The Chan Chich Archaeological Project Field Manual

First Edition



by

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Version 1.0

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About this version: With Version 1.0, the Chan Chich Archaeological Project is making its field manual available as a free iBook, designed to read on iPads.

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Chan Chich Archaeological Project



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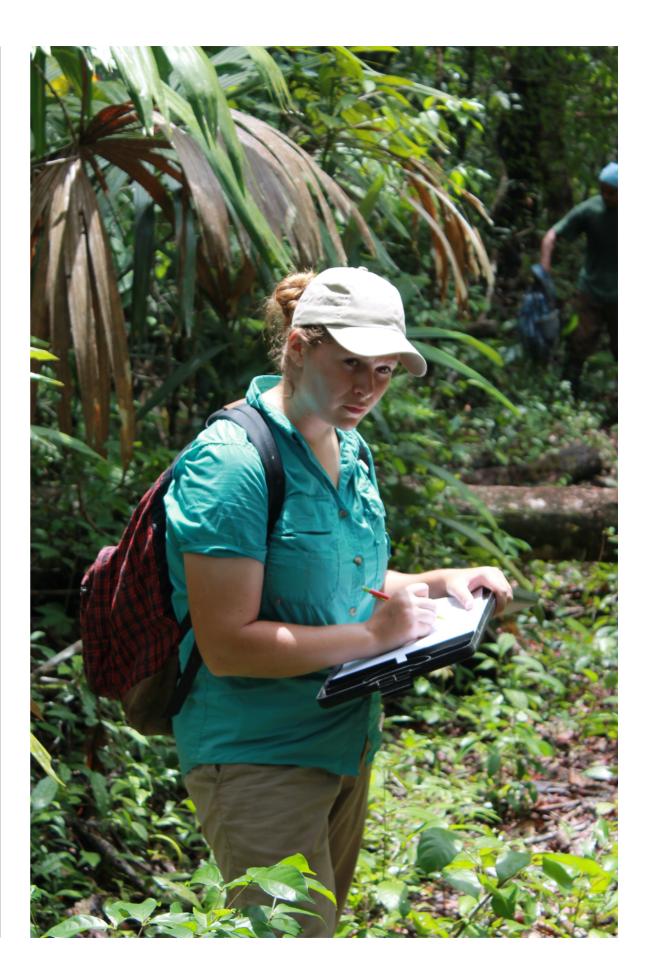
Preface

This book summarizes the methods used by the Chan Chich Archaeological Project (CCAP) and the Belize Estates Archaeological Survey Team (BEAST) to record, excavate, and collect data in the field. It is a modified, modernized, and expanded version of *The La Milpa Core Project Field Manual* (Houk and Zaro 2011) and is designed to be a reference document for students and staff on the CCAP.



Provenience Information

The CCAP and BEAST conduct survey and excavations at multiple sites within an approximately 145,000-acre permit area in northwestern Belize. Properly recording provenience information in the field is essential to prevent the mixing of artifacts and samples in the laboratory.



SECTION 1

Site-Op-Subop-Lot

Generally, the CCAP/BEAST system, described in various publications (see Houk [1996], for example), is based on the the Ixcanrío Regional Project (Houk 1992) and the Programme for Belize Archaeological Project (Houk and Zaro 2011) field methods, which in turn are modified versions of the Tikal system described by Coe and Haviland (1982).

The largest element of provenience information is the "site." Sites being investigated by the BEAST are all assigned unique "BE" numbers—short for Belize Estate. The practice mimics the "BA," or Bajo Azúcar, numbers used by the Ixcanrío Regional Project across the border in Guatemala (Houk 1996) and the "RB," or Río Bravo, numbers used by the PfBAP immediately north of the BEAST permit area (Houk and Zaro 2011). Sites are also assigned a two or three letter abbreviation (such as CC for Chan Chich and KU for Kaxil Uinic ruin). The next provenience level below site is called an "operation," and is abbreviated "Op" when referring to a specific operation. The definition of an operation is flexible: "A site dimensionally limited by the eventual scope of its study" (Coe and Haviland 1982:42). In other words, operations are not dimensionally restricted, but are adaptable and may be expanded at the discretion of the excavators. Operations are numbered sequentially at each site and prefaced by the site's abbreviation to avoid confusion in the field lab. See Houk (2014a) for a list of designated operations through the 2014 season.

Individual excavation units within operations are referred to as suboperations (abbreviated "Supop," when referring to a specific unit) and given letter designations. Suboperations may be any size or shape, but their dimensions must be recorded precisely to facilitate mapping and determine provenience information. When possible, suboperations are established as quadrangular areas, which makes mapping and description easier.

Once a suboperation has been established, photographed, and described, it cannot be expanded. If more area must be excavated adjacent to an established unit, a new suboperation should be established and assigned the next sequential letter designation. The exception to this rule is when the excavators only need to extend the excavation by a small amount in a particular direction to chase an architectural feature. For example, if the excavators of Subop A needed to follow a wall that extended outside of their unit, they could open a 1-x-1-m extension off one edge of Subop A. In this situation, the extension would be designated Subop Ax, but otherwise treated as an individual unit.

The smallest level of provenience information is the "lot." Lots are designated and numbered sequentially within each suboperation. A lot is "the smallest, most significant provenience according to the excavator's perception of such" (Coe and Haviland 1982:43). A lot may be a stratigraphic layer or it may be an architectural feature such as a wall or a floor. A Lot Form, which is a standardized form that prompts the recorder for specific information, is filled out for each lot, recording description, location, associated artifacts, and the relationship of the lot to other lots around it (discussed below).

Because lots are the most significant level of provenience, excavations generally proceed by lot. It is preferable to completely excavate one lot before beginning another.

Using this system, it is possible to refer to the provenience of an artifact or feature from Chan Chich, Op 12, Subop A, Lot 3 as follows: CC-12-A-O3. Note that for numbers below 10, place a "O" in front of the operation's and/or lot's number (i.e., O1, O2, O3, etc.). This helps with sorting lot numbers in the project's relational database. An individual lot number, which is also used on artifact bags and tags (see below), is unique to things associated with one specific lot at a specific site. In excavation reports and notes the specific lot should always be referred to by its full number. The example above is always referred to as "Lot CC-12-A-03." Similarly, the specific suboperation and operation are referred to as "Subop CC-12-A" and "Op CC-12", respectively.

SECTION 2 Special Deposits

In addition to their lot numbers, special features such as burials, caches, and problematic deposits are assigned an identifying prefix (B, C, and PD, respectively) and sequential number, by category, and by site in the same way that operations are numbered. Cache CC-C01, for example, was the first cache excavated by the CCAP (see Herndon et al. 2014; Houk 2014). This facilitates intersite and intrasite comparisons and analysis in the field lab. A cache may be referred to by its lot number (or numbers) and/or its cache number. See Houk (2014a) for a list of assigned special deposit numbers through the 2014 season.



Horizontal and Vertical Provenience Information

Horizontal Control

In 2013, the CCAP began establishing a series of OPUScorrected mapping control points in and around the Main and Upper Plazas at Chan Chich. These points are geo-referenced with UTM coordinates. The list of points can be found in Houk (2014a).

Because working with UTMs can be cumbersome, excavators may establish local metric grids for specific operations. At Chan Chich, these grids should be tied into the UTM control points using a Total Data Station (TDS). At other sites where no OPUS-corrected control points have been established, excavators should establish an independent grid oriented on magnetic north. At least one point should be recorded using a handheld GPS to establish the grid's horizontal location and determine a vertical datum (see below). The locations of suboperations are mapped using a TDS in relation to whichever grid is being used for a particular operation. Each suboperation is then plotted on various project maps using Geographic Information System (GIS) software, Surfer, or some other mapping program, which is then used to create topographic and shaded relief maps. Canvas or iDraw can also be used to create rectified plan maps.

The metric grid is not used to keep track of horizontal provenience information within individual suboperations. Rather, individual lots, features, or artifacts are plotted on scaled plan maps of the excavations (see below).

Vertical Datums, Depth, and Elevation

Vertical provenience refers to the location of an object in relation to sea level, and it is very important to understand the difference between depth and elevation. Depth is a relative term, while elevation is an absolute measurement. At Chan Chich, vertical provenience information is related to the primary datum in the Main Plaza, which is 118.12 m above sea level. At other sites, the elevation of the primary datum should be established using a hand held GPS. At each excavation unit, a vertical datum is established before excavations begin. A datum is usually a string line tied to a nail, which is hammered into a nearby tree. Each datum is designated by its associated suboperation. For example, Subop CC-12-A's datum would be Datum 12-A. This designation is written in Sharpie on a piece of flagging tape, which is tied to the datum nail. As soon as is possible, the TDS is used to determine the elevation of each datum by relating it vertically to the site's

primary datum. The elevations are written next to the datum designation on the flagging tape.

During excavations and mapping, a line level is affixed to the datum string line to ensure that the line is level (i.e., at a consistent elevation), and necessary measurements are made below the string line. The measurement read off of the tape measure is a depth below datum. To convert depth to elevation, the measurement is subtracted from the datum elevation (assuming the point is below the string line). For example, to calculate the elevation of a plaster floor surface with a depth of 1.0 m below a datum, which has an elevation of 120.0 m, you would subtract 1.0 m from 120.0 m. In this example, the elevation of the floor would be 119.0 m. It is very important to include elevation information on plan maps and profiles. On profiles, the elevation of the profile datum line must always be recorded (see below).

In cases where the excavation unit slopes steeply, it is often necessary to establish an additional string line or lines, called subdatums. When this is done, it is important to write the elevation of each subdatum to minimize confusion. If possible, each additional subdatum should be placed at an even interval below the primary datum string line. For example, it is easier to convert depths to elevations when mapping if the subdatums are 1.0 m below, or 1.5 m below, the primary datum, rather than some uneven interval like 0.87 m or 1.03 m.

Recording Data

This chapter describes how staff and students record data in the field. A major component of this chapter is a description of the FileMaker Pro relational database that the project uses. The database has largely replaced the old system of paper forms.



FileMaker Pro Database

The CCAP uses a FileMaker Pro relational database to keep track of all the information collected during excavations (see Houk 2012, 2014b). The database is designed around the original paper forms used by the CCAP in the 1990s, but, rather than requiring reams of soggy paper in the field, the system is deployed in the field on iPads running the FileMaker Go app. Data are entered into the database through layouts, or forms, grouped into three folders: Survey Forms, Excavation Forms, and Lab Forms (Houk 2014b). The survey and excavation forms are hierarchical, meaning that before a lower-order form can be created, the higher-order forms above it in the hierarchy must be created first (Table 2.1). The workflow for field and survey forms is shown in Interactive 2.1.

Although the database is potentially robust, it is ultimately only as good as the information the excavators enter into the various layouts. Therefore, it is extremely important that

TYPE	FORM NAME	PURPOSE
	Site Summary	The Site Summary includes a description of the site, information on location, and portals or links to other field/survey forms including Operations, Site Map, Photolog, Survey Area, and BE #s. Another layout known as the IA Site Form relies on the same information, bu presents it in a format that is consistent with the Institute of Archaeology's official site forms.
Survey	Survey Area	The Survey Area form is designed to allow the survey team to record location and descriptive information on individual survey areas (transects, targeted surveys, etc.) with portals or links to Site Summary, Site Map, and Photolog.
	BE #s	This is a value list of BE #s.
	IA Site Form	This layout reports the information from the Site Summary form in format consistent with the Institute of Archaeology's site form.
	Site Map	This form records descriptive information about a site map and includes a copy of the map.
Excavation	Operation Definition	The Operation Definition Form includes fields for defining the limit of the operation and making comments (Interactive xy). The form a includes portals that auto populate with information from other forms. These portals automatically generate lists of suboperations, field drawings, burials, and caches associated with the operation. The are arranged in a series of tabs at the bottom of the page.
	List of Datums	This is a running list of datums with elevations for an operation.
	Subop Definition	The Subop Definition Form includes a description of an individual suboperation and portals that auto populate with information from other forms. These portals automatically generate lists of lots, photo drawings, samples, burials, and caches associated with the operatio
	Lot	The Lot Form is the most common form. It collects descriptive information, records artifact recovery, documents relationship to other lots, and includes portals to photos, samples, and two lab form (Catalog and Artifact Analysis).
	Shovel Test Lot	This is an alternate layout of the Lot Form that allows for shovel testing by adding a level to the lot number.
	Sample	A Sample Form is required for each sample collected. Sample numbers are assigned consecutively by operation.
	Burial	A Burial Form is required for each burial. Burial numbers are assign consecutively by site.
	Individual- Burial	An Individual-Burial Form is used to document each individual with a burial. In other words, a burial with multiple interments requires one Burial Form and multiple Individual-Burial Forms.
	Cache	A Cache Form is required for each cache.
Both	Photolog	Photolog data are initially entered in Numbers on the iPads then imported into FileMaker Pro into the Photolog, which has a default list layout.

 TABLE 2.1 List of Survey and Excavation Forms

excavators record information into all fields on the forms and do so in as much detail as possible. It is imperative to keep up with the forms at the end of each field day, rather than planning on remembering key details later.

The way the database forms are structured is hierarchical and relational. As shown in <u>Interactive 2.1</u>, before individual excavation forms can be created, higher-order forms must first be created. The forms mirror the order of provenience detail described above.

Using Multiple iPads in the Field

In most cases, each operation has at least two iPads being used to record field data. Past experience with the database has determined that one iPad should be the Primary iPad for an operation, and all other iPads are considered Secondary iPads for that operation. The main difference between the two is



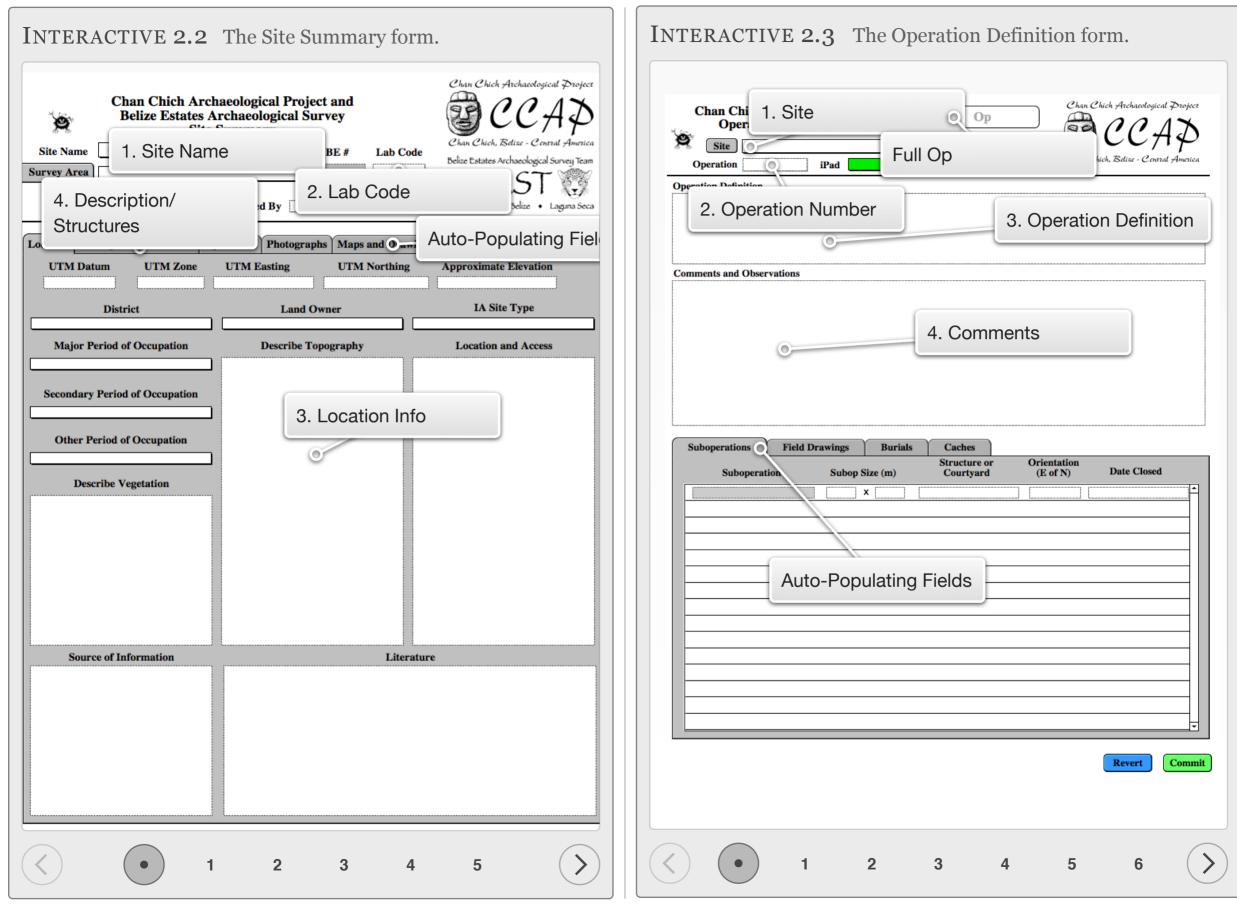
that the official versions of the higher-order forms are kept on the Primary iPad. During database updates in the lab, the lab director only imports the higher-order forms, including Site Summary, Operations, and List of Datums, from the Primary iPad. However, the Secondary iPads each require copies of the higher-order forms so that lower-order forms, including Subop Definition Forms, Lot Forms, Sample Forms, and so on, can be created. The lab never imports these copies, meaning that all descriptive data, interpretations, and so on should be entered on the higher-order forms on the Primary iPad.

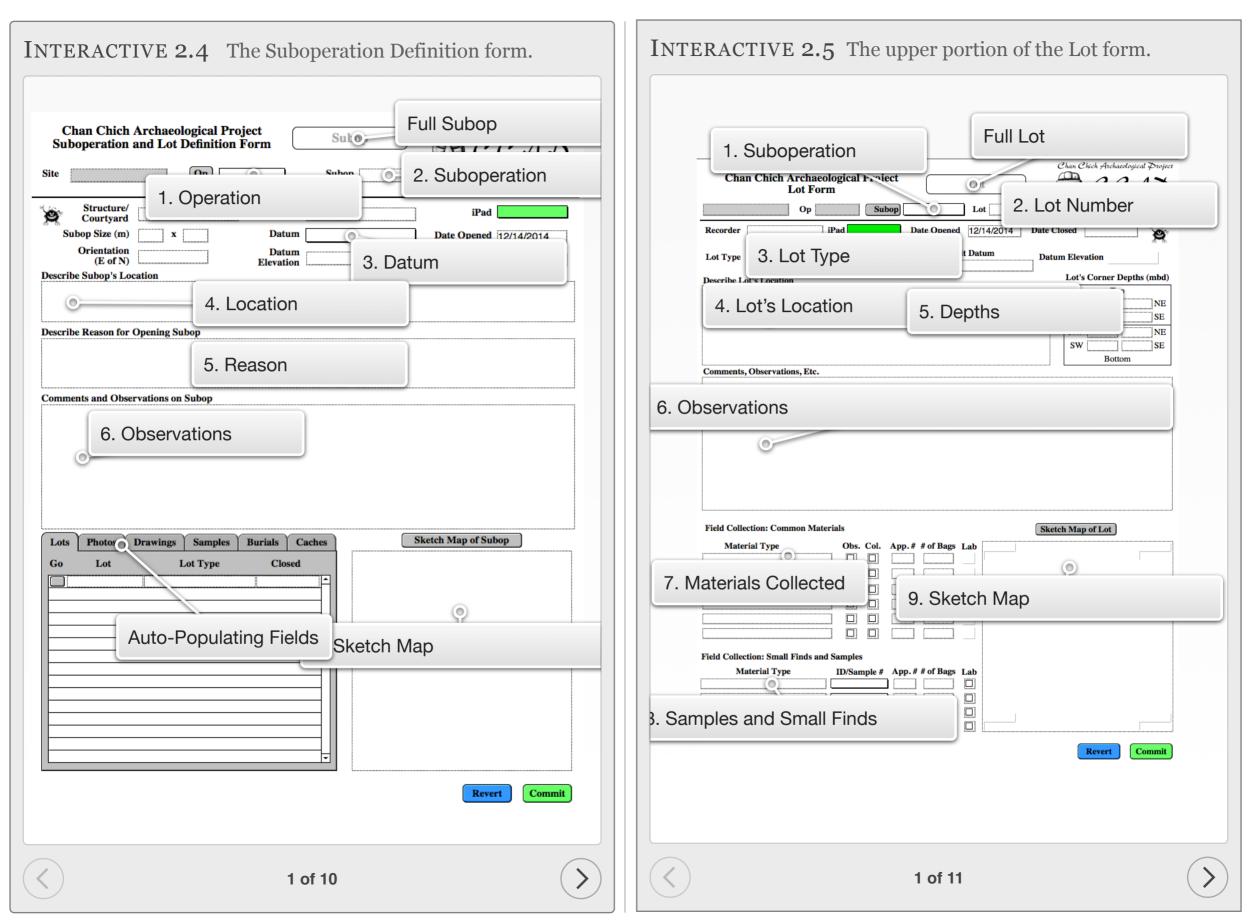
General Tips for Working with FileMaker Go Forms

When entering data into the FileMaker Go database, it is important to be as descriptive as possible and return to forms when necessary to add or update information. Be sure to fill in the header field information, including the name of the recorder, the opening and closing dates, and the iPad being used to collect the data. The iPad field is a drop down list of iPads; this information helps the lab import field data later. When you are finished with a form, even temporarily, click the "Commit" button at the bottom of the form to ensure the information you entered is saved in the database. If you realize you made a mistake on a form, click the "Revert" button to restore the form to its previous version. On forms that have a box for a sketch, you should use the "Get Signature" option to draw a sketch by hand directly in FileMaker Go.

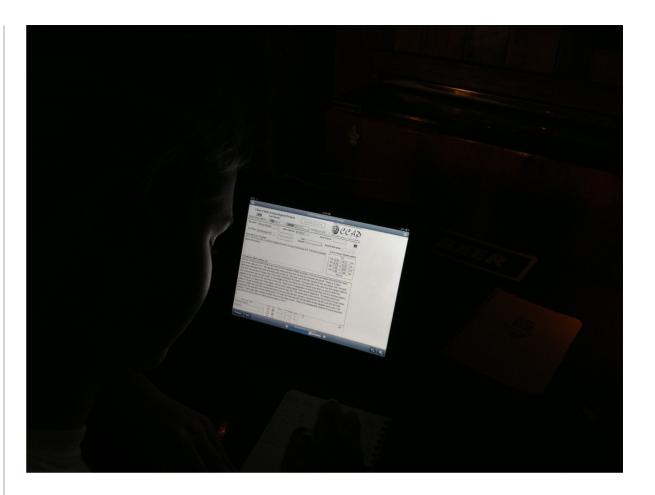
Survey and Excavation Forms

<u>Table 2.1</u> lists the Survey and Excavations Forms used by the CCAP and BEAST. Interactives 2.2–2.6 include more information on the Site Summary Form, Operation Definition





INTERACTIVE 2.6 The lower portion of the Lot form.
Chan Chich Archaeological Project Lot Form Lot Matrix Photos Sare Matrix Photos Sare Auto-Populating Fields
Relationship of Lot to Others
Lots in Same Subop 1. Lot Matrix Below
Lots in Other Subops
 1 2



Form, Subop Definition Form, and Lot Form.

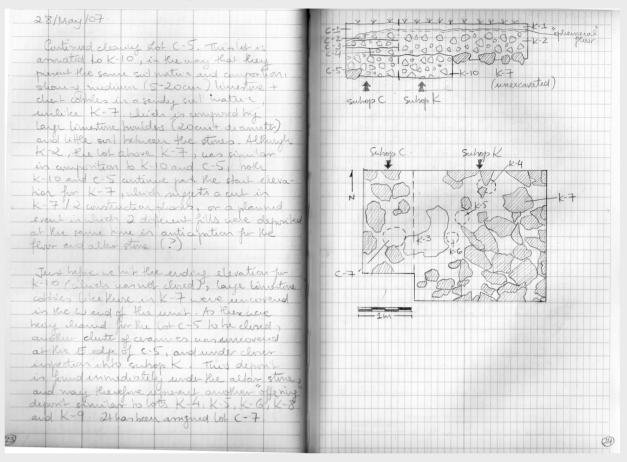
Journals and Drawings

Daily Field Journals

In addition to standardized field forms, all project personnel keep daily field journals. A field journal is not the same as a personal diary or travel journal. Field journals are important supplements to the other forms of recording and allow for more detailed accounts of excavations as well as the thoughts and interpretations of the recorder as the field process unfolds (Figure 2.1). CCAP project staff use Rite in the Rain® spiral notebooks for their field journals. The preferred notebook is No. 363 or No. 383, which measure $4^{5/8}$ by 7 inches, has metric graph paper, and is small enough to fit in a pocket. The following guidelines should be considered when using a field journal.

On the cover of the field journal, list your name, year, and the location of the project in black permanent marker. Each day, start a fresh page with the date and where you are working (i.e., courtyard or plaza, structure, and suboperation). Names

FIGURE 2.1 Example of a good field journal entry.



These two pages are from Debora Trein's 2007 field journal (after Houk and Zaro 2011:Figure 6).

of the people with whom you are working that day should also be included, as well as the name of your supervisor.

The journal should contain everything that occurs each day in the suboperation (as it relates to the excavation). If a new unit was laid out, you should describe its dimensions, along with its orientation and location relative to other units and structures. If you excavated all day, describe which lots you worked on, what artifacts were recovered, and any problems encountered. Add commentary about what was found, any thoughts on the soil matrix, notes on the roots and rocks, and your remarks on features that may have been found. This is an account of what you did each day, so be thorough. However, this is not a personal diary, so personal thoughts or stories that do not pertain to the archaeology should not be included.

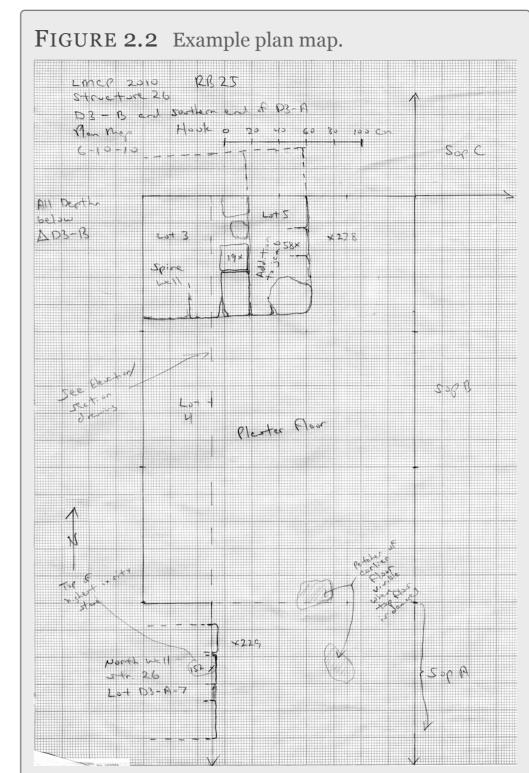
Include sketch maps of your excavation unit to show the size and location of lots, and do quick drawings of important or unusual artifacts found. These maps and sketches are used to aid in the analysis of your excavations and can often help clarify confusion over field forms or artifact provenience.

You may find it helpful to make a list of things that need to be done before a lot or suboperation can be closed. These lists are particularly helpful near the end of the field season when things tend to get hectic and rushed. A simple note to remind yourself to take closing elevations or to draw a plan map can sometimes save the day.

Your daily journal should remain in your backpack and not be left out in the field at the end of the day. This will allow you to work on it in the evenings and/or before breakfast each morning as necessary.

Plan Maps

A plan map is a scaled drawing of an excavation unit showing the horizontal relationship of things (Figure 2.2). It is often described as a "bird's eye view" of a unit. Follow these steps to draw a plan map:

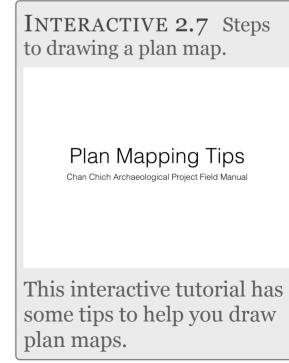


This example plan map is from the La Milpa Core Project, but the conventions are the same as those used by the CCAP (after Houk and Zaro 2011:Figure 7).

- 1. Determine a convenient scale based on the size of your graph paper, the size and shape of the suboperation, and the nature of the features or lots being mapped. Plan maps should be drawn on metric graph paper using a common scale such as 1:10 (1 cm on the graph paper equals 10 cm in the real world) or 1:20 (1 cm on the graph paper equals 20 cm in the real world). When possible, pick a scale that will allow you to draw your map on one piece of paper and show as much detail as required. In some cases, as in a complicated cache, for example, it may be necessary to draw a detailed map at a larger scale of only a section of a suboperation. When this is done, be sure to indicate the horizontal location of the drawing with respect to the edges of the suboperation.
- 2. Draw the outline of your unit on the graph paper using a straight edge. Avoid making the edge of the graph paper be the edge of the drawing. Leave yourself some room for notes around the edges of the plan map by centering the map in the graph paper (but leave your self room for the heading, as described below).
- 3. Draw a north arrow outside of the edges of the suboperation.
- 4. Draw a graphical scale bar. Often maps are reduced when scanned or copied, which makes scales expressed as "1 cm = 10 cm" meaningless.

- 5. Fill in the heading information. The following information should be included on all plan maps in the heading of the map:
 - Project Name
 - Site Name
 - Structure Number
 - Plan map of "Site-Op-Subop-Lots"
 - Date (spell out the month to avoid confusion)
 - Names of the people who drew the map
 - Vertical datum used and elevation of datum
- 6. Draw each feature or lot to scale by measuring from two fixed edges (Interactive 2.7). For example, if you are drawing a cut stone block in the middle of your unit, you would pick a point on that stone (like a corner) and measure from the south edge of your unit to that point

and from the west edge of your unit to that point. When doing so, it is crucial that you maintain a 90degree angle between your tape measure and the edge of your unit and that you keep the tape measure level. A version of this same system is to set up a tape measure along one edge of your suboperation. For example, if you lay a



tape along the western edge of the unit, with "O" at the southwestern corner, you only need to make one measurement to a given point. In the example in Interactive plan mapping, the "north" measurement is determined by the intersection of the two tape measures. It is 66 cm north of the southwest corner. The corner of the stone is 44 cm east of the west edge of the unit.

Once the point has been measured, you plot it on your graph paper by converting the real-world measurements into scaled measurements. In the example shown in Interactive plan mapping, assuming your plan map has a 1:10 scale, the point on the stone being measured would be 6.6 cm north of the south edge of the unit and 4.4 cm east of the west edge of the unit. However, if your scale is 1:20, the point would be 2.2 cm east and 3.3 cm north.

Generally, the most efficient way to draw a plan map is first to plot several key points on a given object using the method described above and then plot other points by measuring from the points you have already drawn. Using the example shown in Interactive xx, the western and northern corners of a cut stone were measured from the edges of the unit, but the eastern corner was measured in relationship to the northern corner of the cut stone. In the example, the eastern corner is 9.35 cm east and 8.6 cm south of the northern corner.

If the object you are drawing is more than 50 cm below your tape measure, you should use a plum bob to reduce measuring error. A plum bob is basically a weight on a string. To use one in plan mapping, suspend the plum bob over the point you are measuring and measure from the edge of the unit, holding your tape level, to the plum bob's string.

7. Record the elevations of key points on your map. Although a plan map primarily shows the horizontal relationship of various things in a suboperation, vertical provenience information is also recorded. To do this, measure the depth below the unit's datum of the point in question and convert the depth measurement to an elevation. In Interactive plan mapping, assume the cut stone block on the north end of the map is sitting on a plaster floor. Two depths are measured to capture the vertical relationship of the floor and the stone. The top of



the floor is 100 cm below the unit's datum. The datum has an elevation of 120.00 m (note that in <u>Interactive 2.7</u> the symbol used to indicate a datum is a triangle with a dot in the middle of it). To determine the elevation of the floor, convert 100 cm to 1.00 m, and then subtract 1.00 m from 120.00 m to get an elevation of 119.00 m. The depth of the top of the cut stone block is 90 cm below datum. Therefore, elevation of the top of the cut stone is 120.00 m minus 0.90 m, or 119.10 m. The cut stone is therefore 10 cm thick, and the top of it is 10 cm higher in elevation than the floor on which it sits.

- 8. When drawing a plan map of architectural features, use a different line thickness or shading pattern to indicate cut stones that are in place (such as those in a step or a wall) or intact plaster. If you do not do this, intact architectural features may not be obvious on the plan map.
- 9. When drawing a plan map, be consistent with your conventions (shading, patterns, symbols, etc.). See Figure 2.2. for examples of common conventions used by the CCAP on plan maps.
- 10. Be sure to include any notes, annotations, or points of clarification on the plan map. All plans will be scanned and digitally redrawn, so notes can easily be omitted for final publication, if needed. The important thing is to clearly convey the necessary information so that months later project personnel (and potentially you!) are able to correctly interpret the plan map.

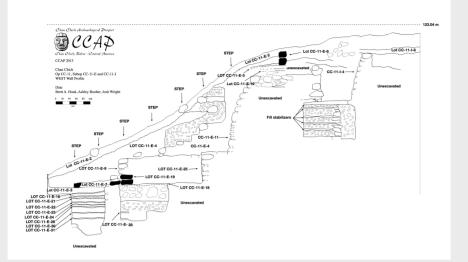
11. Once a plan map has been drawn, the supervisor should complete a Field Drawing Form on the iPad and either scan or photograph the plan map.

Profiles, Sections, Elevation Drawings

Profiles are drawings of the side wall of an excavation unit (Figure 2.3). Typically, at least one profile drawing is made for each suboperation, and in many cases more than one are drawn. Profile drawings primarily capture stratigraphic information, showing the relationship of various lots vertically and depositional sequences. However, in some cases, they may also capture architectural data. A section drawing is very similar to a profile, but it does not follow a wall of an excavation. Rather, it is a drawing along any vertical plane imposed through an excavation unit and is typically made specifically to record architectural data. While both profile and section drawings are of one vertical plane, an elevation drawing may be of multiple parallel planes, flattened onto one drawing. Elevation drawings are made to show how architectural elements are arranged on the face of a building, for example. Follow these steps to draw a profile; these procedures can be modified slightly to make section or elevation drawings:

1. Determine which side walls of the suboperation will be drawn. If the walls all show the same stratigraphy, you may only need to draw one. If different and important features are visible in more than one wall, you may need to draw several profiles of the suboperation.

FIGURE 2.3 Example of a profile drawing.



This is a published version of a profile drawing from the field. This rather complicated profile was actually drawn in multiple stages as the excavations progressed. The published version is a composite of four different field drawings.

2. Establish a datum line (Interactive 2.8). You will measure things up and down from this line, so it is best to put it about halfway up the profile. The datum line should extend across as much of the profile as possible. Use chaining pins and a line level to secure the line, making sure that the line hangs free of any objects jutting out from the wall. Your datum line needs to be tight, and you should check it periodically while you make your drawing to be sure it is still level.

Once you have your datum line established, determine its elevation by measuring its depth below the vertical datum for your unit. To do this, measure down from the unit's vertical datum to the profile datum line and subtract that depth from the elevation of the unit's datum. Make a note of this elevation in your daily journal.

3. Measure how large your profile is horizontally and vertically (i.e., how tall and wide is the space you are drawing?). Once you have that information you can determine a convenient scale based on the size of your graph **INTERACTIVE 2.8** Steps to drawing a profile.

Profiling Tips Chan Chich Archaeological Project Field Manual

This interactive tutorial has some tips to help you draw profiles, elevations, and cross-sections.

paper. Profiles should be drawn on metric graph paper using a common scale such as 1:10 (1 cm on the graph paper equals 10 cm in the real world) or 1:20 (1 cm on the graph paper equals 20 cm in the real world). When possible, pick a scale that will allow you to draw your profile on one piece of paper and show as much detail as required.

4. At this point, you should probably dash in two vertical lines representing the edges of your suboperation. For example, if you were drawing the southern wall of a unit, you would draw a line representing the eastern edge of the unit and another representing the western edge. For now, these lines do not need to resemble the actual edges of the unit, which are rarely as straight as we would like them to be. The lines are simply reference lines at this point.

- 5. Next, draw your datum line extending from one edge of the profile to the other. Exactly where on the graph paper you draw this line will depend on how much room you need to leave above and below the line to draw the profile. Before you draw the line in too heavily, be sure that you have room on the page for the highest point on your profile above the line and for the lowest point below the line. When you draw your line, draw it on one of the thick lines on the graph paper.
- 6. Write the elevation of your datum line next to it on the graph paper.
- 7. The datum string will be used for vertical measurements, but you will need a system for determining horizontal measurements, as well. There are several solutions to this problem. One is to lay a tape measure out on the ground surface along the wall of the suboperation you are profiling. Extend the tape so that the zero point is at the left edge of the unit as you face the wall. This method will work if the ground surface is level. If it is not level, you will need to be more creative. A second solution is to use your datum string for your horizontal measurements as well. To do this, make a mark using a Sharpie on the datum string every 10 or 20 cm (depending on the scale of your drawing). The key to this method is measuring where to make your first mark accurately (i.e., it is likely

that the left end of your datum string will be several centimeters to the right of the edge of your suboperation). In such cases, you will need to measure from the edge of the unit to make your first mark on the string. For example, if the left end of your string is actually 15 cm to the right of the edge of your unit, you would most likely place your first mark on the string 5 cm to right along the string, or 20 cm from the edge of the unit.

- 8. On your graph paper, make small tick marks on your datum line that represent 10-cm or 20-cm increments and larger tick marks every meter. Do the same along the vertical lines representing the edges of the suboperation.
- 9. With your profile all set up, now is a good time to fill in the heading information. The following information should be included on all profile drawings near the top of the page:
 - Project Name
 - Site Name
 - Structure Number
 - East/West/North/South (pick the appropriate one—the direction you are facing when facing the profile) Profile of "Site-Op-Subop"
 - Date (spell out the month to avoid confusion)
 - Names of the people who drew the profile
- 10. Draw a graphical scale bar. Often profiles are reduced when scanned or copied, which makes scales expressed as "1 cm = 10 cm" meaningless.

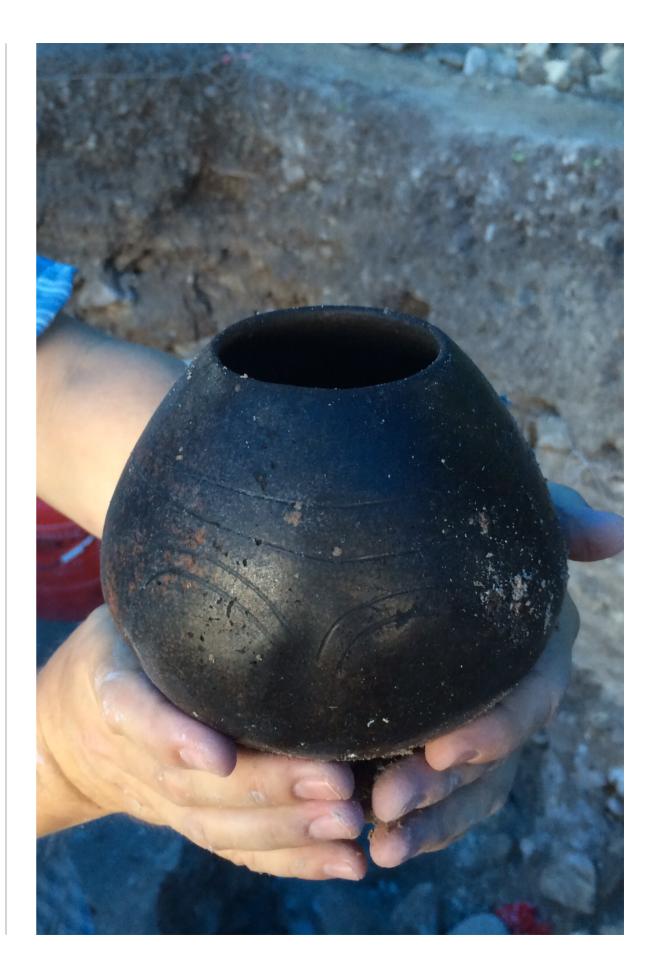
- 11. Drawing a profile generally requires two people: one to measure and one to draw. Start by measuring and drawing the ground surface (see <u>Interactive 2.8</u>). Take measurements of how far above the datum line the ground surface is at 20 cm increments, moving from left to right (see <u>Interactive 2.8</u>). Once a point has been measured, lightly plot it on your graph paper by converting the real-world measurements into scaled measurements. After all the surface points have been lightly plotted, connect the dots to draw in the ground surface. Do not use a straight edge to do this; the line you draw should be smooth and resemble how the ground surface actually looks.
- 12. Continue using this method to draw in different stratigraphic layers, working from top to bottom on the profile. As you work your way down, draw where the actual edges of the unit are in relation to each layer. Typically, the walls will slope in towards the center of the unit slightly and not be straight up and down.
- 13. As you draw each layer, you should individually measure and draw rocks or other features. Use a system similar to the method described for drawing objects in a plan map. Measure several key points on the object using your datum line and your horizontal measuring system (see <u>Interactive 2.8</u>). You can then draw other points in relationship to the measured points.

- 14. When drawing a profile with architectural features in it, use a different line thickness or shading pattern to indicate cut stones that are in place (such as those in a step or a wall) or intact plaster. If you do not do this, intact architectural features may not be obvious on your drawing.
- 15. When drawing a profile, be consistent with your conventions (shading, patterns, symbols, etc.). See Figure 2.3 for examples of common conventions used by the CCAP on plan maps.
- 16. Be sure to include any notes, annotations, or points of clarification on the profile. All profiles will be scanned and digitally redrawn, so notes can easily be omitted for final publication, if needed. The important thing is to clearly convey the necessary information so that months later project personnel (and potentially you!) are able to correctly interpret the profile drawing.
- 17. Once a profile/section/elevation drawing has been drawn, the supervisor should complete a Field Drawing Form on the iPad and either scan or photograph the drawing.

CHAPTER 3

Collecting Artifacts and Samples

Keeping track of the provenience of artifacts and samples collected in the field is one of the most important tasks for excavators. Artifacts without provenience information, as lovely as they may be, are almost always useless to an archaeologist and must be discarded.



Artifacts, except for small finds (discussed below), are turned into the lab only after a lot is completed. Generally, bags from open lots are left in the field at the end of the day in a bucket, which is placed under a tarp to keep it dry in case of rain. Do NOT carry unfinished bags back to camp in your backpack! NEVER put artifacts in your pockets. If you are asked to take artifacts in at the end of the day, take them straight to the lab before doing anything else.

Labeling Bags

When excavating, artifacts are collected and placed in bags by lot and type. This means that the excavator is responsible for separating things like ceramics from lithics in the field and placing each type of artifact in a separate bag for each lot. The CCAP uses special Tyvek soil sample bags as artifact bags. These bags can be washed and reused, and they come with a waterproof label sewn on the side. The label can be reused by covering any previous writing with duct tape.

Each artifact bag is labeled with the information shown in Figure 3.1. Use a black Sharpie to label the tag. Note that only one type of artifact goes into a bag (i.e., ceramics are not mixed with ground stone, etc.). If a lot has many ceramics or other artifact types, it may be necessary to use more than one bag, in which case bags should be labeled "1 of 2," "2 of 2," etc.

As soon as the first artifact of a particular type is encountered while excavating a particular lot, go ahead and create a new bag. Do not place artifacts in unlabeled bags or leave them FIGURE 3.1 Example of a bag label.CCAP 2015CC-12-A-1CeramicsBAH June 1, 2015The label should include the project and season, the full lot number, the type of material collected, the initials of the person who made the bag label, and the date.

around the edge of the unit, thinking you will make a bag later.

Bag Tags

In addition to labeling the outside tag on the artifact bag, you must also put a paper label with the same information within the bag. Each supervisor should have some preprinted tags for this purpose, but any piece of scrap paper can be used. Before it is put in the artifact bag, the paper tag should be placed in a small, sealable plastic bag to keep it from getting wet or dirty.

Small Finds

Small finds are artifacts considered to be unique or unusual and warrant special treatment. Examples include arrow points, obsidian blades, jade beads, unusually decorated sherds, reconstructable ceramic vessels, figurines, etc. Each small find is placed in its own plastic artifact bag or plastic vial with a bag tag. In addition to the standard information written on the outside of the bag/vial and on the tag (see Figure 3.1), the words "Small Find" should be added to the tag. Small finds usually get sketched in daily journals. Small finds are turned in to the lab at the end of each day, regardless of whether or not the lot remains open. In the lab, they are placed in a separate small finds box so that they can be more easily tracked and given special care during processing.

Samples

There are many different kinds of samples that may be collected during the course of a season. Each kind is treated somewhat differently in terms of collection and storage methods. Your field supervisor will determine when and how to collect samples. Samples receive the same provenience information recorded for artifacts, but also are numbered consecutively by operation. For example, if two carbon samples were collected from Op CC-12, they would be "Sample CC-12-S01" and "Sample CC-12-S02." For each sample collected, a Sample Form must be completed.



CHAPTER 4

Field Photography

The Operation Director is responsible for taking three kinds of field photographs: standard excavation photos, crew photos, and Structure from Motion (SfM) photos. The following sections describe general guidelines and tips for taking each kind of photo.



Each operation is assigned a Canon digital SLR camera. The Operation Director should ensure that the camera's battery is charged each evening and coordinate with the Lab Director to download photographs at least once every three days to the lab computer. The Operation Director should also maintain a photolog on their operation's Primary iPad using the Numbers template provided at the beginning of the season. This photolog will be backed up onto the lab computer each time the database is uploaded, and at the end of the season it will be imported into the final version of the database. Once that occurs, photo information will auto populate on various field forms including Suboperation Definition Forms and Lot Forms.

Standard Excavation Photos

Standard excavation photos are the official photographs used in publications and presentations. These photos are generally taken after a unit has been laid out and cleaned (but prior to excavation), and at the end of each lot. Photographs are also taken of profiles. Operation Directors should follow these guidelines for taking standard excavation photos:

- Standard excavation photos should be shot as JPEG files.
- Be sure that the unit has been swept clean and that no tools or equipment are around the edges of the unit.
- Place a north arrow and scale in the unit. For close-up photos the north arrow can serve as the scale, but for large units it may be necessary to place a meter scale in the unit.



- Set the camera to Auto Depth of Field.
- Set the ISO to at least 400.
- Be sure that the lens is not fogged. On humid days, the camera's lens cap should be removed approximately 15 minutes before taking photos to avoid fogging.
- Take closing photos from multiple angles, but always include one facing north.
- Be sure the camera is focused; review photos and reshoot if needed.

• Enter all standard excavation photos on the photolog; each photo should get its own entry.



Crew Photos

Regularly taking photos of the crew at work is good practice. These should be candid photos of people excavating, plan mapping, or profiling. These photos are often used in presentations and advertising. Operation Directors should follow these guidelines for taking crew photos:

- Crew photos should be shot as JPEG files.
- Take at least five crew photos each day in the field; often these photos include important excavation data that standard excavation photos miss because crew photos capture lots during excavation, not after excavation.



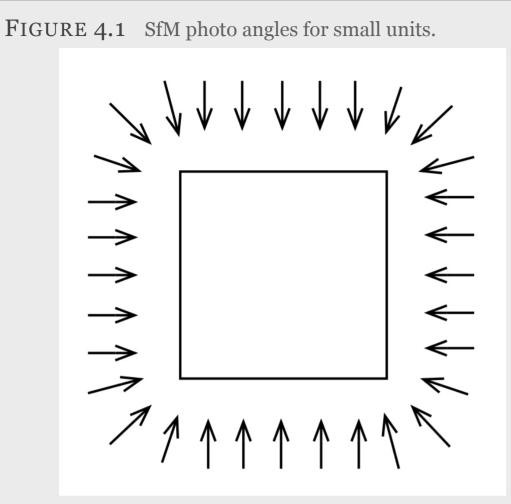
• Crew photos should be entered in the photolog, but the description can be as brief as "crew shot" or "work shot."

SfM Photos

The CCAP uses SfM to document excavation units, interesting lots, and architecture. SfM should not be used on every lot, but should be used to record intact architecture or other interesting features. It is appropriate to take closing SfM shots of a unit once the excavations are complete. The following procedures are based on Agisoft (2013) with modifications specific to the CCAP's procedures and equipment:

- SfM photos should be recorded on the same memory card as other excavation photos, but they do not need to be entered into the photolog.
- Use an iPad to create a photo board in iDraw indicating the subject (subop, lot, or artifact, for example) and noting "Begin SfM." The photographer should take a photo of the iPad to create a visual marker in the batch of images to identify the start of the block of SfM photos.
- Change the file type to RAW, which is preferred over JPEGs for SfM (Agisoft 2013).
- Set the camera on Auto Depth of Field.
- If using a zoom lens, use the same zoom for all photos. It is best to use the minimal zoom.

- Set the ISO to lowest value possible given the available light. This is likely to be no lower than 100 or 200 in most cases.
- Put a north arrow in the scene prior to photographing.
- Having more photos is better than not having enough, so always take more photos than you think you need.
- Plan how you will take the photos before beginning.
- Take photos systematically, moving around the excavation unit—not just turning the camera—and ensure that each photo overlaps with at least 50 percent of the previous photograph.
- For small units, take photos as shown in Figure 4.1.
- For large units, take photos from outside the unit first, as shown in Figure 4.1, and then take photos from inside the unit as shown in Figure 4.2.
- For wide units, you may need to use the painter's pole to take photos from above the unit, as well.
- After taking all the photos needed to build the SfM model, change the iPad photo board to say "End of SfM" and take a photo of the iPad.
- When finished, be sure to change the file type back to JPEG for standard photos.



For small units, take a series of photographs by moving around the edges of the unit.

All SfM images are stored on a dedicated portable hard drive, and that hard drive is regularly backed up onto another portable hard drive. Memory cards are not erased unless absolutely necessary (Houk 2014b).

Prior to building a SfM model, the photographer first creates a disk image (dmg) file and copies all the photos to that file. The PhotoScan files are also saved to this disk image, which can be moved from one hard drive to another without PhotoScan's losing the links to the images (Houk 2014b). All SfM models

are stored together and clearly named by operation and subject (Houk 2014b).

FIGURE 4.2 SfM photo angles inside larger units.

For large units, first photograph the unit from the outside, as seen in Figure 4.1, and then take a series of overlapping photographs from inside the unit. Begin by standing in the middle of the unit and getting overview photographs of all four walls (red). Then get photos closer to the walls of the unit to capture more detail (black). All four walls should be photographed in this manner. CHAPTER 5

TDS Mapping

This chapter provides step-by-step instructions for using the project's Nikon DTM-322 Total Data Station (TDS) and the Nomad data collector with Survey Pro 4.11 software.



TDS Set-up

Set up Tripod directly over datum or traverse point. Point the third leg (with the carrying strap) in the general direction of the readings to be taken.

Place TDS on the center of the base plate of the tripod, but do not tighten it the full amount yet. Attach a plumb bob and move the tripod until it is over the datum. Raise or lower the legs to get the TDS to a comfortable viewing height.

Remove the TDS.

Use a line level or iPhone with Clinometer app to get the table as level as possible.

Place the TDS back on the table and tighten it.

Sight through the base of the TDS centering the TDS over the datum using the optical plumb bob. Adjust the TDS' position on the table as necessary to get it directly over the datum

Use the bull's eye level on the base of the TDS to get the TDS level.

Sight through optical plumb bob to verify the TDS is still centered over the datum.

Level the TDS using the screw mounts. Center the level between two of the leveling screws. Center the bubble by turning the screws in unison and in opposite directions. Turn both thumbs (left and right) in the same direction, i.e. inside or outside, toward or away from the TDS. The bubble will move in the direction that the LEFT thumb is moving

Rotate the TDS over the next set of leveling screws, and repeat the process until the TDS is level.

Verify that the instrument is centered over the datum by sighting through the optical plumb bob.

If adjustment is required, re-level the TDS using the above steps.

Turn on the TDS by pressing the orange power button.

Rotate the barrel until the unit beeps.

Data Collector Set-up Attach the Nomad to the TDS.

Turn on the Nomad by pressing the green power button.

After the splash screen, Windows Mobile will start up.

Use the stylus and press **Start** in the upper left corner of the screen.

Click Survey Pro to launch the survey software.

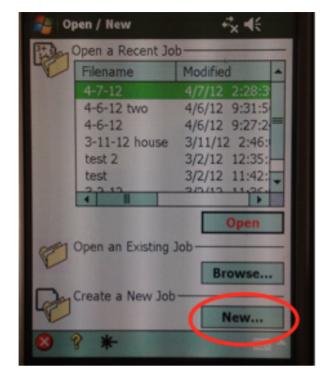
Follow the directions below depending on what you are doing with the instrument.

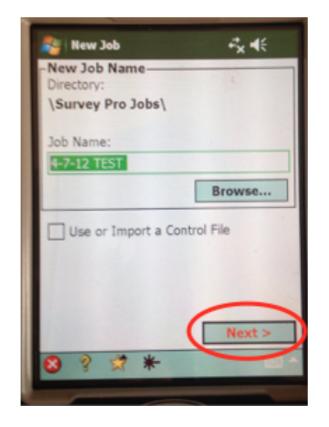
Setting up a New Job

On the Welcome Screen, click **New** to create a new job.

Name the Job using the date and site where you are working (i.e., 6-10-12 CC Upper Plaza). For this example, I used "4-7-12 TEST."

Press Next.

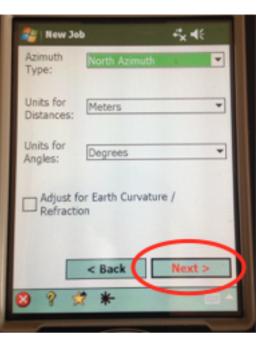




Use the following settings:

- Azimuth Type = North Azimuth
- Units for Distances = Meters
- Units for Angles = Degrees
- Leave the "Adjust for Earth Curvature / Refraction" box unclicked.

Hit Next.



If you are setting up a new grid, follow these instructions. If you are setting up over a previously established grid, skip down to the next set of instructions.

Establish your main mapping datum in a position that is central to your work area and out of the way of planned excavations.

This point will be your Main Datum.

Click the Keyboard Icon in the bottom right corner of the screen to open the keyboard. Type "Main_Datum" as the name for your first point. Click on a blank part of the screen to close the keyboard.

- Set the Northing to 5000 m.
- Set the Easting to 5000 m.

 Set your elevation to either a known elevation based on a GPS reading or topo map or use an arbitrary elevation like 100 m.

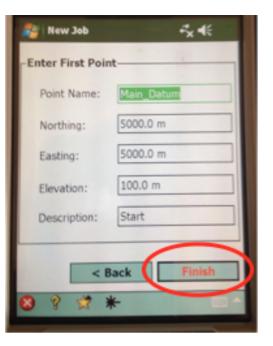
Leave "Description" set as "Start".

Click Finish.

You will be taken to the main screen. The job name will show up in the upper left corner of the screen next to the Windows logo.

To create a backshot, click on the **Survey** button.

Then, select **Station Setup**.



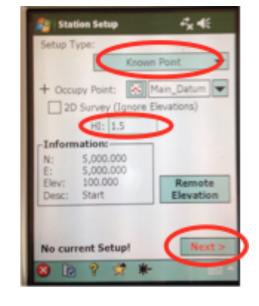
A 47-12 TEST					
File Job Su	rvey				
Stakeout Inverse Co	Cogo				
Curve Roads Adjust					
A Station Setup	1				
8 Check Setup	2				
C Traverse/Sideshot	×-0				
D Repetition Shots	2				
E Multiple Sideshots	4-U				
0 ? 5 🖾 🖈 = 💴 -					

The first screen is where you tell the TDS where you are set up. Select **Known Point**.

Set Occupy Point to "Main_Datum."

Do not click the "2D Survey" box.

Measure the Height of you Instrument (HI) by using a tape measure to measure from the datum



to the line on the side of the TDS that is at the level of the center of the barrel. This is your HI. It won't change until you move or adjust the TDS.

Enter the HI in meters.

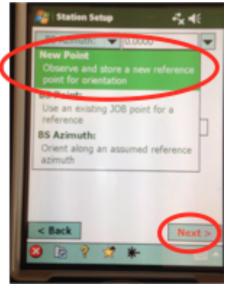
Click Next.

This next screen is where you set up your backsight point. Since you are establishing a new grid, select **New Point** from the pull down menu.

Click Next.

Decide where you want your backshot. This should be a point due north (grid or magnetic) of your Main Datum. Set the point in an area where

you will not be excavating and in a spot with an unobstructed view of the Main Datum.



Measure the height of the prism, which is called height of rod (HR), using a tape measure.

Enter the HR in meters.

Set BS Azimuth to "0.0000."

Set Backsight Circle to "0.0000."

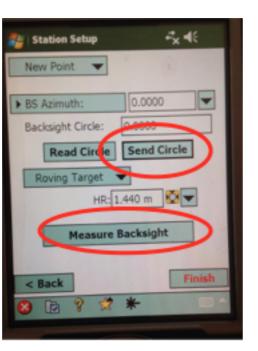
Set the prism rod on the backsight point and locate the prism using the TDS.

Click **Send Circle** to zero the horizontal angle on the instrument.

Select "Roving Target."

With the TDS still aimed at the center of the prism, click **Measure Backsight** to take a shot. Note, if the TDS is still in "leveling" mode, click **ESC** on the TDS before taking the shot

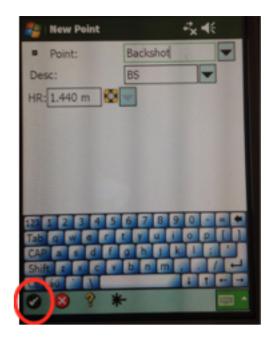
Name the shot "Backshot." (You do not have to rename it; the description will indicate that it is a backshot. However, renaming it will label the shot "Backshot" on the map of your survey).



Then click the **green check button**.

Then click Finish.

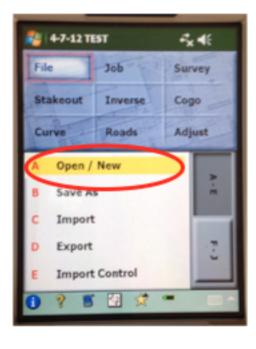
You are now ready to take shots.



Working with an Existing Job

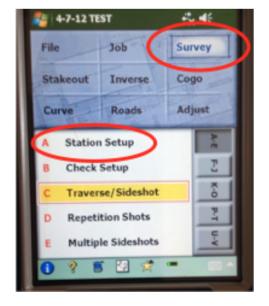
Set up the TDS as described over the datum from which you plan to shoot.

On the Welcome Screen, click **Open** and select the appropriate job.



Se Op	en / New	-% 4 €
Tile O	pen a Recent Joi	b
10	Filename	Modified .
	4-7-12 TEST	4/7/12 2:53:1
	1.7.12	4/7/12 2:20:3
	4-6-12 two	4/6/12 9:31:5
	4-6-12	4/6/12 9:27:2
	3-11-12 house	3/11/12 2:46:
	test 2	3/2/12 12:35:
	4	2000
		Open
000	pen an Existing 3	Job
V		Browse
Pro	reate a New Job	
V		New
8 2	*	

Select **Survey** from the main screen, and then select **Station Setup**.



On the Station Setup screen, select "Known Point" for the Setup Type.

Using the pull down menu, set the "Occupy Point" to the point over which the TDS is set.

Click Next.

Setup Type:				
Known Point 💌				
+ Occupy Point:	lain_Datum			
2D Survey (Ignore Elevations)				
HI: 1.500 m]			
-Information:				
N: 5,000.000 E: 5,000.000				
Elev: 100.000 Desc: Start	Remote			
	0			
Check Setup	Next >			
8 2 7 *	-			

Select "BS Point" from the pull down menu on the top left.

Select the appropriate backshot point from the pull down menu to the right.

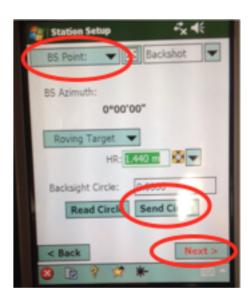
Enter the prism height (HR).

Verify the prism height is correct,

and set the prism on the backshot point. Aim the TDS at the prism.

Click Send Circle.

Click Next.



On the next screen, select "By Distance" on the left pull down menu. Aim the TDS at the prism, which should still be set on the backshot point.

Click **Check** to take a shot and verify that you are set up correctly.

Click Finish.

You are now ready to take shots.

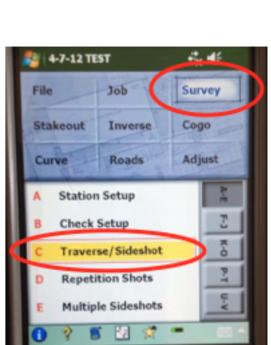
Taking Regular Shots

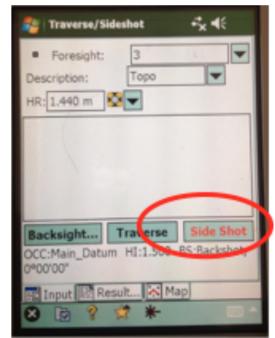
Once you are set up and have taken your backshot reading, you are ready to begin surveying. Most points are what the Survey Pro software calls "side shots."

From the main menu, select Survey and then select Traverse/Sideshot.

In the Foresight field, enter the number for your shot. If you have named your previous shots, this can be either "1" for your first survey point or "3" because it is your third shot.

In the description field, enter a description of the shot. If you are taking simple topography shots, name it "Topo." If you are shooting the corner of a Subop, enter the Subop number and





corner (i.e., CC-1-A_NE). If you are shooting a datum, enter the name of the datum.

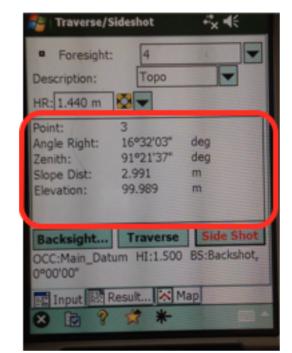
Aim the TDS at the prism, and select **Side Shot** to take a reading.

Click the **green check** to accept the shot.

The screen is now set to take a new shot, but it also shows you the information on the shot you just took.

Keep surveying using this method until you are finished or need to move the instrument.

Before moving, you will want to take a traverse shot to set up a new station.



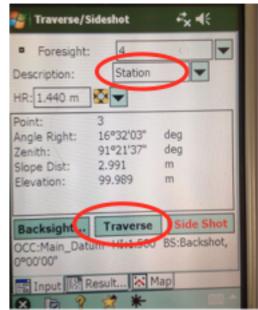
Taking a Traverse Shot

Set up a datum mark in the ground where you want to put your new TDS station.

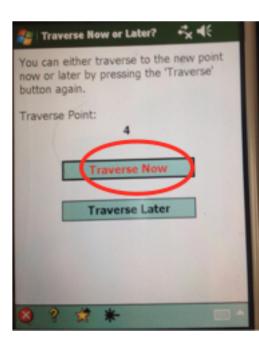
Set the prism up on that point and aim the TDS at it.

For the description of this new point, enter "Station."

Click **Traverse** to take the shot and then click the green check.



If you want to move the instrument now, on the next screen select **Traverse Now**. If not, select **Traverse Later** and skip to the end of this section.



Selecting "Traverse Now" brings you to the Station Setup screen.

Go ahead and move the instrument and set it up over the new station.

Measure your new HI and enter it.

Set the prism on the backshot point and aim the TDS at it.

Enter Send Circle.

Click "Ok" after you are properly aimed. Then click Next.

On the next screen, select "By Distance" on the left pull down menu. Verify the prism height is correct, and set the prism on the backshot point. Aim the TDS at the prism.

Main Datum

0°00'00"

HR: 1.440 m

Station Setup

New Occupy Point:

New Backsight Point:

New Backsight Circle:

Roving Target 🔻

Send Circle

HI: 1.515

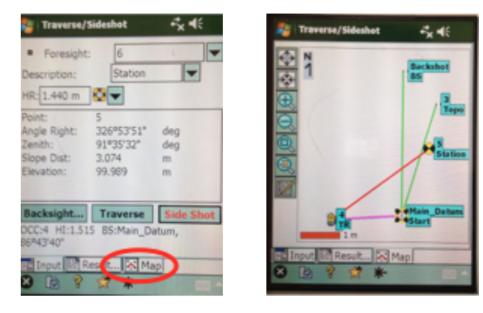
Click **Check** to take a shot and verify that you are set up correctly.

Click Finish.

You are now ready to take shots.

After taking your first shot from the new station, click the Map icon on the bottom of the Traverse/Sideshot screen.

If the map looks correct, then you are all set to keep surveying!



If you selected "Traverse Later," you can continue shooting side shots until you are ready to move the instrument. When you are ready to move your Traverse point, click the **Traverse** button on the Traverse/Sideshot window. You will be prompted to use your previous traverse point or shoot a new on. Follow the steps above to move the instrument and get set up on your new station.

Shutting Down

To quit Survey Pro, on the main menu, select "F-J" and then click **Exit**.

To turn off the Nomad, hold down the green power button for a few seconds until you see the "Power Menu." Select **Shutdown**. Be sure to recharge the Nomad.

Make a note of the DTM-322 battery level be shutting it down and remember to get a fresh set of batteries if necessary before mapping again. To turn off the DTM-322, push the red power button, then push the yellow **Rec/Ent** button.



References



Agisoft

2013 Agisoft PhotoScan User Manual, Professional Edition, Version 1.0.0. Agisoft, LLC, St. Petersburg, Russia.

Coe, William R., and William A. Haviland

1982 *Introduction to the Archaeology of Tikal, Guatemala.* Tikal Reports 12. University Museum, University of Pennsylvania, Philadelphia.

Herndon, Kelsey E., Gregory Zaro, Brett A. Houk, Samantha Mitchell, and Erica Gallis

2014 The 2014 Excavations of the Chan Chich Dynastic Architecture Project. In *The 2014 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 31–68.
Papers of the Chan Chich Archaeological Project, Number
8. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Houk, Brett A.

- 1992 Excavations at Nak'nal (BA-22a): Small SiteInvestigations in Northeast Peten, Guatemala. UnpublishedM.A. thesis, Department of Anthropology, The University ofTexas, Austin.
- 1996 The Archaeology of Site Planning: An Example from the Maya Site of Dos Hombres, Belize. Unpublished Ph.D. dissertation, Department of Anthropology, The University of Texas, Austin.
- 2012 The Chan Chich Archaeological Project's Digital Data Collection System. In *The 2012 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 73–82.

Papers of the Chan Chich Archaeological Project, Number 6. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

- 2014a The Chan Chich Archaeological Project: 1996 to 2014 Project Lists. In *The 2014 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 169– 177. Papers of the Chan Chich Archaeological Project, Number 8. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.
- 2014b The Evolution of the Chan Chich Archaeological Project's Digital Data Collection System. In *The 2014 Season of the Chan Chich Archaeological Project*, edited by Brett A. Houk, pp. 161–168. Papers of the Chan Chich Archaeological Project, Number 8. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.

Houk, Brett A., and Gregory Zaro

2011 *The La Milpa Core Project Field Manual*. Occasional Papers in Archaeology, Number 5. Department of Sociology, Anthropology, and Social Work, Texas Tech University, Lubbock.