

Millersville University Archaeology
Manual of Field Methods and Procedures

FIELD PROCEDURES GUIDE

This guide is intended to provide a brief, general description of both the archaeological field procedures used in excavation and the methodology used in recording significant field information. These procedures are best explained in the field by example, so this guide can only serve as a written introduction to what is primarily learned by experience. If there are any problems or questions concerning procedures during any stage of the excavations ASK QUESTIONS. Archaeology is essentially a destructive process, and it is always better to be safe than sorry. As with all sets of guide lines there are exceptions to rules, and as circumstances demand, these exceptions will be explained.

Phase 1 - Pedestrian Survey & Shovel Test Pits

Field surveys are undertaken to find sites that are on old maps or to locate sites that are undocumented. Archaeologists employ a variety of survey strategies, all seeking to sample large areas consistently and quickly. For details about excavation and sampling techniques, tools, artifact bags, soils and mapping, see the section below on Area excavations. To begin a survey, it is useful to walk over the survey area, noting areas of where there is a high probability of finding a site (such as elevated, flat areas in close proximity to water, unusual landforms that may denote the presence of a site or non-native vegetation) and where the probability of sites is low (such as steeply sloping hillsides or wetlands). In this way, survey priorities and testing strategies can be formulated. Next, using a transit, a grid is established over all or part of the survey area. The grid is usually oriented on a north-south axis. This is easy enough to do in an open field, but in a wooded area the grid may be created using a compass and walking through the underbrush with a tape measure following a compass heading. An interval is chosen for digging small shovel test pits (STPs) over the grid. When choosing grid intervals and unit sizes, archaeologists must balance the expenditure of time against the risk of missing sites with low artifact densities. At Millersville, we dig 1 foot square units at 50 foot intervals. The grid is set up over the survey area with transect lines 50 feet apart and the individual holes set at 50 foot intervals. Grid intervals can be altered to suit specific circumstances; however, it is best to keep the grid consistent to ensure that the survey area is sampled consistently. If artifacts are found in a particular unit, that unit is "bracketed" by digging additional units at each of the four cardinal directions at half of the grid interval (for example 25 feet). If artifacts are found within these units, the bracket distance can be made even smaller by halving the distance again (12 1/2 feet). In this manner the sites in a survey area will be located and the general dimensions of the sites will be known.

Phase 2 - 3 x 3 Test Units

This often entails a closer look at sites previously identified by preliminary survey, but also includes areas where nothing significant was located during the initial phase of testing. In this second phase of data recovery, archaeologists sample targeted areas by using 3 foot squares spaced at 25 foot intervals.

Phase 3 - Area Excavations

A. *Site Grid and Recording System*

The basic unit we will use is a 1 foot square. In stratified, large-area excavations, we will occasionally leave "balks" (2' wide, unexcavated areas which we use to record stratigraphy) running north-south and east-west between units. Balks are placed along the north and east walls of each ER unit. Circumstances such as testing will require the use of units of different dimensions, but all units will ultimately derive from and be related to the grid. For record keeping purposes, each excavation unit receives a **unique** number, combined with the abbreviation "ER". ER refers to the "Excavation Register", a series of books in which all field records are stored. Units are numbered consecutively. Layers are labeled consecutively A-H, etc. Thus, ER 100A refers to Elizabeth Furnace unit number 100, level A, the top soil layer.

B. *Tools*

The usual complement of excavation tools includes a trowel, a dust pan, and a pair of small root clippers, and a bucket. Other tools are used as required, and include a shovel and/or hand-pick for removal of topsoil and disturbed layers, a hoe for scraping, whisk brooms for cleaning bricks and stones, and paint brushes and dental tools for excavating fragile

artifacts. The ground bakes quickly in the hot summer sun, so units will need to be sprayed with hoses fairly frequently to highlight soil changes.

D. Artifact Bags

Before any excavation begins, an artifact recovery bag is made out for the level being excavated within each unit or survey test. Each bag is marked clearly with an indelible black marker and lists the ER number/letter designation, the date, and the names of the excavator(s). Any relevant notes or comments are included on the bag, such as feature identification or location (structure interior vs. exterior, for example). The number of bags used for each level is to be kept to a minimum. Bags are folded closed when not in use. Bags are not to be overfilled; 2/3 full is sufficient. Bags are to be kept dry by avoiding contact with damp ground. During rain, they are to be covered. If a level requires more than one bag for its artifacts write "Bag 1 of" and then the total number of bags. This prevents redundant inventories and catalogs later in the lab.

Site Name: Elizabeth Plantation
ER: 120
Level: A
Northing: 205, Easting: 200
Excavator (s): Joel Dworsky
Date: 06/06/06
Bag 1 of _____

An index card containing the ER number and letter designation, the name(s) of the excavator(s), the date, and a description of the layer/feature, **should** be included within **each** bag. Bags are discarded in the lab, but these cards stay with the artifacts while they are processed. During the recovery of artifacts in the field, decisions must be made as to storage of items within the bag. Small and/or fragile items, such as bones, shells, charcoal, buttons etc. are placed in small bags. Overglaze decorated ceramics are placed in separate bags, as are several fragments of the same object. All small bags and vials are labeled as described above and are put in the larger artifact bag. Small cardboard boxes are available for soil samples for flotation and for wood or other fragile items. The amount of brick, mortar, and building stone will vary by site. If in doubt, ask. Cleaning an artifact in the field is strongly discouraged. For example, the surfaces of overglaze decorated ceramics are not rubbed as this may damage the decoration, and dirt supporting a fragile artifact is not removed, since this might weaken the object. Your supervisor may make an exception in certain rare cases. Always ask if you are uncertain.

When a bag becomes full or if a level has been completed, the related artifact bag is to be placed in the artifact box for transportation back to the lab. At the end of the day, all unfinished bags are placed in the box marked UNFINISHED. Similarly completed artifact sheets should be placed in the ER sheet binder, while unfinished sheets should remain on their respective clipboards and be placed in the UNFINISHED box along with the bags for that level. Occasionally, coins or other significant or fragile objects should be clearly labeled and given to a supervisor for immediate curation in the lab.

E. Soils

Soil is not just the matrix within which we find artifacts- soils are of paramount importance as a source of information to archaeologists. Subtle differences between soils are used to define and understand occupation layers, time periods, and ground-disturbing human activities throughout a site. Soils are defined by four properties: texture, color, structure and quantity and arrangement of water. Together, these properties give soil its characteristic look and feel. Of these, archaeologists pay particular attention to texture and color when describing layers and features. "Texture" refers to the coarseness or fineness of soils. Minerals, which make up the bulk of soils, range in size from microscopic particles to sand grains, gravel and finally: small rocks. The four basic size categories from smallest to largest are "clay," "silt," "sand," and "gravel." Texture varies in most undisturbed soils, with coarser materials on the top of the soil column and smaller, finer grains in subsoil. Major texture groups are (from fine to coarse and from least porous to most porous) "clay," "clay loam," "loam," "silty loam," "sandy loam," and "sand." At Elizabeth Plantation, nearly all of our sites contain soils best described as either "clay" or "clay loam." Soil color is also an important property to identify when examining soils. While is general soils can range in color from white to black, most are different shades of red, yellow or brown. These colors indicate different moisture conditions and also result from varying concentrations of iron and aluminum oxide which stains

the soil grains. Good aeration or old age will cause iron oxidation, which gives soils in this area their rich red hue. Dark brown and black soils generally indicate a high content of organic matter in the soil, and are often associated with features such as trash pits, postholes and garden beds. In these places, wood, manure, food remains or other organic matter have been added to the soil, visibly darkening the color.

The Munsell color system is used to precisely define soil color, information which must be written on every artifact bag. A Munsell soil color chart is present in the field notes and will be used to provide consistent and accurate descriptions of soils. The nomenclature for soils color consists of two complimentary systems: (1) Color names; and (2) the Munsell notation of color. The use of the Munsell book is really quite simple sample of soil is held up behind a color chip with a hole in the middle for viewing (preferably with the sun at your back). When the color *of* the soil is matched to the Munsell color chip, the soil color is given the appropriate name indicated, such as "Dark Reddish Brown".

The numeric Munsell designations are a way to further refine the ability to accurately and consistently classify color by providing a statistical treatment *of* color also three continua. Every color is classified by its HUE, VALUE, and CHROMA. Hue measures the spectrum between yellow and red. Value measures the spectrum between absolute white and absolute black. Chroma measures neutral grays. The notation for a dark reddish brown, for instance, could read, "2.5 YR 3/4" with 2.5YR being the Hue, followed by a space, and 3/4 for the Value and Chroma ratings. It will be less confusing when you actually do it because the Munsell books are quite self-explanatory, but these books aren't cheap so treat them with care.

F. Soil Sampling

Soil chemistry can provide important data for archaeologists. Many human activities produce chemicals which are transferred to the surrounding soil. These chemicals can survive for thousands *of* years. Archaeologists look for anomalies in the chemical levels which may indicate activity areas or boundaries not revealed by excavation.

The four principal chemicals that archaeologists study are Phosphorus (P), Potassium (K), Calcium (Ca) and Magnesium (Mg). Phosphorus is found in both the tissue and waste products *of* humans and animals as well as in some foodstuffs. High phosphorus levels may indicate the presence *of* privies, animal pens and trash middens. Potassium is found in wood and wood ash. High potassium levels may indicate hearths well as ash dumping sites. Calcium is a component *of* bone and shell and therefore, may indicate the locations *of* middens, food processing areas. Magnesium has been tentatively linked to burning.

A Note on Excavation

You will often be asked "Why do archaeologists dig square holes?" The answer is what separates professionals from common looters. We begin with the premise that within every site exists highly complex information about the people who created the site, and the subsequent activities which have impacted it through time. Archaeology is an inherently destructive process: when you dig a site, you are effectively obliterating the archaeological record of that site forever. It is therefore imperative to ensure that all excavation is carefully controlled and recorded in order to preserve as much of this information as is possible. The way this is accomplished is by following strict guidelines or digging, known as "field methods". Once the excavation unit is strung off, topsoil is removed with a shovel. The hovel is used to cut inside the string line. A small square of soil is left around each corner nail (to ensure that the nail is not pulled from the sidewall). Once topsoil is removed, the shovel, in combination with a trowel, is used to carefully square up the sides of the unit inside the string line. Each wall or side of the unit is kept clean and absolutely vertical as excavation progresses. This practice aids in controlling the excavation, provides statistical validity to artifact counts, and produces a clean, readable wall surface which records the area's stratigraphy. Even questionable artifacts should be kept, as it is much better to err on the side of caution. When a layer or feature is completed, a supervisor will be available to review the contents of your bag with you and "mistakes" can be discarded at that time. Non-artifacts can also be discarded as the bags are processed and catalogued in the lab. Artifacts which have lost their context (termed "provenience") are put in the topsoil bag for the excavation unit or in the surface finds bag for the site area. Artifacts at the bottom of an excavated level or between two levels (the "interface"), are put in the bag for the top layer. Since this bag is for a relatively more recent stratum, an artifact from an earlier, deeper layer will not adversely affect the layer date. If modern artifacts, such as bottle caps or plastic, are found in a level containing Jefferson period artifacts, notify a supervisor. These items may well be intrusive and are then excluded from the layer's bag. In cleaning an area for photography, first remove the old string from the perimeter of the square. Then begin cleaning from the top surface down, leaving no roots or loose dirt. Areas of stones and bricks are carefully swept, as these need to be sharply

defined. Soil should be evenly scraped with a trowel, and then swept if the soil is hard enough so that sweeping will not blur distinctions in color and texture. Clean from the intended focal point of the photograph toward the camera's foreground and background, which are not as important. Clean string may be put back around the square to help define the subject. A clean, clear photograph is important to both document the site and to communicate information about it.

How to fill out an ER Sheet

ER _____: The number of the excavation unit is entered in the blank space.

Size: The size of the unit is entered here (e.g. 5' x 5')

Date: The date the unit is begun.

Site Name: The name of the site (i.e. Elizabeth Plantation)

Unit Coordinates, Northing, Easting: The distance from the site datum point using directional coordinates, ie. N200 E, or 100' south - 0' east.

Corner Measured From: Refers to the corner from which you pull of your opening and closing elevations, using a string and line level. This corner should be the highest corner in the unit.

Elevation: The opening elevation of each unit taken from the northwest corner.

Unit Size: Usually test units will be 1'is feet or 3 feet square, but they may be expanded if features are located.

Datum: refers to the control point near the site from which the grid is drawn and the elevations taken. Datum points across the property have been surveyed from a master datum the SE corner of the Huber house. The daily elevation of the datum point relative to the transit should be filled in here.

ER/Layer: Enter the ER number and letter of the level being excavated.

ER context: Enter the stratigraphic position of the layer/feature relative to other layers/features in the unit.

Layer/Feature/Lens: Enter the type of soil formation.

Soil Color: Visually describe the appearance of the soil. (i.e. Red-Brown loam, with heavy charcoal flecking.)

Description of Soil: Describe the type of soil present in that layer (i.e. light brown clay loam with charcoal flecking.) Be Specific.

Munsell Color: Use the Munsell soil color charts to determine the exact color of the soil. (Refer to the above section on soils for more details)

Features: Note any features that are associated with the feature/layer currently being recorded. For example, if you are digging a post mold, you might note the designation for the accompanying post hole in this space.

Artifacts Recovered: In this space, all artifacts found in that unit/layer/quadrant are listed. Be as complete as possible and include not only the type of artifacts, but their number as well. *Try your best in identifying the artifacts regardless of your level of experience.* If there is a mistake made at any stage of field or laboratory processing, an incomplete artifact listing can make it *impossible* to fix that mistake.

Layer TPQ: This space is used to synthesize the information listed above and put it into chronological context when possible. What does the layer/feature mean in terms of the occupation of the site? Find the newest artifact in your layer and write down its oldest manufacturing date for the TPQ, because that date is the earliest if could have possibly been deposited. (You can't deposit something before its first made)

Based On – The diagnostic artifact that the Layer TPQ was based on.

Samples: Enter the type of soil sample taken (e.g. chemical, charcoal, phytolith, flotation).

Excavator(s): Enter the names of the people assigned to excavate the unit, and the dates on which it was excavated.

Elevations: Enter the elevations from the top surface as you read them from the tape measure using string and line level. When excavating features such as post holes, you may need to only take one center reading. Please remember to record the top and the bottom of all features and the daily elevation of datum if you are using the transit.

Notes: Any information regarding the unit that does not fit into the above format can be included here.

Reason for Closing Level: Describe the soil and why you decided to close the current level. (i.e. encountered a change in soil color and composition).

Unit Wall Profile
(Sample Sheet)

ER: _____

Date: _____

Unit Size: _____

Site Name: _____

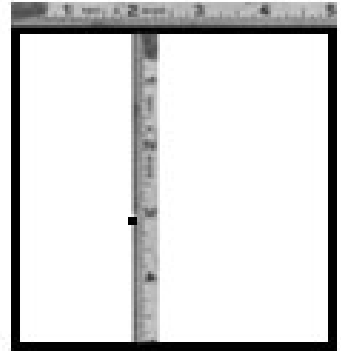
WALL PROFILE OF _____ WALL

	Munsell Colors & Layers

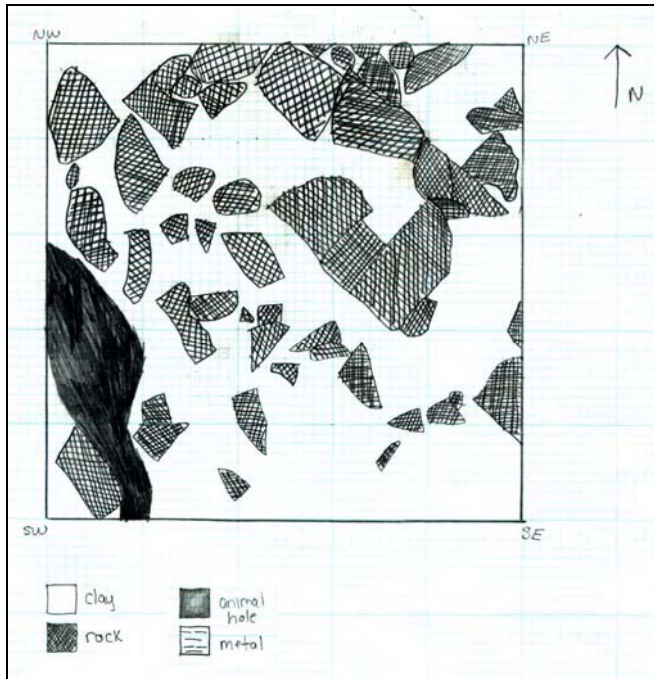
Key:

Plan View:

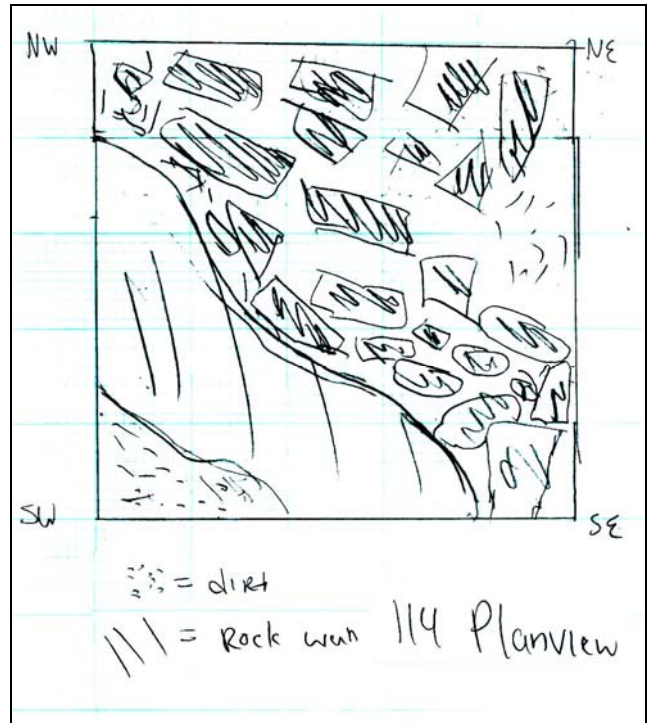
A plan view is a 2D representation of the floor of a unit. It is used to record the horizontal component of the spatial relations in a unit. Two measuring tapes are used to construct a plan view drawing, one for the East-West side of the Unit and one for the North-South Axis. Using a plumb bob on a string you hanging over a point you want to map used the two measuring tapes to plot its position two dimensionally. Lay one tape along the either the north or south wall of the pit. Let the point of your plumb bob touch the top of the area on interest on the pit floor, and then with the other tape, determine the distance along the north south axis at which the string to the plumb bob string intersects. Then record the distance from the corner along the E-W axis. You should end up with something like this: (Measuring from the NW corner) 1.5 East, at 3.2 South. This point is then mapped out on the back of that level's ER sheet in the space provided. This process is repeated many times until all the necessary points on all of the features are mapped in. Then connecting lines are drawn to accurately define the features.



Good Example

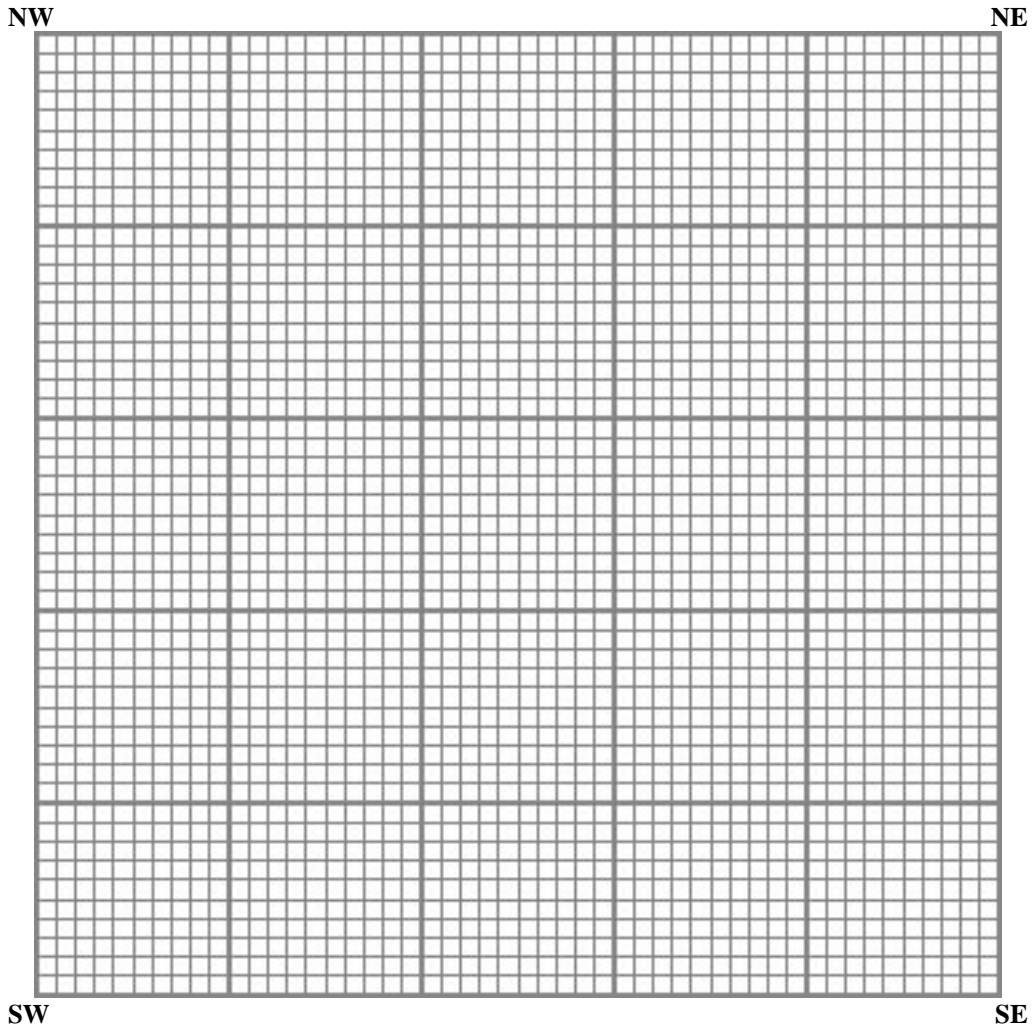


Bad Example



Sample Plan View Sheet

Plan View Sheet for ER _____ LEVEL _____



KEY:

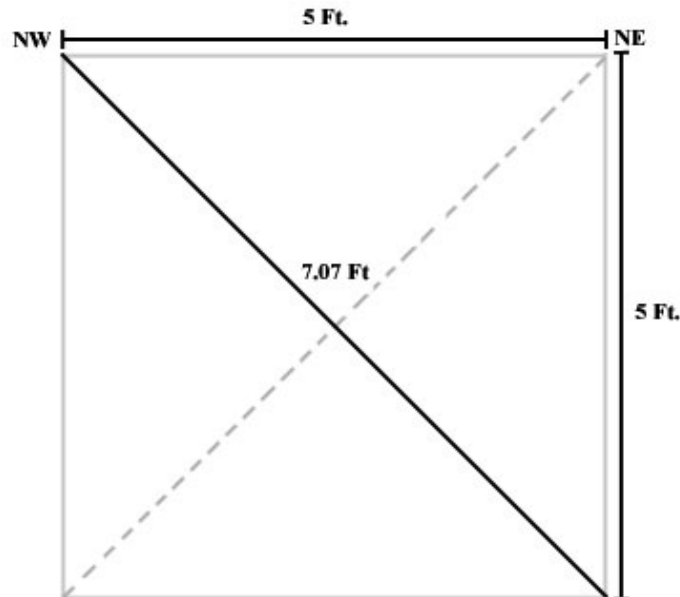
Establishing a Unit

Establishing a unit, whether for testing or for block excavation, is essentially the same process. First a datum point is selected and recorded. Usually the datum is a permanent feature of the landscape like an exposed rock, a statue, the corner of a house, or any other topographic feature that is not easily move. From the datum point a grid is mapped out across the site using a transit. The purpose of breaking the site down into square grids is so that we may be able to accurately record the locations of our units on the landscape in the 2D spectrum. Once the grid is established the transit is used again to shoot in points on the grid that will become the NW corners of our units. At Millersville University we always use the NW corner to denote the location of a unit within the grid. The NW corner of a unit is the unit's address in relation to the datum. This information is called the unit's Northing and Easting and is recorded on all ER sheets and Artifact bags. (For Example: (N200, E301) is the address of a unit in relation to a datum with the coordinates 100, 100. We do not make datum points (0, 0) because this would make every number south or west of the datum a negative number, which we try to avoid. However, in the above scenario where the datum is at (100, 100) the unit with coordinates of N200, E301 would be located 100 ft. north of the datum and 201 ft. east.)

Once the NW and another point are shot in with a transit the rest of the unit can be laid out with just a compass, and knowledge of basic geometry. We use the Pythagorean Theorem ($A^2 + B^2 = C^2$) to determine the hypotenuse of a unit. We then use the hypotenuse to double check the square unit we establish and ensure that it is truly square and not leaning like a rhombus or diamond. The length of the hypotenuse depends on the length of the size of the pits. From the NW corner can measure 5 feet east and 5 feet south and get your NE and SW corners. Use a compass to keep these lines oriented to the grid. Use the hypotenuse to check the angles and keep them straight. Then using the NE corner use a compass and measuring tape to find the SE corner, by using the aforementioned process. Use the hypotenuse measurement to make sure that this point is straight. Make minor adjustments, and double check your side lengths to make sure the whole unit is squared. **MAKE SURE YOUR UNIT IS SQUARED AND ALIGNED TO THE GRID BEFORE YOU LET ANYONE ELSE USE YOUR UNIT'S POINTS TO ESTABLISH NEW UNITS ON THE GRID.**

HYPOTHENUSE CART

1 X 1	3 X 3	5 X 5	10 X 10	20 X 20
1.42	4.24	7.07	14.14	28.28



SITE ETIQUETTE

The following rules are designed to protect the site, the contents of your unit, and the reputation of Millersville University.

1. Stay away from the edges of a unit at all times. Do not ever step or sit on the edge of an excavated unit. Wet soil tends to break off in large chunks; when dry and baked from the sun it tends to crumble. Nothing is more humiliating than caving in the side of a beautiful unit.
2. Watch out for grid strings. They have been laid out to correspond exactly with our grid, and tripping on them not only tears them out of the ground, but tears up the ground, and may cause profiles to cave in.
3. Squat or kneel in your pit while hand troweling. Sitting is acceptable only if you are careful to keep moving (sitters tend to dig in one place and create a huge hole, which is very bad) and do not drag your seat around on the floor of your unit, obscuring soil changes. Needless to say, reclining a lying prone is generally unacceptable, unless you are digging a particularly deep feature.
4. Always ask permission to enter someone else's unit. There is nothing more irritating than to have carefully scraped down your unit to reveal a subtle feature or delicate artifact, only to have someone's muddy boots leave tracks across your unit, or crush the bone you've spent several minutes exposing. Do not walk through another person's unit unless absolutely necessary and even then, only with that person's permission- they know what is going on in that pit, and you don't.
5. There will be no smoking at the site.
6. All shovels and trowels are to be placed facing down when not being used. A sharp shovel or trowel can do serious damage if stepped on. When the wheelbarrow you are sharing is 2/3 full, please empty it yourself. Don't wait for someone else to do it.
7. Keep the tools organized. If you need special equipment from the shed or trailer, return it where you found it. If you take drafting equipment from a tool box, please return it as soon as you are finished with it, as it is "communal" property. If a tool breaks, please tell the foreman or Dr. Trussell members.
8. Everyone is responsible for tools and site clean-up at the end of the day. Screen all dirt in bucket before closing the site. Everyone must pitch in to open the site in the morning, and to close it at night. **NO ONE LEAVES** until all tools are put away and the site is completely covered.
9. Always be polite to visitors and answer their questions if you can. Be as helpful as possible, but if you do not know the answer, offer to find someone who does. Remember we do archaeology for the public's benefit, telling them about our work is just as important as digging.

11. You are expected to arrive on-time for work every day, and to be ready to work when you get here. If you are ill and cannot come to the field, please call us and let us know first thing in the morning at (267)-679-1495 (Field Foreman's Cell Phone).

GLOSSARY

(Adapted from S. J. Knudson, Culture in Retrospect, 1978, Rand McNally: Chicago). (Compiled by Barbara Heath)

Artifact - anything made, used or modified by people in the course of their daily life.

Assemblage - all artifacts of one culture or time period found within the context of an archaeological site.

Balk - a wall left standing between two adjacent excavation units in order to preserve a record of stratigraphy and to provide access to all parts of the site.

Context - the framework within which we locate and analyze our archaeological remains and from which we derive our inferences about past cultures.

Datum Point the point in the site from which measurements are taken and in relation to which all soil layers and features are recorded.

ER - abbreviation for Excavation Register, the basic unit of record keeping on the site.

Fauna - animals or animal remains.

Feature - evidence of human activity that is too large, bulky or difficult to transport to the laboratory. (Architectural elements such as hearths, walls, floors); also components of the landscape such as ditches, post holes, planting beds. Features generally intrude through layers of natural or man-made stratigraphy.

Flora - plants or plant remains.

Flotation - the technique of separating various constituents of a soil sample by mixing it with water or other liquid, useful for recovering pollen, seeds, small finds such as fish scales, small beads, pins etc.

Lens - a shallow cultural deposit, often associated with short term, repeated activities; for example continuous cleaning of hearths results in the deposition of numerous lenses of ash and charcoal.

Midden - cultural refuse associated with human occupation sites.

Posthole - a stain marking the soil disturbance which occurs when a hole was dug, by hand or with a posthole digger, to seat a structural or fence post. Post holes vary

in size and shape through time. The posthole as dug was generally larger than the post to be seated within it.

Postmold - a stain marking the organic remains of a post (set within a posthole) or the backfilled hole left behind when a post is removed from the ground.

Provenience - spacial location or context

Site - any area of the landscape that shows evidence of past human activities; a portion of the environment used by people.

Soil Horizon - the visible subdivisions seen in a soil profile, classed from top to bottom as A, Band horizons, for example.

Soil Profile - a succession of soil layers of different composition from topsoil to subsoil.

Stratigraphy - a series of layers in an archaeological deposit that results from human activities or natural forces.

Subsoil - undisturbed soil which pre-dates the occupation of the site

Test Pits - trial unit excavations undertaken prior to full scale excavation of a site to locate features/artifact concentrations (also known as STPs for shovel test pits).

Triangulation - a measurement technique using grid lines and intersections as reference points to locate artifacts or features on record maps.

Topsoil - the first layer of soil removed from an excavation unit; typically composed of a mixture of sod, roots and recently deposited soil often containing modern artifacts.