under federal Section 106 when there is an adverse effect to an eligible property. The DRP is generally written in response to a Scope of Work or Request for Proposals (RFP) issued by a regulating agency or developer.

Some agencies use percentage of site area impact guidelines to establish how many square meters should be excavated in a data recovery. While project disturbance percentages have some usefulness in gauging treatment needs, percentages are generally not very useful in determining absolute numbers of test units. This is because there is so much variability in site sizes, the location of use areas within sites, artifact densities, soil types, site depths, the presence of and type of features, the cultural context, and nature and extent of the adverse effect as well as consideration of what a “reasonable and good faith effort” entails. Mitigation needs to be reasonable if the agency is going to willingly undertake it and the public or project sponsor willingly pay for it. Excavating even 1% of many archaeological sites could cost millions of dollars and may not yield additional important information that a much smaller excavation would have found. In some settings, treatment strategies should involve the use of techniques such as remote sensing and mechanical stripping to find features, as well as excavation units scattered over the affected area based on shovel test results or surface features.

Data Recovery Plans must not only contain the standard elements of a Research Design discussed earlier, but the following elements as well: a project description, a description of all affected properties, the results of previous research relevant to the project including a summary of Phase 1 and 2 surveys, a justification of the cost-effectiveness of the field and laboratory methods, procedures for evaluating and treating unexpected finds (e.g., human remains), curation arrangements, methods to keep Indian tribes, local governments and other interested parties informed, a reporting schedule, and methods to present the final results to the public and professional peers in a timely manner. It should also address any specific requirements of the OSA or those listed in a project MOA.

The research objectives of the treatment activity must be clearly defined. Is the purpose to mitigate adverse effects of a project upon an eligible archaeological site or is it just to explore the archaeological value of a site? Once the objectives have been defined, methods must be discussed and justified. Clarification of any specialized or unique archaeological methodologies must be detailed in the research design for the project. The best research designs are innovative and flexible in order to deal with initial field findings and unanticipated field conditions. They may also involve phasing to eliminate excessive fieldwork or analysis if recovery expectations are unfulfilled. However, recovered materials that are not being addressed by project research questions should not be discarded without careful consideration of their future research value.

The National Register Bulletin on archaeological sites (Revised 36:31) stresses that “a single important research question is sufficient” for a site to be eligible under Criterion D. A single question may be enough for a Phase 3 if that question is indeed *important* and indeed *answerable*.

Phase 3 Literature Search

Literature searches should follow the general guidelines discussed earlier in this manual. An extensive References Cited section is expected because a detailed understanding of the regional cultural and environmental history as well as archaeological method and theory is necessary. Standard culture histories for the region and the Upper Midwest should be examined, as well as contract completion reports and journal articles on recent work at other relevant sites. Studies that include treatment activities should be of particular importance. The literature search for a treatment activity significantly differs from those associated with reconnaissance and evaluation surveys in that the Principal Investigator must demonstrate not only a familiarity with the region, but with the scientific methods and sound archaeological practices.

Phase 3 Field Procedures

Field methods used for extensive excavations at archaeological sites exhibit the most diversity and are the most expensive to implement. As mentioned earlier, there is no standard formula for the amount of excavation based on the area of the site being affected. All artifacts need to be retained and properly curated. Field documentation should include daily log sheets, photographic logs, and sketch maps. Soil profiles should be recorded for each formal test unit and include color, texture, and structure. Level forms can be used to record information on each arbitrary or natural level in formal units and recovered artifacts should be placed in provenience labeled bags by level or feature. Feature forms should describe features. Human remains discovered during fieldwork should be left *in situ* and immediately reported to the State Archaeologist.

Formal Unit Excavation

If excavation of formal units is the principal data recovery technique, these units should be no smaller than 1-meter square and should be laid out on a grid system tied into a permanent datum. The datum should be located outside of the construction area and tied to construction plans. It should also be recorded with a sub-meter GPS unit. All unit measurements should be metric.

When features or artifact concentrations are encountered, contiguous meter square units should be opened and taken down together to obtain a better “window” into the site and to maximize data recovery. Configuration of the units is best determined by the Principal Investigator following the excavation of a number of initial test units. The use of soil balks between units or in the corner of units is also the decision of the Principal Investigator, although the use of balks is generally unnecessary if the site lacks a complex soil stratigraphy or obvious features.

In Minnesota, many sites do not exhibit visually obvious soil stratigraphy so excavations often utilize arbitrary levels to maintain vertical control. Phase 2 examination of the site should have ascertained appropriate excavation level thicknesses or if obvious stratigraphic layers exist. For arbitrary levels, 5 or 10-centimeter levels are the most commonly used. In settings where the upper horizon of a site has been severely disturbed (e.g., cultivated), it is permissible to remove the disturbed horizon as a single layer, but this needs to be justified in the data recovery plan. Some consideration may need to be made of the artifacts within this disturbed horizon (e.g., controlled surface collection), unless they are not essential to the site’s eligibility or understanding.

If an archaeologically insignificant modern fill deposit overlies intact archaeological deposits, mechanical removal of the overburden may be necessary. If used, this technique should be described and justified in the research design. Artifacts within fill layers determined to be originally from the site being excavated may still have value in answering research questions, however, and they should not be discarded without proper consideration and justification.

One-quarter inch mesh should be the maximum screen size used to sift excavated soil. Deviations from this must be well justified in the research design. Smaller screen sizes are encouraged if soil conditions permit. Fine-mesh screening and flotation of features should be done, utilizing water separation methods. The size of the mesh should be specified in the research design and related to expected results. Standard nested screens can be used early in the process to determine appropriate sizes. Whether or not soil samples are to be retained should be described in the data recovery plan. A discard protocol should also be developed for items like fire-cracked rock and recent historic materials if present.

When undertaking an excavation, representative samples of all artifact types should be sought and retained even when research questions don't require those types of materials. For example, if cultural context is a critical research question and answering this question is dependent only on obtaining diagnostic artifacts through ½ " screening, but this screening may not retain much of the small mammal and fish bone and lithic debitage. A sample of significant historic period artifacts should be saved even when all of the research questions focus on the prehistoric period.

Detailed field notes accompanied by extensive photographic images are expected during Phase 3 excavations. Photographs should include mortarboards in excavation units listing the site number, unit, level, view direction, and date. The vertical and horizontal provenience of recovered artifacts must be carefully maintained in the field and in the laboratory. Features as well as typical sections of the stratigraphy should be sketched and photographed with scale. Level forms should be carefully and consistently completed.

Other Phase 3 Field Techniques

If the site is largely an artifact scatter in a cultivated field, controlled surface collection followed by grading monitoring are the most cost-effective techniques for data recovery. Two controlled surface collections are recommended with soil turnover intervening and adequate weathering preceding each collection. If a controlled surface collection was completed as part of the Phase 1 or 2 survey, this will suffice for one. Transect spacing should not exceed two meters. Artifact locational controls should utilize exact piece-plotting when artifacts have low or moderate densities and grid squares for high density sites. Surface collection control grids should not exceed five (5) square meters. For especially dense sites, sampling is permitted, although all potentially diagnostic artifacts should be recovered. A few formal test units should be excavated to better assess overall site artifact density.

When archaeological monitoring of heavy equipment stripping of the site during or prior to construction is required, a monitoring plan should be submitted as part of or as a supplement to the data recovery plan. The monitoring plan can be altered following the completion of the archaeological controlled surface collection or excavation. The monitoring plan should include timing of the procedure, methods of grading and surface examination, and data recovery strategies if significant materials are exposed. Wheeled vehicles (e.g., graders, belly scrapers) are recommended rather than tracked vehicles (e.g., bulldozers) to complete the striping as they leave a cleaner surface, although large tree roots in some areas may require the use of a tracked vehicle.

Phase 3 Laboratory Analysis

The purpose of a data recovery is to recover data, but data are not the same as artifacts. Artifacts are of little value unless they are carefully analyzed. Once they are analyzed by appropriate experts and summaries are made available to others they become data. Regardless of the formal research questions, some basic analysis should be performed for all recovered artifacts, although analytical techniques should be focused on answering questions outlined in the research design. Cleaning and labeling techniques should be pre-approved by the ultimate curational institution. Organic materials suitable for radiocarbon dating should be handled carefully to avoid contamination. Absolute dating is one of the most important considerations for any archaeological data recovery on Precontact sites.

Ceramics are generally the most useful artifacts for determining cultural/temporal affiliation (context) from Precontact archaeological sites. Basic counts and weights of sherds by size grades and analytical categories (e.g., rims, near-rims, body sherds) should be presented in tabular form according to provenience. Sherds used to determine cultural/temporal affiliation should be carefully described and classified according to standard historical index wares, types, and varieties, although new types can be defined. Manufacturing techniques (e.g., thickness, temper, surface treatment, vessel form) and decorative modes should be carefully described. The number of vessels present should be determined. Sherds should be carefully examined for charred encrustations useful for dating or dietary analysis.

Lithic artifacts are the most commonly recovered items from Precontact archaeological sites in Minnesota. Projectile points are the most useful stone tools for determining cultural/temporal affiliation so they should be carefully described and classified according to standard historical index types. Other formed tools should also be carefully described and classified by function or type. Broken to complete tool ratios should be presented or fracture analysis undertaken to suggest use-phase or life cycle. Lithic raw material types and percentages based on source locations should be determined. Debitage should be examined to determine basic technology (e.g., core, blade) and be size graded and examined for cortex presence. Cores should be identified. Ground stone tools should be categorized by function and/or standard typologies. Ground stone should be carefully examined for pigments and other residues prior to washing.

Faunal analysis should identify what species and elements are present. Minimum numbers of individuals and amounts of edible meat for each species should be determined. Epiphyses, teeth, and fish scales should be examined to help determine seasonality. Weight percentages of burned versus unburned bone based on provenience should be determined. Bone should be carefully examined for butchering marks and polishing suggesting tool use. Suspected human remains should immediately be reported to the State Archaeologist and set aside in a secure, respectful location.

Floral analysis should attempt to determine species, especially for charred seed remains. Species identification of wood charcoal is not necessary unless it has direct bearing on research questions. Pollen survival in terrestrial environments is usually poor, but investigators should be aware of its applicability to some research questions. Opal phytolith analysis is also a research option.

Other artifacts such as copper, bone tools, and shell tools should be carefully described and classified using standard typologies. Determining the source for the copper may have bearing on research questions. Fire-cracked rock (FCR) may be discarded in the field, but its location, density, and raw material type should be carefully recorded; weighing prior to discarding is recommended. Some FCR can be used as expedient tools, a fact which may escape casual field inspection so the retention of some sample of the FCR is advised. Reasons should be presented why rock is classified as fire-cracked.

Historical artifacts such as ceramics and bottles are important in determining the absolute age of Contact and Post-Contact sites if manufacturers or places of origin can be ascertained. These artifacts are also useful for determining site function, assigning historic context associations, and answering other research questions. Curatorial needs of artifacts made of ferrous metals or organics need to be given careful considerations, especially if removed from wet environments. Historical artifacts include a wide range of artifact types that need to be carefully considered by research questions and the appropriate level of analysis and expertise applied.

Radiometric Dates are critical to our understanding of the state's Precontact archaeological history and where individual sites and contexts fit into this history. Every effort should be made to obtain and properly conserve datable materials at all levels of archaeological investigation. Phase 2 and 3 investigators are encouraged to obtain several radiometric dates if appropriate materials are recovered from sound stratigraphic or feature contexts. Agencies should budget for radiometric dates in their scopes of work and investigators should assume they will obtain dates when this information is important to assessing site significance or implementing a data recovery.

Radiocarbon dates should be listed in the report text with their uncorrected RCYBP date (conventional age) along with the standard deviation and lab number. A corrected BC/AD date can also be listed along with the correction program used and version (e.g., CALIB 6.0).

The OSA maintains a database of radiocarbon dates from Minnesota. Copies of all original laboratory forms for radiocarbon dates along with basic information as to the type of material dated, the type of site, (e.g., habitation), the depositional context, and the suspected cultural context should be sent to the OSA even if radiocarbon dates are obtained for a project not reviewed by the OSA.

AUTHENTICATION ACTIVITIES

As defined in Minnesota Statutes 307.08, Subd. 13, *authenticate* means "to establish the presence of or high potential of human burials or human skeletal remains being located in a discrete area, to delimit the boundaries of human burial grounds or graves, and to attempt to determine the ethnic, cultural, or religious affiliation of individuals interred." The State Archaeologist has the exclusive right to authenticate historic burials in Minnesota, but due to limitations on OSA staff-time and funding there are instances where the State Archaeologist recommends that another archaeologist do the fieldwork necessary to complete an authentication.

Authentication by the State Archaeologist involves three steps: 1) *Verification* - an assessment of whether or not an area is indeed a human burial ground or uncovered remains are indeed human, 2) *Delimitation* - a determination of the boundaries of the burial ground, and 3) *Identification* - an attempt to identify the ethnic, cultural, and/or religious affiliation of the remains. Authentication can take place in the event of an accidental discovery of suspected human remains or upon request from agencies or landowners who have suspected burial grounds on their property.

Archaeological contractors must obtain an Authentication License from the OSA before beginning fieldwork. If a probable Indian burial is involved, MIAC approval of the archaeological contractor is also needed if the fieldwork involves the *disturbance* of a possible Indian burial ground. The State Archaeologist will serve as co-Principal Investigator for all authentications. All coordination with MIAC will be handled by the State Archaeologist.

A Literature Search for an Authentication should begin with a careful examination of OSA paper files in both the Burial Sites file and the Archaeological Site file. If the authentication involves mounds mapped by T.H. Lewis, investigators should not rely on the Winchell (1911) map alone, but examine the Lewis notes on file at OSA to verify that the Winchell reconstruction is accurate and complete. If the mounds were mapped by Brower, his notebooks and publications should be examined. The OSA has microfilm copies of both the Lewis and the Brower notes and these may need to be examined if photocopies are indistinct. If information concerning a suspected burial site is based on a recent informant account, the informant should be contacted to

verify the initial account and to determine if the informant has any ulterior motives such as trying to stop a development adjacent to their property for economic or aesthetic reasons.

Fieldwork should carefully follow the OSA Scope of Work and begin with a thorough surface examination of the entire area for bone and artifacts in exposed soil, for obvious surface features (e.g., mounds, depressions, markers), and for other visual indicators of burials or burial grounds (e.g., plantings, disturbed ground vegetation). The use of non-invasive or minimally invasive techniques is also encouraged. In the case of burial mound sites, Light Detection and Ranging (LiDAR) analysis is often helpful and high quality LiDAR data is available for most mound areas of Minnesota. Other remote sensing techniques such as ground penetrating radar have proved useful for historic burial grounds, but these techniques have not demonstrated their usefulness for finding prehistoric burials in Minnesota. Use of metal detectors is recommended for examination of historic period burials that may be shallow.

Small diameter soil probes may be used to look for sub-surface features or assess soil conditions. However, burials will not be authenticated by the State Archaeologist on the basis of remote sensing results or small diameter soil cores alone even if no longer visible mound-like features or human remains have been previously found at a particular location. Remote sensing and small-diameter soil cores have limited value in determining that a soil anomaly is for certain a remnant of culturally placed mound fill or a burial pit. There are many cultural and natural processes that cause soil anomalies.

If the initial field examination fails to find any surficial or sub-surface evidence for burials, the authentication procedure may be terminated unless there are detailed records (e.g., T. H. Lewis notes) or reliable oral evidence for a burial ground in a specific location. Additional field work may be performed utilizing more invasive hand excavation methods (e.g., large diameter soil cores, shovel tests, narrow trenches, formal test units). Soils should be ¼” screened. If the detailed field examination fails to find any evidence for burials, the State Archaeologist may terminate the authentication procedure at any time. If human remains are found, they should be left *in situ*, carefully covered from view, and the State Archaeologist immediately contacted. The State Archaeologist will handle all coordination with MIAC.

If the results of detailed field examination are negative or problematic, yet written records and/or strong oral evidence suggest a burial ground once existed in a particular area and the area cannot be reasonably avoided by a development, the OSA may recommend more aggressive methods to find possible burials or burial features. Depending on the detail of the locational information and the nature of the development, the additional work may involve large area hand excavation or even monitoring machine excavation. In some instances, the additional work can be done in conjunction with construction activities and may essentially be monitoring of controlled topsoil or fill removal. If these aggressive techniques are to be utilized on a suspected Indian burial ground, careful OSA consultation with MIAC will take place prior to any disturbance.

PART 3: OSA GUIDELINES FOR REPORTING ARCHAEOLOGICAL PROJECTS

Reporting is perhaps the most important element of an archaeological project. It documents that archaeological work has been done at a specific site or on a specific project and provides enough to detail to assess if the work is adequate to fulfill legal and management needs. Reports are also the foundation of archaeological research. Although most CRM reports are not widely distributed, they are available to researchers at the OSA, the SHPO, or at sponsoring agencies.

Project sponsors, regulating agencies, or Principal Investigators can submit project completion reports to the OSA. In the case of federal and state laws, it is the regulating agency's responsibility to insure that the report is adequately completed and that archaeological personnel meet appropriate standards, although any work on non-federal public land or involving non-federal historic burials is subject to OSA licensing requirements.

Agencies should submit the final report to the OSA along with an accompanying letter that states the overall effect findings as well as eligibility/significance opinions regarding any involved sites. Cover letters should also include the project name, a basic description of the scope of the project, and the scope of the archaeological work. Do not bind cover letters into reports.

If a report discusses a site that was unnumbered prior to a survey, an official site number should be obtained from the State Archaeologist prior to report submittal to OSA. Site numbers are needed to link reports to sites in the OSA databases. Occasionally, a site number cannot be obtained in time to complete a Phase 1 report if there is some urgency to project development. Site numbers must be obtained for all Phase 2 reports, data recovery plans, Phase 3 reports, and positive Authentication reports.

GENERAL GUIDELINES FOR REPORTS

Letter Reports

Letter reports for Literature Searches and Reconnaissance Surveys may be submitted in lieu of formal reports if the project under review affects a relatively small area (less than 40 acres) that does not contain or has demonstrated low potential to contain archaeological sites. Letter reports are generally only two or three pages in length. The letter report should contain a detailed description of the project (location, acreage, type of project), a description of the current land use, the date of the survey, a description of the archaeological survey methods, the names of the personnel involved in the survey, and the results of the survey. A photocopy of a USGS 7.5' map with the project area clearly depicted and survey areas delimited must accompany the letter report. The letter report does not need to contain regional environmental histories, regional culture histories, references, or lengthy background discussions. The Principal Investigator should sign letter reports.

Agency survey forms are generally not accepted by the OSA in lieu of formal archaeological reports unless the forms are consistent with OSA reporting guidelines or the individual surveys are comprehensively summarized in an annual report submitted to OSA.

Annual Reports

Certain programs and agencies produce annual reports that summarize their cultural resource management activities. Annual reports need to be clearly titled as to whether they summarize programs, projects, or surveys. These reports should follow the general reporting guidelines summarized in this section noting the special needs listed under Management Summary/Abstract. Annual reports usually do not need to go into the detail individual project or site reports provide, unless they are the only reports being written for a program, project, or site. If annual reports are being widely distributed, care should be taken to avoid providing sensitive site locational information accessible to the general public, especially for burial sites. The OSA copy, however, must have this information.

Public Reporting

For large survey projects and most Phase 3 mitigations or excavations, some form of public reporting is expected. All archaeologists need to be aware that they have a professional obligation to make important information widely accessible to a variety of audiences, especially other professionals. The OSA encourages agencies to include some form of public reporting in their project scopes when important sites are involved. Public reporting considerations not only include the form the report takes, but its method of distribution. A well-written public report or pamphlet is only useful if it is disseminated to a widespread, interested audience. The Internet has greatly facilitated public reporting and its use is encouraged. Other public reporting venues include giving copies of appropriate reports to local libraries, making local presentations, holding news conferences, having an open house at a site, and publishing summary reports in regional or national archaeological journals. Agencies and archaeologist must take care to not reveal exact archaeological site locations to the general public unless a site is locally well-known.

Formal Reports

Formal reports should consist of the following sections: **Cover/Title Page, Management Summary/Abstract, Table of Contents, Report Body** (main text with sections listed below), and **References Cited. Appendices** may be added if needed, *but should only include necessary information* (see below). In general, keep reports as compact as possible by using single-line spacing, margins that do not exceed one inch, and printing on both sides of the paper. Long reports should be bound (> 50 sheets), but shorter ones stapled. Compact disks of entire reports or selected sections of reports can be submitted along with printed reports, but the OSA generally requires a printed copy of all reports, although extensive appendices can be submitted in digital form.

The report should be written as much as possible in non-technical language so it is understandable by the project sponsors and the general public. Always consider all possible audiences when writing reports. Report preparers should also review the reporting requirements of the contracting agency, as well as the SHPO if applicable. In most cases, OSA reporting standards meet or exceed guidelines of other review agencies.

Cover/Title Page

Make the *title as short as possible* because titles need to be entered into the OSA report database and long titles make this process more difficult and use of the database more cumbersome. In general include the following items in the title: the **level of the archaeological work**, the **name**

of the project, the **county** (and **city** if applicable), and **Minnesota**. For example, “An Archaeological Reconnaissance Survey of County Road 37 in Beltrami County, Minnesota.” If the project is Phase 2 or Phase 3 involving a single site, put the site number in the title. If the project sponsor or agency requires additional information such as a more exact location or contract/project numbers, put this in a sub-title.

Do not use “*Cultural Resource Management Survey*” in the title unless the report addresses *all* potential historic property types including archaeological sites, buildings, structures, landscapes, and traditional cultural properties. Do not use just “*An Archaeological Investigation...*” without being specific about the level of a CRM investigation (e.g., reconnaissance). If “archaeological” is listed in the title, it is assumed that *historic* as well as *prehistoric* resources were included.

Other items that need to be on the title page are the report author(s), the Principal Investigator, institutional affiliation of the archaeologists, and the date of the report including month and year. The SHPO Review and Compliance number and OSA license number can be included.

Management Summary/Abstract

The Management Summary or Abstract needs to appear as a separate page. *It should not exceed one page in length, yet should be long enough to contain basic necessary information.* The basic information it contains is generally what goes into the various fields of the OSA archaeological reports database and summarizes what is needed to make an effect finding, management decision, or characterize a project. It should contain a *brief* summary of the project including:

- type of project (e.g., highway construction, pipeline) and basic scope
- level of archaeological work (e.g., reconnaissance survey)
- name of Principal Investigator and institutional affiliation
- names and roles of key personnel
- survey dates (days, months, and year)
- location: county, township, range, sections (if large project use county only; if in multiple counties, list all counties)
- archaeological region and sub-region where the project is located (see Appendix C)
- number of acres surveyed or length of survey in miles and corridor width
- the project sponsor and government agency involved
- identifies the landowner/manager
- brief description of methods employed (e.g., shovel testing)
- the use of any special analytical techniques (e.g., C14 dating)
- a brief description of located sites: number, type, contexts, and state site number
- site eligibility recommendations if applicable
- management recommendations (e.g., effect finding, project alternatives)

Abstracts of program annual reports should also contain basic statistical information such as how many development projects were reviewed, the types of archaeological work (e.g., reconnaissance surveys, evaluation surveys), the counties where the work took place, the number of previously unrecorded sites located, the number of previously known sites involved, and an estimate of total surveyed acres.

Table of Contents

This section is especially important for longer reports that involve multiple sites or complicated projects that involve detailed artifact analyses, extensive field work, or extensive specialty work (e.g., geomorphology). Page numbers of important sections must be listed in the Table of Contents. Lists of illustration or tables should also be included for extensive reports.

Report Body

The report body is the main text of the report that presents a detailed description of the project and its setting, the archaeological methods employed, the results of the investigation, and management recommendations. In most cases, the report body could be divided into the following sub-sections: **Introduction/Project Description, Research Design and Methods, Environmental and Cultural Setting, Results, and Conclusions and Recommendations.** Titles for these sections and their sub-divisions may vary greatly in reports, but basic content should include the elements listed below.

The detail presented in the sub-sections of the Report Body will vary greatly based on the objective of the archaeological project and the extensiveness of the undertaking it is addressing. For instance, most Literature Searches and Reconnaissance Surveys do not need lengthy environmental background and culture history sections unless they deal with a project that affects a large, diverse area such as multi-county pipelines. On the other hand, Evaluation Surveys and Mitigation projects need to provide enough supporting information to adequately assess site significance, site integrity, and properly address research questions.

The **Introduction/Project Description** should:

- describe the project (purpose, sponsor, ground disturbing potential)
- define the project APE (Area of Project Effect)
- provide a photocopy of a 7.5' USGS map clearly showing the project boundaries;
for large area or long length projects use a county map or a larger scale USGS map
- list the project location by legal description (Section, Township, Range) and UTM
(For projects less than 40 acres in size, one UTM point at the approximate center. For larger projects and projects with complicated boundaries use multiple UTM points.)
- identify the key project personnel (e.g., Principal Investigator, Field Director)
- identify any groups or individuals consulted and why
- identify the curational facility

The **Research Design and Methods** should:

- Research Designs consist of two parts: Objectives and Methods
- address research questions that are *important* and *answerable*
- suggest methods that are appropriate to answer the research questions
- include both field and laboratory methods used
- note necessary personnel qualifications
- list major sources examined for literature search
- list institutions visited or individuals consulted and the date of visit/consultation

The **Environmental and Cultural Setting** should:

- describe the current environmental setting

- describe the past environmental setting within its regional context
- cite the references used to define the environmental setting
- note the archaeological region and sub-region where the project is located
- list recorded sites and previous archaeological work in project vicinity
- provide a culture history of the project area within its regional context

The **Results** should:

- give days, month, and year when activities were performed
- describe pertinent field conditions (e.g., percent of surface visibility)
- describe areas surveyed with Area of Project Effect (APE) and why
- describe and justify methods and techniques used in field
- describe and justify laboratory methods and techniques
- describe and justify any deviations from the research design
- note curation arrangements
- provide 7.5' USGS map photocopy showing site locations
- include sketch maps showing survey areas/transects and excavation units
- include sketch maps showing important site features and known site limits
- include photographs of important artifacts or features

The **Conclusions and Recommendations** should:

- discuss sites located and materials observed/collected
- present a brief summary of survey findings
- state an opinion as to the potential National Register eligibility of involved sites
- state an opinion as to the appropriate environmental review finding
- present management recommendations or suggestions for additional work
- make recommendations for additional consultation and why

Illustrations bound into the text should generally be standard paper size (8.5" x 11").

The use of color is unnecessary except in instances where it is important for defining the project setting (e.g., Sanborn Insurance Maps) or illustrating particular artifactual aspects (e.g., lithic raw material types). If color is used on critical project or survey location maps, use colors and symbols that photocopy distinctly and discreetly. USGS maps should be copied at the original scale, but need not be in color. Captions on USGS maps should note the map name and date. All sketch maps must include a scale and a north arrow. Sketch maps are usually better hand-drawn rather than computer generated. If computer generated maps are used, they should be clearly tied into features that are easily recognizable on USGS maps or can be easily relocated in the field. Do not plot unexcavated shovel tests or test units on sketch maps. Captions on photographs of site or project areas must include a direction of view and describe from where they were taken. Photographs of artifacts must include a regularized scale preferably with both metric and English measurements.

References Cited/Bibliography

The References Cited or Bibliography section of the report should follow the *American Antiquity* style guide found online at www.saa.org/publications/styleguide/saaguide.pdf or found in issue 57:749-770 of October, 1992.

Appendices

Reports for literature searches, reconnaissance surveys, and most evaluation surveys generally do not need appendices. Copies of negative shovel test forms, personnel *vitae*, unessential project correspondence, the state archaeological license, state site forms, National Archaeological Database (NADB) forms, agency scopes of work and contracts, SHPO or OSA inventory printouts, and artifact catalogue sheets should not be included in the bound copy of reports submitted to the OSA. Descriptions of typical shovel test profiles and pertinent soils information should be included in the main body of the report.

Important artifacts should be discussed and illustrated in the body of the report. Statistical summaries should be presented in tabular form in the main body of the report. Artifact inventory sheets are submitted to the curational institution and perhaps the agency, but not to OSA. Include in the Appendix copies of the original lab sheets for all radiocarbon dates.

Appendices are appropriate in reports of extensive surveys, detailed site evaluations, and major excavations. Appendices for these reports can include data recovery plans, supplemental information from specialty analyses (e.g., geomorphology), and supporting information that has been summarized in the report body. Reports are not evaluated by their length, but by their ability to serve management and basic informational needs. Redundant information or information readily available elsewhere needlessly expands a report, leading to filing problems, wasted resources, and unnecessarily inflated project costs.

Additional Reporting Guidelines by Project Type

Reporting Literature Searches

For reporting literature searches, the general reporting guidelines for Formal Reports should be followed as listed above. Be sure to list all repositories visited and the date of the visit. Include management recommendations if applicable (e.g., the need for field survey).

Reporting Phase 1 Surveys

Formal reports for Reconnaissance Surveys are required for any project over 40 acres in area, over 1 mile in length, or for surveys that result in the discovery or documentation of potentially significant archaeological materials. For small, negative surveys, a **letter report** will suffice. The general guidelines for reporting the results of Reconnaissance Surveys are outlined above. The report for a Reconnaissance Survey must document: 1) the boundaries of the area surveyed, including the number of acres examined, 2) the scope of the survey with regard to general class of property types involved, 3) a detailed explanation of the methods employed by the survey, 4) the kinds of archaeological properties located in the surveyed area, and 5) management recommendations.

Boundaries - The boundaries of the project area and any survey areas must be clearly explained and clearly outlined on a 1:1 scale photocopy of a 7.5' USGS map. If the project involves a very large area or long linear corridor, a county index map or a large-scale USGS map should also be used to show general project location. Areas of intensive reconnaissance within large or long projects should be shown on USGS map photocopies. Some projects will require more than one map to cover the survey area. The survey map must depict and identify, by inventory number or field number, all inventoried properties. All non-USGS maps must have a scale and north arrow. All USGS maps must have the base map name and date clearly indicated.

The scale must be noted if not the same as the original scale. A UTM center point should be recorded for all projects less than 40 acres. For linear projects and areas over 40 acres, multiple UTM points defining the survey boundaries should be included.

Scope - If the survey involved a search for archaeological sites only, this should be stated in the Abstract and Research Design. If other types of properties are involved, such as buildings, structures, cultural landscapes, or traditional cultural properties, this should also be stated.

Methods - The report must describe and justify the methods used. For example, why or why not the archaeologist did or did not conduct subsurface tests or survey particular areas. The percentage and character of surface visibility throughout the survey area must be described. The exact locations of pedestrian survey or shovel tests need not be documented on negative surveys involving large areas, but areas of intensive survey should be plotted on maps or described in enough detail to relocate.

Properties Located - The report must discuss all Precontact and Contact period sites located and all potentially significant Post-Contact sites as discussed on page 20. Comparison to similar sites in the region is helpful in determining potential.

Management Recommendations – This section must include a recommended finding (e.g., *No Historic Properties Affected*) for environmental review surveys and recommendations for additional archaeological work if sites are encountered and cannot be avoided by a development project. Preliminary site significance evaluations of any properties examined are also appropriate for Phase 1 surveys as they will help justify and direct additional archaeological work and assist project sponsors in planning.

When making even preliminary eligibility recommendations, investigators must support these recommendations by applying National Register significance criteria and integrity considerations. Some sites can be determined Eligible or Not Eligible based on the results of a reconnaissance survey alone. The presence of features, artifact density, historic context association, site disturbance, and site location can be used to support eligibility determinations based on even limited fieldwork.

For example, if a surface reconnaissance of a cultivated field that has clearly been plowed to glacial till and possesses excellent surface visibility yields only a few undiagnostic artifacts (e.g., lithic waste flakes), the site is probably not eligible. A site documented by shovel testing in a relatively undisturbed area that has yielded diagnostic artifacts in numbers that could be used to answer important research questions could be determined eligible without intensive testing. It is always the right of the landowner or sponsoring agency to challenge any eligibility determination, but this would generally require additional archaeological work.

Reconnaissance surveys of large areas or long transects that utilized site locational models in their research designs should evaluate the validity of the models in the report's management recommendations. This may assist future surveys in the same region in locating sites and assessing the need for new surveys based on project locations.

Site Inventory Forms must be completed that contain precise locations for all identified properties, including a USGS map (1:1 photocopy) of each site separate from the map provided in the report text. Locational information must include a legal description (Section, Township, Range) down to at least the quarter, quarter section. For sites under 10 acres in size, a single UTM point at the approximate site center also needs to be listed on the inventory form. For larger sites and sites with complicated boundaries (e.g., linear features), multiple UTM points should define the site limits. The non-centroid UTM points can be included in the *Other Locational Information*

section of the state site form. The method of determining the UTM coordinates should also be listed (GPS, USGS map manual plot, computer conversion program). Any previously numbered sites that are re-examined must have site form updates completed. Updated site forms that include sketch maps must have the site number on the sketch map.

Reporting Phase 2 Surveys

Reporting should follow the general guidelines discussed at the beginning of this section. An Evaluation Survey should focus on the kinds of properties identified, the boundaries and appearance of the properties, survey and excavation methods, including the number of acres surveyed and square meters excavated, and the significance and integrity of the resources. The report must also contain updated inventory forms, a photocopy of a USGS map showing the property's location, a sketch map showing site boundaries, the exact location of excavation units, and locations of proposed disturbances or other project effects. Include a north arrow and scale.

For evaluating the eligibility of a site, it is important to discuss the major physical characteristics of the property as they relate to the site's *integrity*. Discuss the land use history of the property and assess its impact on site preservation. Discuss the various impacts that have either served to enhance or detract from the integrity of the site. Note non-project related threats to the site (e.g., encouraging adjacent developing).

Discuss the archaeological nature of the site. What are the types of artifacts found? Where were they located? Does the site contain a subsurface component not manifested on the surface? Are there noteworthy artifact concentrations? Does the site contain important features (i.e., outbuildings, depressions, trash dumps, etc.)? Include these features on the site map and as part of photographic documentation of the site.

Discuss the methods used for the survey. Which methods were most effective for evaluation and characterization? What is the general cultural history of the site and how does the site relate to the historic contexts in comprehensive plans for historic preservation? Are there datable materials and can they be used to help establish a time frame for the site's occupation? What types of written, oral, or photographic documentation are known for the site?

Is the site eligible for inclusion on the National Register of Historic Places? Whether it is or is not eligible, justify your conclusion. If eligible, state the applicable National Register criteria and the historic contexts that the site is addressing. Carefully evaluate the site's integrity and state what National Register aspects of integrity the site retains appropriate to the significance criteria (e.g., setting, feeling, materials, etc.). Clearly identify any non-eligible areas of the site and justify why they are not eligible. Show all eligible and non-eligible areas of the site on a map.

If characterization was completed for a possible data recovery, provide a preliminary research design including research themes to be addressed, field and laboratory methods to be employed, and personnel required. Some preliminary suggestions as to the number of units needed to mitigate adverse effects should be stated. Justify the recommended methods and techniques.

Inventory form updates must be completed for previously numbered site subjected to Phase 2 surveys. Updated site forms that include sketch maps must have the site number clearly indicated on the sketch map.

Reporting Phase 3 Projects

The general guidelines for reporting should be followed as outlined earlier in this section. In addition, Excavation/Phase 3 reports need to include detailed overviews of the regional environmental and cultural history and a summary of previous archaeological research in the region as well as detailed analyses of artifacts and features. A detailed discussion of the ethnographically known cultures of the region may be appropriate to determine cultural linkages or subsistence-settlement patterns. The analysis should focus on questions posed in the research design, but discussion of unexpected results and additional questions that were developed during the excavation should also be included. Synthetic analysis of how the site fits into the regional culture history should be an important part of the conclusions.

Extensive use of illustrations is encouraged depicting site morphology, excavation techniques, typical and diagnostic artifacts, and explanatory aids such as charts, tables, and graphs. Photographs should be used only to explain important information or show typical views. The References Cited section is expected to be robust. It is especially important to follow the *American Antiquity* style guide for Phase 3 reports. Phase 3 reports need not be burdened with excessive appendices. If agencies require detailed artifact catalogues or field notes, they can be submitted separately. Appendices should include copies of reporting sheets from radiocarbon laboratories and analytical specialty reports that have been summarized in the report body.

Some form of public reporting is strongly recommended for all archaeological data recoveries. Public reporting refers to making important information easily accessible to the general public and to other professional archaeologists. The most convenient and cost effective way of accomplishing public reporting is on an Internet web page.

Reporting Authentication Surveys

Prior to report submittal an inventory form must be sent to OSA and an official state site number must be obtained for all positive authentications if the site was previously unrecorded. The reasons why a location is thought to contain burials should be summarized. A detailed land-use history and detailed description of the current setting are essential. Pertinent photographs (e.g., setting, soil profiles, artifacts, features, aerial) or maps should be included. If the site involves mounds mapped by T.H. Lewis, the report should contain a map reconstructing the Lewis mounds scaled to the project area and should not rely solely on Winchell's (1911) reconstruction of the Lewis notes.

Reports must include a detailed description and justification of field techniques employed. As soils are a critical element of burial authentication, detailed soils descriptions are required, especially if soil anomalies or the lack thereof are the principal reason for authentication conclusions. Soils analyses should include transect profiles showing difference or similarities across the project area. A sketch map with a scale and a re-locatable datum should be included showing core and test unit locations.

All conclusions regarding the probable presence or absence of burials must be carefully explained. If the results are inconclusive, recommendations for additional work if any should be stated. If results are positive, the report should include recommendations regarding ethnic affiliation and site limits. The report should be submitted to OSA at the same time of submittal to the sponsoring agency or landowner. Positive authentication reports should not be released to the general public, although the landowner or designated representative of the landowner should get a copy.

References Cited

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Pope, Willey and Sarah Fee

- 1998 *Minnesota Cemetery Locations*. (Second Edition) Minnesota Family Trees, St. Paul.

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- 1911 *The Aborigines of Minnesota*. The Pioneer Company, St. Paul.