



Excavation Manual

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INTRODUCTION

This manual is intended to function as a guideline and is not to be considered a "cook book" on archaeology. Methods and ways of surveying and excavating will often differ from region to region, and organization to organization. The purpose of this manual is to provide a foundation to the individual on how basic techniques in survey and excavation are conducted in archaeology in general, and at the field school of the Totah Archaeological Project (TAP) specifically.

The development of this manual and the system used at the TAP is partly credited to the author of this manual, San Juan College Cultural Resource Management Program (SJC-CRMP), and the Zuni Archaeology Program/Zuni Cultural Resource Enterprise. It has undergone many tests and refinements over some 10 years. Excavation in archaeology is a continual learning process and will require changing or refining techniques and methods of collecting and recording depending on the site. As a result, this manual is a guide to "common" excavation situations and "unusual" excavation situations will require trial and error methods of approach.

The field manual outlines the provenience system and associated codes (Appendix A), documentation and forms used (Appendix B and C), and illustrations demonstrating various recording methods or attributes (Appendix D).

PROVENIENCE SYSTEM

The TAP will be using a system known as the Provenience Designation (PD) for collecting and describing subsurface investigations. It is an adaption of the SJC-CRMP system and is composed of a three-part hierarchical system: *Site*, *Study Unit*, and *Feature* (Figure 1). This allows grouping of materials in a traditional archaeological manner and yet allows comparisons at an analytical level. The site is the first level in the hierarchy.

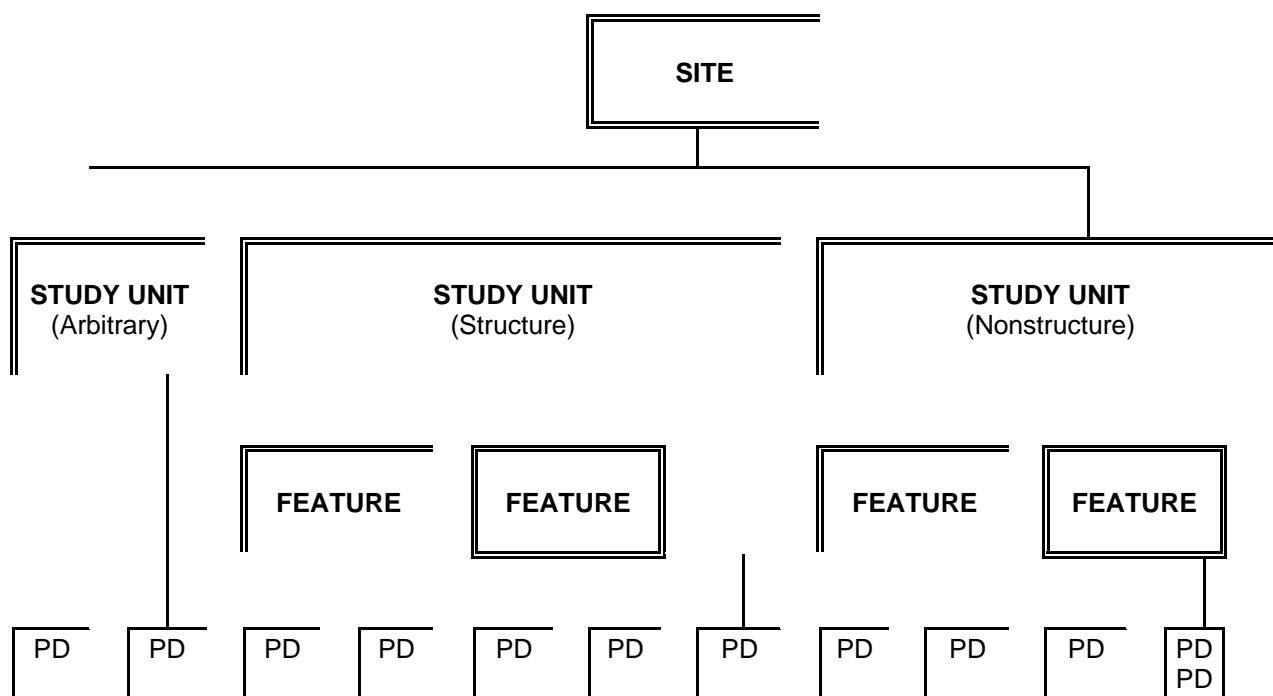


Figure 1. Provenience Designation (PD) hierarchy.

The keystone or building block of the PD system is the **PD number**. The PD number is the smallest analytical unit of the system that represents a single discrete and independent spatial unit of space at a site (see Figure 1). **Each PD number is unique and cannot be duplicated!** PD numbers are assigned beginning with 1 and numbered consecutively. A series of attributes is coded for each PD number that describes pertinent information about the area being excavated. The following sections describe the coding system used for recording these attributes associated with each PD number, with the codes listed in Appendix A.

Study Unit

The **Study Unit** (SU) is the second level in the hierarchy. It enables grouping of the data (PD numbers) into large groups with cultural significance. There are three categories within Study Unit: Arbitrary Unit (e.g., test square), Structure, and Nonstructure (e.g., midden). Details of these study units are provided in Appendix A and the pertinent field forms are further discussed in the following *Documentation and Paper Records* section.

Feature

The next level within the hierarchy of the provenience system is the **Feature**. A **Feature** is any cultural-spatial entity not included in the SU Type hierarchy of the PD system. Feature types are provided in Appendix A and the pertinent field forms are further discussed in the following *Documentation and Paper Records* section.

DOCUMENTATION and PAPER RECORDS

Documentation and paper records are essential to conducting archaeological work in a professional manner. As such, there are several different types of documentation procedures required during the course of investigations. For the TAP, there are two principal types of documentation:

Tracking Forms - used to keep track of numbers assigned during the course of various tasks.

Recording Forms - used to document activities, attributes, and results of investigations.

It should be clarified that "blank spaces" and "negative answers" are not equivalent, especially on recording forms. When a space is provided for an answer or response, something is required in that space. If there are no responses to these "spaces" simply put a N/A (not applicable) or dash (-) in the response. This then lets the reviewer know that the response was addressed and not intentionally overlooked by the recorder. Blank spaces suggest that the information or a response was forgotten.

Tracking Forms

Tracking forms are used to manage and keep track of the assignment of numbers or items so as not to duplicate information accidentally and reduce the efficiency of work (e.g., trace paperwork for corrections). Examples of tracking forms used by SJC-CRMP and during the course of excavations at the TAP are listed below and provided in Appendix B.

1. Provenience Designation (PD) Tracking Log
2. Field Specimen (FS) Log
3. Study Unit Summary Log
4. Feature Log
5. Datum Log
6. Photo Log
7. Point Located (PL) Log

For purposes of the TAP, the students will be responsible for maintaining the FS Log and their assigned set of PD numbers. The Feature Log and Point Located (PL) Log may also be maintained by the field student when the need arises or is warranted. All other tracking forms will be maintained by the instructors. However, each student will be briefed and shown each of the forms during its use while the TAP is in progress so as to understand the level and extent of recording required to maintain efficient documentation of site investigations. This section briefly describes each form.

PD Tracking Log

The *PD (Provenience Designation) Tracking Log* is used to keep track of the assigning of PD numbers to excavators throughout all excavations on a site. **Every PD number assigned must be recorded on this form.** The field supervisor and/or instructor is solely responsible for maintaining this form and verifying that the information (obtained from the *Excavation Form*) on this form is accurate. At the top of the form is a header that requires the project number, site number, to whom the page of PD numbers are assigned to, and page numbering. The filling out of this information should be self-explanatory. The remaining portion of the form is in table format and groups the information into six main columns delineated by double vertical lines. Except for the *Comments*, all information is to be written using the codes listed on the *Provenience Designation (PD) Codes* sheet (Appendix A). Only single responses are permitted for each column. In other words, no multiple choices/responses can be accepted.

PD No. Provides a space for each PD number assigned. Remember that each PD number is a discrete numeric designation and no duplications are allowed. Blocks of PD numbers will be assigned to each team by the field instructor.

Study Unit. The study unit section on both the PD Tracking Log and Excavation form consists of seven columns:

Type - is for the assignment of the Study Unit type. It is either an *Arbitrary Unit* (10), *Structure* (20), or *Nonstructure* (50). It cannot be a combination of the above.

Number - is used for assigning the Study Unit number. The SU number is a sequential numbering for designating the "frequency" or "occurrence" of the SU Type (i.e., *Arbitrary Unit* 1, 2, 3,...; *Structure* 1, 2, 3,...; etc.). See Appendix D, Figure 1.

Horiz - is for coding the horizontal (plan view) shape of an investigation on the Study Unit. How was the investigation/excavation conducted horizontally; 1-by-1-m square, complete, north , etc.

North - is for the north coordinates of the particular horizontal provenience coded in the previous column for the Study Unit. The southwest corner will always be the reference point.

East - is for the east coordinates of the particular horizontal provenience coded in the previous column for the Study Unit. The southwest corner will always be the reference point.

Strat - is for coding the stratigraphic zone that both the horizontal and level of the Study Unit incorporates. This does not necessarily match the number of levels excavated unless excavations are conducted solely in strat levels.

Level - is for recording the level number of excavation. This is an arbitrary numbering system that begins with 1 and is assigned sequentially to *n*. It is preferred that the numbering sequence is consecutive regardless of the number of stratigraphic zones.

Feature. The feature section on both the PD Tracking Log and Excavation form consists of five columns. If no feature is being excavated, put dashes (-) or draw a line through these column spaces. Leaving the columns blank may infer that a feature was excavated but the excavator failed to code the excavation as such. In addition, if a feature is excavated, codes for the Study Unit section must still be filled out in a way to reflect the association of the feature to a particular Study Unit Type and Number. The Feature columns are:

Type - is for the assignment of the Feature type. A feature will always be associated with only one study unit and it is either a structure or non-structure study unit. Refrain from associating a feature with an Arbitrary Unit study unit. If a feature is encountered in an Arbitrary Unit, reestablish the investigations to reflect a Nonstructure study unit.

Number - is used for assigning the Feature number. The Feature number is a sequential numbering for designating the frequency of features (regardless of the feature type) within each structure study unit and across all nonstructure study units (entire site). This will enable complete lists of features from each structure and across the entire site for extramural features. See Appendix D, Figure 1.

Horiz - is for coding the horizontal (plan view) shape of an investigation on the Feature, or how the investigation/excavation was conducted horizontally; 1-by-1-m square, complete, north half, etc.

Strat - is for coding the stratigraphic zone that both the horizontal and level type/number of the Feature incorporate. This does not necessarily match the number of levels excavated unless excavations were conducted solely in strat levels.

Level - is for recording the level number of excavation. This is an arbitrary numbering system that begins with 1 and is assigned sequentially to *n*. It is preferred that the numbering sequence is consecutive regardless of the number of strats or changes in the level type occur.

Context. Context consists of one column reserved for the interpretation of the fill (deposition) within a level of a study unit or a feature. If the PD number represents a feature, then the context code refers to the fill in the level of the Feature, not the Study Unit. If the PD Number does not

represent a feature, the context code describes the fill of the level within a SU that is being described.

Screen. Screen (SRN on the excavation form) consists of one column reserved for describing how the soil was processed or how the artifacts/samples were collected. If the soil matrix is screened from a particular PD, it must be screened 100%.

Field Specimen (FS) Log

The *Field Specimen (FS) Log* functions as a daily bag inventory for all artifacts/samples recovered from a site. Each bag receives a unique FS Number. Each excavator is responsible for assigning the FS number and it is recorded on an *FS Tag* (put into the bag with the artifacts/sample), outside the bag, back of the *Excavation Form*, and on the *FS Log*. The redundancy is to minimize problems in the event that the provenience information from any one place is lost or wrong.

On the top of the form is a header that requires the project number, site number, and page numbering. The filling out of this information should be self-explanatory. The remaining portion of the form is in table format and groups the information into five groups as shown in double vertical lines. Only single responses are permitted. In other words, no multiple choices/responses can be accepted. Each category is discussed below from left to right.

FS Number. Consists of two columns that represent the two parts that form a complete FS number. The two parts are: PD Number and Bag Number.

PD - is the first column and the column in which the PD number is written. It can repeat more than once depending upon the number of bags collected within a particular PD. Since there is usually more than one excavator and work is being conducted at different rates of speed, the PD numbers will not always appear in numeric order. This is not a problem.

BAG - is the column reserved for the assigning of bag numbers within each PD number. The bag numbering begins with 1 and continues sequentially within each PD number. The sequence begins over with 1 when a new PD number is used.

FS Type. Consists of one column and is for identifying the field specimen or material type for that particular FS number. The codes for the FS Type are found on the *Field Specimen (FS) Codes* list (Appendix A).

Point Located Materials. Consists of four columns and is used only on two occasions. The first is for point located surface artifacts and secondly for point located materials from excavation. If the materials do not fall in either of these two categories, this section does not get filled out.

PL - is for assigning a point located or map number to a specific piece plotted artifact/sample. All materials with a PL number must be bagged separately from other materials. If this column is filled out, the following three columns; northing, easting, cmbd, must be filled out. The only exception is for point located surface artifacts. Coordinates can be added later in the lab and elevation is not required.

Northing - a north grid coordinate must be written to the nearest centimeter (e.g., 1087.65) for all point located subsurface materials/samples. The center point will always be the reference point regardless of the size of the artifact/sample.

Easting - same as for northing.

CMBD - means centimeters below datum. This column requires an elevation in centimeters below the datum (e.g., 34) and a datum designation (e.g., BB) from which the centimeters were measured down from. The response should look like this 34 BB. Elevations are not required for surface collections.

LAB. Is the fourth group and consists of four columns. Information recorded here is reserved for lab use and is not to be filled out in the field.

Check - reserved for lab use and is to be initialed by the individual who confirms that an FS bag has been accounted for during lab check-in.

Count - reserved for lab use and requires a whole number count of items present in the FS bag. This is usually conducted at the time of artifact/sample processing.

Status - reserved for lab use and is for coding the status of an FS bag. The following codes are used for Status:

P - processed, for flotation and water-screened samples.

D - decataloged, for bags that do not have artifacts.

M - missing, indicates that a bag is missing or lost.

Volume - reserved for lab use and is for recording the volume (in liters) of flotation and water-screened samples.

Comments. Is the last column and for additional information required to alert the lab staff of material/sample conditions or requirements (e.g., Do Not Wash, Pollen Wash Needed, etc.) or any other unusual aspect about a material/sample. In most cases this is not entered into the computer.

Study Unit Summary Log

The *Study Unit Summary Log* is a master list for all Study Unit Types and Numbers assigned at a site. The top of the form includes the basic information of project number, site number, and page number. This should be self-explanatory. The remaining log is structured in table format.

Feature Log

The *Feature Log* is used to keep track of the number of features present at a site. The top of the form contains the basic information of project number, site number, study unit type-number, and page number. This should be self-explanatory. The remaining portion of the form is in table format and discussed below.

The remaining columns are filled out similarly to the *Study Unit Summary Log*. The only significant difference is the addition of the northing and easting columns. The coordinates should be the

center point of the feature. This functions as a check in case discrepancies in feature numbering arise.

Datum Log

The *Datum Log* is for keeping track of all mapping stations and excavational subdatums used at the site. Mapping stations (MS) receive numeric designations (e.g., MS-1, MS-2, etc.) and excavational subdatums receive alpha designations (e.g., A, B, C, etc.).

Photo Log

The *Photo Log* is used to track all photographs taken on a particular roll of film. A *Photo Log* must accompany each roll of film turned into the lab before it is sent for processing. The top of the form has the heading of project, film type, exposures, camera number, photographer, and roll number. Circle the appropriate response of B/w or Clr for film type and 24 or 36 for the number of exposures in the roll of film. The remaining fields should be self-explanatory. The remaining portion of the form is in table format and is described below from left to right.

Point Located (PL) Log

The *Point Located (PL) Log* is used for keeping track of the point located artifacts/samples from each floor of a structure or extramural surface of a nonstructure study unit. This is necessary when multiple PD numbers are used and a master list of mapped items on a floor/surface is to be generated for a map. The lead excavator of a structure or nonstructure excavation is responsible for keeping track of and maintaining the log. The top of the form contains the standard heading of project number, site number, study unit type and number, and page number. These fields are self-explanatory. The remaining portion of the form is in table format.

Most of the fields on this form are redundant with the *Field Specimen (FS) Log*. The main reason for the PL Log is to provide a check in the event that errors are made on the FS Log and output from the computer does not match the figure or drawing. This form will enable corrections to PL items on the *Field Specimen (FS) Log* to occur.

Recording Forms

Examples of recording forms used by SJC-CRMP and during the course of excavations at the TAP are listed below and provided in Appendix C. For purposes of the TAP, the excavation and feature summary will be the two most common forms used by the students.

1. Excavation Form
2. Feature Summary Form
3. Stratigraphy Summary Form
4. Transit/Mapping Form
5. Architecture Forms

Excavation Form

The *Excavation Form* is one of the most important forms used by SJC-CRMP to document excavations. It will also be the primary form used and filled out by each student. It is designed to cover a range of excavational situations and yet provide a basis for documenting certain information consistently. An excavation form must be filled out for each hand excavation unit. It is the responsibility of the excavator to fill out this form properly. Inaccuracy and inconsistency will only make the data and retrieval of data garbage.

The *Excavation Form* consists of a single double-sided page that **must be completely filled out**. The front page of the form is subdivided into four parts; heading, PD codes table, excavation descriptions, and percentage charts. The back page consists of two parts; a Field Specimen (FS) list and narrative. Each section is discussed below from top to bottom, left to right.

Heading. The upper section is the heading and consists of the standard information of project number, site number, excavator, and date. This is self-explanatory.

PD Codes Table. Below the heading is the PD codes table which is identical to the *Provenience Designation (PD) Tracking Log*. Explanations of the fields in this table will not be reiterated as they have been fully explained in detail under the discussions for the PD Tracking Log. Several lines have been provided for multiple PD numbers in the event that multiple screening processes (e.g., 1/4 screened, flotation, etc.) are used for the same analytical space.

Excavation Description. This section is located in the lower, left-half of the form and consists of a graph with descriptive prompts to the right. The descriptive prompts for the most part reflect the codes filled above in the PD codes table. The graph is for general plan view drawings and recording upper and lower elevations of the excavation (upper elevation / lower elevation). If detailed drawings are required, use a separate piece of graph paper. The information to the right of the graph requires brief descriptions of the excavation and include:

Datum - write the datum being used for the elevation readings.

Level Thickness - write in the appropriate level thickness of the excavated level within the box provided.

Scale - note the scale of the graph drawn on the excavation form., whether 1 cm equals 10 cm or 20 cm , etc.

Plan View - requires a circled response of YES or NO if a separate graph paper was used for drawing a detailed plan view and is to accompany the excavation form.

Percentage Charts. This section is located in the lower, right-half of the form. The use of the *Percentage Charts* is to estimate or approximate the percentage of inclusions or disturbance present within the excavational unit. Use an "X" to select the appropriate percentage. See Appendix D, Figure 2.

Field Specimen (FS) List. The Field Specimen (FS) list, located on the back page, is identical to the *Field Specimen (FS) Log* discussed previously and will not be further discussed here.

Narrative Section. This section, also located on the back page, is often the most neglected part of the excavation form either due to the excavators urge to complete their excavation and continue or

an aversion to writing. For what ever reason, excavators need to take the time to say something about the excavated unit. The narrative may contain impressions or "gut feelings" as to what is going on in the excavational unit, even if it is unsubstantiated. This section should be filled out using the same guidelines as the Project Director's log book and in the same expected professional manner.

In the event that there is not enough space for listing all the FS materials or narrative, a continuation sheet is provided. Below the narrative is a prompt for whether photographs were taken and whether a continuation sheet accompanies the excavation form. Respond with the appropriate answer.

Feature Summary Form

The *Feature Summary Form* consists of a single double-sided page that must be filled out for every feature excavated. It is the responsibility of the excavator to fill out this form completely. The front side is structured into five parts; heading, shape, construction, measurements, and fill summary. The back page is structured into four parts; function, remodeling, narrative, and documentation summary. Each part is discussed below.

Heading. The heading prompts for the standard information of project number, site number, recorder, and date. Additional prompts include the study unit type and number, feature number, and all PD numbers assigned to the feature during excavation. The heading should be self-explanatory.

Shape. This section documents the appearance or shape of the feature in plan view and profile (cross section). Circle the appropriate option for plan view and profile shape. See Figures 3 and 4 in Appendix D for examples of plan view and profile shape options.

Construction. This section requires selecting the materials used for construction of the walls and floor/base of the feature. Circle all appropriate answers for the wall and floor construction. If none of the options are applicable, write the appropriate answer in the lines provided.

Measurements. Prompts for measurements are provided for the long axis (length) and short axis (width) and minimum and maximum depth and/or height of the feature. Note the direction of the length and width measurements in the *Direction* columns. Figures 5 and 6 in Appendix D illustrate the proper procedures for each measurement.

Fill Summary. This section requires selecting the fill that best describes the feature fill. If more than one stratum is present, number the stratigraphic sequence from top to bottom, beginning with 1 in the boxes provided to the left of the selection. If multiple strats are present, then a *Stratigraphy Summary Form* must be filled out. Below are definitions for the ambiguous fill types.

Natural Fill - the soil is almost completely free of charcoal and artifacts.

Cultural Fill - the fill contains artifacts/charcoal, but not in sufficient density to imply purposeful trash dumping.

Trashy Fill - the fill contains high amounts of artifacts/charcoal and implies that trash dumping occurred.

The remaining fill types should be self-explanatory. If none of the options are good descriptors, select "Other" and describe the fill in detail in the space provided. Expand any additional discussions of the fill in the *Narrative* section on the back.

Function. This section deals with the function of the feature. Minimally select (circle) the appropriate "General" function of the feature. If possible, also select (circle) a more "Specific" function and substantiate the decision in the *Narrative* section of the form.

Modifications. This section asks questions about how the feature may have been modified, either by capping, truncation, and/or remodeled. Circle and/or write the appropriate responses. Further discuss in detail these attributes in the *Narrative* section below.

Narrative. This section is for additional notes on a feature and for substantiating the responses from previous sections. Be complete and thorough in your narrative. Below the narrative is a summary of how the feature was documented. Place an (X) in the square below the response, if the response is "No". If the response is "Yes" put the date of when it was conducted in the square provided.

Stratigraphy Summary Form

The *Stratigraphy Summary Form* is used to document stratigraphy across the entire site, for each structure, and for features with complex stratigraphy. This form is designed to record soil attributes in a consistent manner, although the form does not necessarily encompass all soil attributes. The form contains a standard heading and should be self-explanatory. The remaining portion of the form is in table format and prompts for either written information or presence/absence (X) options. As a reminder, all *Stratigraphy Summary Forms* must accompany a profile drawing showing the stratigraphic zones which should match the strat numbering on the form.

Transit/Mapping Form

The *Transit/Mapping Form* consists of a single page and is used for recording mapping information from the transit. The form is subdivided into three parts; heading, mapping information, and a footer for additional mapping notes.

Architecture Forms

Since attributes are considerably different between surface and subterranean structures, two architecture forms have been used by SJC-CRMP; *Surface Architecture Form* and *Subterranean Architecture Form*. The *Surface Architecture Form* is used for recording attributes most commonly found in surface structures and the *Subterranean Architecture Form* is used for recording attributes most common to subterranean structures (pitstructures). The attributes for recording each type of structure are partially adapted from the Intermountain Antiquities Computer System (IMACS) guidelines for recording structures. Modification of recording attributes and terminology of the system is based upon various experiences from the primary author of this manual.

Both architecture forms are structured similarly with differences being in the presence or absence of prompts for certain common architectural attributes and/or features. Each has a heading, construction attributes section, feature summary section, and a page for structure discussion and interpretation. The *Surface Architecture Form* in addition has a section on wall abutment/bonding.

The *Subterranean Architecture Form* has an additional page for architectural structures/features commonly associated with subterranean structures (e.g., antechamber, bench, tunnel, etc.).

The sections on construction are structured with six columns; first column listing the attributes that are being recorded, middle four columns for noting wall location, and the last column for commenting on problems or peculiarities about that particular attribute recording. When a presence or absence of an attribute (not to be misconstrued with measurements) is being requested, presence is mark with an (X) in the appropriate cell (column and row) and for absence of attributes mark a dash (-) in the cell.

For purposes of the TAP, this manual will not go into any discussion on how to fill out the architecture forms. The forms are only provided in Appendix C to provide the student with an understanding of the complexity for properly documenting Anasazi prehistoric structures.

SURFACE INVESTIGATIONS

Surface investigations normally include reconnaissance of the site, mapping, and collecting or non-collecting of surface artifacts. Non-collecting investigations are principally conducted at the survey level. Methods commonly used are general descriptive or simple in-field analysis of artifacts either across the general site area or within feature areas identified on the surface of the site. Collecting of surface artifacts is usually conducted at the excavation level of investigation through point locating or grid collection units.

Mapping

A site map is generated for each site and depending on the level of investigation, whether survey or excavation, various mapping equipment can be used. A site map should include the following:

1. All modern manifestations - roads, fence lines, pipe lines, etc.
2. Site boundaries when possible.
3. Cultural manifestations - historic and/or prehistoric features observed.
4. Project area and/or proposed undertaking.

Topographic mapping of the site can be conducted with several instruments, most common is a transit and stadia rod. Mapping of cultural manifestations is best conducted with tape in reference to an established grid system. This will be the primary mapping experience that you as a field student will be trained. Mapping with reference to a grid system allows greater detailed mapping of structures and/or features and has a smaller error factor than mapping with an instrument. It also allows for the combining of maps to form a larger master map. Maps generated must be clear and concise. Problems can be minimized if the following mapping guidelines are followed:

- 1. Adhere to the standard legend used by the organization or institute that you are working for. For the TAP, the SJC-CRMP legend will be used (Figure 7, Appendix D). If additional symbols or notions are required, make sure that they are properly labeled.
- 2. Make sure that all structures, features, and other mapping data are properly labeled (Figure 8, Appendix D).
- 3. Include a north arrow and indicate whether the north arrow is True north or Magnetic north. It is preferred that north be oriented up the page (Figure 8, Appendix D).
- 4. A scale must be included on the map (Figure 8, Appendix D).

- 5. All of the mapping that will be done at the TAP site will be conducted in relation to the grid system. Therefore, note at least two grid points on any plan map drawn.

For purposes of the TAP, a permanent site datum has been established and arbitrarily assigned the coordinates of **North 100** and **East 100**. This reference point serves as the basis for establishing the grid system across the entire site. The use of the grid system is imperative in establishing horizontal control of subsurface investigations.

Depending on the organization, the permanent site datum will have an absolute sea-level elevation or will be assigned an arbitrary elevation of 100 m when no known elevation mark is available. The permanent site datum for the TAP site has been assigned an arbitrary elevation of 100 m. When setting up a grid system the following is recommended:

1. Orient the grid system to north, but specify whether north is true or magnetic.
 - 2. For purposes of the TAP site, the southwest corner will always be the reference point of the excavational grid squares.
3. Grid stakes (wooden or metal rebar or spikes) should be established at defined intervals.
 - 4. Set up at least one parallel baseline and one perpendicular line. Additional baselines are recommended if possible, depending on site size.

If these procedures are followed, the remaining site area can be gridded easily with use of metric tapes. This will provide relative accuracy for mapping, arbitrary hand excavations, and expedite surface collections.

Mapping Equipment Use

The TAP has both a transit/theodolite and Brunton for use in mapping sites. Bruntons are the most common mapping instrument used for mapping sites at the survey level. For excavation projects, the transit is used for accurately setting up grid baselines and elevation subdatums. Use of a Brunton during excavations is limited to aligning north arrows for photographs and for recording dips/strikes of postholes or stratigraphy when necessary (Figure 9, Appendix D).

Transit

The transit (or theodolite) in conjunction with the stadia rod is primarily used for relatively long-distance mapping, elevation mapping of topography, datum elevation readings, and setting up of the grid system baselines. Discussions on general procedures and use of the transit will be brief and are listed below.

1. Set transit tripod firmly and centered over the mapping station.
 - 2. Loosen all clamp screws of transit and attach to top of transit tripod. Hand tighten. Do not over tighten!
 - 3. Attach plumb bob to base of transit and adjust tripod legs until plumb bob is centered over the mapping station.
4. Once centered, adjust leveling screws until the instrument is level. Check level with a 360° rotation.
1. 5. Set horizontal veneer and horizontal circle to 0° or to the appropriate backsight declination. Lock upper clamp screw and unlock lower clamp screw.

6. Orient the 0° bearing to true north. Since the SJC- CRMP transit does not have a built in magnetic needle, a Brunton will be necessary to establish a true north marker from the mapping station with a rebar or stake. This can be done by setting up the Brunton first and then sighting a true north marker. Once this is done, then set up the transit and sight in the backsight marker (stake or rebar) and lock the lower screw clamp and then unlock the upper screw clamp. For first time set-up on the site, establish backsights immediately.
1. 7. Level the scope.
8. Record the instrument height which is the distance from the top of the mapping station to the middle of the leveled scope onto a form.

Once the above steps have been conducted, the transit is ready for stadia rod readings or establishing baselines for the grid system. It is highly recommended that stadia rod readings are taken with a level scope and minimize vertical angle readings. If this is done, calculating elevation readings is greatly simplified. The following steps are done to read the stadia rod:

1. 1. Maintain a leveled scope.
2. Focus telescope cross hairs (stadia wires) with eyepiece focus ring and then focus telescope with focus knob.
 1. 3. Record reading of the Top, Middle, and Bottom cross hairs. If vegetal coverage is too thick, minimally a Top and Middle or Middle and Bottom cross hair readings are required in order to calculate distance and elevation.
4. Record horizontal angle reading and vertical angle reading if shot was not level. The SJC-CRMP theodolite is veneered into degrees and minutes. For ease of mapping, minutes (e.g., 15, 30, 45) can be rounded/converted to 1/4, 1/2, or 3/4 degrees.
 1. 5. Proceed to next mapping shot. Remember to check the scope level every fourth or fifth shot or when the scope is rotated over 90°. Changes in temperature throughout the day will cause slight plate and level bubble expansion/contraction. Make minor adjustments to scope level. Do not adjust the leveling screws of the transit mount.

Distance and elevation are calculated from the Top, Middle, and Bottom cross hair readings. The following formulas are used for calculating the distance and elevation readings:

Horizontal Distance (HD)

$$HD = (\text{Top Hair} - \text{Bottom Hair}) \times 100$$

If either top or bottom readings are missing, then

$$HD = (\text{Top Hair} - \text{Middle Hair}) \times 200 \quad \text{or} \quad HD = (\text{Middle Hair} - \text{Bottom Hair}) \times 200$$

Elevation (E)

If scope is level, then $E = (\text{Datum elevation} + \text{Instrument Height}) - \text{Middle Hair}$

Surface Collections

Surface collections are conducted by point locating individual artifacts or by bulk collections within an established grid system. The method used is dependent upon several factors:

1. Size of the site (spatially)
2. Density of artifact materials
3. Data requirements of the research design
4. Specifications in the contract or scope of work

SUBSURFACE INVESTIGATIONS

Subsurface investigations can involve the extensive use of hand excavations with assistance from mechanical machines when warranted and properly monitored. For purposes of the TAP, students exposure to mechanical equipment will be very limited. However, the following sections do briefly describe the use of mechanical equipment only to prepare the field student to the reality of contract work.

Backhoe

When possible or required, exploratory trenching or expedient removal of post-abandonment fill (i.e., pitstructure excavation) is often conducted with a backhoe to meet certain aspects of the research design. All trenching must be monitored and conducted in accordance with the safety rules for work around heavy machinery operation.

Mechanical Stripping

Mechanical stripping may be required in certain cases. Stripping may be conducted with the front bucket of a backhoe, a road blader/scrapper, or in rare cases a belly-loader. Mechanical stripping must be monitored and conducted in accordance with the safety rules for work around heavy machinery operation.

Hand Excavation

All hand excavations will be conducted in relation to the grid system. This is required, if horizontal control of artifacts and samples are to be maintained and research questions are to be addressed. Excavations oriented with the grid system will be maintained vertically for structures and features greater than 1-m. Features smaller than 1-m can be excavated completely (as a cultural unit) or bisected along the grid line of north-south or east-west.

The size of the grid squares for analytical purposes will often depend upon the organization and research design of the site/project. In most cases, 1-by-1-m or 2-by-2-m grid squares are the standard sizes used for spatial analysis and excavational control.

Screening

All excavations conducted at the TAP will involve 100% screening of the soil matrix. A 100% screening means that all the dirt from a provenience is passed through a screen. The size of the screen mesh is dependent upon the excavation unit. In general, 1/4-inch mesh will be used. In certain cases, a field student may be instructed to use 1/16-inch mesh. Below is a guideline for what size screen mesh will be implemented.

1/4-inch mesh

Used for non-structural features, large floor features, and control squares in structural and nonstructural areas. This is the most common screen size used.

1/16-inch mesh

Most commonly used for screening of human burials and small features. Once most of the soil matrix has passed through the screen the remaining matrix is bagged in bulk fashion and sent into the lab for picking/sorting.

Water-screened or Flotation Sample

This is a bulk soil sample whereby some or all of the matrix is bagged for processing, which occurs in the lab. As a reminder, every time the soil matrix is processed differently, a new and different PD number must be assigned. For example; excavation in a level of a 1-by-1-m square is being screened through 1/4-inch mesh (PD 100), a flotation sample and a water-screened sample are also taken within that level; the flotation sample should be assigned a new PD number (PD 101) and the water-screened sample another PD Number (PD 102).

Stratigraphy

Understanding the stratigraphy of a feature, structure, or non-structural area is crucial in developing information on site structure and formation. Site structure and formation is the understanding of how cultural and/or non-cultural activities of deposition are related. As a result, profiles are necessary and are only reliable when the soil matrix descriptions are concise and accurate.

Profile Maps

General profile maps are drawn for backhoe trenches and control square excavations, all structures, all extramural features, and representative structural features. Figure 10 in Appendix D lists the procedural steps for setting up a profile while Figure 11 in Appendix D provides an outline and shows what information is required on a profile map.

Profiles must be drawn at a scale large enough to provide an accurate picture of the stratigraphy and preferably to the same scale as the plan view of the structure or feature. The orientation of the profile must be marked at each end on the plan view map for each structure or feature profiled. Use the symbols with alpha (A) and alpha' (A') to show the ends of the profile in relation to the plan view. When possible also label grid coordinates above the profile.

Stratigraphic Zone Designation

As a rule, stratigraphic zones are labeled from top to bottom, in sequential order. Subtle changes vertically should be drawn with broken, dashed, or dotted lines and labeled with the associated zone and numeric suffixes. When these suffixes are used the recorder is implying that subtle changes occur but not significant to change the zone designation.

Stratigraphic Descriptions

The greatest mistake made by excavators is misunderstanding the difference between description and interpretation of stratigraphy deposits. *Description* is the listing of attributes about the stratigraphy. *Interpretation* results from the conclusions drawn from the descriptions and demonstrated by excavations. There are numerous attributes that can be documented on stratigraphy, but for the purpose of our work three common attributes are minimally described; color, texture, and inclusions.

Color. Sediment color is the most commonly recorded characteristic in determining stratigraphic breaks in the depositional history. Though far from perfect and often fallible in distinguishing subtle color changes, the **Munsell Color Chart** is often used. Though the Munsell Chart is only able to distinguish strong color changes, it at least provides a standardized set of color terms. There are numerous debates on how color readings should be taken, but discretion is left to whomever is managing or supervising the excavations.

Texture. Texture is more complicated to determine than color. Texture is basically the recording of the grain size and whether the soil is characterized as sandy, silty, clayey, or a mixture. To simplify the process a quick reference in determining the texture of soil is provided in Figure 12 of Appendix D. Note that most of the tests are conducted with the soil slightly moist.

Inclusions. Inclusions are the presence or absence of nonsoil material (e.g., gravel, charcoal, etc.) and can be cultural or natural in origin. The density of inclusions can be estimated using a composition chart (see Figure 2, Appendix D).

Horizontal Control

As previously mentioned numerous times, horizontal control of collections and excavations is required. All collections and hand excavations must have grid coordinates assigned. This not only enables greater control of mapping and transferring of map information, but will enable grouping of data in a manner not dependent upon cultural affiliation. As previously mentioned, north and east coordinates are the standard with the southwest corner the reference point for grid units. However, when features are excavated the center of the feature is the reference point. The grid system for a site will always be in relation to the site datum which is for our purposes, North 100 and East 100.

Vertical Control

Elevations at a site are always relative to the site datum that will either have an absolute sea-level elevation calculated from a known bench marker or arbitrarily assigned a 100 m elevation. The site datum must be permanent and either tagged or stamped depending upon the datum type. All mapping stations and excavational subdatums will be tied into the site datum elevation. All hand excavations must be conducted in relation to a subdatum, with elevations written as centimeters below datum (## cmbdAA). As a standard, the following is a guide for designating datums:

1. Excavational datums (or subdatums) will be designated with alpha characters (A...Z, AA...ZZ, etc.).
2. Elevation measurements should always occur from top of the stake. The subdatum must be labeled with an alpha designation and when possible grid coordinates.

ARTIFACTS

The artifacts and samples collected during surface and subsurface investigations must be handled with specific procedures to ensure that materials are fully provenienced and in proper condition. Procedures for collecting and handling special samples (e.g., flotation, radiocarbon, etc.) will be discussed in the field. The following sections discuss proper procedures for proveniencing and handling general artifact material collections.

Collection of Artifacts

All artifacts collected will be separated by material class and material type (Appendix B). General and durable artifacts (e.g., sherds, debitage, etc.) will be bagged by the appropriate material type with the provenience information written on tags. Tags are to be enclosed with the artifacts in their bags with the same information written on the outside of the bag in the upper left portion of the bag.

All tool items (e.g., cores, hammerstones, groundstone, etc.) are bagged individually and provenienced in similar fashion. Fragile items (e.g., shell, corn cobs, awls, etc.) should be wrapped in tissue, placed within a container (i.e. film canister, small box, etc.), and provenienced in similar fashion.

Assigning Field Specimen (FS) Numbers

The field specimen (FS) number is a unique numbering system used for cataloging and repository of materials. All FS information is filled out on the *Field Specimen (FS) Log* and further discussed later. This section discusses the concept and rationale of the FS system.

The FS number is composed of two parts: **PD number** and **Bag number**. The **PD number** identifies the provenience from which the artifact(s) or sample came from and was discussed previously. The **Bag number** is an inventory number of collected materials from each independent PD number. Numbering of the bag sequence within each PD number begins with 1 and continues in sequential order to *N*. Each Bag number begins over with 1 for each new PD number.

Following the FS number is a three-lettered code known as FS type. The FS type stipulates what is "in the bag." Each FS type specifies a specific material type which is grouped by material class (Appendix B). The purpose for a complex material type list is to assist in obtaining refined counts of raw materials versus tool items and necessary for curation purposes at most repository institutes. An added feature to the FS number is the point located (PL) information. The PL information is composed of a PL number, coordinates, and elevation. The Point Located (PL) number represents the point location or piece plotting of an artifact and/or sample within a particular PD. In general this number is sequential within each PD. The exception to this rule, is floor/surface associated artifacts, whereby the PL numbers are sequential within the Study Unit. This makes generating tables of point located materials easier for matching with artifact/sample numbers on accompanying figures. For each PL number assigned, horizontal (north and east coordinates) and vertical (elevation - centimeters below datum) information must be recorded.

Material Transport

Guidelines for transporting materials follow a very simple concept, use common sense. Heavy and bulky materials (e.g., flotation, groundstone) should be separated in different containers from less durable materials (e.g., sherds, flaked stone) or placed at the bottom of the same container. Further still, very fragile materials (e.g., corn cobs, bone tools, etc.) should be separated from the above materials. This is basic common sense and the responsibility of a professional in preserving the materials remains for curation.

Appendix A
Provenience Designation (PD) and Field Specimen (FS) Codes

FIELD SPECIMEN (FS) CODES

CERAMICS (CER)

Code	Description
CFG	Figurine
PIP	Pipe
SHD	Sherd(s)
UCL	Unfired clay/sheerd
VES	Whole/partial vessel

FLAKED STONE (FLS)

Code	Description
BIF	Bliface
CHO	Chopper
COR	Core
DEB	Debitage
HAM	Hammerstone
HOE	Hoe
OBS	Obsidian
PPT	Projectile point
RET	Retouched flake

GROUNDSTONE (GRS)

Code	Description
ABR	Abrader
ANV	Anvil
AXE	Axe
FET	Flint
GFG	Figurine
GOR	Lithic Ornament
GPG	Ground pigment
MAN	Mano
MET	Metate
MOR	Mortar
PES	Pestle
PLS	Polishing stone
SHS	Shaft straightener
SLA	Slab; ground/shaped/worked

UNMODIFIED STONE (UST)

Code	Description
FOS	Fossil
GYP	Gypsum
MIC	Mica
MIN	Mineral, unknown
QCR	Quartz crystal
TUR	Turquoise
UPG	Pigment, including ocher

FAUNA (FAU)

Code	Description
ANI	Animal interment
ANT	Antler
ATL	Atlatl spur
AWL	Awl
EGG	Eggshell
FLA	Flaker
FOR	Bone Ornament
FPL	Worked/polished/cut bone
GAM	Gaming piece
NEE	Needle
POI	Point
SCR	Scraper
UMB	Unmodified bone

SHELL (SHE)

Code	Description
CRL	Coral
MAR	Marine
SOR	Shell ornament
STL	Shell tool
TER	Terrestrial

VEGETAL (VEG)

Code	Description
BAS	Basketry
CHA	Charcoal
COC	Corn cob(s)
COK	Corn kernels (only)
IMP	Plant impression
NET	Netting
PLA	Plant materials
RTH	Roof thatching
SAN	Sandals
SEE	Seeds
TEX	Textile
TWI	Twine/rope
WFR	Wood fragments

FLOTATION (FLO)

Code	Description
FAF	Artifact/vessel fill
FBA	Burial-anatomical region
FBF	Burial fill
FFC	Floor/base contact
FFF	Floor/base fill
FGF	General fill
FMS	Surface control
FRF	Roof/fall fill
FSF	Subfloor fill
FTF	Trash fill

POLLEN (POL)

Code	Description
PAP	Artifact/vessel fill
PBA	Burial-anatomical region
PBC	Burial fill
PFC	Floor/base contact
PFF	Floor/base fill
PFS	Floor/base scrape
PGF	General fill
PRF	Pollen roof/fall
PSC	Surface control
PSF	Subfloor fill
PTF	Trash fill

WATER-SCREEN (WSC)

Code	Description
WAF	Artifact fill
WFC	Floor/surface contact
WFF	Floor/surface fill
WGF	General fill
WRF	Roof/fall fill
WSF	Subfloor fill
WTF	Trash fill

TREE-RING / DENDRO (DEN)

Code	Description
DPT	Post in situ
DRF	Roof/fall
DEN	Dendro, not specified

MISCELLANEOUS (MOT)

Code	Description
HUM	Human burial(s)
HMF	Human isolated fragments
MAG	Archeomagnetic samples
SED	Sediment samples
FSC	Fine-screen sample
THL	Thermoluminescence samples

HISTORIC MATERIALS (HTH)

Code	Description
CLO	Cloth
EAC	Euro-American ceramics
GLA	Glass
HBN	Bone
HSH	Shell
LEA	Leather
MTL	Metal
PTC	Plastic
RUB	Rubber
WOO	Wood

Appendix B
Tracking Forms

PHOTO LOG

PROJECT: 98-SJC-063 FILM TYPE: B/w / Cfr EXPOSURES: 24 / 36 CAMERA NO.: _____ PHOTOGRAPHER: _____ ROLL NO.: _____

DATE	FRAME	SITE NUMBER	SUBJECT	SU TYPE-NO.	FEATURE NO.	FACING	DESCRIPTION/COMMENTS
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

DATE	FRAME	SITE NUMBER	SUBJECT	SU TYPE-NO.	FEATURE NO.	FACING	DESCRIPTION/COMMENTS
	21						
	22						
	23						
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						

SUBJECT CODES

- | | | | |
|---------------------------|---------------------------|---------------------|----------------------------|
| 1 Subject coded elsewhere | 11 Feature(s) | 23 Whole vessel | 50 Petroglyphs/pictographs |
| 2 Site overview | 12 Burial(s) | 24 Projectile point | 90 Restricted |
| 3 Artifact scatter | 13 Floor/Floor assemblage | 31 Tool | 99 Other |
| 4 Unit relationships | 21 Profile | 32 Ornamnt | |
| 10 Structure(s) | 22 Artifacts (general) | 40 Crew working | |

LAB USE ONLY

Proofed with Originals: By: _____

Date: _____

Appendix C
Recording Forms

EXCAVATION FORM

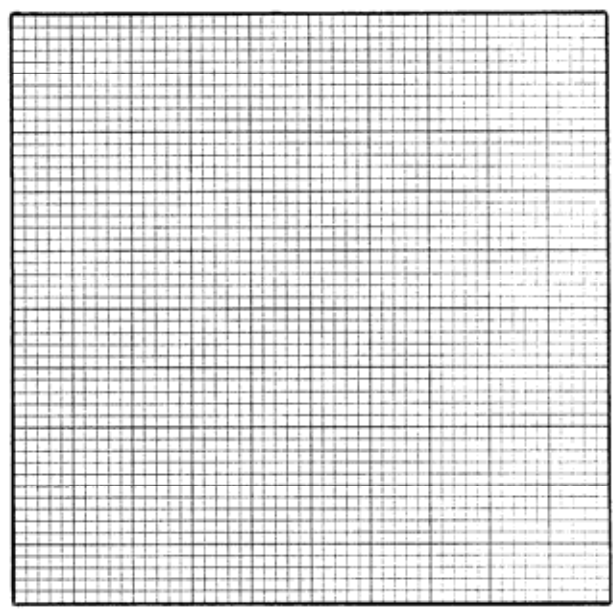
PROJECT: 98-SJC-063
 SITE: LA 126581

EXCAVATORS: _____
 DATE: _____

PD NO.	STUDY UNIT				FEATURE				CONTEXT	SRN				
	TYPE	NUMBER	HORIZ	EAST	STRAT	LEVEL	TYPE	NUMBER			HORIZ	STRAT	LEVEL	

EXCAVATION DESCRIPTION

PLAN MAP (Use graph paper for detailed plan views)



Datum
 Level
 Thickness
 Scale
 1 cm =

	Composition %				
	<1	1-4	5-9	10-19	>20
Charcoal					
Ash					
Burned Earth					
Rock					

	Disturbance %				
	<1	1-4	5-9	10-19	>20
Rodent					
Roots					
Mechanical					
Erosion					

Plan view on separate graph paper? YES NO

FEATURE SUMMARY FORM

PROJECT: 98-SJC-063
 SITE: LA 126581
 SU TYPE-NO.: _____
 FEATURE NO.: _____

RECORDER: _____
 DATE: _____
 ASSOC. PD(s): _____

SHAPE <small>(Circle options)</small>	
Plan View	Profile
Circular	Basin
Ovoid	Bell
Subrectangular	Cylindrical
Rectangular	Conical
Linear	Trough
Square	Irregular
Irregular	_____
_____	_____
Indeterminate	Indeterminate

CONSTRUCTION <small>(Circle all appropriate options)</small>	
Walls	Floor/Base
Earthen	Earthen
Masonry <small>(Shaped stone)</small>	Masonry <small>(Shaped stone)</small>
Cobble <small>(Unshaped stone)</small>	Cobble <small>(Unshaped stone)</small>
Slab	Slab
Adobe	Adobe
Wood	Wood
_____	_____
_____	_____
Indeterminate	Indeterminate

Location	MEASUREMENT of TWO DIRECTIONS				DEPTH and/or HEIGHT
	Long Axis	Direction	Short Axis	Direction	
Top:					Max:
Bottom:					Min:

FILL SUMMARY (Number strata from top to bottom)		
<input type="checkbox"/> Non-cultural Fill <input type="checkbox"/> Cultural Fill <input type="checkbox"/> Trashy Fill <input type="checkbox"/> Other, describe:	<input type="checkbox"/> Ash Lens <input type="checkbox"/> Charcoal Lens <input type="checkbox"/> Burned Earth Lens <input type="checkbox"/> Ash/Charcoal/Burned Earth Lens	<input type="checkbox"/> Wallfall <input type="checkbox"/> Rooffall <input type="checkbox"/> In situ Post <input type="checkbox"/> In situ Vessel

Stratigraphy Form must be attached and completed, if the feature has complex stratigraphy.

FUNCTION					
GENERAL	Thermal	Storage	Post	Other	Indeterminate
SPECIFIC	Hearth	Bin	Primary	Deflector	Pit
	Roasting Pit	Floor Vault	Secondary	Tunnel	
	Ashpit		Ladder	Vent Shaft	
	Lens		Indeterminate	Wingwall	
				Pilaster	
				Mealing Bin/Trough	

MODIFICATIONS						
CAPPING (Circle Options)			TRUNCATION (List Feature Nos.)		REMODELED (Circle Option)	
None	Slab	Adobe	Stone	By: _____	YES	NO
				Into:		

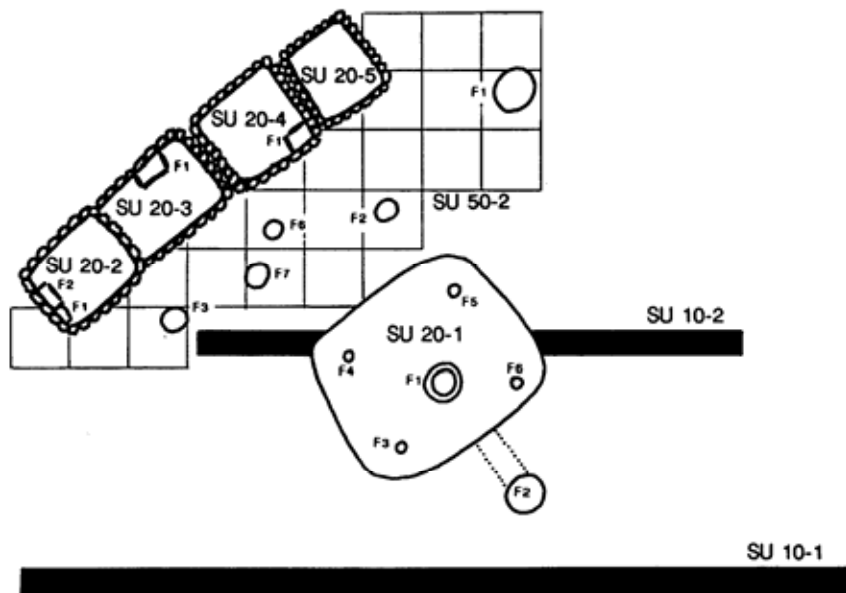
NARRATIVE

In complete sentences, describe the importance of this feature, which samples are most important, how does this feature relate to other features spatially, temporally, etc.

	Plan View Drawn	Profile Drawn	Cross Section Drawn	Photographed
YES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				Roll Nos. _____
NO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If response is "YES" put the date in the box. Use an (X) for "NO" responses.

Appendix D
Figures and Illustrations



SU 10 = Study Unit - Arbitrary
 SU 20 = Study Unit - Structure
 SU 50 = Study Unit - Nonstructure
 F# = Feature Number

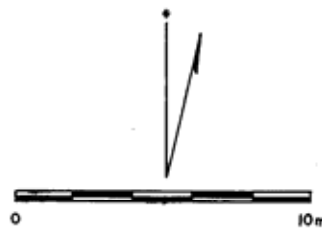
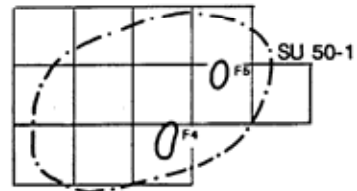


Figure 1. Study Unit and Feature Designations

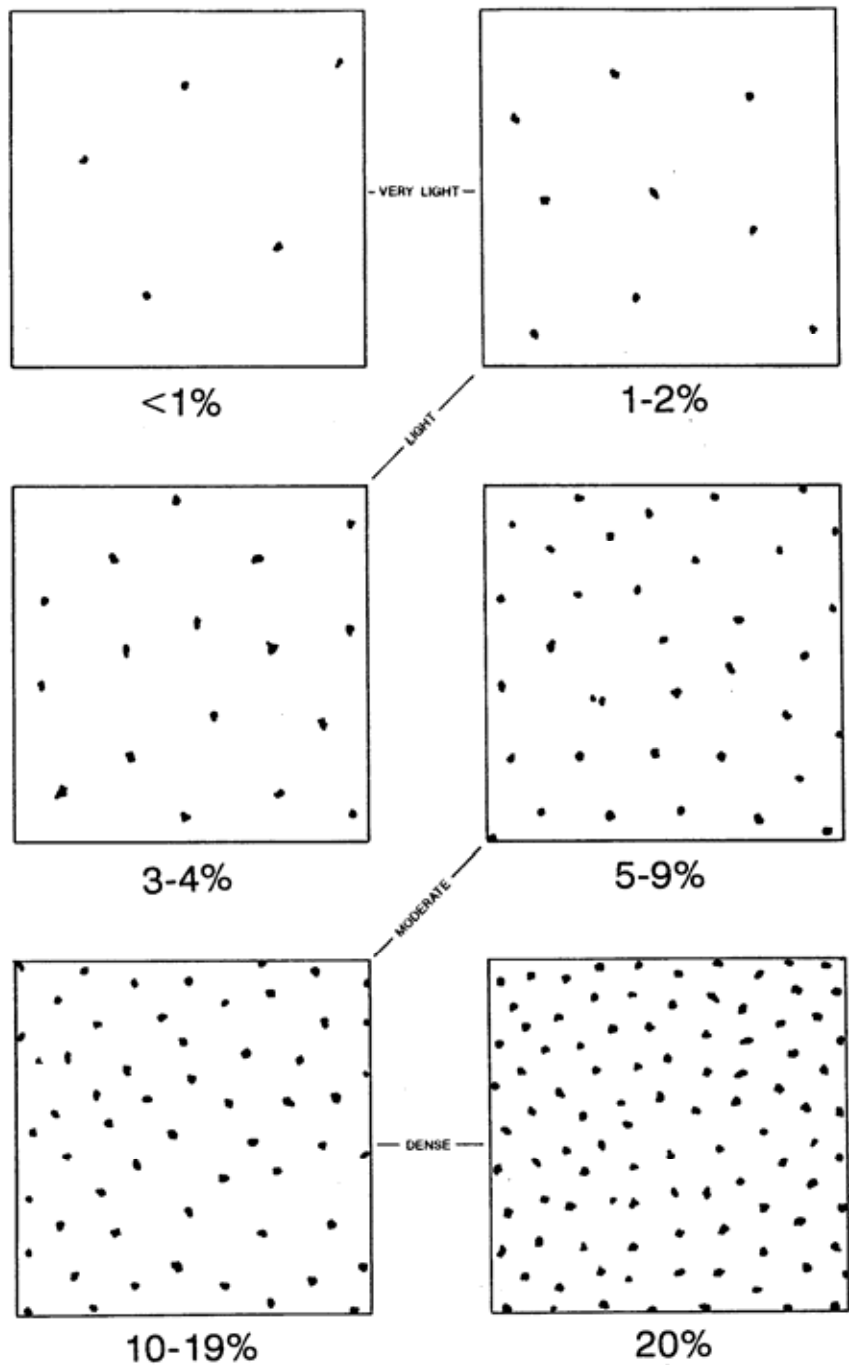
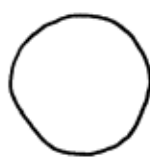
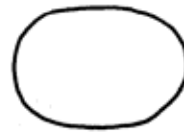


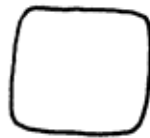
Figure 2. Composition Percentage Chart



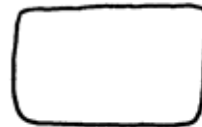
CIRCULAR



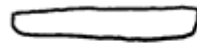
OVOID



SQUARE



RECTANGULAR



LINEAR



SUBRECTANGULAR

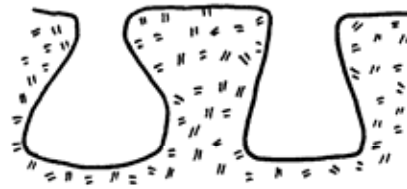


IRREGULAR

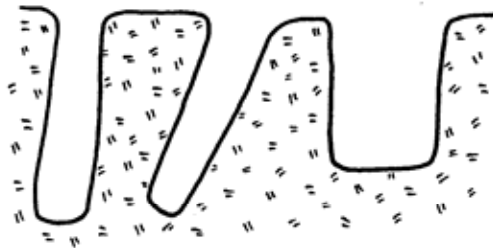
Figure 3. Plan View (Horizontal) Shapes



BASIN



BELL



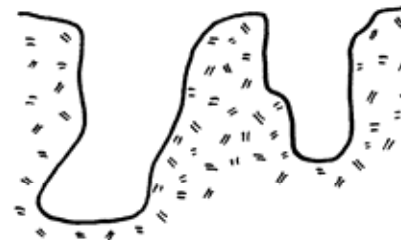
CYLINDRICAL



CONICAL

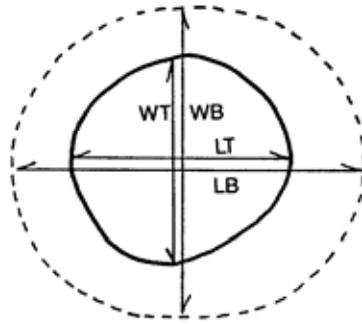


TROUGH



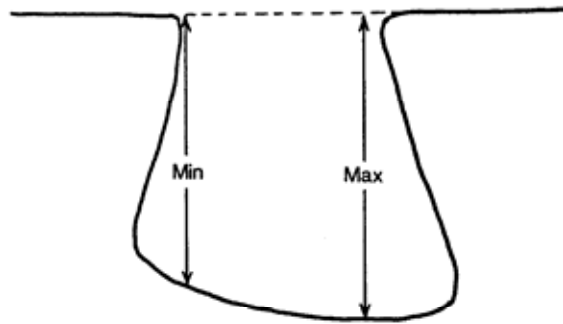
IRREGULAR

Figure 4. Profile (Vertical) Shapes



WT = Width of Top
WB = Width of Bottom
LT = Length of Top
LB = Length of Bottom

Length and Width Measurements



Depth Measurements

Figure 5. Illustration of Feature Measurements

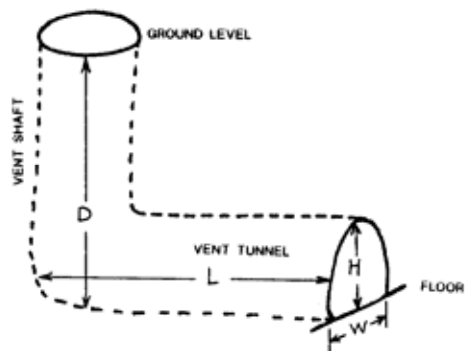
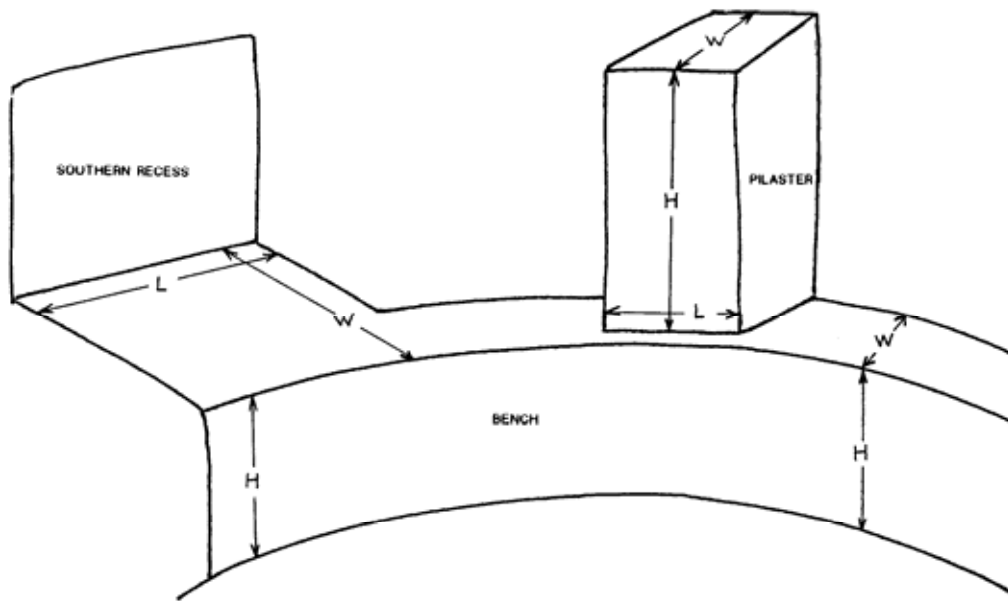


Figure 6. Illustration of Feature Measurements























<u>Surface Landmarks</u>		<u>Artifacts / Samples</u>	
	Maintained Road		Ceramic
	Unimproved Road or Two-Track		Debitage
	Trail		Flaked Tool
	Fence		Groundstone
	Cutbank		Fauna (Unmodified bone)
	Centerline		Bone Tool / Ornament
	Right-of-way Edge/Project Boundary		Flotation sample
	Drainage		Pollen Sample
	Juniper or Pinyon Tree		
	Site Datum		
	Site Boundary		
	Mapping Station		
F#	Feature Number		
	Stone Elements / Rubble		
	Stone Elements / Vertical Slabs		

Figure 7. Key to Symbols Legend

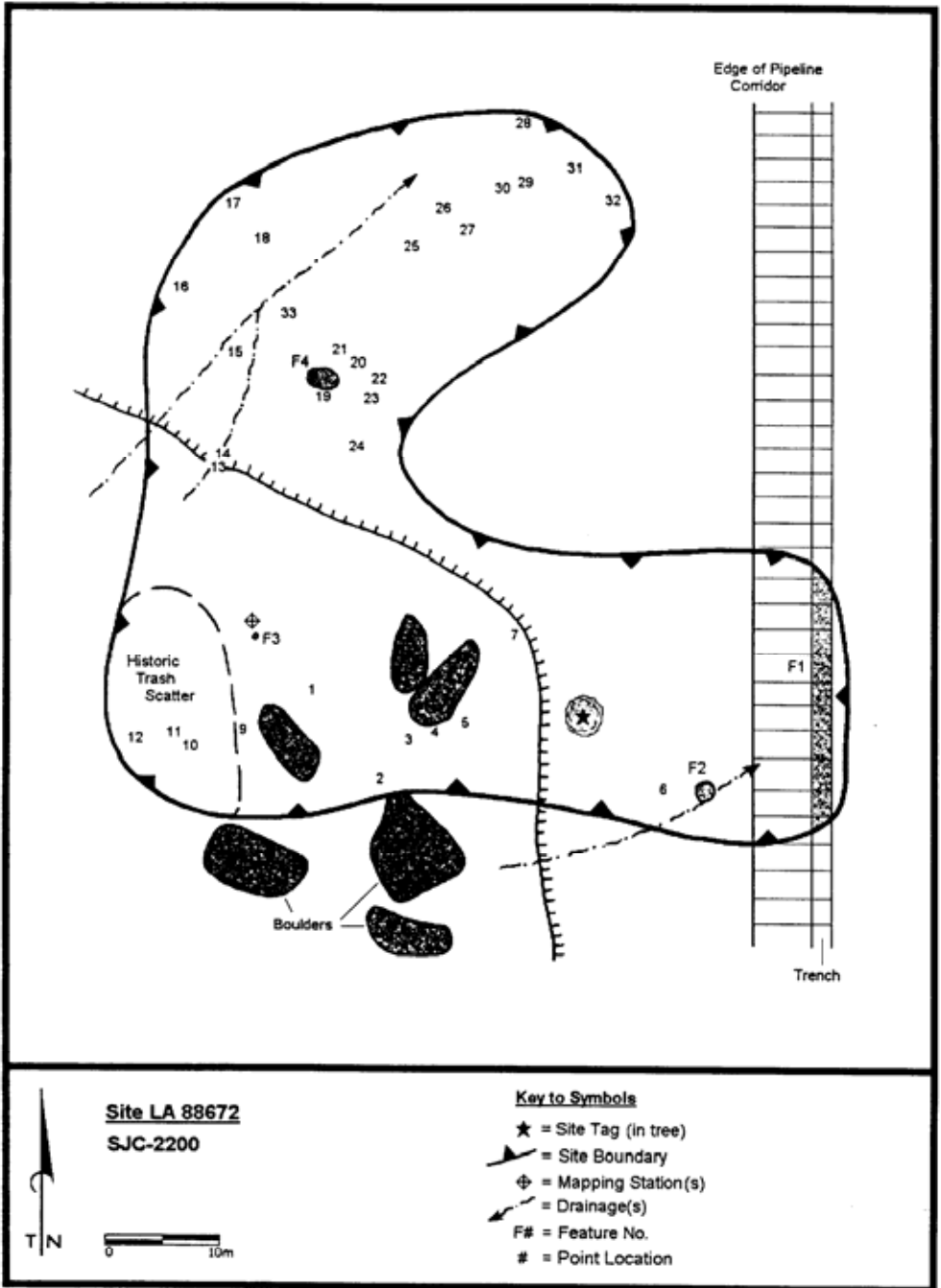
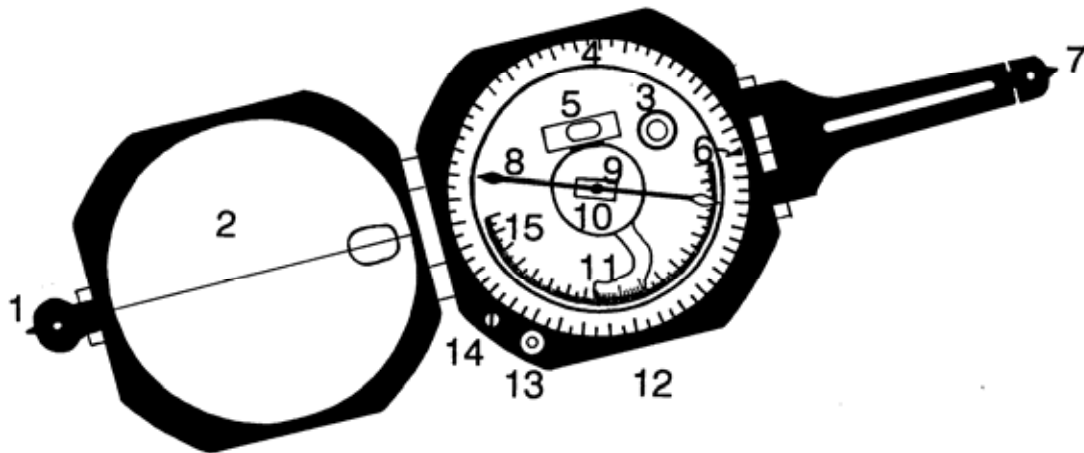
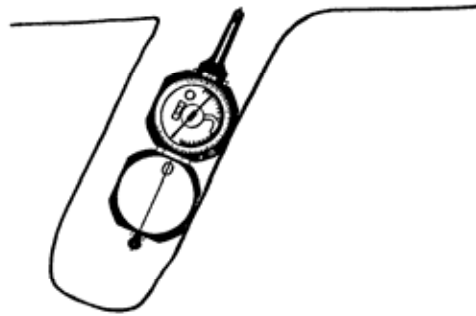


Figure 8. Example of a Proper Site Plan Map



Taking a reading for a vertical angle



- 1 - Small sight
- 2 - Mirror
- 3 - Round level
- 4 - Graduated circle
- 5 - Long level
- 6 - Zero pin
- 7 - Large sight
- 8 - Magnetic needle
- 9 - Magnets
- 10 - Dampen pan
- 11 - Vernier for vertical angle readings
- 12 - Vertical vernier adjusting lever (backside of brunton)
- 13 - Needle lock
- 14 - Declination adjusting screw
- 15 - 0° to 90° scale for vertical angle readings

Figure 9. General Description of a Brunton Compass








APPEARANCE	CAPABILITY TO	SOIL TEXTURE
	1) Heap only into a pyramid.	Sand
	1) Form only a ball.	Sandy loam
	1) Form only a short coil.	Loam
	1) Form a long slender coil, but 2) cannot be bent into a U-shape.	Silty-sand Loam
	1) Form a long slender coil and 2) bends into a U-shape without breaking.	Sandy-clay
	1) Form a long slender coil and 2) a circle with cracks and breaks.	Silty Clay
	1) Form a long slender coil and 2) a circle <u>without</u> cracks and breaks.	Clay

Figure 12. Soil Texture Chart