APPENDIX E:
Data Collection Protocols

CEC-200-2023-017-APE

2018
California Commercial End-Use Survey (CEUS)

Data Collection Protocols

Prepared for the

California Energy Commission

Prepared by

ADM Associates, Inc.

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1 INTRODUCTION

1.1 PROJECT GOALS

Through agreement number 300-15-011, the California Energy Commission (CEC) has contracted with ADM Associates, Inc. (ADM) for the California Commercial End-Use Survey (CEUS). The goals of the project, according to the Request for Proposals (RFP) developed by the CEC are as follows[1]:

- Increase the sample size for on-site surveys significantly above that of historical levels to support disaggregation of energy demand forecasts.
- To survey sites and collect on-site end-use equipment type by area and fuel type. This data will be used to calculate end-use fuel saturations, with special attention given to the heating and cooling areas by fuel type.
- Calculate end-use fuel saturations at the forecast zone level by building type.
- Calculate commercial floor space estimates at the forecast zone level by building type.
- Calculate annual whole-building energy use estimates at the forecast zone level by building type.
- Calculate annual whole-building hourly load profiles at the forecast zone level by building type.
- Incorporate interval-metered electricity consumption data into forecast model input development.
- Develop a methodology and evaluate the pros and cons for over-sampling newly constructed commercial facilities, so that statistically significant population estimates can be made of the most recent building stock vintage.
- Examine the potential for using purchased commercial real estate data to benefit the CEUS design or as a means of collecting commercial end-user characteristics.
- Accurately characterize building economic activity and assess **North American Industry Classification System's (NAICS's)** code classification. Tabulate data on NAICS's misclassifications by utilities and /or the industry.
- Develop Energy Commission staff expertise in the evaluation of sample design alternatives, construction of sampling frames and recruitment pools, computation of sample weights, and population estimation techniques.

These goals are discussed in greater detail in the CEUS Research Plan.

[1] California Energy Commission RFP-15-319, page 13.

1.2 PROJECT DESCRIPTION

Our project follows closely the work plan developed by the CEC in Request for Proposal number 15-311. The work plan has the following elements:

- **Research Plan**
- **Sampling**
- **Development and testing of field data collection protocols**
- **On-Site Data Gathering**
- **Gathering of Utility AMI data for sampled survey-sites**
- **Documentation, Training, Technology Transfer, and Support**

1.3 THIS DATA COLLECTION PROTOCOL

This data collection protocol has four primary components. We briefly describe each component below.

1.3.1 Sample Execution

The data collection protocols must address how the sample design is adhered to. This includes the development of a tracking system to monitor achieved sample points for each "sample cell" (a distinct combination of geographical zone, NAICS code grouping, and energy usage history). Moreover, the protocols must describe how "canvassing," or direct on-site recruitment of certain businesses into the CEUS is managed to avoid over-sampling certain cells.

1.3.2 Customer Recruitment

The customer recruitment data collection protocols include detailed instructions for the recruitment of customers. These protocols will discuss the following topics:

- Branding of the CEUS project
- Written communications in advance of calls
- Telephone call scripts and protocols
- Call center hierarchy and call escalation procedures
- Canvassing
- Sector-specific seasonality
- Facility types or customers that require special recruiting methods (e.g., large corporations, institutions, and non-English speaking customers)
- Tracking of survey-site contacts and dispositions
- Quality control

1.3.3 On-Site Data Acquisition

The on-site data collection protocols include detailed instructions for on-site data collection. These protocols will address:

- Safety, driving, and lodging/accommodation
- Field attire
- Talking points and protocols for customer engagement
- Data collection instruments and custom software application
- Data transfer protocols

- Quality Control
- Field effort management, hierarchy

1.3.4 Telephone and Email Surveys

Remote data acquisition will be used for several purposes throughout the project. Section 3 covers the following topics related to remote data collection.

- Application of Remote Data Acquisition
- Telephone Interviews
- QC surveys as QC remediation

2 SAMPLE EXECUTION

2.1 DEFINITION OF A SAMPLE CELL

A sample cell is the finest type of stratum in our stratification scheme. The stratification scheme has the following hierarchy.

1. Planning Area
2. Forecast Zones
3. Sub-forecast zone (to be determined when utility data is analyzed)
4. 12 Building Types
5. Vintage
6. Usage Level (Strata 1-5 with 5 being the largest users)

The Planning Areas have one-to-one correspondence with utility electric service territories. As of this writing, five planning areas have been identified for this survey. These are the electric service territories of LADWP, PG&E, SCE, SDG&E, and SMUD.

CEC Forecast Zones are similar to the more familiar Climate Zones, although we propose to disaggregate the SDG&E zone into coastal and inland zones. Additional sub category of the forecast zones will be conducted based on distribution of customers in the utility database which will be provided to ADM.

The 12 building types represent groupings of NAICS codes into market sectors, called building types in traditional CEC forecast model and CEUS nomenclature. The forecast model and CEUS use 12 building types in the commercial sector because the "Office" sector is broken out into large and small offices[2].

Table 1. List of Commercial Building Types.

1. College	7. Office – Small
2. Food Stores	8. Restaurant
3. Health Care	9. Retail
4. Lodging	10. School
5. Miscellaneous	11. Warehouse
6. Office – Large	12. Refrigerated Warehouse

The vintage classifications are broken into two categories: those buildings built prior to 2006 (existing) and those built in 2006 or later (new). The building vintage is not available in utility company customer information systems (CIS) data, and therefore is not known for the entire population of candidate participants in sample frame. In many cases, however, we are able to determine or estimate building construction dates by matching addresses to a third-party database from CoStar, or infer that a building is at least as old as the customer move-in date in the CIS. Once the survey at a site is conducted, the surveyor will document the construction data.

Annual energy use for each survey-site is stratified into usage levels. The existing building vintages typically have four kWh-based sampling strata, while the new building vintages – with their much smaller populations – typically have two strata. Each combination of zone, vintage, and building type

[2] Large offices are defined as having more than 30,000 square feet. In this CEUS study we will use an energy-based threshold of 600,000 kWh per year between small and large offices for the initial sampling. The 30,000 square foot threshold will be used to post stratify based on measured square footage.

also potentially includes a stratum of "certainty survey-sites"[3], which is reserved for sites that individually account for at least 5% of the total annual kWh energy usage for the building type and zone. The kWh thresholds between strata vary by building type, vintage, and zone, and are determined through numerical optimization algorithms in the R statistical software. The strata one through five are numbered in order of increasing annual kWh energy usage.

2.2 Tracking Progress of Targeted Sample Points

The study will achieve the targeted distribution of sample survey-sites identified in the Research Plan. ADM will have a tracker that maintains a running tally of survey-site surveys completed. The tracker will tabulate the survey-sites by all appropriate categories (utility, forecast zone, building type, vintage, and size). The quota of survey-sites for each unique category will be entered into the data collection database. The data collection tool (CEUS Tool™) will not allow an excess number of survey-sites to be booked by the call center staff or checked out by field surveyors as non-scheduled visits. The project manager will have access to the category tabulations to identify those that are being under represented in the completed surveys. A plan will be formulated for each situation to address how to increase production rates for categories that are not maintaining par completion rates with the other categories.

The tracking system will be used to assign certainty survey-sites that need special handling by survey engineers familiar with complex survey-site situations. Many of these certainty survey-sites we expect to be completed remotely by survey engineers contacting facility managers and obtaining the detailed information needed for completing the survey via phone calls and emails. Remotely completed surveys will use the same survey instrument and procedures as the field surveyors but will conduct the communication with the customer via phone or email.

A summary status output of the tracker will be provided to the CEC during regularly scheduled updates.

[3] A census is attempted if the population is very small (fewer than four).

3 RECRUITMENT

3.1 BRANDING OF THE CEUS PROJECT

To effectively communicate with the public (commercial businesses) the study needs a unifying theme and verbiage. The title of the study needs to convey the official necessity of the study and imply the benefits of participation. With an authoritative title, a simple logo can be used to brand the study. Currently, we suggest using the CEC seal as the visible logo for the study and historical name of the survey and tying it to California. The logo/seal will be used in recruitment letters, introduction letters, emails, business cards, vests worn by field staff, and on a CEUS website. One example of the recommended title is provided here.

Figure 1. This graphic depicts example of the recommended title.

3.2 RECRUITMENT LETTER

Following is a version of the recruitment letter that will be used to solicit participation in the CEUS study.

January 3, 2018

[Customer Name]
[Customer Organization]
[Customer Address]
[Customer City and ZIP]

Dear [Contact Person]:

The California Energy Commission in cooperation with [Utility] is conducting a major survey of the ways in which commercial customers use energy. This study, known as the California Commercial End-Use Survey, will be used to support the Energy Commission's efforts to forecast future energy needs and to ensure that these needs are met in a prudent manner.

As a central part of the study, ADM Associates Inc. has been retained to conduct an on-site survey of commercial establishments in the [utility] service area. The survey will be used to collect information on commercial building activity characteristics.

Your organization has been randomly selected as a participant in the study. In the near future, ADM Associates will send a representative to your site to conduct a brief survey. The survey will have two parts:

- A brief interview with someone from your organization who is knowledgeable about energy use at the survey-site; and
- A physical inspection of the facility.

If you agree to participate in the survey, [utility] will provide information on your recent energy usage to the study team (the Energy Commission, its contractors, and [utility]. This information and the information collected during the survey will be kept in the strictest confidence in accordance with applicable law and the privacy policies of the Energy Commission and [utility]. It will not be released to anyone in a form that could allow the identification of any business, individual, or facility.

If you have any questions, feel free to call ADM's CEUS dedicated Call Center at 1-(916)-529-4443, the California Energy Commission's CEUS contact number at 1-(800)-858-0784, or [designated utility coordinator] at [telephone number]. You may also find additional information regarding this survey on the Energy Commission's website at http://www.energy.ca.gov/ceus or ADM's website at www.admenergy.com/ceus.html. Thank you for considering our request to participate in this valuable research.

Sincerely,

CEUS Project Manager
ADM Associates, Inc.

Reference: "ADM", "CEUS", "Commercial End-Use Survey"

3.3 Introduction Letter

Following is a version of the introduction letter that will be sent with surveyors to hand out to all businesses. It helps with businesses that question their need to participate in the CEUS study. The top of the letter contains the CEC logo, ADM's logo and the utilities' logos.

June 4, 2018

Dear [Utility] Business Customer:

The California Energy Commission in cooperation with [Utility] is conducting a major survey of the ways in which commercial customers use energy. This study, known as the California Commercial End-Use Survey, will be used to support the Energy Commission's efforts to forecast future energy needs and to ensure that these needs are met in a prudent manner.

As a central part of the study, ADM Associates Inc. has been retained to conduct an on-site survey of commercial establishments in the [Utility] service area. The survey will be used to collect information on commercial building activity characteristics.

Your organization has been randomly selected as a participant in the study. ADM Associates will contact you to arrange a brief survey. The survey will have two parts:

- A brief interview with someone from your organization who is knowledgeable about energy use at the survey-site; and

- A physical inspection of the facility.

If you agree to participate in the survey, [Utility] will provide information on your recent energy usage to a study team consisting of members of the Energy Commission and its contractors for the CEUS survey. This information and the information collected during the survey will be kept confidential in accordance with applicable law and the privacy policies of the Energy Commission and [Utility's] privacy policy. The California Energy Commission and its contractors will not release energy usage information to anyone in a form that could allow the identification of any business, individual, or facility.

If you have any questions, feel free to call ADM's CEUS dedicated Call Center at 1-(916)-529-4443, the California Energy Commission's CEUS contact number at 1-(800)-858-0784. You may also find additional information regarding this survey on the Energy Commission's website at http://www.energy.ca.gov/ceus or ADM's website at www.admenergy.com/ceus.html. Thank you for considering our request to participate in this valuable research.

Sincerely,

CEUS Project Manager

ADM Associates, Inc.

Reference: "ADM", "CEUS", "Commercial End-Use Survey"

3.4 TELEPHONE CALL SCRIPT

Following is a version of the call script to solicit business to participate in the CEUS survey.

1. FINDING A VALID CONTACT AND SURVEY-SITE VALIDATION

To the person who answers the phone when there is no known survey-site contact name:
Hello. I am calling on behalf of The California Energy Commission and [Utility]. Could you please tell me the name of the (manager, building engineer, property manager) for your business at this location [service address]? Are they available?

To the person who answers the phone and there is a known contact name:
Hello. Is [Survey-Site Contact Name] available?

To Survey-Site Contact:
Hello, my name is _____ with ADM. I'm calling on behalf of the California Energy Commission and [Utility]. The Energy Commission recently sent you a letter or email about an energy survey of your commercial establishment. Did you receive it? (if no, then offer to email them a copy after you end the phone call).

The Energy Commission is conducting equipment and facility surveys of commercial customers in the area. This will provide the Energy Commission with information which they can then use to plan future energy needs for California. Would you be able to participate in this survey?

If the caller inquires, direct them to the CEUS specific ADM website. Inform them that the field surveyors' photos are on the website.

If the survey-site contact does not want to participate, note the reason.

If the survey-site contact is willing to participate but wants to talk to a utility representative, then give the following contact information and tell them to reference the CEC CEUS project:

CEC Website: http://www.energy.ca.gov/ceus

[UTILITY]:-[Utility Contact Name] [Utility phone number]

ADM's website at www.admenergy.com/ceus.html

If the survey-site contact is willing to participate, ask the pre-qualification questions.
Thank you for agreeing to participate in the survey. I would now like to ask you a few specific questions about your business.
(Verify the business name and location)
Is the name of your business [Business Name]? _____
Is your business located at [Service Address]? _____

If the customer name is different (and not just a different version of the name or a DBA) but service address is the same (i.e., business has changed): I'm sorry, but your business facility does not meet the requirements for the survey. Thank you for your time. (Note the disposition as "different business/customer" and explain in comments)

2. PRE-QUALIFICATION SCREENS

Now establish if the survey-site meets the "minimum building criteria," i.e., is a commercial building and not a non-building (e.g., stand-alone parking garage, radio tower, pump, etc.):

Is more than 50% of this floor area devoted to manufacturing, industrial, or agricultural activities or residential living areas? __

Is the space occupied by your business less than 100 square feet? _____

If the above survey-site meets either of these criteria, ("Yes" answers to either question) then:

I'm sorry, but your business facility is outside the scope of this survey. Thank you for your time. (Disposition the survey-site as a non-commercial or non-building survey-site and explain in comments.)

Next ask the survey-site contact about survey-site accessibility, criteria are that more than 50% of survey-site must be accessible to surveyors or information on that section can be provided by the survey-site contact:

To do the survey, a surveyor from [ADM, Matrix, or DAV] will come to your facility. They will be collecting information on your facility's operation, survey-site activities, and equipment. This is a detailed survey, so we will need access to all spaces to measure square footage. We would also like to have some time to talk with the building technical staff or maintenance people, if possible.

Is the majority of your survey-site accessible to a surveyor (i.e., no high-security or limited access areas such as clean rooms)?

If the above survey-site would not be accessible to a surveyor or they won't provide information about more than 50% of survey-site, then drop:

I'm sorry, but your survey-site is outside the scope of this survey. Thank you for your time. (Disposition: this survey-site has limited access.)

Identify if the assigned NAICS code is correct or ask questions to find a better NAICS description.

We have your business listed as a *[ADM NAICS description].* Is this correct or is there a better description? ***If they have a better description, then type it in and use the CEUS Tool™ lookup for the code number. Enter the NAICS code number.***

3. SCHEDULE THE APPOINTMENT

If the survey-site passes the above screens:

I would like to set up an appointment to survey your business.

I have an opening in my schedule for _____ or _____. Would one of these times be better for you?

Set up an appointment date, time, and place and then verify the following with the survey-site contact:

Survey-Site Contact name spelling
Survey-Site Contact telephone number(s)
Survey-Site Contact email address
Business name and spelling
Service address
Special instructions for the survey-site visit *(where to meet, badging required, etc.)*

4. GET ADDITIONAL INFORMATION NEEDED TO ASSESS SURVEY TIME

Ask about survey-site configuration:

I just have two more questions to ask you. Which of the following best characterizes your business facility?

a) A suite or suite in a strip-mall;
b) Tenant in a multi-floor/high-rise building;
c) An entire building;
d) A multiple building business or campus;
e) Building owner with some space leased to tenants; or
f) Other (describe) _____.

If the answer is (d) then the site will be classified as an assigned site and assigned to an engineer.

Ask what is the major type of business activity conducted at this location:

Compare customers answer with utility NAICS code and if different make a note for the surveyor.

Get estimate of business size/total floor area:

Can you give me a floor area estimate for the space your business occupies? _____

Before ending the conversation, request that blueprints or floor plans and a copy of one month's energy bills are available on the day of the survey. Energy bills will be used to validate multiple accounts grouping. Also, make sure they have a copy of the Recruitment Letter, and if they don't, be sure to email them a copy.

3.5 CALL CENTER HIERARCHY AND CALL ESCALATION PROCEDURES

ADM has used call center staff for years and has procedures to follow when a customer needs more information or attention than the initial call staff can provide. The object is to keep the customer satisfied while obtaining a scheduled appointment. If the customer questions the call staff, they are not to take it personally and have a defensive tone. They will politely transfer the customer to the call center manager. The call center manager will either be able to address the customer's questions or concerns or if needed, transfer the customer to the ADM project manager. At some stage the customer will be satisfied before finishing the call or there will be a plan with the customer to re-contact them to bring the matter to resolution.

3.5.1 Hierarchy

ADM operates its own call center within its corporate headquarters in Sacramento, CA. ADM's call center is overseen on a continuous basis by a Call Center Manager. This individual has the authority to refer call center staff to directors for corrective action including reassignment and termination.

As call center staff is expanded, additional Call Center Managers will be added such that the appropriate ratio remains. Each new manager will be given the same referral authority to maintain high quality standards when communicating with customers.

All call centers operated by ADM or subcontractors will have the same structure while employed on the CEUS project.

3.5.2 Escalation Procedures

In some cases, calls may be escalated to higher-level staff who are more knowledgeable or who possess greater authority. There are two main cases that are addressed here:

1. When prospective participants have questions that call center staff cannot immediately answer

   Occasionally, a prospective participant will ask a question that call center staff does not have an immediate answer for. In these cases, the question will immediately be posed to the on-duty Call Center Manager.

   If it's a quick question, this will occur while the prospective participant is still on the phone. For example, if the prospective participant asks how long the visit will take, and the call staff doesn't know, the Call Center Manager will give an estimate.

   If the question is more involved or requires additional expertise than what the Call Center Manager can provide, the call staff will ask to contact the prospective participant in a short time with a comprehensive response. For example, if the prospective participant asks to see a certificate of insurance (COI), the call staff will acquire a valid email address, engage our Office Administrator, who will in turn contact our insurance carrier and have a COI issued to the customer.

2. When participants have complaints

   Participants may have complaints at various stages of our data collection process. Although we take utmost precautions to eliminate this risk, it is important that we have a plan to address it if it happens.

- Complaints that happen during scheduling, but before project staff have gone on-site:
  As customer service is our highest priority, and we cannot risk sacrificing sampled survey-sites, we take a zero-tolerance approach to complaints regarding our call center staff. Outreach staff who offend prospective participants will be given a warning after the first offense and will be reassigned to other work when the same behavior is exhibited a second time.
- Complaints regarding their experience with on-site auditing staff which can include both field surveyors and field supervisors (collectively "field staff"):
  Again, customer satisfaction is our number one priority. Field staff who offend participating customers will be warned the first time and reassigned the second time.

If damages have been incurred by the customer, the incident will be escalated to staff that are designated to handle such complaints. In all cases where a customer or prospective participant has a complaint about staff working on the project, the incident will be logged on our database and tied to the survey-site ID. Management will review these logs regularly and reinforce training designed to eliminate these risks.

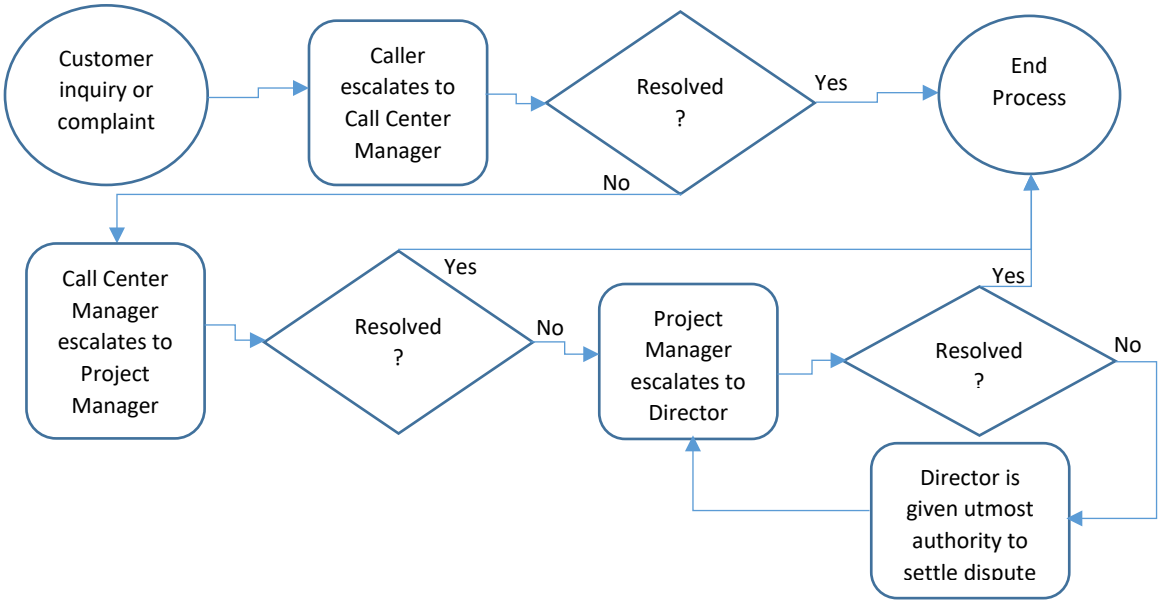


Figure 2. This graphic depicts our escalation process.

3.6 CANVASSING

Canvassing generally is a "cold-call." Although some customers may be communicated with in advance, letting them know that the California Commercial End-Use Survey field representatives will be in the area during a given week, and may request a simple walk-through of their facility. The surveyors use the mapping option in the CEUS Tool™ to identify customers that qualify for canvassing. They start in an area that they have a scheduled appointment and approach the closest businesses that qualify. A copy of the recruitment letter (from section 3.2; customized to the utility area they are canvassing) is presented to the person in charge at the site being canvassed.

As with the call center, the surveyor may use the terminology of conducting the survey "on behalf of The California Energy Commission and [Utility]", but never to present themselves as being "from" or employed by the California Energy Commission or [Utility].

We will test our rules and practices to avoid oversampling certain areas or building types that are eligible for canvassing. One way to prevent oversampling is to remove from the canvassing pool all sites that are within a sampling cell (e.g., full-service restaurants in midtown with annual energy usage above 40,000 kWh) if the quota for that cell has been met. The basic functionality of the CEUS Tool™ will be tested and validated.

3.7 SECTOR-SPECIFIC SEASONALITY

Some business types have reoccurring periods of heavy business activity. Those are periods to avoid contact with the customer to minimize reasons for rejection or conflict. Anything that interferes with the profitability of the business is distained. To give our staff the best chance for success we provide them guidelines for select business types. They are as follows.:

Restaurants – Do not call or visit a food establishment from one hour prior to the time they serve meals or during the mealtime. The best days are early in the week, Monday to Wednesday, and the best times are 9:00 a.m. to 11:00 a.m. or 2:00 p.m. to 4:00 p.m.

Retail – The holiday season is the most profitable time of the year for retailers. Avoid contact with them from mid-November through the first week of January. Also, right before or during any of the major holidays they may be conducting special sales (President's Day, Memorial Day, Fourth of July, Labor Day, etc.).

Tax Accountants – They are busy preparing taxes and should be avoided from mid-February to mid-April.

Lodging – Hotels and motels are very busy during check in and check out times. Do not contact them prior to 9:00 a.m. or after 4:00 p.m.

Florists – Avoid their busy seasons: the week before Valentine's day and Mother's Day.

Banks – Avoid paydays, particularly the first couple and last couple of days each month, and especially if they end on a quarter.

Auto Sales – They are best visited in the morning and early in the week. Avoid Fridays and the weekends completely.

Seasonal produce – Businesses that rely on specific crops may have increased activity during and immediately following the harvest season.

Plan the calling and visits appropriately for each business.

3.8 SPECIAL FACILITY TYPES

Some types of facilities may require special attention or different procedures than the majority of the survey-sites. This section addresses non-standard scenarios.

Non-Corporate Headquarter Survey-Sites – For survey-sites that are part of a business chain, but not the headquarter facility, we may be able to get information from their headquarters that is not available

at the sampled survey-site. During the appointment scheduling phone calls, we will request copies of floor plans for the sampled survey-site(s). If it is a chain for which multiple locations are in the sample, we will request the floor plans for all sample locations to minimize the number of contacts with headquarters.

Large Campuses – Large multi-building survey-sites, such as universities and colleges, will be addressed by experienced in-house engineers. The call center staff will contact the campus through normal channels, but instead of scheduling an on-site appointment visit, the call staff will identify a facility manager with whom an ADM engineer can communicate to obtain the required survey information, either by phone or email. Once the information is obtained, the ADM engineer will attempt to complete the survey without a site visit. If the information cannot all be collected remotely, a site visit will be scheduled to complete the survey.

Certainty survey-sites – Certainty survey-sites have characteristics similar to large campuses in that there will be a facility manager who can be contacted to provide all the survey information.

Schools – For schools or any facilities that have children under 18 years old, the call center staff will request that a school employee be present with the field surveyor for the entire time the field surveyor is on the survey-site. This is intended to avoid the need for background checks required by each school or school district.

Multi-lingual recruitment – Some ADM call center staff are multi-lingual. If the call center staff contacts a business that speaks a language different than that staff member, then the call will be transferred to another staff member that has the ability to communicate with the business. The call staff will identify if there is or can be someone at the survey-site to speak English with the field surveyor during the site visit. If not, then the language will be documented so that only field staff with that language skill set will be assigned to that survey-site.

Safety – During appointment scheduling, the call center staff will ask the customer if there is any personal protective gear that is needed to be able to walk through the survey-site. If yes, the specific equipment required will be documented. The field surveyors will then be aware what they need to have with them for those survey-site visits. An example could be ear plugs needed for visiting an indoor gun range.

3.9 TRACKING OF SURVEY-SITE CONTACTS AND DISPOSITIONS

Each time a customer is contacted, or an attempt is made to contact them, a record will be made on ADM's tracking system. There are two main purposes for this activity: Quality Control and Optimization.

3.9.1 Quality Control

Customer satisfaction with ADM's and our subcontractors' performances is our highest priority on this high-profile contract. As each survey-site contact is tracked, all negative feedback and/or complaints will be documented and followed-up by management as described above. These data will be analyzed and discussed in biweekly meetings of the "Tracking and Improvement" group.

3.9.2 Optimization

Since each contact is tracked, we will be able to tell when certain schedulers are unable to meet quotas or otherwise fall short of expectations. These underachievers will be coached to see if additional support from management can overcome the issues at hand. If this is not the case, these staff will be

reassigned to tasks that are more suitable to them. In some cases, this may mean a simple reassignment of outreach targets wherein this staff can glean higher success. In other cases, this may mean a reassignment of duties. For example, an individual may be more suited to field work rather than telephone outreach. In extreme cases, team members will be released for poor performance.

Outreach shall be optimized considering the current targets. Using our tracking system, we will be able to determine which times and which individuals are most likely to succeed in the time period allotted.

3.10 QC SURVEYS AS QC REMEDIATION

All field surveyors' work will be quality checked (QC). Some of the QC work will be automated and flagged for further review by quality control staff. Some will be randomly checked to assure that there is not a deceitful field surveyor conducting field surveys remotely or by using educated answers. The quality control staff will make calls to survey-sites that do not constitute new sample points but may be required to support data collected in the field.

4 ON-SITE DATA ACQUISITION METHODOLOGY

4.1 SAFETY, DRIVING, AND LODGING/ACCOMMODATION

ADM has a history of safely conducting field studies. ADM expects all staff to abide by its safety policy which is found in ADM's Safety Manual / Injury & Illness Prevention Program. ADM expects all staff to conduct activities in a safe manner. Failure to abide by the safety policy is an offense that can result in termination. The following is a condensed version of the ADM Safety Manual / Injury & Illness Prevention Program.

4.1.1 Safety Policy and Enforcement

The safety and health of each ADM employee is of primary importance to us. As a company, we are committed to maintaining a safe and healthful working environment. Management will provide all necessary safeguards, programs, training, instruction, and equipment required to reduce the potential for accidents and injuries.

To achieve this goal, we have developed and implemented a comprehensive Safety Manual and Injury and Illness Prevention Program (IIPP). This program is designed to prevent workplace accidents, injuries, and illnesses. A complete copy is maintained on the company intranet for access by all employees at any time.

It is the responsibility of each employee to support the company safety program and to perform in a manner that assures his or her own personal safety and the safety of others, including customers, visitors, and other trades. To be successful in our endeavors, all employees must adopt proper attitudes towards injury and illness prevention. We must also cooperate in all safety and health matters, not only between management and employees, but also between each employee and his or her respective coworkers. Only through such an effort can any safety program be successful. Our objective is a safety and health program that will reduce the total number of injuries and illnesses to an absolute minimum. Our goal is zero accidents.

Drug and Alcohol Policy: Because of our concern for the safety of our employees, our property, the public, and our concern about the productivity of our workforce, ADM has fully adopted a Drug and Alcohol Policy that is applicable to all employees. Our purpose in adopting this policy is to further the objective of establishing and maintaining a work environment free from the adverse effects of drug and alcohol misuse. Per this Policy, every ADM employee is prohibited from using, possessing, selling, purchasing, manufacturing, distributing, or transferring alcoholic beverages and/or controlled substances and/or other performance impairing substances (including legalized drugs) while on duty and/or on ADM property.

Employee Safety Training: California law requires that employees be trained in the safe methods of performing their job. ADM is committed to instructing all employees in safe and healthful work practices. Awareness of potential hazards, as well as knowledge of how to control them, is critical to maintaining a safe and healthful work environment and preventing injuries. To achieve this goal, we will provide training to each employee on general safety issues and safety procedures specific to that employee's work assignment. Every new employee will be given instruction by their Supervisor or assigned Safety Officer in the general safety requirements of their job. Our Code of Safe Practices is found on ADM's intranet and required is reading for each new employee.

4.1.1.1 Hazard Identification

Upon arrival at a designated address, surveyors need to look at the exterior of the facility and observe any situations that may indicate a lack of safety concern at the facility. This can include such things as building in disrepair, obstacle in the parking lot or entryway, construction areas not barricaded, foul odors, poor illumination, etc.

After first introductions have been completed at a survey-site, ask the survey-site contact, "**Are there any hazards at the survey-site which I need to be aware or for which Personal Protective Equipment is needed?**" Surveyors should take any appropriate precaution suggested or required by the survey-site contact. If they feel they are entering an area with hazards that are not adequately addressed, they should not proceed. They can ask the survey-site contact if there are other ways to get the information without putting themselves at risk. If no alternates are provided, they need to call the ADM project supervisor to inform them of the situation and that they will not be able to complete the data collection for the assigned survey-site. A replacement survey-site will be scheduled.

4.1.1.2 Personal Protective Equipment (PPE)

PPE can encompass many forms of protection. The most common that include safety glasses, ear plugs, dust masks, and hard hats.

Safety Glasses: For suitable eye protection, ANSI approved safety glasses must be worn when in areas of facilities where eye safety is needed. Safety glasses are provided by ADM to all field surveyors. Safety glass use will vary depending on survey-site conditions. Ask survey-site contact if safety glasses are required or recommended while at the survey-site. If yes, then they shall be worn.

Ear Plugs: ADM has established a Hearing Conservation Program to protect workers from the hazards of noise on the job. Typically, noise levels exceeding 85 decibels (dB) are experienced around chillers, air compressors, and some industrial facilities. Exposure to higher than normal noise levels is only for brief periods during inspections or measurements. ADM provides ear plugs designed to reduce noise by 25 decibels when properly worn.

The following table (Table 2) lists OSHAs reference of acceptable duration of continuous exposure to various sound levels.

Table 2. OSHA Sound Level Exposure Durations

A-Weighted Sound Level, dB	Reference Duration, hours	Example Sound Source
80	32	garbage disposal
85	16	passing diesel truck
90	8	lawn mower
95	4	food processor
100	2	handheld drill
105	1	table saw
110	0.5	jackhammer
115	0.25	emergency vehicle siren
120	0.125	front row at a rock concert
125	0.063	balloon popping
130	0.031	professional DJ system

Dust Masks: At facilities with dusty conditions, a dust mask would be appropriate. The conditions requiring a dust mask are generally readily evident by visible dust in the air.

Hard hats: Hard hats may be required in building that have construction activity or overhead activity or storage.

4.1.1.3 Working at Heights, Fall Protection

Avoid use of ladders. This project does not require and does not permit climbing of ladders or being in elevated locations where fall protection is required. Rooftops may be accessed if there is a stairway leading to it and the perimeter of the roof has a barrier at least 42 inches high.

4.1.1.4 Working Alone

A person is "working alone," when he or she is on their own and they cannot be seen or heard by another person. Any person working alone is required to have a charged cell phone with them within reach in case of an emergency. The means of communicating between worker and ADM must be predetermined and understood by both parties. A designated contact person is aware of the work schedule for the working alone employee and makes contact at least once a day to confirm everything is satisfactory.

4.1.1.5 Infectious Disease Exposure

It is our goal to eliminate or minimize occupational exposure to infectious pathogens or other potentially infectious materials in accordance with Cal/OSHA. Some of the staff will be visiting hospitals or medical offices and should take precautions. Comply with any procedures recommended by staff at such facilities to remain safe.

4.1.1.6 Heat Illness Prevention, Hydration

Employees working outdoors and exposed to high heat must follow some procedures. These include wearing sunscreen if exposed to the sun for more than 30 minutes, pre-hydrate, and drink 16-32 ounces of cool fluids each hour. If an employee feels faint or dizzy, they are to immediately report it to their supervisor, and call 911 if emergency medical attention is needed.

4.1.1.7 Dogs

For survey-sites that have an unrestrained dog(s) present, ask for the dog(s) to be contained or restrained. Do so despite the survey-site contact or dog owner assuring, "The dog won't bite." Containment of the dog can be in a separate room, on the other side of a fence, or on a leash controlled by the owner.

4.1.1.8 Medical Emergency: Call 911

For severe accidents call 911 and request the paramedics. Calling 911 is also appropriate for medical emergencies, fire, rescue, and breathing difficulties. For non-emergency medical attention, refer to the medical provider network (MPN) in the area.

4.1.1.9 Enforcement *of Safety Policies*

The compliance of all employees with ADM's Safety Manual and IIPP is mandatory and shall be considered a condition of employment.

4.1.1.10 The *following programs will be utilized to ensure employee compliance with the safety program and all safety rules.*

- Training programs;
- Retraining;
- Disciplinary action; and
- Optional safety incentive programs.

Training Programs: The importance of safe work practices and the consequences of failing to abide by safety rules will be covered in the new employee safety orientation and safety meetings. This will help ensure that all employees understand and abide by ADM's safety policies.

Retraining: Employees that are observed performing unsafe acts or not following proper procedures or rules will be retrained by their supervisor. A Safety Contact Report may be completed by the supervisor to document the training. If multiple employees are involved, additional safety meetings will be held.

Safety Incentive Programs: Although strict adherence to safety policies and procedures is required of all employees, the company may choose to periodically provide recognition of safety-conscious employees and job sites without accidents through a safety incentive program.

Disciplinary Action: The failure of an employee to adhere to safety policies and procedures established by ADM can have a serious impact on everyone concerned. An unsafe act can threaten not only the health and wellbeing of the employee committing the unsafe act but can also affect the safety of his/her coworkers and customers. Accordingly, any employee who violates any of ADM's safety policies will be subject to disciplinary action.

Note: Failure to promptly report any on-the-job accident or injury, on the same day as occurrence, is considered a serious violation of the ADM's Code of Safe Practices. Any employee who fails to immediately report a work-related accident or injury, no matter how minor shall be subject to disciplinary action.

Employees will be disciplined for infractions of safety rules and unsafe work practices that are observed, not just those that result in an injury. Often, when an injury occurs, the accident investigation will reveal that the injury was caused because the employee violated an established safety rule and/or safe work practice(s). In any disciplinary action, the supervisor should be cautious that discipline is given to the employee for safety violations, and not simply because the employee was injured on the job or filed a Workers' Compensation claim.

Violations of safety rules and the Code of Safe Practices are to be considered equal to violations of other company policy. Discipline for safety violations will be administered in a manner that is consistent with ADM's system of progressive discipline. If, after training, violations occur, disciplinary action will be taken as follows:

1. Oral warning. Document it, including date and facts on the "Safety Contact Report" form. Add any pertinent witness statements. Restate the policy and correct practice(s).
2. Written warning. Retrain as to correct procedure/practice. Retaining is to be documented.
3. Written warning with suspension.
4. Termination.

As in all disciplinary actions, each situation is to be carefully evaluated and investigated. Each step taken in the disciplinary process will depend on the severity of the violation, employee history, and regard to safety. Managers and supervisors should consult with the office if there is any question about whether disciplinary action is justified. Employees may be terminated immediately for willful or extremely serious violations.

4.1.2 Driving Program

ADM has established the following guidelines and procedures for our drivers and vehicles to protect the safety of individuals operating any motor vehicle on company business. Protecting our employee

drivers, their passengers, and the public is of the highest priority. The commitment of management and employees is critical to the success of this program. Clear communication of, and strict adherence to the driving program's guidelines and procedures are essential.

Our primary goal is to maintain a high level of safety awareness and foster responsible driving behavior. Driver safety awareness and responsible driving behavior will significantly decrease the frequency of motor vehicle accidents and reduce the severity of personal injuries and property damage.

Motor vehicle accidents are the leading cause of workplace death in the nation. Fortunately, auto accidents are often preventable. By driving defensively and using good judgment, one can significantly reduce one's chances of being hurt or killed in a motor vehicle. The following defensive driving tips are designed to help avoid accidents and injuries. These rules are mandatory for all employees driving ADM vehicles*.

* ADM vehicles can refer to ADM vehicles owned, rented, or personal vehicle when mileage is paid.

1. Personal and off duty use of ADM owned vehicles is prohibited.
2. Only authorized employees may drive ADM owned vehicles.
3. Non-employee passengers are not permitted in ADM vehicles at any time unless they are business related.
4. No employee is permitted to drive ADM vehicles while impaired by alcohol, illegal, legal, or prescription drugs, or over the counter medications.
5. All accidents involving ADM vehicles must be reported to the office immediately.
6. Employees with two or more preventable accidents in a three-year period, or who obtain three points on their driving record, will be subject to a loss of their driving privileges or have their driving privileges restricted.
7. Seat belts must **always** be worn in ADM vehicles. Hundreds of studies over the years have proven that seat belts save lives. Even in crashes where fire or water submersion is involved, this is proven true. Properly worn seat belts absorb crash forces that otherwise would be transferred to the body. If the seat belt(s) in the vehicle are inoperative or defective, have them repaired or replaced immediately. The lap belt is worn low across the hips. The shoulder strap is worn diagonally across the chest. The belt is worn tight, so there is no more than an inch between the body and the belt at any point.
8. Inspect the vehicle for mechanical defects prior to each trip. Worn tires can make the vehicle difficult to control or stop. Test the brakes as soon as starting out to insure they are properly operating.
9. Always walk behind the vehicle before backing. This will insure that there are no people or objects behind that cannot be seen from the driver's seat. Also make sure that all loads are properly secured to prevent them from moving.
10. While driving, **do not text** on the phone, **do not dial** a phone, **do not use** the phone camera, **do not read** GPS or maps or do other distracting activities. These actions take the eyes off the road and often cause drivers to swerve. Pull over into a safe, legal parking area before using the phone for any purpose. If a phone must be used while driving, only use hands free phone equipment.
11. Get the big picture while driving. Keep eyes scanning down the road and try to anticipate hazards and other drivers' mistakes. Look and scan well ahead. Always leave an out in case the other driver does the unexpected.

12. Always maintain a safe following distance. Approximately one-third of all auto accidents are rear end collisions. At whatever speed, drivers should be at least two seconds behind the vehicle in front to allow sufficient time to stop. This calculates to longer stopping distances the higher the speed. Do not tailgate. Following distances should be further increased for larger/heavier vehicles or for slippery or rainy conditions.
13. Avoid passing on two lane roads. Head on collisions are the most common cause of fatalities. Turn on headlights while driving on two lane roads. This helps traffic see the oncoming vehicle. Never pass another vehicle on blind turns or hills.
14. Always be sober and alert while driving. The use of drugs or alcohol while driving, or prior to driving, significantly increases chances of having an accident. It should be at least eight hours from the consumption of alcohol until operating a vehicle. Avoid the use of prescription or over the counter medicines that potentially increase drowsiness or impair save driving.
15. Never drive faster than road conditions warrant. Slow down when road conditions are poor (rain, fog, night) and don't exceed posted speed limits.
16. Always signal well in advance when changing lanes or turning. Check blind spots for other vehicles. Also, avoid driving in someone else's blind spot. As they can't see vehicles there, they don't know the vehicle is there; therefore, anticipate this.
17. **Surveyors should not drive aggressively**; they are representing ADM. Avoid tailgating, rapid lane changes, speeding, and hand gestures to other drivers. If another car is tailgating, change lanes and let them pass. Do not participate in escalating a situation with another driver; they may be armed. It's not worth getting killed over.
18. Use caution when passing any stopped vehicle, especially near intersections or cross walks.
19. Intersection collisions are also a significant problem. These are often caused by someone running a red light. Look for a possible oncoming driver, even if they have a green light. Always be under control when approaching an intersection and be prepared to stop if the light changes.
20. Slow down and look for trains at all railroad crossings. Even with modern signals and gates, hundreds of cars are hit by trains each year at railroad crossings.
21. Use low beams while driving in fog and slow down. If they can't see, they need to pull over into a safe parking area and wait for better visibility. Do not stop in the traffic lanes.
22. Yield the right of way until certain the other driver is going to stop. Always yield the right of way to emergency vehicles.

<u>Vehicle Inspection & Preventive Maintenance</u>

All ADM vehicles must be inspected by the driver prior to each use. Mechanical defects will be repaired immediately. Vehicle inspections will include:

- Lights
- Mirrors
- Tires
- Fluids
- Windshield condition and wiper condition
- Turn signals
- Emergency flashers
- Brakes
- Horn

All vehicles will also be maintained in accordance with the manufacturers' recommendations. It is the responsibility of the individual assigned the vehicle to ensure proper maintenance and repairs are performed. If the vehicle is not safe, do not drive. This includes rental cars. If the surveyor determines

the vehicle does not comply with the above safety inspection, they need to insist that the rental company provides a safe vehicle.

ADM expects that each field surveyor will provide their own vehicle that is reliable, respectable, and meets the above conditions. ADM will reimburse mileage in accordance with the project guidelines. The vehicle should also contain a first aid kit, fire extinguisher, and flares or emergency reflectors.

4.1.3 Lodging and Accommodations

Lodging accommodations can be provided to field surveyors who must travel more than two hours from their residence to the survey-sites scheduled for a day or longer. Scheduling will be optimized to use field surveyors that are closest to the sample survey-sites. This will minimize lodging accommodations. Lodging will be booked by ADM's travel administrator to insure hotel budget limits are maintained. The nightly hotel budgets will be dependent on the location and dates of travel. Lodging will be in clean and safe locations to the best of the ability for the information available. If conditions create an overload of travel arrangements by the administrator certain field staff (both surveyors and supervisors) may be provided authorization to find and book their own hotel accommodations at a predetermined dollar limit for the area and dates they will be conducting survey-site visits.

4.2 FIELD ATTIRE

ADM will provide blue safety vests that have a clear pocket to hold the name tag badge of the surveyor. These vests will provide a uniform look of the field staff (both surveyors and supervisors). ADM will also issue field staff ID badges that will include field staff's photo. This field surveyor photo will be placed on ADM's website to allow clients and utility customers access to field surveyor photos so that they will be able to confirm the ID of field staff. The vests and ADM issued ID badges will always be worn when approaching the customer's site and while on a customer's site. It is the policy of ADM that each employee's dress, grooming, and personal hygiene should be appropriate to the work situation.

1. Employees are expected to always present a professional, businesslike image to customers and the public. Radical departures from conventional dress or personal grooming and hygiene standards are not permitted.
2. Employees must comply with the following personal appearance standards:
    a) Employees should not wear suggestive attire, athletic clothing, sandals (flip-flops), novelty buttons, anything with wording that is politically or emotionally sensitive, baseball hats, and similar items of casual attire that do not present a businesslike appearance.
    b) Hair should be clean, combed, and neatly trimmed or arranged. Shaggy, unkempt hair is not permissible regardless of length.
    c) Sideburns, moustaches, and beards should be neatly trimmed.
3. During client meetings and any public appearances, ADM employees will observe the following guidelines:
    a) ADM employees will wear business casual clothing during client meetings and public appearances. Examples of clothing that should not be worn during client meetings and public appearances include clothing that is typically worn for recreational activities including gym, cycling, running, or hiking apparel.
    b) Polo shirts with an ADM logo are typically acceptable apparel for client meetings and public appearances.

4.3 TALKING POINTS, AND PROTOCOLS FOR CUSTOMER ENGAGEMENT

When meeting and interacting with a customer, surveyors need to be professional, courteous, and respectful of their time and their business. They will need to engage them in conversation to get questions answered. A polite introduction and casual conversation can sometimes set the customer at ease. Items that need to be covered include:

1. Identify themselves. Provide their name, company they work for, and utility they represent. Provide the customer with a business card and copy of the introduction letter. If necessary, state that an appointment had been scheduled (by whom, for whom, and when). If necessary, for ID verification, direct them to the ADM website and the field staff photos.
2. State what they need to do while at the survey-site and approximately how long it will take.
3. Let them know they have a few questions for them: where would they like to conduct the interview?
4. If asked, let the survey-site contact know: the purpose of the survey is "official business" and that no products or services are being marketed to the business.
5. There is no cost for this site visit. Any data collected is strictly confidential.
6. Ask the survey-site contact, "Are there any hazards at the site which I need to be aware or PPEs needed?"
7. Ask if there are any restrictions for taking pictures; if so, where do they apply? We will want pictures of the meter numbers, bills, building drawings, and exterior, etc.
8. Do they have floor plans, either hard copy or electronic that the surveyor can see? Specifically, the floor plans are for identifying square footage and square footage by *heating, ventilation, air conditioning* (HVAC) fuel type. The preferred choice would be to obtain a PDF or electronic copy that they can email to *firstname.lastname*@admenergy.com. **At a minimum**, try to obtain photos of the plans.
9. Thank them for their time and cooperation. This project, CEUS, is important and will help the state plan for and maintain stability of the utility grid and energy supply to customers.

At medium and large companies, the surveyor will need to check in with the front desk or security desk. State who they are scheduled to meet with and the time of the appointment. Some will require to see the driver's license or ID. They may be given a Visitor's badge and then be asked to wait until the survey-site contact shows up in the lobby or designated area.

If the survey-site contact says they don't have as much time today as the surveyor mentions, then ask if they can reschedule for another day. Determine if part of the data collection can be done while they are already there. Let the ADM scheduling office know the details of the encounter if a new or additional appointment needs to be set.

If the survey-site contact wants a utility contact name and phone number, refer them to the **introduction letter**.

4.3.1 Introductory Letter

Field Staff will have introduction letters available to hand to customers as they initially make contact with the customer. The letter will have phone numbers for the customer to call if they have any questions. It will also provide the website address if they want to check the photo ID of the field staff which will be posted for customers to verify the field staff are part of the survey.

4.3.2 Primary Objective

After introductions, proceed with the survey. **The primary objective is to survey the place of business for end-use equipment by type, by area, and fuel type.** Of particular importance are the heating and cooling end-uses. Properly identify the HVAC system types by area (partition) and fuel type. Additionally, identifying the correct NAICS code and square footage of the site is of critical importance.

4.4 Survey-Site as the Unit Surveyed

The primary sampling unit for the CEUS project is the survey-site. Survey-site is defined as:

"A contiguous location controlled by the same business entity with at least one utility meter."

For this study, a contiguous location is a building or a set of buildings owned or operated by a single entity on the same side of the street and adjacent sets of property (no buildings in between), not limited to one street address for the business. A survey-site may have one or more buildings, one or more electric utility meters, serving one or multiple business customers. A survey-site may house tenants that are unrelated businesses, such as a multi-tenant, high-rise office building with one master meter or multiple electric utility meters. Similarly, a survey-site may be a portion of a building such as one store in a strip mall, served by one or multiple electric utility meters.

Additionally, we recognize conditions that are useful when describing a survey-site. The physical boundary is one or more buildings or space occupied and operated by a business. However, an entire group of buildings that are owned or operated by one customer do not need to be included if they all have similar activities and each building has its own meter. Exceptions include businesses that generally occupy and operate multiple buildings with different activity as a single entity (schools, colleges, universities, hospitals, hotels, etc.)

The energy boundary should coincide with the physical boundary and is a known area served by one or more electric meters. Occasionally, in a shared services situation, energy boundary goes beyond the physical boundary when a portion of the metered energy leaves the physical boundary. The extent of the energy boundary may not be known but can be estimated by inquiry of the facility management staff.

Field surveyors MUST understand the proper definition of a survey-site, so they can decide in the field if the survey area needs to be something other than what is identified on the CEUS Tool™ tablet data collection system.

Special emphasis must be placed on the accurate identification of meters at the survey-sites. A survey-site can have multiple electric and/or gas utility meters. The CEUS Tool™ contains a screen listing the meters identified by the utility database to be associated with the survey-site. All utility meters need to be identified and confirmed that they are for this survey-site. **Ask and find out if there are any additional utility meters that supply energy to the survey-site.** These could include meters for other energy sources besides electricity or natural gas. Do not include meters that are the customer's private meters for internal allocation of energy use to various parts of the operation or tenants.

Since a survey-site requires there be a building, a central plant with meters/accounts exclusively serving the plant would not be considered a survey-site. The central plant should also be associated with a building that receives cooling and/or heating service from the plant. If there is a building identified, then the survey-site is defined as the building plus the central plant. All the meters/accounts associated with

that building and the central plant should be included in the survey. If not, record the central plant as a non-survey-site.

4.4.1 Survey-Site Area Determination Flowchart

The flowchart in Figure 3 is provided to help determine survey-site areas. Follow from the “Start” and answer questions for the survey-site in consideration to determine the area. End at one of the solid rectangle blocks. The flowchart is implemented in the CEUS Tool™ on the tablet as a series of questions. The questions start on a tab immediately following the verification of the utility meters associated with the survey-site. Answering the questions provides the user a determination of the scope of the survey-site or steps to be taken.

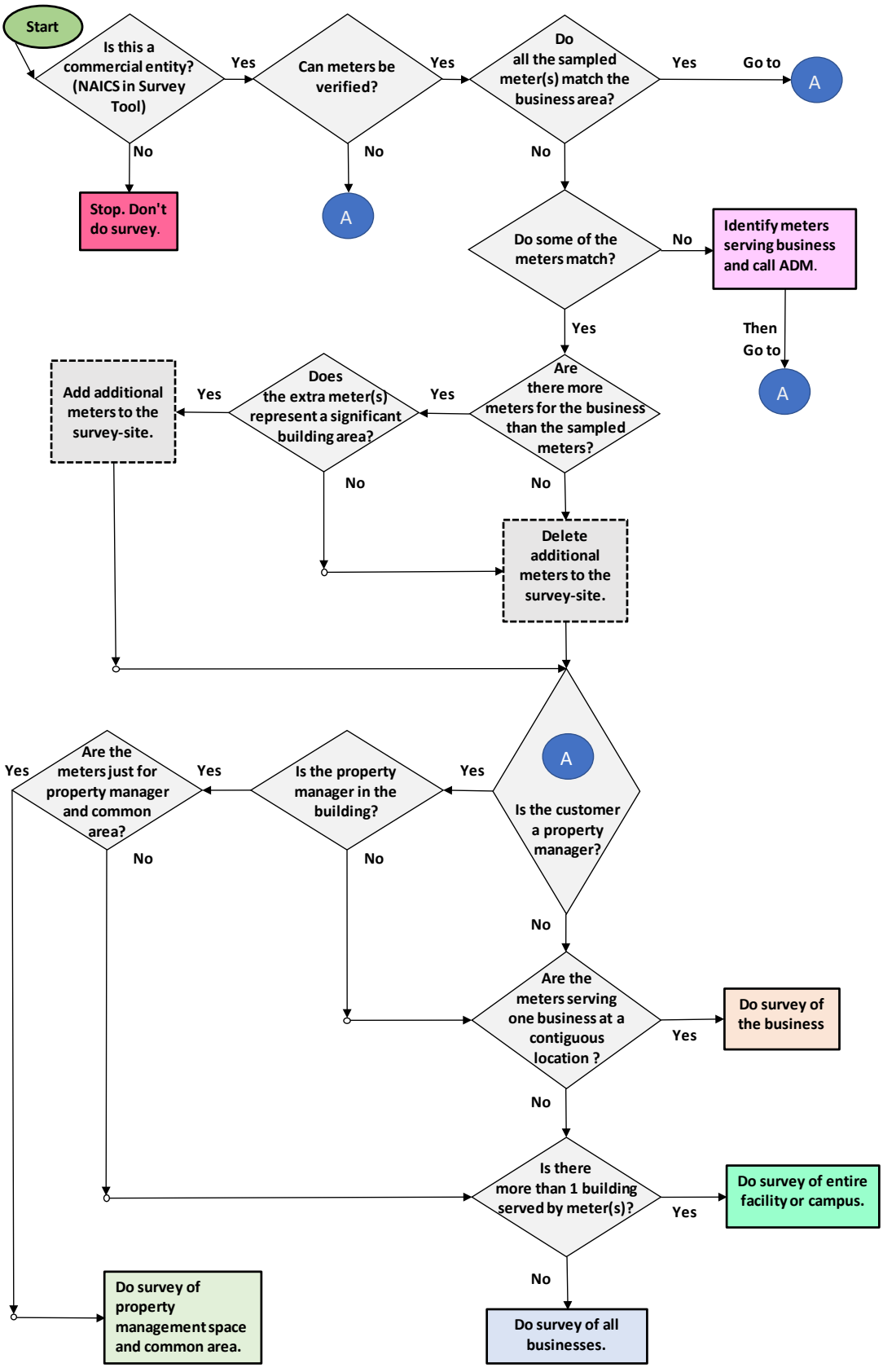


Figure 3. Flowchart for Survey-Site Area Determination.

4.4.2 Survey-Site Example Cases

Several simple diagrams are provided to help surveyors understand the definition of a survey-site. The simplest case is where one business occupies one building and has one electric meter. The meter serves the entire facility for one business that has one NAICS code, as shown in Figure 4. Other, increasingly more complicated, cases are shown in Figure 5 through Figure 12. **Each double walled box represents a building. The dashed single oval line represents the survey-site boundary.**

Case 1A – Single Building, Single Business

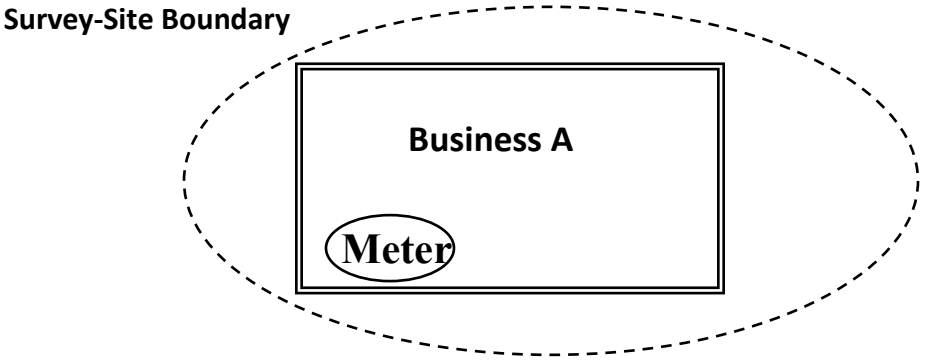


Figure 4. Simplest Survey-Site: 1 Building, 1 Business, 1 Meter.

Description

Survey-site contact information shows the customer is Business A with one meter.

One meter is the only source of electricity at the survey-site.

Meter serves Business A in the building. Business A may occupy all or only part of the building.

Typically, Business A occupies all of the building.

Action

- The survey-site (survey area) is defined as Business A.
- Survey Business A.
- NAICS code for the survey-site will be determined based on the activity-type of Business A.

Variation

The survey-site may have more than one electric meter. Include all electric meters that serve Business A in this building.

Case 1B – Single Building, Leased

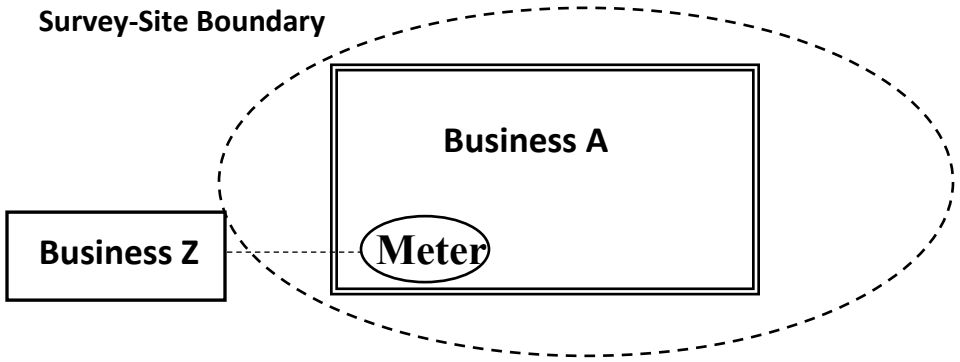


Figure 5. 1 Building, 1 Business, 1 Meter; re-define customer.

Description

Survey-site contact information shows that Business Z is the customer and there is one meter.

Meter is the only source of electricity at the site.

Meter serves Business A in the building. Businesses A occupies all of the building. Typically, the building is managed by a property management company (Business Z) who does not occupy the building.

The property management company is responsible for the utility account. Business A is a tenant that is not directly responsible for the utility account.

Action

- The survey-site is re-defined as Business A. Change the business name in the CEUS Tool™ to the name of the business leasing the space.
- Survey Business A.
- NAICS code for the survey-site will be determined based on the activity-type of Business A.
- Shared Services is not applicable.

Variation

The survey-site may have more than one electric meter. Include all electric meters that serve Business A in this building.

Case 2A – Multiple Buildings

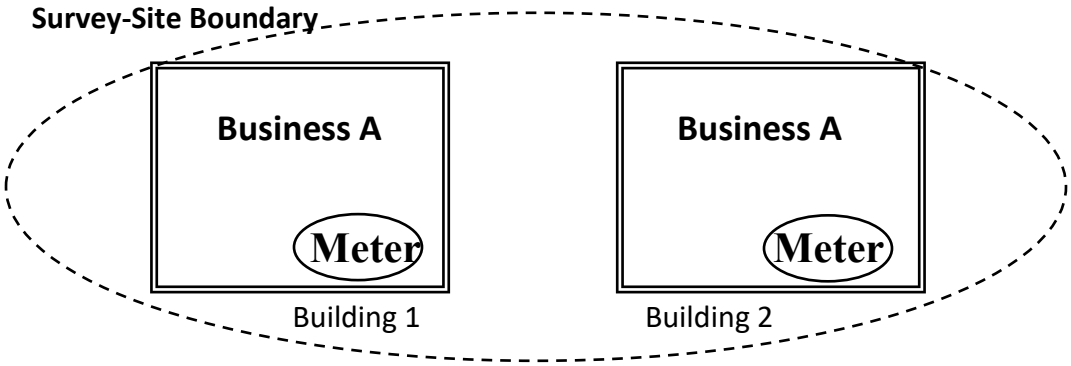


Figure 6. 2 Buildings, 1 Business, 2 Meters.

Description

Survey-site contact information has identified business A as the customer and two meters.

Two known meters provide electricity to the survey-site. One for each of the two buildings.

One meter serves Business A in Building 1. Second meter serves Business A in Building 2. The activity in Building 1 is different than the activity in Building 2 (see Example 1 below when two buildings have the same activity). An example is furniture store with a showroom building and a warehouse building for overstock items.

Action

- The survey-site is defined as Business A in Building 1 and Building 2, provided the two buildings are on the same or contiguous property. The area surrounding the buildings should be considered a single facility.
- Survey Business A in Building 1 and Building 2 (if Business A has more than one building within the contiguous property with different activities, survey all buildings).
- If Building 1 and 2 are not contiguous to each other (i.e., separated by one or more buildings or street): Survey Business A in Building 1 only.
- NAICS code for the survey-site will be determined based on the primary activity-type of Business A.

Variations

The survey-site may list only one meter. If one meter serves all buildings, then survey all buildings. If there are multiple meters that serve the buildings, then list or add all the meters found on site.

Campus facilities where different buildings house different activities that are subset of the primary business activity (such as schools, colleges, universities, hospitals, hotels, etc.) will be assigned to an engineer and all the buildings will be included in the survey. Be sure to include restaurant and cafeteria areas in the survey.

Exception: Where both or all buildings have the same business activity. **Example 1**: Property management operated twin adjacent high-rise office buildings, then only survey one that is randomly sampled. Example 2: An insurance company has contiguous buildings with separate meters, then only survey one building that is randomly sampled. Example 3: A school district has an elementary and middle school on contiguous property, then only survey the school that is randomly sampled.

Case 3A – Single Building, Multiple Tenants

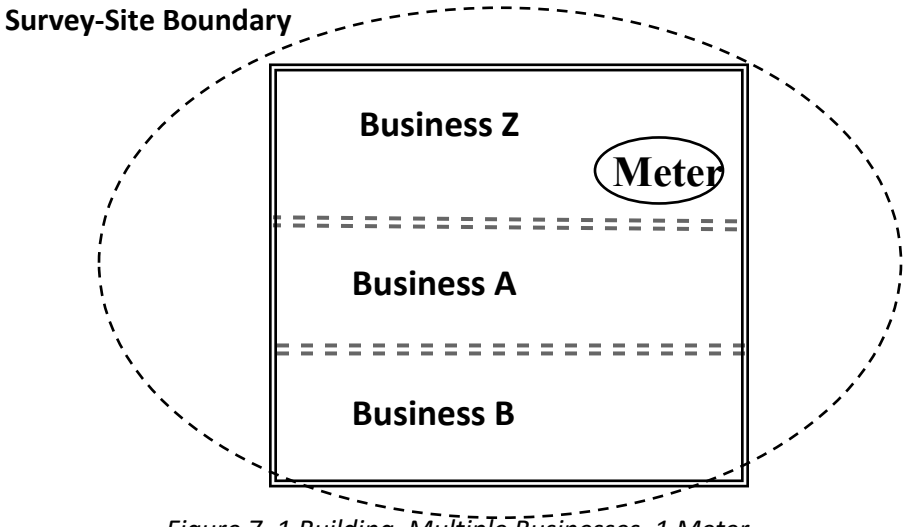


Figure 7. 1 Building, Multiple Businesses, 1 Meter.

Description

Survey-site contact information has identified Business Z as the customer and one meter (or more).

Identified meter(s) are the only source of electricity at the site. Meter serves Business Z, A, and B.

The building is managed by property management company (Business Z) who also occupies the building. The meter also serves the common areas of the building. The property management company is responsible for the utility meter(s). As an example, this is typical of a high-rise office.

Business Z has agreed to participate in the study but has not contacted the tenants.

Action

- Since the identified meter(s) collectively serve the building, then define survey-site as the building.
- Obtain square footage of the tenant spaces for all businesses in the building from Business Z.
- Business Z has agreed to participate in the study. Tenants have not. Obtain permission to survey a sample of businesses. If permission is granted, then survey the businesses.
- Survey Business Z and the number of tenants at the survey-site as is given by the following table and the special cases listed below the table.

Number of Tenants	Number of Tenants to Survey*
Less than or 4	3
5 to 7	4
8 to 10	5
11 to 20	7
More than 20	10

** Quantities based on a 90/25 confidence and precision sampling.*

1. If at least 75% of the total survey-site square footage can be captured by surveying fewer than the "Number of Tenants to Survey", then the area sampled is used to satisfy the criteria.
2. If a restaurant is a tenant and Business Z pays the utility bill, then survey the restaurant.
3. If a retail store is a tenant and Business Z pays the utility bill, then survey the retail store.

- Identify the three most common business activities and list the associated building types for those activities as a percent of the overall building size. (The NAICS code for the entire site is 531120, Lessors of non-residential buildings **or** 531312, Nonresidential property managers. These codes map to Office building type. The three most common business activities are collected to get a better understanding of the building use by providing a space where up to three building types can be entered by the surveyor. These can be reflective of different tenants in a building or different parts of a building(s) by one business).

If permission to survey sufficient businesses is not granted, then do one of the following:

- Request Business Z to send notifications to tenants that they are requested to participate in the survey. Then conduct survey on appropriate number of sample tenants.
- If still unable to sample sufficient businesses, then record the site as a refusal and leave but pass information to engineering staff to contact Business Z so they can collect sufficient information to complete the survey for the survey-site.
- NAICS code for the survey-site will be the property management (Business Z), 531120 Lessors of nonresidential buildings.

Variation

The survey-site may list only one meter. If there are multiple meters that serve the building, then list or add all the meters found on site that are paid by the property management.

Case 3B – Single Building, Property Manager

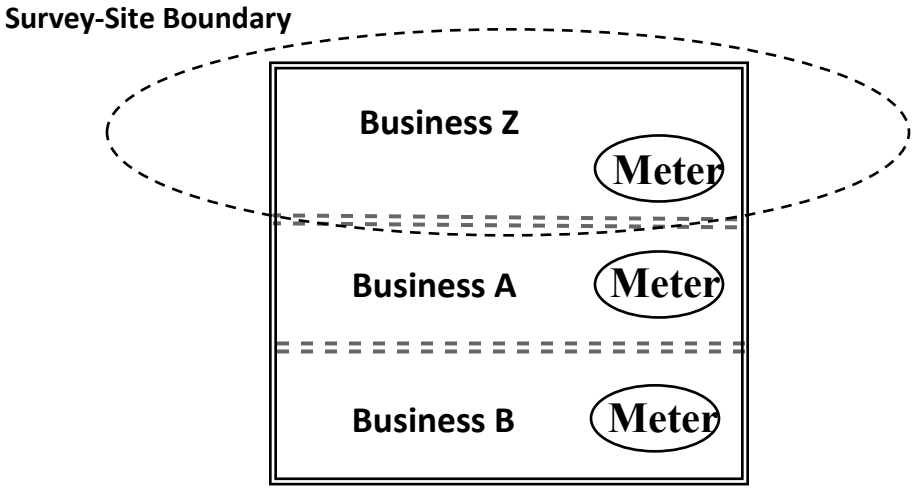


Figure 8. 1 Building, Multiple Businesses, 3 Meters.

Description

Survey-site contact information has identified Business Z as the customer and one meter(s).

Identified meter(s) serves Business Z and common area, who is also manages the property. The property management company is responsible for the utility meter(s) of the space it occupies and the common area. Each tenant space has a meter and each tenant is responsible to pay the utility bills directly to the utility company. As an example, this is typical of a shopping mall.

Business Z has agreed to participate in the study and has not contacted the tenants.

Action

- Since the identified meter(s) serve only Business Z and the common area, then define the survey-site as the common area and the area occupied by Business Z.
- Survey Business Z.

If the meter(s) also serve a central plant that provides heating and or cooling to the tenants then, do the following:

- Obtain square footage of the tenant spaces conditioned by the central plant from Business Z.
- NAICS code for the survey-site will be the property management office only (Business Z), 531312 Nonresidential Property Managers.

Variation

This situation is common for indoor shopping malls where all the retail tenants have their own utility meter, but there is common area that may be conditioned which ties the retail businesses together.

Case 3C – Partial Building, Property Manager

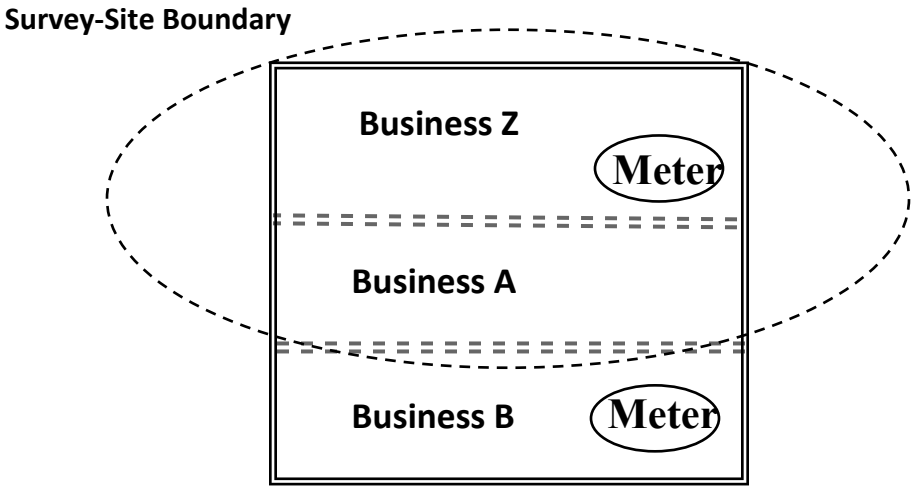


Figure 9. 1 Building, 3 Businesses, 2 Meters.

Description

Survey-site contact information has identified Business Z as the customer and one meter (or more).

Identified meter(s) are the only source of electricity at the site, except one business (or more). Meter serves Business Z, A.

The building is managed by property management company (Business Z) who also occupies the building. The meter also serves the common areas of the building. The property management company is responsible for the utility account. As an example, this is typical of a high-rise office.

Business B has a meter and pays the utility bill. As an example, Business B is a restaurant on the first floor of a high-rise office building.

Business Z has agreed to participate in the study but has not contacted the tenants.

Action

- Obtain square footage of the tenant spaces for all businesses in the building from Business Z, except for those on their own meter(s) like Business B.
- Since Business B has its own meter do not include it in the survey-site.
- Since the identified meter(s) serve the building (excluding Business B), then define survey-site as the building less Business B.
- Business Z has agreed to participate in the study. Tenants have not. Obtain permission to survey a sample of businesses. If permission is granted, then survey the businesses.
- Survey Business Z and the number of tenants at the survey-site as is given by the following table and the special cases listed below the table.

Number of Tenants	Number of Tenants to Survey*
Less than or 4	3
5 to 7	4
8 to 10	5
11 to 20	7
More than 20	10

** Quantities based on a 90/25 confidence and precision sampling.*

1. If at least 75% of the total survey-site square footage can be captured by surveying fewer than the "Number of Tenants to Survey", then the area sampled is used to satisfy the criteria.
2. If a restaurant is a tenant and Business Z pays the utility bill, then survey the restaurant.
3. If a retail store is a tenant and Business Z pays the utility bill, then survey the retail store.

- Identify the three most common business activities and list the associated building types for those activities as a percent of the overall building size.

If permission to survey sufficient businesses is not granted, then do one of the following:

- Request Business Z to send notifications to tenants that they are requested to participate in the survey. Then conduct survey on appropriate number of sample tenants.
- If still unable to sample sufficient businesses, then record the site as a refusal and leave but pass information to engineering staff to contact Business Z so they can collect sufficient information to complete the survey for the survey-site.
- NAICS code for the survey-site will be the property management (Business Z), 531120 Lessors of nonresidential buildings.

Case 3D – Partial Building, Tenant with Meter

Survey-Site Boundary

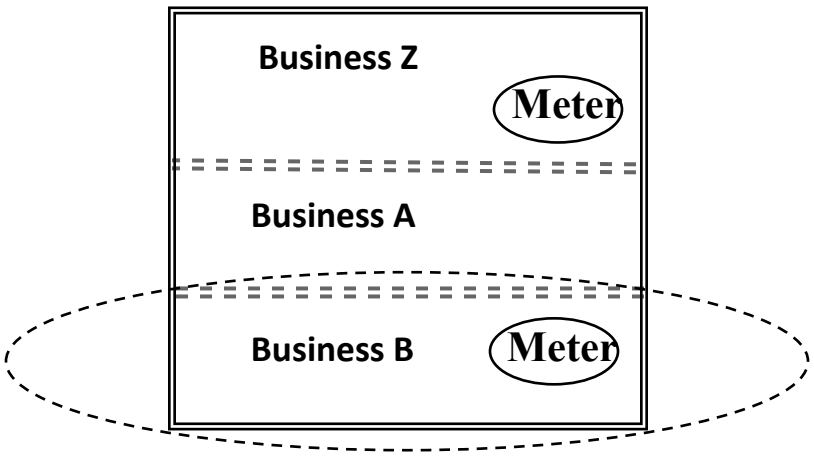


Figure 10. 1 Building, 3 Businesses, 2 Meters.

Description

Survey-site contact information has identified Business B as the customer and one meter.

Identified meter is the only source of electricity for the business.

Business B has a meter and pays the utility bill. The building has multiple tenants and the other tenants may or may not have meters for their own spaces. As an example, this would be typical to have of a restaurant on the first floor of a high-rise office building. Or another example is a restaurant in a shopping mall or strip mall.

Business B has agreed to participate in the study, no other tenants are participating.

Action

- Since Business B has their own meter, then define survey-site as Business B.
- Survey Business B.
- NAICS code for the survey-site will be determined based on the activity-type of Business B.

4.4.3 Survey-Site with Shared Services

A situation that complicates a survey-site is energy leaving the survey-site boundary. That energy can be in the form of electricity, natural gas, or converted to something like chilled water being supplied to neighboring businesses. Figure 11 shows an example of this scenario.

Case 4A – Shared Services

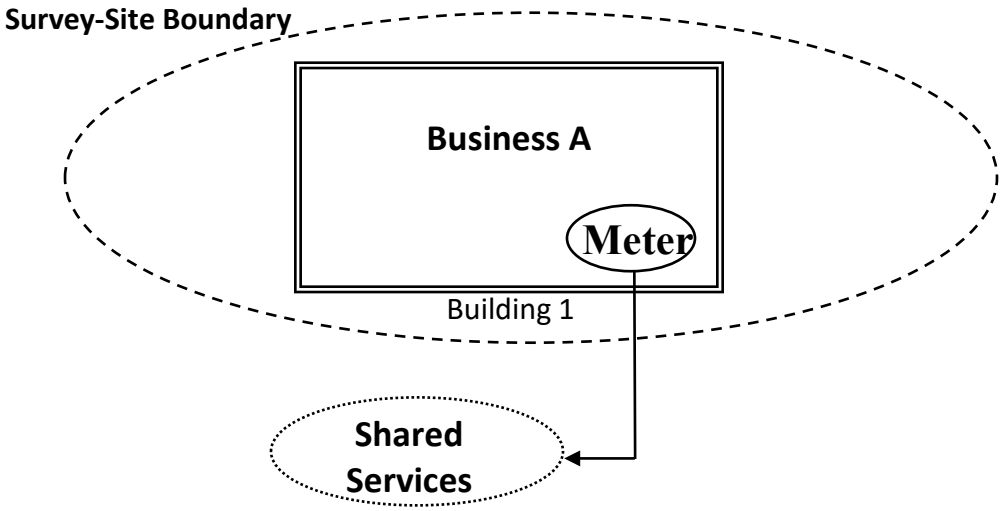


Figure 11. 1 Business, 1 Meter, Shared Services.

Description

Survey-site contact information has identified Business A as the customer and one meter.

One meter serves Business A in Building 1 and energy is also shared outside the building to another user. An example is equipment not associated with the business, such as an illuminated billboard or a pump.

Action

- Since the other user is not a building but shares the meter, then define the survey-site as Business A.
- Survey Business A.
- Complete the Shared Meter section in the CEUS Tool™.
- NAICS code for the survey-site will be determined based on the activity-type of Business A.

Variation

The shared services may be electricity that is being used by another building or business or it could be another service such a chilled water produced by a chiller plant operated by Business A.

The survey-site may have more than one electric meter. Include all electric meters that serve Business A in this building.

4.4.4 Survey-Site Using Other Energy Sources

Another situation that complicates a survey-site is if there is energy being supplied to the survey-site by a source other than a utility meter. Figure 12 shows an example of this scenario. The other energy sources could be coming from sources such as chilled water, steam, bottled gas, biogas/fuel, or leased community solar. Solar PV (photovoltaic) that is connected on the customer side of the utility electric meter may still have a meter and needs to be collected and documented.

Case 5A – Other Energy Sources

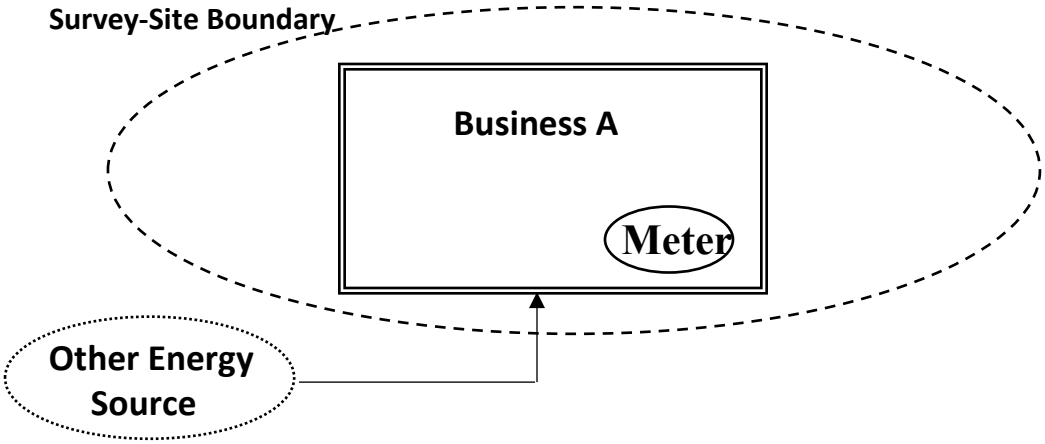


Figure 12. 1 Building, 1 Businesses, 1 Meter, Other Energy Sources.

Description

Survey-site contact information has identified Business A as the customer and one electric meter. Business A receives energy from additional source(s) other than the electric utility. Business A may occupy all or part of the building.

Action

- Business A uniquely occupies the building so the defined survey-site is Business A.
- Survey Business A.
- Obtain information on the other energy sources received by the business.
- Complete "Other Energy" section in the CEUS Tool™.
- NAICS code for the survey-site will be determined based on the activity-type of Business A.

Variation

If the other energy source is generated on-site (such as Solar PV Array or waste heat recovery, etc.) then document it as on-site generation (Table 18 in the data collection survey form). If it is purchased energy (such as Bottled Gas, Steam, Chilled Water, etc.) then document it as other energy source (Table 17 in the data collection survey form).

The survey-site may have more than one electric meter. Include all electric meters that serve Business A in this building.

Special emphasis must be placed on the accurate identification of meters at the survey-sites. A survey-site can have multiple electric and/or gas utility meters. The Survey-site contact screen will list the number of meters identified by the utility database to be associated with the survey-site. All utility meters need to be identified and confirmed that they are for this survey-site. **Ask and find out if there are any additional utility meters that supply energy to the survey-site.** These could include meters for

other energy sources besides electricity or natural gas. Do not include meters that are the customer's private meters for internal allocation of energy use to various parts of the operation or tenants.

A meter that is identified in the database as a survey-site, but upon further investigation is found only to service a chiller or central plant was not properly identified as a survey-site. The central plant meter should also be associated with a building that it provides cooling and/or heating service. Identify the rest of the facility that should be associated with the central plant, so the database can be updated to account for the entire survey-site. Since the originally identified survey-site is NOT an actually survey-site, it should not be surveyed. Record this as a non-survey-site.

4.4.5 NAICS Determination

Accurate determination of the 2017 NAICS code for a survey-site is key to the success of the CEUS study. Identify the main business activity at the survey-site. The NAICS code classification will be based on the business activity in the largest percent of area at the survey-site and should also be the same as how the business describes itself. The identification of the correct 2017 NAICS code is an important piece of information collected while at the survey-site. Special attention should be given to the selection at each level of the NAICS classification decision. The field surveyor can ask the survey-site contact what the primary activity is for the survey-site and use that information along with their observations to select the most appropriate NAICS description. NAICS codes are six digits long. A successive set of dropdown menu options is provided for the selection for the most appropriate classification. Two successive digits are covered in each of three steps. Each successive dropdown drills to another level in the NAICS categorization of the business activity. Select the option that most closely represents the business and activity of the survey-site. For this project only one NAICS can be selected to describe the primary business at a survey-site. Refer to Appendix A for additional details on the NAICS listing. If the customer knows the NAICS code used by the business, then the surveyor can enter that number into the CEUS Tool™ and it will display the 2017 NAICS code description.

The utility provides a NAICS code for each business and those are entered into the CEUS Tool™. The call center also can revise the NAICS code based on conversations with the customer. The field surveyor also makes a determination of NAICS code based on first-hand observations and conversation with the customer. All three sources of NAICS codes are tracked separately in the database. If all three sources of NAICS code do not match exactly then the field surveyor is provided the three options and asked to make a final selection of NAICS code for the business.

4.4.6 Survey-Site Area (Square Footage)

Survey-Site area is defined as the square footage of the commercial floor space. Area is a measure of the interior floor space. It does not include parking lots. Parking garages are addressed separately in Section 5.1.13.11. Since survey-site area is a critical data field, extra attention will be provided to properly train staff on the methods approved for use in this study.

The first step is to clearly identify the survey-site. Data collection of the area (square footage) is required using the following methods. The two best (highest priority) methods should be used to collect the area. This will be discussed more in the following paragraphs. A description of data collection for each of these methods is provided in turn. The order of priority for collecting the area measurements are provided here with number one having the highest priority.

1. Floor Plans – Interior
2. Floor Plans – Exterior
3. Floor Plans – Can't determine if interior or exterior
4. Property Management leasing space records
5. On-site distance measurement – Interior
6. On-site distance measurement – Exterior
7. Satellite/Aerial (using web-based measurement tool)
8. Interviewed survey-site contact – Interior
9. Interviewed survey-site contact – Exterior
10. Interviewed survey-site contact – Can't determine if interior or exterior
11. I know that this information is not available or cannot be determined

A subset of the floor area is th***e end-use fuel partition*** and is the area where a particular fuel type is used for a particular type of heating system, cooling system, ventilation or exhaust, and in the case of refrigerated warehouses, the refrigerated or freezer portion. The ***end-use fuel partition*** area is further defined in section 5.1.12.1. The end-use fuel partition(s), as a subdivision of the survey-site, will also use the following methods for measuring its area.

Floor Plans / Site Plans: Floor plans and/or site plans are a great source of information. Ask the survey-site contact if they have any to view. Ask if the plans are up-to-date. Generally, the square footage of the building is on the plans, and it usually includes the exterior walls. If the plans don't list the square footage, then use dimensions that represent the interior to calculate square footage. If only exterior building dimensions are provided, then subtract the wall thickness from both exterior walls. If no wall thickness is shown on the plans, then use 1.0 foot as default (2.0 feet total for both exterior walls). If the floor plans only list square footage without dimensions, then list the square footage and mark on the tablet form the source of the information.

The floor plans provide a talking point to ask the survey-site contact if there are any different end-use fuel partition areas. Obtain a copy of the floor plans if possible. The preferred choice would be to obtain an electronic copy. **At a minimum**, take pictures of the floor plans that have useful information showing the calculated square footage, dimensions, number of buildings, and/or designated HVAC areas. Sometimes emergency exit plans are posted near exits or lobbies and may be scale versions of the floor plans. These may be readily accessible and show the floor plan layout, although they may only show a portion around the area where it is posted.

Examples of site plans are shown in Figure 13 to Figure 15.

Figure 13 shows a small strip mall with two buildings. Each building has multiple tenants. Each tenant space has a calculated square footage listed. If each tenant has a utility meter, then this drawing shows seven survey-sites. If each building has one utility meter and each building has its own address, then there are two survey-sites, with each building having up to three or four businesses.

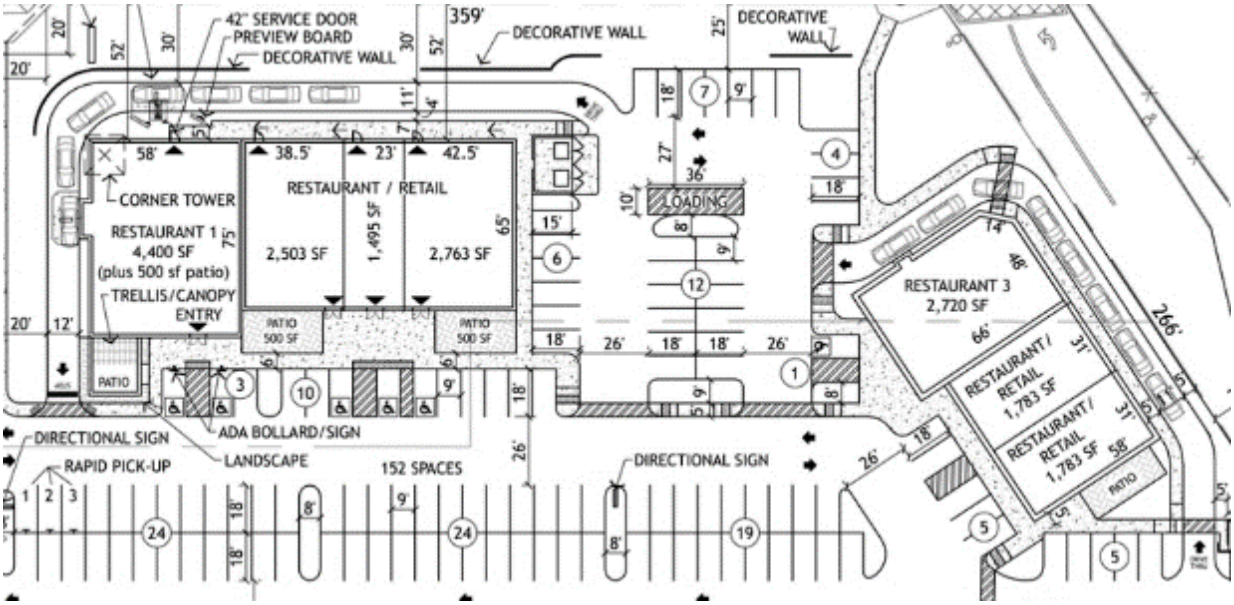


Figure 13. Example of a Site Plan Drawing for a Strip Mall with Multiple Tenants in two Buildings.

Figure 14 shows a site drawing for plans of a business expansion. Note, that the drawing indicates there is a residential space above a business (restaurant) and in the basement. The residential spaces are not part of the survey-site and should have their own utility meter[4]. In this case, the total survey-site area is the existing business area plus the new addition area (1,300 sq ft + 700 sq ft = 2,000 sq ft). Mark the area on the tablet form as "exterior from plans."

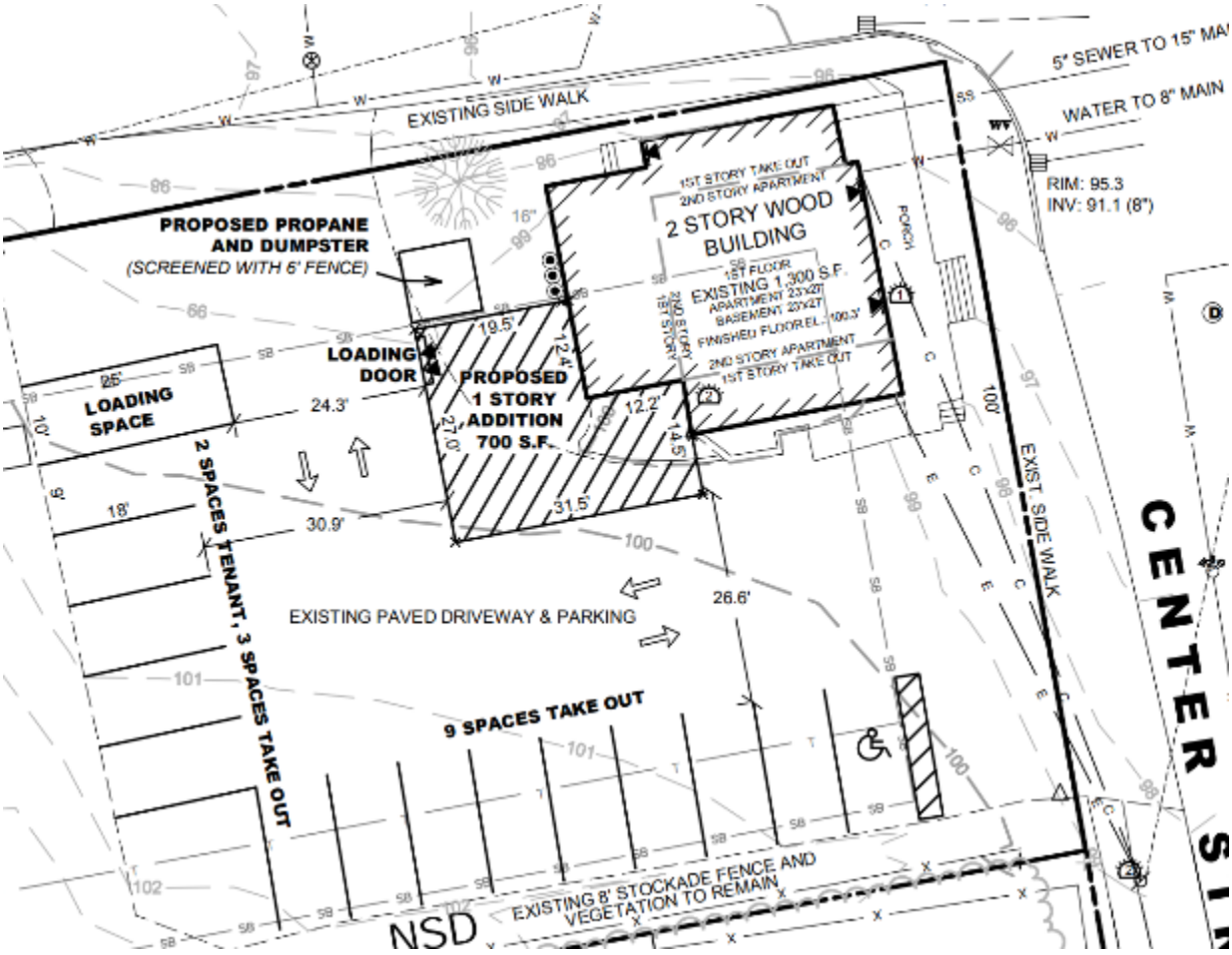


Figure 14. Example of a Site Plan Drawing for a Building with Commercial and Residential.

[4] If a non-commercial space uses energy from the survey-site meter, then an estimate of the amount of utility billed energy needs to be provided in the shared services question of the survey (see 5.1.8.5).

Figure 15 shows the site plan is for a mall. Most of these businesses should have their own utility meter. If the survey-site is just one of the businesses, then the plan can be used to find the area of the building or portion occupied by the business. If the survey-site is the mall management then they operate the parking structure and possibly the outdoor lighting on the property. As discussed later, sites that only consist of parking garages will be dropped from the sample, so the property management for this example would not qualify as a survey-site.

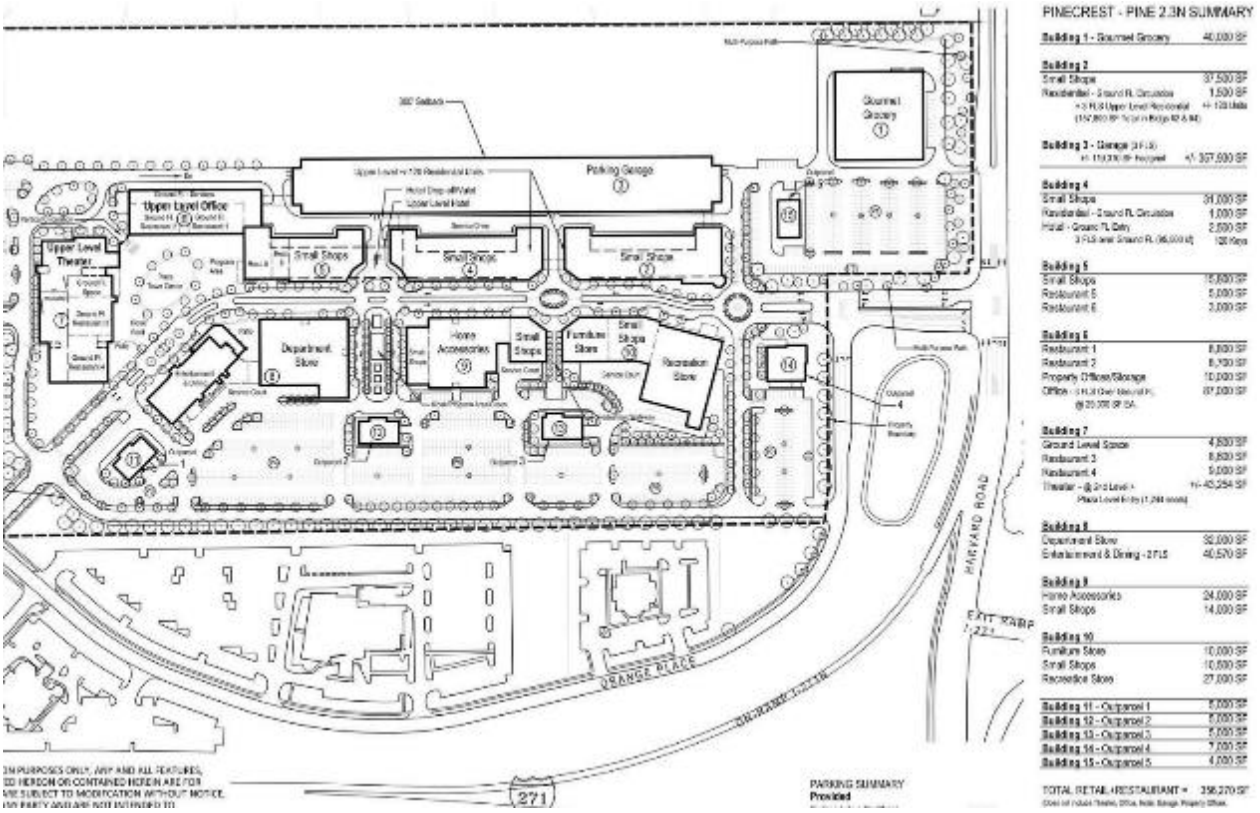


Figure 15. Example of a Site Plan Drawing for an Open-Air Mall with Multiple Buildings.

Property Management leasing space records: Property management companies maintain records of the size of all the properties or spaces they lease. These records must be accurate because they are used in legally binding contracts with the businesses leasing the space. Obtain the area from the property management company or view a copy of the lease agreement. The surveyor should take a picture of the documentation that lists the size of the space. For the high-rise office building the tenant spaces listed by the property manager are interior measurements and do not include common areas. The common areas of a high-rise office building typically account for 15% of the total building square footage. If a business is leasing a standalone building, then the listed square footage is generally an exterior measurement and may even include overhangs.

Distance Measurement: At many survey-sites the square footage and end-use fuel partition areas will be manually measured by the surveyor. This requires access around the building(s) and through the interior, if more than one end-use fuel partition area is identified. Interior measurements are preferred if there are large open areas that lend themselves to making measurements between outer walls. Exterior measurements are made outside from the outer edges of the walls and wall thickness should be documented. Minor nocks, crannies, and extensions can be ignored if they are less than 50 square feet

or less than two percent of the total square footage, whichever is more. Two types of measuring equipment are listed here.

- Laser tape
- Rolling wheel

Laser Tape:

CAUTION: Do Not look into the laser beam or point it into someone else's eyes.

A laser tape uses line of sight for an optical laser beam to measure distance. It will work indoors but not outside in sunlight. In unfavorable conditions, e.g., with extreme illumination or a badly reflecting surface, the measuring range may be limited. The rear edge of the measuring tool is always the reference point for the measurement. With the laser light turned on, the digital display will provide a real-time reading of the distance from the back of the device to the point on the wall where the beam is reflecting. Make sure the beam is striking the wall perpendicularly and at the same height as the device. Exceptions are for walls that are not at right angles. Laser tapes have different functions or modes of operation. For measuring linear distance, make sure the device is in that mode. Some models can add two measurements together to get a total distance. Switch the beam off as soon as each measurement is completed. This will conserve battery life and avoid accidentally pointing the laser in someone's eyes. Pictures of a laser tape are in Figure 16. The surveyor should always carry spare batteries for electronic devices.

Figure 16. Laser Measuring Tape Devices.

Other factors that influence the ability to make a good measurement can be due to physical effects. Faulty measurements can occur when measuring on different surfaces which include:

- Transparent surfaces (e.g., glass, water);
- Reflecting surfaces (e.g., polished metal, glass);
- Porous surfaces (e.g. insulation materials); and
- Structured surfaces (e.g., roughcast, natural stone).

Rolling Wheel:

A rolling distance measuring wheel is useful for long distances on the outside of a building. It can also be very effective inside. The rolling wheel has a mechanical digital counter that reads in feet and inches.

They do not require batteries. Be sure to reset the counter at the beginning of a measurement. It is very important to roll in a straight line and to keep the wheel in firm contact with the ground while rolling out the distance.

Figure 17. Rolling Wheel Tape Measuring Devices.

For exterior measurements place the point of contact of the wheel with the ground in line with the outer edge of the building. Reset counter and roll the wheel to the opposite end of the wall until the ground contact point is in line with the outer edge of the wall. Identify the measurement as exterior or subtract off the exterior wall thicknesses.

For interior measurements of end-use fuel partition area, start with the wheel against one of the walls. Reset the counter and roll the wheel straight until the wheel reaches the opposite wall. Add the wheel diameter to the distance. If the wheel cannot make the measurement in one straight run then first go as far as possible in a straight line, carefully pick up the rolling wheel and displace it perpendicularly to the original direction of travel until it is in a location that can resume the forward rolling of the wheel. Set the wheel back down and continue rolling forward. The surveyor should not reset the counter unless manually recording the individual measurements.

Satellite View: It is recommended that prior to visiting each site an internet view of the building should be made. An internet satellite view of the building(s) can be captured and used. Google Earth™ has a ruler tool that can be used to measure distances, such as from one corner of a building to another corner. However, the version of Google Earth™ for mobile devices does not have the features listed in the figures that follow. Other Apps, such as Measure Map have features that are useful for making satellite measurements. If a satellite view measurement is made on the tablet, then make a screen capture and store it as a picture (see photo capture in section 5.1.16.1.)In Figure 18, the thin yellow line on the left side of the building was drawn using a mouse and the "Ruler" window shows the ground length dimension for that side of the building is 90.44 feet. Each exterior wall dimension can be measured using this feature of Google Earth™. Subtract off 2 feet (1 foot for each exterior wall in that direction.) or identify it as an exterior measurement. Google Earth™ Pro (free) has a ruler tool that can measure areas of a polygon, such as from marking all the corners of a building. Figure 19 shows a thin yellow line outlining the roof of a building which is partially obscured by trees. The "Ruler" window shows that the building is 7,719 square feet. This can only be used as an initial area estimate of the

building pending on survey-site verifications. When using this method, the important items to verify while at the site are:

- Measure areas of overhangs and subtract from polygon area;
- Number of floors
- If floors are not all the same polygon area, then note the differences;
- Measurement of any basement or non-satellite visible areas of the survey-site and add them to calculate the total area; and
- Verify on survey-site that the satellite view is up-to-date, and no additions have been made.

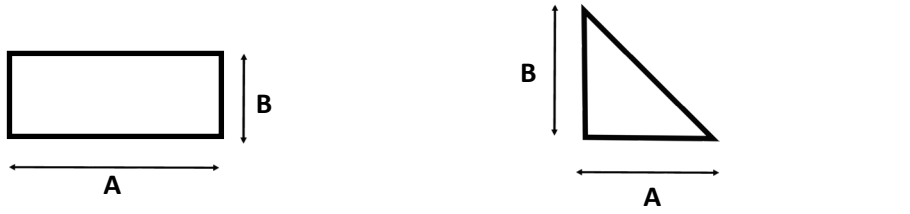
Figure 18. Google Earth™ Satellite View of a Building and a Measurement of One Side.

Figure 19. Google Earth™ Pro Satellite View of a Building and Measurement of Roof Area.

Interviewed Survey-Site Contact: If all previously identified methods are not possible, then ask the survey-site contact the area of the building. Ask if it is an interior or exterior measurement. Obtaining

verbal data from utility customers that know the size of their building can also be used to validate the measurements made in the previous methods.

Square Footage Calculation: Although the tablet data collection tool is designed to calculate area(s) of a building, it is always good to know the simple math to do the calculation. The majority of building shapes can be broken down into or approximated using two shapes: rectangles and right triangles. The area (square footage) of these two shapes is given in Figure 20.



Area of Rectangle = A x B **Area of Right Triangle = (A x B) / 2**

Figure 20. Rectangle and Triangle Area Calculations.

4.5 DATA COLLECTION INSTRUMENTS AND CUSTOM SOFTWARE APPLICATION

Field staff will be well trained on the data collection procedures and use of the data collection tool. They will receive a copy of these data collection protocols to read and have as a reference. They will attend a training seminar conducted by experienced ADM staff. They will be quizzed to identify that they understand the details of the data collection. How we train them on this is the most important part.

Field surveyors will be required to sign a confidentiality or non-disclosure agreement. If any customer shows concern about the collection of business sensitive data, they can be assured that all employees are bound by non-disclosure agreements.

4.5.1 Data Collection Instrument Hardware Requirements

ADM's CEUS Tool™ tablet data collection instrument will be Android based with the following minimum requirements:

- Android 5, with 2GB RAM

Minimum software requirements for Android:

- Google Chrome 50
- Microsoft Edge 1.0.0

Surveyors will be using Samsung Galaxy S3 Tab 8-inch tablets to run the CEUS Tool™ app to collect the data. ADM will provide the tablets to all the survey team members for use on this project. The tablets can use Wi-Fi for internet connectivity when a secure Wi-Fi signal is available. Connectivity allows the tablet to update to the latest version of the CEUS Tool, identify the status and availability of survey-sites in the database, claim survey-sites for the surveyor, and upload collected survey data to the ADM server. Surveyors are not to use public Wi-Fi. When a Wi-Fi signal is not available, the tablet will connect to the internet with a secure Verizon data plan. The preferred method for the surveyors to use is the secure Wi-Fi when in the company office.

4.5.2 Data Collection Instrument Software Installation and Updating

ADM's IT department will control installation of the CEUS Tool™ app and other required apps. The ADM IT department has the capability to remotely install apps and revise settings as the project manager approves them. The CEUS Tool™ app automatically updates when the user signs in and goes online.

Security Procedures for Devices

The first level of security for the data on the tablets is that a key code is needed to open the tablet. The next level of security is a username and password are required to login to use the CEUS TOOL™ data collection software.

All project tablets will be managed with Cisco Meraki Mobile Device Manager (MDM). The Cisco Meraki MDM enforces device security policies, deploys software and applications, as well as provides limited remote support of device. Important features pertaining to ADM's CEUS Project needs include:

- Secure application management;
- Remote control over ADM controlled Personally Identifiable Information (PII); and
- Security policy enforcement.

The login privileges of any user can be modified at any time by the ADM I.T. staff to block access to a specific user.

In the event that a tablet is lost or stolen, the field surveyor will contact the ADM project manager immediately. Once the project manager is notified, ADM's IT staff will remotely wipe the data stored on the tablet.

4.6 CLAIMING SURVEY-SITES

There are three ways to select and claim a survey-site. Once the field surveyor logs onto the tablet and opens the CEUS Tool™ app, the options are: 1. from "My Sites", 2. from list in "Canvass Sites", and 3. from Site Map. These three options are shown across the top of the screenshot in Figure 21. In the "My Sites" option is a list of sites that have been scheduled for the surveyor on their tablet. Select a survey-site to download the site-specific data by tapping on it. There are three categories. First, "Sites assigned for revision" which are survey-sites the surveyor submitted but quality control has asked for some revision to the survey, so it has been reassigned to the original surveyor. Second, "Scheduled sites" are listed in most current to future date order. Third, "Assigned sites" which will be for some of the largest survey-sites and specially assigned to engineers.

Next, is the "Canvas Sites" option which lists all eligible survey-sites. Tap on the blue cloud with a down arrow icon that is to the left of the survey-site name to select a survey-site. Survey-sites without the icon are not eligible for the surveyor to download. This is a very large list, so the surveyor can filter the list by a variety of fields to find a site or group of sites. The filter fields include: survey-site ID, survey-site name (partial names can be entered, such as "auto" to find a variety of parts or repair shops), zip code, or address (just the street name can be entered and all the survey-sites on that street will be shown).

Last, is the "Site Map" option. A map of California is shown, and the surveyor can zoom to any part of the state to find pins that represent sites in the sample database. The same filter options from canvas sites are also available in the map view. Additionally, a "Jump to my location" button zooms to the GPS coordinates of the tablet. The surveyor can click on a pin, a small window of additional information about the survey-site will pop up. Within that window will be a "Claim" button if the site is available to

claim. Click on the button to claim the survey-site and download the survey-site details. Figure 21 shows an example map with pins. Table 3 has the legend of pin colors and symbols inside the pins. The red pins with squares are sites that are already claimed, the plain blue pins are canvassing sites available to claim, and the starred blue pins are completed sites. The yellow pins are assigned by a Tool administrator and as such, are only claimable by the assignee.

The field surveyors can claim a limited number of sites. That limit may be adjusted as appropriate based on experience that is gained during the survey effort. As field surveyors complete survey-sites and upload the results, a like number of survey-sites become available for them to claim and download.

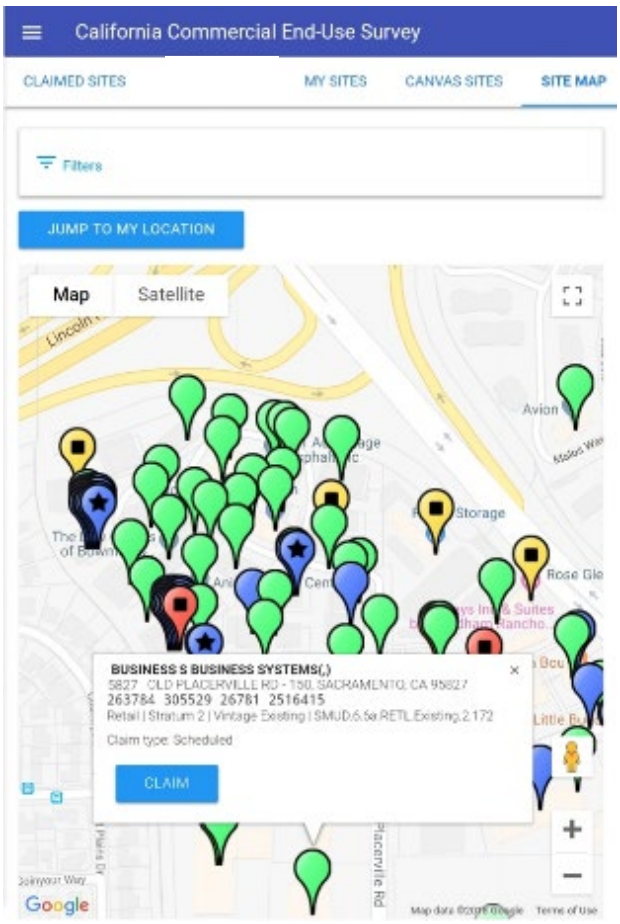


Figure 21. CEUS Tool™ Example Map of Survey-Sites showing a Variety of Pin Types.

Table 3. Pin Legend for Site Map (Figure 21)

Site Designation	Available Site	Claimed Site	Completed Site
Scheduled (green)		 *	
Assigned (yellow)		 *	
Canvas (blue)		-	
Not Available (red)	-		

* Site not assigned to you.

The survey-sites claimed by a field surveyor can be viewed on the CEUS Tool™ tablet in the "Claimed Survey-Sites" tab, see Figure 22. For each survey-site, the option is to edit, upload, or cancel. Editing is the process used to complete the survey form. The process to complete every question on the survey is detailed in Chapter 5.

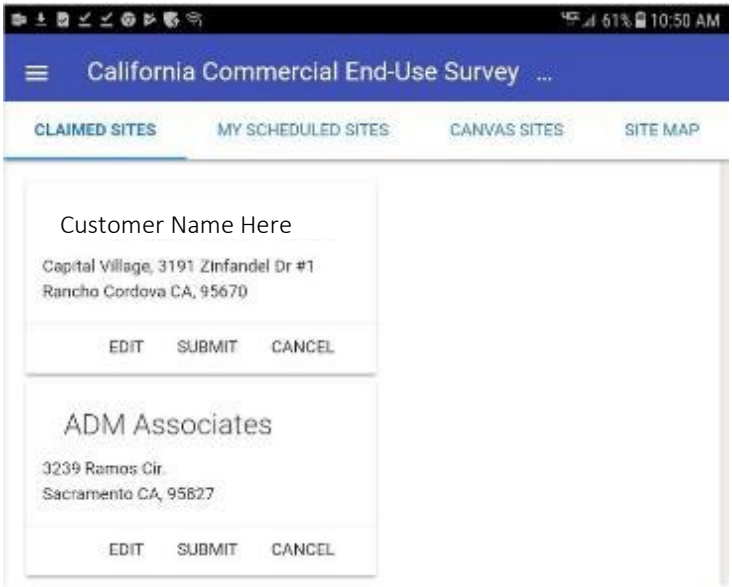


Figure 22. CEUS Tool™ Example of Claimed Survey-Sites Tab.

4.7 Entering Data into the CEUS Tool™ for a Survey-Site

Section 5 describes the step by step process for filling in each data field. As the tab sections in the Tool are completed a green check mark is placed next to the tab name in the dropdown list of tabs (from upper left corner), see Figure 23. The number of sections remaining to be completed is shown in the small yellow box, in this example three more sections need to be completed. Once all the tab names have a green check mark the survey has been completed and can be submitted. If a tab name is not checked green you can go to the "Complete Survey" tab, see Figure 24, to see what questions still need

to be addressed or completed. After all questions have been completed check the “Survey Completed” box.

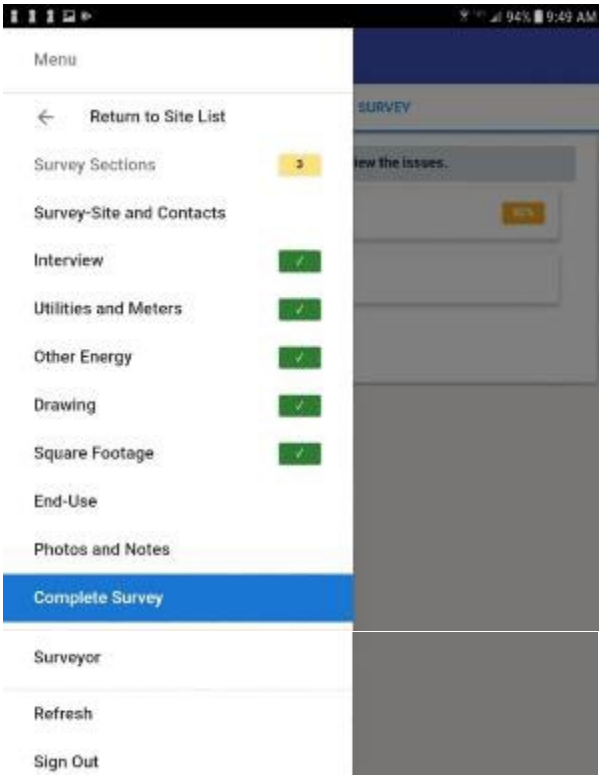


Figure 23. CEUS Tool™ Tab Checklist Dropdown Showing Completed Tab Sections.

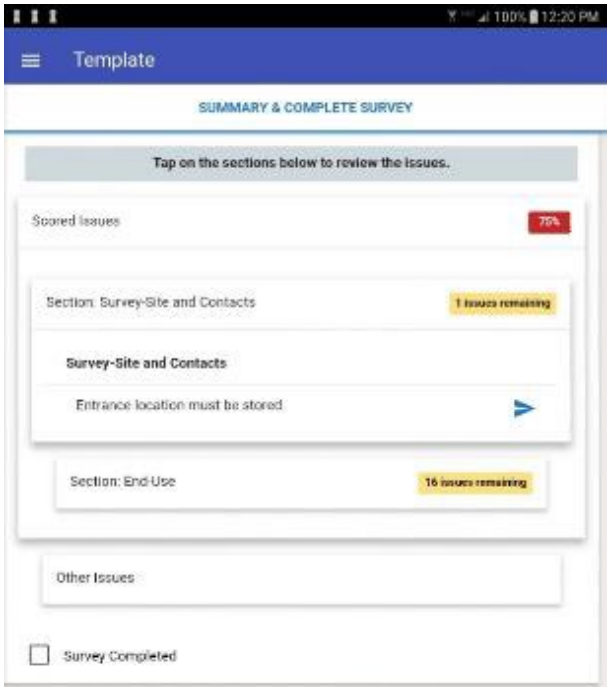


Figure 24. CEUS Tool™ Example List of Questions Remaining to be Completed.

4.8 SUBMITTING A SURVEY-SITE

A survey-site can be uploaded (submitted) with whatever information is available at the time. Subsequent uploads can be made as additional data is collected until the survey is completed. An example would be if the surveyor may need to wait until a survey-site contact emails them requested information, such as a copy of the utility bill or floor plans. Once all the auxiliary information has been collected and attached to the survey, the survey-site can be submitted as completed. The "Survey Completed" box (as described in section 5.1.17.1) must be checked so when the survey-site is submitted it will be identified as completed which will prevent other surveyors from claiming or revisiting the site. Once submitted as a completed survey-site, changes can only be made if a quality control reviewer releases the survey-site back to the surveyor.

The survey is intended to be completed while at the survey-site. To upload a completed survey, click on the "Submit" option for the survey-site as shown in Figure 22. A good connection to the Verizon network or a secure Wi-Fi signal is needed to upload the survey. If the signal is not strong where the field surveyor is located, they can wait until the end of the day and upload all the completed sites. At a minimum the completed survey-sites for each day will be uploaded the same day (or evening). Submissions must also be made for survey-sites that do not or cannot participate in the survey.

4.9 QUALITY CONTROL

Uploads by the surveyors places all entered data for survey-sites into a database which is accessed by the ADM quality control team. The quality control (QC) process involves four stages.

The first stage (Stage 1) occurs during data collection. Selected field entries generate a red underline of the values if they are outside a predefined range. For example, if the sum of certain entries which is supposed to be 100% does not add-up to 100%.

At the second stage (Stage 2), data for all available survey-sites are analyzed and run through several automated validation checks. The checks will identify data gaps, inconsistencies, and values that are out of range. The checks will examine metrics such as energy use intensity (kWh/ft^2), overall energy use, square footage, business hours, number of floors, and others. Outliers will be identified based on tolerances in units of standard deviations from the mean of a given distribution. Survey-sites that fail the basic data integrity checks will be flagged for third stage QC.

At the third stage (Stage 3), an ADM engineer will review the data for sites with unusually large errors or have been flagged for Stage 3 review and make one of the following determinations:

- The data gaps or inconsistencies identified during Stage 2 review are resolved.
- Unresolved data gaps remain, and the survey-site is flagged for a follow up telephone conversation with the survey-site contact.
- The survey-site has irrecoverable data losses which require a second visit or the selection of an alternate sample point.
- Large residuals are reviewed by engineer and may be found as naturally occurring; all data appear to be accurate and defensible, otherwise follow ups will be done to clean the data.

A random sample of projects are promoted from Stage 3 QC to Stage 4 QC. At this level, a senior engineer checks the Stage 3 work conducted by our engineers. We can control the fraction of survey-sites that enter Stage 3 by modulating thresholds on residuals calculated in Stage 2. We have budgeted for 100% of all survey-sites undergoing Stage 1 and Stage 2 review, 40% of all survey-sites undergoing

Stage 3 review, and 10% of all survey-sites undergoing Stage 4 review. The Stage 2 to Stage 3 and Stage 3 to Stage 4 promotion rates will intentionally be set to higher levels at the beginning of the project and will eventually be set to levels specific to the building type and field surveyor to optimize the quality control effort's impact.

4.10 FIELD EFFORT MANAGEMENT, HIERARCHY

All field surveyors will have a field supervisor to which they report. If a field surveyor has a question about a situation, they should first ask their field supervisor. Each subcontractor will have their own field supervisors. The field supervisors for all subcontractors and ADM will report to a lead field supervisor in the ADM Sacramento office. The lead field supervisor will respond to questions from all the field supervisors, and as needed, directly with field supervisors. The lead field supervisor will notify all field surveyors and field supervisors of any updated or changes in procedure.

5 CEUS TOOL™ DATA COLLECTION

5.1 DATA COLLECTION INSTRUMENT – STEP-BY-STEP

This is a step-by-step guide to the CEUS Tool™ data collection app. A description of each survey instrument question and how to answer it are provided here[5]. This is the largest section in this protocol document. Each fourth level section heading is the question or identifier of the field to be reviewed or completed. Immediately following the question heading is a one row table identifying the CEUS Tool™ tab name/category, the type of data field (string, numeric, dropdown list, yes/no, etc.), if the field is expected to be pre-populated (yes/no), and if the surveyor can edit the field using the CEUS Tool™. Some questions in this protocol only appear on the tablet if they are applicable, based on certain previous entries. The third level headings are intentionally skipped so all the tablet questions do not show up in the table of contents. The term "customer" is used in the following section to mean the utility customer who is being surveyed.

Questions in the CEUS Tool™ are organized by categories. The categories are quickly accessed by using the dropdown menu icon which is always visible in the upper left corner. The tab/category names are listed in Table 4 with a short description.

Table 4. CEUS Tool™ Question Category Tabs

Tab Name	**Short Description**
Contacts	Survey-Site address, primary and alternate contact info
Interview	Interview questions, including NAICS entry
Meters	Electric and gas meter numbers and accounts
Other Energy	Information about other sources of energy
Drawing	Floor plan drawing layout tool, partition for HVAC fuel
Square Footage	Measurement type and entry of survey-site floor area
End-Use	End-use fuel saturation questions
Photos & Notes	Take pictures and enter comments and notes

Some questions have space available for multiple entries, such as when there is more than one electric meter serving the survey-site (all would need to be listed). Directions are provided for answering the first entry and are marked by a **#1**. Subsequent entries are marked as **#2 to #N**, where N is the maximum number of entries provided in the tablet. Some questions are identified as "[Conditional]", which means that they only appear in the CEUS Tool™ when a prior question has been answered in a way which makes the question applicable.

There are a variety of data types that are entered in various parts of the CEUS Tool™. They include the types listed in Table 5. Some dropdown lists also allow for string entries to account for "other" situations. These cases are identified by not only the list appearing, but also a keyboard for entering text.

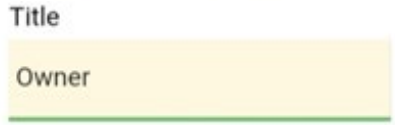
[5] The paper copy of the CEUS Field Data Collection Form has some questions in a slightly different order. The CEUS Tool™ has dynamic changes and only displays "Conditional" questions or options based on some answers.

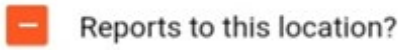
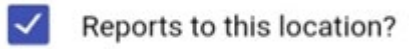
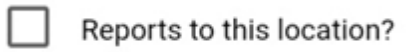
Table 5. CEUS Tool™ Data Types and Descriptions

Data Type	Description
String	Letters, numbers, special characters
Numeric	Numbers 0-9
Dropdown List	Predetermined list of possible responses
Dropdown List, Other	Dropdown list that allows typing in a different option
Drilldown List	Special Dropdown list with 3 levels
Yes / No	Yes or No answers
Numeric or n/a	Numbers 0-9 or not applicable
%	Percent (numbers 0-100)
% or n/a	Percent (numbers 0-100) or not applicable
..	Entry used for “not applicable” answer in numeric fields
String or NA	Letters, numbers, special characters or not applicable
Table	A matrix of entries
Check Box	Check box to say question applies
Push Button	Push the button to select/set
Drawing	Special drawing tool for building footprints and partitions

The display of entries in the CEUS Tool™ has different formats which help guide the surveyor to fields that require entry or fields that have been entered incorrectly. The broad red diagonal cross hatching represents fields that need attention or to be entered. Examples of the formatting and symbols are provided in Table 6.

Table 6. CEUS Tool™ Entry Display Formats and Descriptions

Tablet Display Format	Description
	Field that must be completed
	String Field that has been entered (green underline)
	Field that is actively being entered (blue underline)
	Optional entry field or displayed only (gray underline)
	Numeric field entered with value in accepted range
	Numeric field entered with value outside of accepted range

	Dropdown list not yet selected
	Dropdown list after selection
	Yes/No check box not yet answered
	Yes/No check box, **checked = Yes**
	Yes/No check box, **unchecked = No**
	Optional check box (not needed)
	Optional check box (answered)
	Option to add more elements
	Option to duplicate data blocks
	Option to delete an element

The following sub-sections in this chapter step through all of the questions or identifiers of fields to be completed or reviewed. Certain questions only conditionally appear on the tablet. These are labeled as ***[Conditional]*** at the end of the question.

Throughout section 5, references to the Survey Form Sections are marked with ***blue*** bold, italic text; and table numbers are indicated as ***blue*** text with the sub-section headings of the first question for each table.

5.1.1 Survey-Site & Site Contact Information

5.1.1.1 Survey-Site sample Identifier: Survey-Site ID Number (Cover)

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: No

There will be a unique survey-site ID for each potential sample point. The survey-site ID will be generated during the sampling process, after each set of utility data are obtained. This will be pre-populated for the CEUS Tool™ and fixed.

5.1.1.2 Save Entrance Location

Tab: Contacts	Data Type: Push Button	Pre-Populated: No	Can Edit: Yes

When the surveyor goes on-site to conduct a survey (either canvased or scheduled) we need the surveyor to identify the entrance of the building with a geotag. When the surveyor is at the entrance of the survey-site, the "Save Entrance Location" button is pushed. The CEUS Tool™ will save and show the latitude and longitude for that location. The displayed latitude and longitude are not editable. If the button is pressed more than once, the surveyor will need to answer a confirmation question before the new coordinates overwrite the saved location.

5.1.1.3 Business Name (Table 1)

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: No

The business name is provided by the utility and will be pre-populated into the CEUS Tool™. When the survey-site is contacted to schedule an on-site visit the business name and spelling will be verified. If there is a misspelling of the business name, it will be corrected in the database which will re-populate to the tablets. If the billing data is listed under a parent company name, the name will be changed to reflect the company doing business at the address. If it is identified during contact with the customer (either the recruitment call or during survey-site visit) that the name of the business has changed but they are still doing the same business activity, the name will be changed to reflect the current business name. If it is identified during contact with the customer that a new or different business occupies the location than listed by the utility, then the business will be dropped from the sample.

5.1.1.4 Business Name - Alternate

Tab: Contacts	Data Type: String	Pre-Populated: No	Can Edit: Yes

This field allows the caller or the surveyor to identify an alternate business name to the one provided by the utility.

5.1.1.5 Number of Street Address

Tab: Contacts	Data Type: Numeric	Pre-Populated: Yes	Can Edit: No

This is the business street address number. The business address is provided by the utility and will be pre-populated into the CEUS Tool™. When the survey-site is contacted to schedule a survey-site visit the street address will be verified to ensure the field surveyor is being directed to the correct location. If the business has moved, then the past record of billing data will not represent the current business at the location and the business will be dropped from the sample. If it is identified during the survey-site visit that a new or different business occupies the business location, then the business will be dropped from the sample.

5.1.1.6 Street Name

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: No

This is the street name the business is located on. It includes the street suffix (St, Dr, Ave, Blvd, etc.). The business address is provided by the utility and will be pre-populated into the CEUS Tool™. When the survey-site is contacted to schedule a survey-site visit the street address will be verified to ensure the field surveyor is being directed to the correct location. If the business has moved, then the past record of billing data will not represent the current business at the location and the business will be dropped from the sample. If it is identified during the survey-site visit that a new or different business occupies the business location, then the business will be dropped from the sample.

5.1.1.7 Suite

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: No

This is the business suite, if there is one. If there is not a suite identifier, leave blank. The business address is provided by the utility and will be pre-populated into the CEUS Tool™. When the survey-site is contacted to schedule a survey-site visit the street address will be verified to ensure the field surveyor is being directed to the correct location. If the business has moved, then the past record of billing data will not represent the current business at the location and the business will be dropped from the sample. If it is identified during the survey-site visit that a new or different business occupies the business location, then the business will be dropped from the sample.

5.1.1.8 City

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: No

This is the city where the business street address is located. The city is provided by the utility and will be pre-populated into the CEUS Tool™. This will be verified during contact with the customer to ensure the field surveyor is being directed to the correct area.

5.1.1.9 Zip Code (5-digit + 4)

Tab: Contacts	Data Type: #####-####	Pre-Populated: Yes	Can Edit: No

This is the zip code where the business street address is located. The zip code is provided by the utility and will be pre-populated into the CEUS Tool™. This will be verified during contact with the customer and the plus 4 digits will be added if they can be verified.

5.1.1.10 What Language is Required to Schedule Appointment or Conduct Survey?

Tab: Contacts	Data Type: Dropdown List	Pre-Populated: Yes	Can Edit: Yes

English is the default answer that is pre-populated. If a language other than English is required to schedule the appointment or conduct the survey, then select the language from the dropdown menu list. The database will display on the sample list any survey-site that requires one of the following non-English languages. Only surveyors who have a proficiency in the language identified during the appointment scheduling will be flagged and have access to claim those survey-sites.

English
Spanish
Tagalog (Philippines)
Chinese
Korean
Vietnamese
Other _____
No

5.1.1.11 Survey Completion Status

Tab: Contacts	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Select the appropriate response from the dropdown list. If the survey can be completed, then select "Everything OK. If the survey cannot be completed, then provide the reason. If the survey-site contact refuses to participate in the survey, then politely comply and leave the survey-site. If the response is that now is not a good time, then select "Busy come back later" option and provide details in the Notes tab. If the survey cannot be conducted at this business, then select the applicable response and submit the site so no other surveyors visit this site. Since this is a commercial business (as defined by the CEC) survey then non-commercial sites must be dropped. A site would be dropped if more than 50% of the site area is non-commercial. Select the appropriate response from the dropdown list.

Answer Options	**Messages**
Everything OK	After completing survey, then submit.
Follow Up	Stop survey, fill out Contact Log, then submit.
Survey-Site no longer in business	Stop survey, fill out Contact Log, then submit.
Different business occupies this survey-site	Stop survey, fill out Contact Log, then submit.
Contact refuses to participate in survey	Stop survey, fill out Contact Log, then submit.
Busy come back later (say when in Notes)	Stop survey, fill out Contact Log, then submit.

Made contact – status pending (add details in Notes)	Stop survey, fill out Contact Log, then submit.
Not a Commercial business- Manufacturing	Stop survey and submit it now.
Not a Commercial business - Industrial	Stop survey and submit it now.
Not a Commercial business - Agricultural	Stop survey and submit it now.
Not a Commercial business - Residential[6]	Stop survey and submit it now.
Not a Commercial business - Transportation	Stop survey and submit it now.
Not a Commercial site - Does Not Qualify	Stop survey and submit it now.
Combined with another Survey-Site	Enter Site ID this site is being combined with, then submit survey.
Unknown language spoken on-site	Stop survey, fill out Contact Log, then submit.

5.1.1.12 Contact Name #1

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: Yes

This is the name of the primary survey-site contact for the business. The primary survey-site contact is provided by the utility and will be pre-populated into the CEUS Tool™. Initial contact with the business will be made with this person. If it is identified that this person no longer works there or is not available, then we will ask to speak with the person who has taken the place of the primary survey-site contact or is substituting for them. This person now becomes our primary survey-site contact unless it was a temporary substitution of personnel. If the primary survey-site contact has changed, then the field will be updated with the new name. The procedure listed above for replacing the survey-site contact can either be made by the phone call center staff or the field surveyor.

5.1.1.13 Contact Title #1

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: Yes

This is the title of the primary survey-site contact for the business. The title of the primary survey-site contact is provided by the utility and will be pre-populated into the CEUS Tool™. Initial contact with the business will be made with the primary survey-site contact and their title will be confirmed or asked if it is blank. Any identified update to the title will be made in the database.

5.1.1.14 Contact Phone Number, #1

Tab: Contacts	Data Type: ###-###-#### x####	Pre-Populated: Yes	Can Edit: No

This is the phone number and extension of the primary survey-site contact for the business. The phone number of the primary survey-site contact is provided by the utility and will be pre-populated into the CEUS Tool™ along with any extension number provided. Initial contact with the business will be made using this number. If this number is answered by a different person at the business, then an updated phone number for the primary survey-site contact will be requested and updated in the database. If the phone number does not go through, then the call center will next attempt to use the contact alternate phone number. If the alternate phone number also does not go through, then the call center will move to the next survey-site in the same sample bin. If all survey-sites in the sample bin have been exhausted, then the call center will attempt to investigate an alternate phone number through an online search.

5.1.1.15 Contact Email #1

Tab: Contacts	Data Type: String	Pre-Populated: Yes	Can Edit: Yes

[6] Per Title-24, any multi-family residential housing with three floors or less is considered “Residential”. That means 1-3 story apartment buildings do not qualify as “Commercial” even if there are common areas operated by management company.

This is the email address of the primary survey-site contact for the business. The email address of the primary survey-site contact is provided by the utility when available and will be pre-populated into the CEUS Tool™. Initial contact with the business could be made using the email address provided. If the email contact approach is used, then confirm the business information we have is up to date. If no email is provided, then first the call center and then the field surveyor will attempt to get the email address of the primary survey-site contact.

5.1.1.16 Does this contact report to this location? #1

Tab: Contacts	Data Type: Yes/No	Pre-Populated: If available	Can Edit: Yes

This is a question to identify if the primary survey-site contact is located at the service address (or at a corporate location different from this one.) This information may not be available. When contact is made with the survey-site, the call center will confirm if this person works at the business location provided. If this person does not work at the survey-site location, then the call staff will ensure that at least one of the alternate contacts work at the survey-site location and are aware of the scheduled appointment and expectations.

5.1.1.17 Contact Name #2 or More

Tab: Contacts	Data Type: String	Pre-Populated: If available	Can Edit: Yes

This is the name of additional survey-site contacts for the business. The additional survey-site contact may or may not be provided by the utility and will be pre-populated into the CEUS Tool™ if available. If the Initial contact is made with the primary survey-site contact, the call center will ask if there is a second or third level person for the field surveyor to contact if they are not available when the field surveyor arrives. It is important to have the names of at least two survey-site contacts that work at the survey-site. If this field is blank, then the call center will attempt to enter it into the database. If the field surveyor finds an informative person at the survey-site who is not listed as the primary or secondary survey-site contact, then the field surveyor will enter the helpful person's information into the third or more level of this field.

5.1.1.18 Contact Title #2 or More

Tab: Contacts	Data Type: String	Pre-Populated: If available	Can Edit: Yes

This is the title of the second level or more survey-site contact for the business. The title of the second level survey-site contact may be provided by the utility and will be pre-populated into the CEUS Tool™ if available. If contact is being made with the second level survey-site contact, then their title will be confirmed. Any identified update to the title will be made in the database.

5.1.1.19 Contact Phone Number #2 or More

Tab: Contacts	Data Type: ###-###-#### x####	Pre-Populated: If available	Can Edit: Yes

This is the phone number and extension of the second level or more survey-site contact for the business. The phone number of the second survey-site contact may not be provided by the utility but will be pre-populated into the CEUS Tool™ if available along with any extension number provided. Initial contact with the business will be made using this number only if the primary survey-site contact phone number does not successfully reach someone at the business. If this number is answered by a different person at the business, then an updated phone number for the first, second, and additional survey-site contacts will be requested and updated in the database. If the phone number for all additional entries do not go through, then the call center will next attempt to move to the next survey-site in the same sample bin. If all survey-sites in the sample bin have been exhausted, then the call center will attempt to investigate

an alternate phone number through an online search. If the field surveyor finds an informative person at the survey-site who is not listed as the primary or secondary survey-site contact, then the field surveyor will enter the helpful person's information into the additional level fields.

5.1.1.20 Contact Email #2 or More

Tab: Contacts	Data Type: String	Pre-Populated: If available	Can Edit: Yes

This is the email address of the second or more level survey-site contact for the business. The email address of the second level survey-site contact may be provided by the utility when available and will be pre-populated into the CEUS Tool™ if available. Initial contact with the business could be made using the email address provided. If the email contact approach is used, then confirm the business information in the database is up to date. If no email is provided, then either the call center or the field surveyor will attempt to get the email address of the secondary survey-site contact.

5.1.1.21 Does this contact report to This location? #2 or More

Tab: Contacts	Data Type: Yes/No	Pre-Populated: If available	Can Edit: Yes

This is a question to identify if the second or more level survey-site contact is located at the service address (or at a corporate location different from this one.) This information may not be available. When contact is made with the survey-site, the call center will confirm if this person works at the business location provided. There must be at least one survey-site contact that works at the survey-site.

5.1.1.22 Notes

Tab: Contacts	Data Type: String	Pre-Populated: No	Can Edit: Yes

Surveyors or call schedulers can add notes specific for each contact person.

5.1.2 Survey-Site / Contact Log

This section is to log all contacts with a customer, whether by a call scheduler or a surveyor. The Contact Log is for use by either the call scheduler or the surveyor. They are also information only areas for the surveyor that are provided by the call scheduler.

5.1.2.1 Contact Disposition (Contact Log) (Table 2)

Tab: Contact Notes	Data Type: Dropdown List	Pre-Populated: Sometimes	Can Edit: Yes

In the Contact Log block the first entry is the disposition type of the contact with the customer. For scheduled sites the call scheduler will select an option and once appended to the log it is not editable. For canvas sites, the surveyor must enter the contact disposition and notes for each time the customer is engaged. The list of dropdown options is provided here:

Answer Options
Busy come back later
Call Center follow up
Complete
Do not call (DNC)
No contact
Refused at this time
Site no longer in business/Moved Locations
Surveyor follow up
Additional information added
Other

5.1.2.2 Notes (Contact Log)

Tab: Contact Notes	Data Type: String	Pre-Populated: Sometimes	Can Edit: Yes

In the Contact Log block enter notes describing any pertinent information obtained during the customer contact. Sites that are scheduled through the ADM call center will have notes that the surveyor needs to become familiar with prior to visiting the site. It can provide a quick assessment of the size of the facility or information about the business or who is the best person to speak with. There is also another field the call schedulers can provide general notes about the sites that is a read only field for the surveyor.

5.1.3 Interview

5.1.3.1 Activity Type -2017 NAICS Code Classification (Table 3)

Tab: Interview	Data Type: Drill Down List	Pre-Populated: No	Can Edit: Yes

Identify the primary business activity that represents the largest percent of area at the survey-site. The identification of the correct **2017 NAICS** is a critical piece of information collected while at the business. NAICS codes are six digits long. Special attention should be given to the selection at each level of the NAICS classification decision. There are three levels of drill down to get to the final NAICS classification. A limited number of options to choose from are provided at each level. The field surveyor can ask the survey-site contact what the primary activity is for the survey-site and use that information along with their observations of the business location to select the most appropriate NAICS description. A successive set of dropdown menu options will be provided for the selection for the most appropriate classification. Each successive dropdown drills to another level in the NAICS categorization. Select the option that most closely represents the business activity for the majority of the space.

For this project we are only looking for the best NAICS description of the primary business at this survey-site. For example, a fast-food restaurant has a full NAICS code of 722513 which is described as "Limited-service restaurants." Study and review the full list of NAICS codes and classifications provided in Appendix A (Section 6.) If the customer knows their six-digit NAICS code, there is a place (see 5.1.3.4) where the surveyor can enter the code number and it will display the 2017 NAICS description. If the business is more than 50% of the area is industrial, manufacturing, residential, and/or agricultural then the survey-site does not qualify as a commercial business for this survey and the survey-site must be dropped (make a comment in the "Notes" section what type of business activity is conducted at the survey-site). The first level of the drill down list is provided in the following table, while the full NAICS code list of commercial classifications is provided in Appendix A.

NAICS Code Description – Level 1	**NAICS Code Description – Level 1**
11 Agriculture, Forestry, Fishing and Hunting*	**55** Management of Companies and Enterprises
42 Wholesale Trade	**56** Administrative, Support, Waste Management, & Remediation Services
44-45 Retail Trade	**61** Educational Services
49 Warehousing	**62** Health Care and Social Assistance
51 Information	**71** Arts, Entertainment, and Recreation
52 Finance and Insurance	**72** Accommodation and Food Services
53 Real Estate and Rental and Leasing	**81** Other Services (except Public Administration)
54 Professional, Scientific, and Technical Services	**92** Public Administration

** Only a limited number of NAICS codes in this category are commercial for the CEC.*

Sites that have more than one type of business activity will be classified by the activity that encompasses the largest area of the floorspace. Several examples are given here.

1. *A bar that serves alcoholic beverages and has a stage for entertainment.* The primary activity is selling alcohol to customers and providing them a place to consume the product. Although the bar itself may have a small area footprint, the tables the patrons use to consume the alcohol are included in this space category. Therefore, the establishment would be classified as a 722410: Drinking Places - Alcoholic Beverages.

2. *A firm that designs parts for the automotive industry has a building with 75% of the space as office for engineers and designers and 25% of the space is a shop to construct and test prototypes.* Based on the square footage the site would be classified as a 541420: Industrial Design Services.

3. *A firm that designs parts for the automotive industry has a building with 25% of the space as office for engineers and designers and 75% of the space is a shop to construct and test prototypes.* Based on the square footage the site would be classified as industrial and would be dropped from the CEUS sample.

4. *A snow ski lift operation has a facility that 50% is for lift ticket sales, instruction signups, waiting area, and snack bar, while the other 50% is rental of ski equipment.* One option would be to consider that the classification would be for the rental side of the business, but without the ski-lifts there would be no rentals. The classification would fall into the recreation category of 713990: All Other Amusement and Recreation Industries.

5. *A dinner theater business has a full kitchen a, serves full dinners, and has a stage with performing artists.* Is it a restaurant or an arts venue? Luckily there is a category that combines the two and is: 711110: Theater Companies and Dinner Theaters.

6. *A culinary school has more cooking appliances than a restaurant.* It would be classified under educational services as 611519: Other Technical and Trade Schools. However, if the facility was a restaurant where a limited number of chefs were being trained in a working environment at any one time then it could be a 722511: Full-Service Restaurant.

For some businesses to be properly classified the surveyor needs to select the correct Level 1 description. The following table gives some examples of common business types that may be questionable regarding what the starting level 1 category should be and provides the starting point. These are in no particular order.

Business Type - Examples	**NAICS Code Description – Level 1**
Farm Management Services	11 Agriculture, Forestry, Fishing and Hunting
Gasoline Station with convenience store	44 Retail Trade
Costco	45 Retail Trade
Tire Store	44 Retail Trade
Refrigerated Warehouse	49 Warehousing
Formal Wear and Costume Rental	53 Real Estate and Rental and Leasing
Property Management	53 Real Estate and Rental and Leasing
Motion Picture Theaters	51 Information
Library	51 Information
Recording Studios	51 Information

Business Type - Examples	NAICS Code Description – Level 1
Karate Instruction	61 Educational Services
Automobile Driving Schools	61 Educational Services
Barber Shop	81 Other Services (except Public Administration)
Nail Salon	81 Other Services (except Public Administration)
Automotive Repair Shop	81 Other Services (except Public Administration)
Church	81 Other Services (except Public Administration)
Car Washes	81 Other Services (except Public Administration)
Dry cleaning and Laundry Services	81 Other Services (except Public Administration)
Parking Lots and Garages*	81 Other Services (except Public Administration)
Professional Organizations	81 Other Services (except Public Administration)
Tax Preparation Services	54 Professional, Scientific, and Technical Services
Advertising Agencies	54 Professional, Scientific, and Technical Services
Veterinary Services	54 Professional, Scientific, and Technical Services
Employment Placement Agencies	56 Administrative, Support, Waste Management, & Remediation Services
Travel Agencies	56 Administrative, Support, Waste Management, & Remediation Services
Security Guards and Patrol Services	56 Administrative, Support, Waste Management, & Remediation Services
Janitorial or Landscaping Services	56 Administrative, Support, Waste Management, & Remediation Services
Child Day Care Services	62 Health Care and Social Assistance
Assisted Living Facilities for the Elderly	62 Health Care and Social Assistance
Bed-and-Breakfast Inns	72 Accommodation and Food Services
Fire Protection (fire stations)	92 Public Administration
Correctional Institutions	92 Public Administration
Legislative Bodies	92 Public Administration

*Parking lots and garages do not qualify for this CEUS study. A parking garage can only be included with a survey-site if it is an accessory structure to the main building for the survey-site. So, the NAICS code 812930 (Other Personal Services – Parking Lots and Garages) is not valid for CEUS.

Note that the NAICS category 531110 (Lessors of Residential Buildings and Dwellings) and 531311 (Residential Property Managers) are considered commercial and therefore qualify to be included in CEUS, if the multi-family building is a high-rise of at least four stories.[7] For those buildings three or fewer stories, only the common area is considered viable for surveying in the CEUS study.

NAICS code 531120 (Lessors of Nonresidential Buildings (except Miniwarehouses)) is a common code assigned by the Utilities where the property manager pays the utility bill. Going forward, the CEUS project will subdivide this code into two codes that are not official NAICS codes. The main distinction between the two new codes is to classify whether the property management is in the building or not and defined as:

New NAICS Code 531121 – Property management is in the building, there are fewer than four tenants and the dominant tenant is the property management.

[7] Per Title-24, any multi-family residential housing with three floors or less is considered "Residential".

New NAICS Code 531122 – Property management is not in the building and only pays for utility services in the common areas.

A summary of handing NAICS codes for **property management survey-sites** is provided here:

- If the property management is in the building, and
    - there are fewer than four tenants, or when there is obviously one dominant tenant (over 50% of space).
        1. If there's a dominant tenant, then assign the NAICS code based on the dominant tenant's activity;
            - If the dominant tenant is the property management then assign NAICS code 531121;
        2. No dominant tenant: Assign NAICS code 531120 **and** enter a NAICS code for the most dominant tenant activity into the Customer Supplied NAICS Code field. See section 5.1.3.4 for more directions.
    - there are more than four tenants – the building is most probably either an office or a retail
        1. If there's a dominant tenant, then assign the NAICS code based on the dominant tenant's activity;
        2. No dominant tenant: obtain a list of the tenants with associated square footage. Assign NAICS code 531120 **and** enter a NAICS code for the most dominant tenant activity into the Customer Supplied NAICS Code field. See section 5.1.3.4 for more directions.
- Property management is not in the building, and
    - tenants do not have any utility accounts, and all utilities are paid as part of the rent: See multi-tenant cases above;
    - only takes care of the common areas, then assign NAICS code 531122.

5.1.3.2 Is this a Unique Business? (Table 4)

Tab: Interview	Data Type: String	Pre-Populated: No	Can Edit: Yes

Provide a brief description about the business activity or energy use **uniqueness** of the business. What makes this survey-site unique from other businesses of this type? For example, a take-and-bake pizza shop does not have ovens to cook the pizzas. Also consider the type of work and/or primary product/service. This is the opportunity to provide information that could help substantiate the NAICS code for the business. Enter some key words that help describe the business.

5.1.3.3 Select Best 2017 NAICS from Provided Options? [Conditional] (Table 5)

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

This question is only displayed if more than one NAICS codes were assigned to the survey-site by either the utility, the call scheduler, or the surveyor. Select the code that describes the primary business activity-type the best.

This question does not display if all NAICS codes are the same. Otherwise, a dropdown list of the four sources of 2017 NAICS codes associated with this survey-site will be provided and the surveyor must choose the one that best describes the business activity for the survey-site. The last option is the selection the surveyor made in section 5.1.3.1. This gives the surveyor a chance to rethink his/her

selection. Following is an example of what the dropdown list might look like. This list cannot be edited, only a selection made.

Source	NAICS Code /Description
Utility Database	448140 – "Family Clothing Stores"
ADM Database	448140 – "Family Clothing Stores"
ADM Pre-On-Site Interview	448120 – "Women's Clothing Stores"
CEUS Surveyor	448150 – "Clothing Accessories Stores"

5.1.3.4 Customer Supplied NAICS Code (Optional)

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

This is an optional entry if the customer has the NAICS code they use. The NAICS code provided by the survey-site contact may not necessarily be correct. Once entered, the corresponding 2017 NAICS code description will be displayed by the CEUS Tool™. Note that NAICS codes are self-assigned by businesses, so just because a customer provides an NAICS code does not mean that is the code we should use. If entering a customer supplied NAICS code, a 2017 NAICS code description will display. If this NAICS code is appropriate to use for CEUS, the surveyor then enters it in question 5.1.3.1. If the customer supplies a NAICS code from a version prior to 2017, the description may not display.

For property management survey-sites (NAICS = 531120) the tenants will not be supplying NAICS codes so this field will be used to identify the predominant business activity at the survey-site. In general, the surveyors should provide sufficient description in the Notes section based on the interview and/or observations. Therefore, if the NAICS determination cannot be done at the time of survey, the notes can be used later on in the office to assign the appropriate NAICS code. If there is not one predominant NAICS code applicable to enough tenants to account for 50% or more of the space then a partially defined NAICS code will be entered. A partially defined NAICS code may only have two or four digits followed by zeros to bring the total number of digits to six. For example, consider a strip mall that the property management pays all the utility bills and 75% of the space is occupied by a combination of Grocery Store, Meat Market, Liquor Store, and Baked Goods Store. The NAICS code for all these starts with 445, so the entry should be 445000. A second example has over 50% of the survey-site space of the predominant activity as Auto Parts Store, Furniture Store, and Paint Store, then the entry should be 440000. The partially defined NAICS code entries are expected to generally represent retail or office building types.

Building-Type & Operational Characteristics

5.1.3.5 Building Type #1 (Table 6)

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

This is an entry the surveyor makes to classify the building type. The surveyor's assessment of building type should be independent of the CEC building type for the previously identified NAICS code. If there is more than one building type classification for this survey-site, then this first entry should be for the largest area. Select from the dropdown list.

Building Types	College Food Stores Health Care Lodging Miscellaneous Office, Large Office, Small Restaurant Retail School Warehouse Refrigerated Warehouse

Most of the building types are self-explanatory. There are two sets that have distinctions to classify the different types. They are Offices and Warehouses. Following are definitions used to classify each.

Large offices are defined as having more than 30,000 square feet. Likewise, small offices have 30,000 square feet or less. In this CEUS study we use an energy-based threshold of 600,000 kWh per year to delineate between small and large offices for the sampling process but will post assign based on measured square footage, once the area is known.

Refrigerated warehouses will be defined as follows:

1. If originally built as a refrigerated warehouse and currently used as a refrigerated warehouse then it is a refrigerated warehouse.
2. If not built as a refrigerated warehouse, is there more than 3,000 square feet of refrigeration space?[8] If yes, then it is a refrigerated warehouse. If less than 3,000 square feet but more than 25% of the survey-site then it is a refrigerated warehouse. If not, then it is just a warehouse.
3. If the surveyor can't determine how it was originally built, is the refrigeration/freezer section built-in? If yes, then it is a refrigerated warehouse; if not, then it is just a warehouse.

5.1.3.6 Percent of Site Area (for Building Type)

Tab: Interview	Data Type: %	Pre-Populated: No	Can Edit: Yes

Approximate the percent of the survey-site associated with the first Building Type entered. If there is only one building type, then enter 100 for 100 percent. If there is more than one building type for the survey-site, **the entry here must be the largest percent Building Type**. Estimate the percent of the floor area to within 5%.

5.1.3.7 Building Type #2 or #3

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

These are entries the surveyor makes to classify the additional building types associated with the survey-site. There are three main reasons for identifying more than one building type. First, if a survey-site has an unusual mix of activities, up to three building type activities can be classified. For example, a gas station minimart also houses a fast food restaurant. However, it is not to be used to identify normal

[8] REFRIGERATED WAREHOUSE is a building or a space greater than or equal to 3,000 square feet constructed for storage or handling of products, where mechanical refrigeration is used to maintain the space temperature at 55° F or less. (2019 Building Energy Efficiency Standards, Section 100.1, Definitions and Rules of Construction, page 81)

combinations that exist such as a retail store with 20% area in the back to warehouse merchandise. Second, in multi-tenant buildings, it provides an opportunity to identify the three largest building type activities for the businesses that lease space at the survey-site. Third, if less than 50% of the survey-site is non-commercial, this provides a place to make this categorization. Note that two more building types (highlighted in the table below) are available in these dropdown lists to account for any non-commercial area of the survey-site.

Building Types	College Food Stores Health Care Lodging Miscellaneous Office, Large Office, Small Restaurant Retail School Warehouse Refrigerated Warehouse **Manufacturing** **Non-Commercial**

5.1.3.8 Percent of Site Area (for Building Type) #2 or #3

Tab: Interview	Data Type: %	Pre-Populated: No	Can Edit: Yes

Approximate the percent of the survey-site associated with the other Building Types entered. If there are more than one building type, then the sum of the percent of site floor areas must equal to 100. Do not separate out areas that account for less than 10% of the total floor area. Enter as values from 10 to 100.

5.1.3.9 Survey-Site Physical Type

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Select from the dropdown list. This is to provide a short description about the type or portion of building(s) that make up the survey-site. See definition of survey-site in section 4.4. Selection options include:

- 1. 1 building, single footprint, single-story (Stand-alone building);
- 2. 1 building, single footprint with multiple floors (Stand-alone building);
- 3. Part of a single-story building (Tenant in a space or suite);
- 4. Part of a multi-story building (Tenant in a space or suite);
- 5. 1 building w/multiple footprints (multiple floors, high rise, large base or small top);
- 6. Small multi-building cluster (all buildings surveyed);
- 7. Campus (multi-building, subsampled buildings); and
- Other _____

The description for Other may be something such as “unmanned gasoline station”.

Leased Tenants, Number of Employees & Operational Characteristics

5.1.3.10 Are there any other tenants with a leased business at this survey-site? (Table 7)[9]

Tab: Interview	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

This question is basically asking if there are any more businesses in this survey-site. If no, then the questions for number of number of employees will be asked in the following questions. If there are multiple businesses in the survey-site, then the number of employees will be asked in the "Tenant" section tab which will allow entry of employee counts in up to ten tenant entries (see section **Error! Reference source not found.**). For the hard copy of the survey form, line 1 of ***Table 7*** is for the primary business at the site. The name of the business and square footage only needs to be entered if there is more than one business at the survey-site.

5.1.3.11 Tenant Business Name #1 to #10

Tab: Interview	Data Type: String	Pre-Populated: No	Can Edit: Yes

For survey-sites with multiple tenants or businesses we need to collect some basic employment and square footage information about a sample of the tenants. To start this section, a list of tenants and area leased from the property manager would be very useful. Get the business names for the tenants in this survey-site. Enter the business name for each business onto a new "Add" Tenant entry. See "Case 3A – Single Building, Multiple Tenants" (page 34) for number of tenants to sample. Enter it as a numeric value.

5.1.3.12 Leased Square Footage #1 to #10

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Obtain the leased square footage either from the property manager or the business contact. Collect the square footage information for each tenant sampled. If the utility customer for the survey-site is a property manager and the tenants don't have their own utility meter, then enter the combined common areas, facilities areas, and property management office areas together to enter for the "leased square footage" in row 1 of ***Table 7*** followed by information on a sample of tenants in subsequent rows.

5.1.3.13 During the past year, what have been the typical number of Full-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the typical number of **full-time** employees during the last 12 months. The value needs to represent the number of full-time employees typically working at this survey-site. It may not be the same as average but generally close. Do not include employment from other locations. If the survey-site contact does not have the answer, ask who can provide the information and speak with that person.

[9] For the tablet version of the survey form: If there is only one business at the survey-site, the CEUS Tool would proceed directly to the "number of employees" questions (skips to section 5.1.3.13). If there is more than one business or tenant at the survey-site, then the CEUS Tool would proceed to the "Tenants" tab where questions in sections 5.1.3.11 to 5.1.3.18 are repeated for each of the sampled tenants.

5.1.3.14 During the past year, what have been the typical number of Half-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the typical number of **half-time** employees during the last 12 months. The value needs to represent the number of half-time employees typically working at this survey-site. It may not be the same as average but generally close. Do not include employment from other locations.

5.1.3.15 During the past year, what have been the typical number of Quarter-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the typical number of **quarter-time** employees during the last 12 months. The value needs to represent the number of quarter-time employees typically working at this survey-site. It may not be the same as average but generally close. Do not include employment from other locations.

5.1.3.16 During the past year, what was the peak number of Full-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the maximum number of **full-time** employees during the last 12 months. The value needs to represent the number of full-time employees working at this survey-site and not include employment from other locations. For seasonal businesses the peak employment should be for the highest work load period. For non-seasonal businesses the peak could have occurred at any time during the last 12 months. If the survey-site contact does not have the answer, ask who can provide the information and speak with that person.

5.1.3.17 During the past year, what was the peak number of Half-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the maximum number of **half-time** employees during the last 12 months. The value needs to represent the number of half-time employees working at this survey-site and not include employment from other locations. For seasonal businesses the peak employment should be for the highest work load period. For non-seasonal businesses the peak could have occurred at any time during the last 12 months.

5.1.3.18 During the past year, what was the peak number of Quarter-Time employees [Conditional]

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the maximum number of **quarter-time** employees during the last 12 months. The value needs to represent the number of quarter-time employees working at this survey-site and not include employment from other locations. For seasonal businesses the peak employment should be for the highest work load period. For non-seasonal businesses the peak could have occurred at any time during the last 12 months.

5.1.3.19 What Percent (%) of Usable Floor Space is Currently Vacant, Empty or Not Used?

Tab: Interview	Data Type: %	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what percent of the survey-site's usable floor area is currently vacant, empty or not used, available for lease, etc. Vacant can be defined as unoccupied or unused floor space which has the lights at least mostly turned off because the space is not in use. The term vacancy generally is

only associated with certain business types, such as office space leased or rented in buildings. Hotel and motel vacancy are addressed in 5.1.3.22, a lodging occupancy rate question.

5.1.3.20 What % of Employees Use Electronic Office Equipment on a Regular Basis?

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what percent of employees use electronic office equipment on a regular basis. Office equipment can include computers, printers, copiers, cash registers, etc. Enter the percent as a number from 0 to 100.

5.1.3.21 Lodging – Total Number of Usable Rooms/Residence Units [Conditional]

Tab: Interview	Data Type: Numeric or ".."	Pre-Populated: No	Can Edit: Yes

For hotels, motels, or other lodging facilities, ask the survey-site contact how many rooms or residence units they have on the survey-site that are rentable. The survey-site contact should know the number of rooms they have (not available, but maximum number of rooms for rent). If they do not provide this information, then it generally can be found on their website. If the survey-site contact declines to answer, then enter "..".

5.1.3.22 Lodging – Average % of Rooms Occupied [Conditional]

Tab: Interview	Data Type: % or ".."	Pre-Populated: No	Can Edit: Yes

For hotels, motels, or other lodging facilities, ask the survey-site contact what is their average annual occupancy rate during the last 12 months. This is the most common occupancy rate. If the survey-site contact indicates that the typical weekday occupancy rate is 80% and the typical weekend occupancy rate is 50%, the surveyor needs to know how to determine the overall typical occupancy rate: ((80%x5) + (50%x2))/7 = 71%. The survey-site contact may be reluctant to provide this information. Advise them that the information is strictly confidential, but they are not obligated to provide an answer. Or tell the customer that this information is used to verify the energy use levels reported by the utility. If the survey-site contact declines to answer, then enter "..".

5.1.3.23 Restaurants – Average Number of Meals Served Per Day [Conditional]

Tab: Interview	Data Type: Numeric or ".."	Pre-Populated: No	Can Edit: Yes

For Restaurants, ask the survey-site contact the average number of meals they served per day during the last year. They may say it depends on the day of the week. Figure on determining an average if they give values based on day of the week. If they are not sure, ask how many orders there were per day and what the average number of people were served per order. Multiply these two together to get the number of meals per day. If the establishment does not serve meals but other food items to consume (like donuts, frozen yogurt, coffee, etc.), then ask how many customers, transactions, donuts, or etc. per day they have or sell. If the survey-site contact is reluctant to provide this information, then advise them that the information is strictly confidential, but they are not obligated to provide an answer. Or tell the customer that this information is used to verify the energy use levels reported by the utility. Enter the number of meals as a whole number. If the survey-site is not a restaurant or they decline to answer, then enter "..".

5.1.3.24 Restaurants – Units [Conditional]

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For Restaurants, enter the units for the answer provided to the previous question. From the dropdown list select one of the following: meals per day, transactions per day, customers per day, donuts, items, gallons, pounds, ounces, or other. If other then enter into the notes.

5.1.3.25 Hospital/Health – Number of Beds in Hospital [Conditional]

Tab: Interview	Data Type: Numeric or n/a	Pre-Populated: No	Can Edit: Yes

For hospitals, ask the survey-site contact how many patient beds they have. If the number has recently changed, then enter the current number of beds. If they provide the number of emergency room beds, the number of intensive care beds, the number of maternity beds, the number of recovery room beds, etc., then add them together and provide the total. Enter the number of beds as a whole number. For other health practitioners, such as dentists or chiropractors, enter number of chairs or number of patient rooms. If the survey-site is a health facility but not a hospital, and there is no quantifiable patient metric then enter "..".

5.1.3.26 Hospital/Health – Average % of Beds Occupied [Conditional]

Tab: Interview	Data Type: % or ".."	Pre-Populated: No	Can Edit: Yes

For hospitals, ask the survey-site contact what is the typical annual occupancy rate (as a percent). This should be a percent of the beds occupied. This is across all types of hospital beds. If they don't know that, but they have the total number of patients who had overnight stays and the average length of stay, then calculate the average occupancy rate. Enter the occupancy rate as a percent. If the survey-site is a health facility but not a hospital, then enter "..".

5.1.3.27 Education – Average Daily Attendance [Conditional]

Tab: Interview	Data Type: Numeric or ".."	Pre-Populated: No	Can Edit: Yes

For schools, colleges, universities, and learning centers, ask the survey-site contact for the average daily attendance. **The attendance should only be for the survey-site being surveyed.** If school is not in session, ask for the attendance during the most recent typical instruction period. If the college or university does not have average daily attendance, then ask for the number of enrolled students. If they have off-site extension learning centers, then those should not be included. Enter the average daily attendance as a whole number. If the survey-site declines to answer, then enter "..".

Survey-Site Vintage & Number of Buildings

5.1.3.28 How many Buildings Are Part of This Survey-Site? (Table 8)

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact how many buildings are part of the survey-site. The survey-site is a contiguous location with a set of buildings owned or operated by a single entity on the same or adjacent sets of properties. Do not include small unconditioned sheds, pump houses, or such unless they are the major structure on the survey-site.

5.1.3.29 What Year was the Majority of the Survey-Site Built?

Tab: Interview	Data Type: Numeric or DK	Pre-Populated: if available	Can Edit: Yes

Ask the survey-site contact what year the majority of construction for the survey-site occurred. If the building has floor plans the plans will provide a date when the drawings were completed. That is a good year to use since that establishes which year's energy code was followed. If the survey-site contact doesn't know and they lease or rent the space, then ask for a survey-site contact at the property management company. Put the survey-site contact and number in the comments/notes section of the CEUS Tool™ survey until the year of construction can be collected. Hospitals and universities will be the worst-case scenarios because they generally have been built in stages over many decades. The key is to

ask the facility staff when was the largest portion of the facility built? If no one knows the answer, then check the "Can't determine year" box.

5.1.3.30 Year the Majority of the Survey-Site Built: Estimated.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If the customer only has an estimate of the year the building(s) was built then after the surveyor types in that estimated year (question above), then check the box marked "Estimated".

5.1.3.31 Year the Majority of the Survey-Site Built: Can't determine year.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If no one knows the year built, then check the "Can't determine year" box.

5.1.3.32 What Year Was the Primary Business Established on This Survey-Site?

Tab: Interview	Data Type: Numeric	Pre-Populated: if available	Can Edit: Yes

Ask the survey-site contact what year the business was established at this survey-site. This might be a field the utility has available to pre-populate the database. If there is a year already entered confirm it with the survey-site contact. If the survey-site contact does not know, ask who at the survey-site knows the answer. Another way is to look to see if there are any business licenses or plaques that might provide some information on when the business was established. Enter the year as a four-digit year number.

5.1.3.33 What Year Was the Primary Business Established on This Survey-Site: Estimated.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If the survey-site contact only has an estimate of the year the business was established at this location, then after the surveyor types in that estimated year (question above), then check the box marked "Estimated".

5.1.3.34 What Year Was the Primary Business Established on This Survey-Site: Can't determine year.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If no one knows the year the business was established at this location, then check the "Can't determine year" box.

LED Lighting

5.1.3.35 What known or estimated percent of the Interior lighting is LED? (Table 9)

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask if the survey-site contact knows what percent of the permanent interior building lighting is LED technology. Do not include desk-top lamps or wall plug-in fixtures. If the survey-site contact does not have an estimate but the surveyor can observe some of the fixtures, then please make your own estimate.

5.1.3.36 What known or estimated percent of the Interior lighting is LED: Can't determine.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If no one knows nor has an estimate of the percent of interior lighting that are LEDs, then check the "Can't determine" box.

5.1.3.37 What known or estimated percent of the Exterior lighting is LED?

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask if the survey-site contact what percent of the permanent exterior building lighting is LED technology. Only include exterior lighting that is on the same meter as the survey-site. If the survey-site contact does not have an estimate but the surveyor can observe some of the fixtures, then please make your own estimate.

5.1.3.38 What known or estimated percent of the Exterior lighting is LED: Can't determine.

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

If no one knows nor has an estimate of the percent of exterior lighting that are LEDs, then check the "Can't determine" box.

Electric Vehicle Charging

*5.1.3.39 **Are** there Electric Vehicle (EV) Chargers powered by a survey-site electric meter? (Table 10)*

Tab: Interview	Data Type: Check Box	Pre-Populated: No	Can Edit: Yes

Don't count forklift or golf cart charging. Ask if the survey-site has electric vehicle charging stations. If yes, are they powered by the electric meter(s) that are part of the survey-site? If yes, then check the box and continue to the additional EV charger questions that follow.

5.1.3.40 How Many Electric Vehicles can be charged from the Electric Meter serving this survey-site at the same time for the charger types listed?

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

This question shows conditionally if there are EV chargers at the survey-site. Enter the number of electric vehicles that can be charged at the stations at the same time for each charger type listed. Only count vehicles used for public roadways. **Don't count forklifts or golf carts.** The charging stations may be a new addition, if so make sure any new survey-site utility electric meter's number is added to the database. Report the type of chargers:

- Level 1 is a 120 Volt charger. It is a slow charger intended for overnight charging.
- Level 2 is a 240 Volt charger and provides a moderate rate of charge.
- Level 3 chargers are fast chargers and generally have a DC Voltage output.

Tesla has two different types of chargers: Level 2 **Tesla Destination Charger** and a Level 3 **Tesla Supercharger**. A Level 3 charger can also be referred as **CHAdeMO** ("CHArge de MOve", also used as a trade name). If you know the count but not the level type of chargers, then enter the count in the "Can't determine Type" row of the table.

For the Access Type data field, select from the dropdown menu. Select "Fleet Vehicles Only" if the chargers are reserved only for company vehicles. Select "Employees Only" if the chargers are available only to company employees. Select "Public Only" if the chargers are only available for public use. Select one of the other options if it is used by other combinations of vehicle ownership. The dropdown list for Access Types are: (On the paper survey form just check the applicable boxes.)

Public Only	Public & Employee	All 3 Types
Employee Only	Public & Fleet	Can't determine
Fleet Only	Employee & Fleet	Not Used

Enter the electric meter number for the meter serving the chargers.

Then note if the meter is dedicated to the EV chargers or not.

Charger Type	Quantity	Access Type	Electric Meter #	Dedicated Meter (Y/N)
Level 1 (120 volt)				
Level 2 (240 volt)				
Level 3 (DC fast)				
Can't determine				

5.1.4 Interview / Major Renovations

5.1.4.1 Have there been any Major Renovations at this Survey-Site? (Table 11)

Tab: Interview	Data Type: Yes / No	Pre-Populated: If available	Can Edit: Yes

Ask the survey-site contact if there have been any major renovations since the building was built. Do not count any renovations prior to 1978. Renovation could be changes that involve more than 50% of the interior lighting, exterior lighting, HVAC, high efficiency equipment, or envelope. If solar photovoltaic (PV) has been installed at the site include this as a major renovation. If there have been no major renovations, then uncheck the box.

5.1.4.2 If Yes, ask what Year and what Equipment or Components were Renovated? #1 to #5

Tab: Interview	Data Type: Table	Pre-Populated: No	Can Edit: Yes

Enter up to five significant renovations. Based on the conversation with the survey-site contact for the previous question, ask what year the most significant major renovations occurred. Renovations that require a building permit trigger the building to be in compliance with the latest energy and building codes. Use the year the renovation was permitted or started. If they do not remember the year, have them look it up in their records or look at the plans used for the renovation. Enter the year as a four-digit year number. If there is still no information about the year, then check the Can't determine box. For each year there was a renovation ask what type of equipment or building shell was renovated and what percent of it was renovated. Enter the percentages of floor area in the following table as numbers from 0 to 100. If the major renovation type is Solar PV, then enter the percent of floor area as 100% even though the equipment is outside. Also enter a short text description of the renovation.

Type	Year	Percent of Floor Area (%)	Description
1.			
2.			
3.			
4.			
5.			

Type Options: Lighting Interior, Lighting Exterior, HVAC, Equipment, Building Envelope, Water Heater, or Solar PV

Several examples are given here.

1. *A company retrofitted from T-12 to T-8 fluorescent lights 10 years ago and retrofitted from T-8 to LEDs two years ago.* Only include the latest retrofit for the same type of equipment. *This year the company added interior lighting controls with occupancy sensors.* In this case list both the retrofit to LED lighting two years ago and the lighting controls this year since they impact the lighting load in two different ways.

2. *A school replaced 60% of the rooftop HVAC units in 2012 and the other 40% in 2016.* List both retrofits separately as renovations of the HVAC.

3. *A retail store added a cool roof to the building in 2008*. List this renovation type as envelope.

4. *A 1925 office building replaced the chiller in 1968.* Don't list it since this was before there were energy efficiency standards (1978).

5.1.5 Interview / Major Additions

5.1.5.1 Have there been any Major Additions at the Survey-Site? (Table 12)

Tab: Interview	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there have been any major additions to the survey-site since the building was originally built or 1978 (whichever is later) or if any buildings have been added in the contiguous property since 1978. Additions of more than 10% to the original building or more buildings built on the survey-site qualify as a yes answer by "Adding" an entry. If there have been no major additions, then uncheck the box. Compile the major additions for each year square footage was added to the survey-site. These answers are provided by asking a knowledgeable person at the survey-site and not by inspection or measurement.

Several examples are given here.

1. *A specialty retailer built an addition to the building that provided 40% more space to display products for sale.* Yes, this is a major addition.

2. *A restaurant leased a suite in a strip mall, two years later, in 2014, they expand and take over an adjoining suite that was available, doubling their seating capacity.* Although the building did not "change", the business had an addition and now has two utility meters on their account. Yes, this is a major addition.

3. *An office building created a weather protected area for employees to have lunch outside by adding an overhang patio that was 25% of the building space*. This is not a major addition. Not because of the percentage of space, but because it is not an enclosed part of the building.

4. *A hospital originally built in 1940 doubled its size in 1960; in 1985 added a north wing that amounted to 30% more space; in 1998 added a south wing that amounted to a 20% more space; in 2006 they added an east wing that was 5% of the total building area.* What counts as major additions? The first addition in 1960 does not count because it happened before the energy code standards started in 1978. The last addition was only 5% (which is less than the 10% guideline). The additions in 1985 and 1998 both count as major additions.

This table represents the following three questions (5.1.5.2 to 5.1.5.4).

Year	Square Footage	Description
1.		
2.		
3.		

5.1.5.2 If Addition, in what year did it occur? #1 to #3

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Based on the conversation with the survey-site contact for the previous question, ask what year(s) building area addition(s) occurred. Enter the year as a four-digit year number. All building area additions prior to 1978 can be ignored. All additions in one year can be aggregated. If they do not remember the year, have them look it up in their records or pull out and look at the plans used for the addition. If there is still no information about the year, then check the Can't determine box.

5.1.5.3 If Addition, what was the Square Footage of the Addition? #1 to #3

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ignore the square footage of all building area additions prior to 1978. Based on the conversation with the survey-site contact for the previous question, ask what square footage was added during that year and enter it.

5.1.5.4 If Addition, provide description #1 to #3

Tab: Interview	Data Type: String	Pre-Populated: no	Can Edit: Yes

Enter a description of the building area addition. Such as "New North Wing", "warehouse expansion", "Building #2", or whatever is appropriate for the situation.

5.1.6 Interview / Schedule (Primary and Seasonal Operating Schedules)

5.1.6.1 How many Holidays or Shutdown days does the Survey-Site have in a typical year? (Table 13)

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the customer how many holidays the company observes each year and if there are additional days during the year that they shut down. Observing a holiday means they shut down or only operate at a minimum level. Shut downs could happen for maintenance or seasonality and could refer to a period of minimum level of operation. Enter the typical total number of days per year closed or at minimum level of operation.

5.1.6.2 Does this Survey-Site's occupancy vary seasonally?

Tab: Interview	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if the occupancy of the business at the survey-site significantly varies seasonally throughout the year or if it is relatively constant on an annual basis. Significant means a change (Higher or Lower) of at least 25%. Occupancy could mean a change in the number of employees at the survey-site or it could mean a change in the operating hours, such as extending the work hours to add a second shift during a particular season. The season could be from at least two weeks to a few months. For example, if a tax accounting firm doubles the number of employees during March and April

to help with tax preparation then they have a seasonally varying occupancy and the answer is "Yes." In another example, if a delivery service adds 50% more employees during the holiday season, but they are all out delivering packages then there is not a change in occupancy at the survey-site and it would be entered as "No." **Check the box for "Yes" or uncheck the box for "No."** If the question is checked (yes), then the next six questions will appear on the CEUS Tool™.

5.1.6.3 Seasonal schedule description or Name #1 to #3 [Conditional]

Tab: Interview	Data Type: String	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what causes the seasonality to their business occupancy and name the season as described by survey-site contact. The season represents a non-typical period of operation compared to the majority of the year. Enter the name for the primary non-typical season. For example, the season could be "Summer" for an amusement park that increases the number of employees by 30% and has extended hours from June 1 to September 30. In another example, the season can be a slow period, such as January and February for pool sales. As a different example, a bakery has a slow period in January and August. They lay off 30% of the bakers during each of these two months. The seasons may be listed as "Slow January" and "Slow August." For the majority of the year the name of the season should be called **"Normal."** Normal can be the busy, slow, or average season depending on the business, but **represents the largest block of time on the calendar.**

5.1.6.4 Seasons – Percent of typical full capacity #1 to #3

Tab: Interview	Data Type: %	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what percent of typical full capacity the survey-site operates at during this named season. For this purpose, full capacity is the season with the highest typical capacity. **At least one of the seasons should be marked as 100%.** Enter a value from 0 to 100. If there is only one season listed, the default is 100%.

Several examples are given here.

1. *A school operates 10 months per year at normal operation.* It is classified as 100% capacity for the 10 months of school. Based on feedback from the survey-site contact, one summer month they have summer classes and that is classified as 15% of capacity. The other summer month they are effectively shut down; this is classified as 0%. Action: list three season with 100%, 15% and 0% capacity levels.

2. *A ski resort that has ski lifts operating from Thanksgiving to May 1*. This period would be classified as 100% of capacity, even though the actual activity may vary by weekend and the weather. Let's say this resort also operates the ski lifts from June to August for summer sight seers. This period may have a capacity of 10% and the other spring and fall periods may be shut down completely and be at 0%. Action: list three season with 100%, 10% and 0% capacity levels.

3. *A banquet room at a restaurant that is typically used once every week or two.* This is normal capacity: the restaurant would be classified as 100% capacity all year. Now, if the banquet room is used only during a reoccurring period every year (for example, Thanksgiving through New Year's), then this time of year would be 100% capacity and the remainder of the year would be at a lesser percent capacity. Action: list one season with 100% capacity level.

5.1.6.5 Seasons – Start Month #1 to #3

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact the start date of the first season. Use the dropdown list of months to select the month that is the typical start of this named season. For example, June for the start of the summer season. If there is no seasonality to the business the default operating schedule is from January 1 to December 31.

5.1.6.6 Seasons – Start Day #1 to #3

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact the start date of the first season. Enter the day of month that is the typical start of this named season. For example, 1 for the June 1 start of the summer season.

5.1.6.7 Seasons – End Month #1 to #3

Tab: Interview	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact the end date of the first season. Use the dropdown list of months to select the month that is the typical end of this named season. For example, September for the end of the summer season.

5.1.6.8 Seasons – End Day #1 to #3

Tab: Interview	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact the end date of the first season. Enter the day of month that is the typical end of this named season. For example, 30 for the September 30 end of the summer season.

5.1.6.9 Seasons – Primary business hours by day Type and Season #1 to #3 (Table 14)

Tab: Interview	Data Type: Box & Dropdowns	Pre-Populated: No	Can Edit: Yes

Start by looking at the business hours posted on the front door or window of the business. Enter that schedule into Table 7 shown below. Ask the customer what the business hours are for the other seasons. Enter the time by day for each season. Enter the times to the nearest half hour. If the opening time is on a quarter-hour then use the earlier half-hour (example: opens at 11:15 am then enter 11:00 am). If the closing time is on a quarter-hour then use the following half-hour (example: closes at 5:45 pm then enter 6 pm). Every day of the week must be checked in one and only one column. Either enter the opening and closing hours for a day type, check if the day type is open 24 hours, or closed all day, but enter one and only one of these options. Only enter in as many columns as appropriate for the business. For example, if the business is open 24/7 then check the box for open 24 hours, and check each of the days of the week in just the first column. If a business says they have more than three schedules a week then combine the days that are the least different and enter them in the same column. If a business is open at two different times in a day, then enter the first time they open and the last time they close. For example, a restaurant is open for lunch from 11:30 am to 2:00 pm and open for dinner from 4:30 pm to 10:00 pm, then enter the opening time as 11:30 am and the closing time as 10:00 pm. The time entries will be in the form of a dropdown list.

For businesses not open to the public, the weekly business operating schedule should be based on the time when at least 25% of the daily peak staff are on the survey-site. An example of the table being filled out for a typical office business is shown in Table 8.

Table 7. Primary Business Hour by Day Type

	Standard Day	Non-Standard Day 1	Non-Standard Day 2
	☐ Monday	☐ Monday	☐ Monday
	☐ Tuesday	☐ Tuesday	☐ Tuesday
	☐ Wednesday	☐ Wednesday	☐ Wednesday
	☐ Thursday	☐ Thursday	☐ Thursday
	☐ Friday	☐ Friday	☐ Friday
	☐ Saturday	☐ Saturday	☐ Saturday
	☐ Sunday	☐ Sunday	☐ Sunday
Opening Time	____	____	____
Closing Time	____	____	____
Open 24 hours	☐	☐	☐
Closed all day	☐	☐	☐

Table 8. Example of an Office, Primary Business Hour by Day Type

	Standard Day	Non-Standard Day 1	Non-Standard Day 2
	✓ Monday	☐ Monday	☐ Monday
	✓ Tuesday	☐ Tuesday	☐ Tuesday
	✓ Wednesday	☐ Wednesday	☐ Wednesday
	✓ Thursday	☐ Thursday	☐ Thursday
	✓ Friday	☐ Friday	☐ Friday
	☐ Saturday	✓ Saturday	☐ Saturday
	☐ Sunday	✓ Sunday	☐ Sunday
Opening Time	7:30 am	____	____
Closing Time	5:00 pm	____	____
Open 24hr	☐	☐	☐
Closed all day	☐	✓	☐

5.1.7 Utilities / Meters

5.1.7.1 Electric Service Provider (Table 15)

Tab: Meters	Data Type: Dropdown list	Pre-Populated: Yes	Can Edit: Yes

The electric service provider will generally be the electric utility company serving the area of the survey-site, and certainly for the small and medium customers. Ask the survey-site contact to confirm the provider. If it is different than the pre-populated data, then change it using the dropdown menu list of utilities. Select the utility from the dropdown menu. If it is different than the pre-populated list and is "other," then type in the name of the utility.

SDG&E	SMUD
PG&E	LADWP
SCE	Other _____

5.1.7.2 Electric Provider Notes

Tab: Meters	Data Type: String	Pre-Populated: No	Can Edit: Yes

Enter any notes related to electric service provider that may be out of the ordinary. Such as: "The property manager pays the utility bills directly.".

5.1.7.3 Gas Service Provider

Tab: Meters	Data Type: Dropdown list	Pre-Populated: Yes	Can Edit: Yes

The natural gas service transmission provider will generally be the gas utility company serving the area of the survey-site, and certainly for the small and medium customers. Ask the survey-site contact to confirm the transmission provider. If it is different than the pre-populated data, then change it using the dropdown menu and the list of utilities. Select the utility from the dropdown menu. If it is different than the pre-populated list and is "other," then type in the name of the utility.

SDG&E	SoCalGas	None
PG&E	SWGas	Other _____

If the customer answered "Other", then ask who is the natural gas energy service provider. Enter the name of the gas service provider.

5.1.7.4 Gas Provider Notes

Tab: Meters	Data Type: String	Pre-Populated: No	Can Edit: Yes

Enter any notes related to gas service provider that may be out of the ordinary. Such as: "the property manager pays the utility bills directly."

5.1.8 Meters

5.1.8.1 Meter Type #1 to #10 (Table 16)

Tab: Meters	Data Type: Dropdown List	Pre-Populated: Yes	Can Edit: Yes

Select from the dropdown list if the following meter information is for an Electric or Natural Gas meter.

5.1.8.2 Electric Meter Number #1 to #10

Tab: Meters	Data Type: String	Pre-Populated: If available	Can Edit: Yes

Collect or verify the electric meter(s) number for this survey-site. There are many numbers on the face of an electric utility meter. The utility meter number is the large number (or alphanumeric) near the utility name or logo. Enter the meter number into the CEUS Tool™ or verify the utility provided meter number is correct. Make sure it is a utility meter and not a sub meter the customer has installed. Also,

take a picture of the meter face showing the meter number. The picture needs to be in focus to see all the numbers on the face of the meter. There may be more than one meter for this survey-site. If there is more than one meter for the survey-site, then collect information about each meter. If there are more utility electric meters on the survey-site than the CEUS Tool™ indicated, then collect meter numbers for all of them. If the survey-site is a tenant in a multi-tenant building, then confirm with the customer which meter serves their space. The annual energy use in kWh from the utility will be shown on the tablet for reference. Figure 25 to Figure 27 show pictures of electric meters for the major utilities.

Figure 25. Electric Meters for SDG&E and SCE.

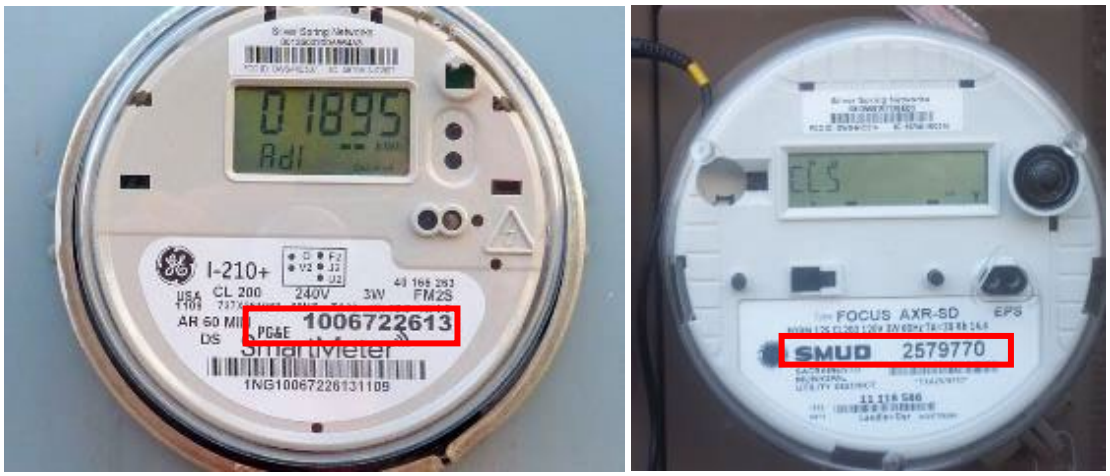


Figure 26. Electric Meters for PG&E and SMUD.

Figure 27. Electric Meter for LADWP.

5.1.8.3 Electric Meter Account Number #1 to #10

Tab: Meters	Data Type: String	Pre-Populated: If available	Can Edit: Yes

Collect or verify the electric utility account number(s) for this survey-site. The surveyor will need to ask the survey-site contact to see a copy of the utility bills to find the account number. Enter the electric meter account number into the CEUS Tool™. There may be more than one electric account for this survey-site. If there is more than one account for the survey-site, then collect information about each one.

5.1.8.4 Electric Meter Status Code #1 to #10

Tab: Meters	Data Type: Dropdown List	Pre-Populated: If available	Can Edit: Yes

Document the meter verification situation for each of the electric utility meters by selecting the dropdown menu selection that applies to this meter order entry. The status codes are the disposition status of collecting the meter numbers. There may be more than one electric meter. Provide a status code for each meter number. Following are the status codes and descriptions.

V	Verified on-site
A	Add this meter
D	Delete this meter - definitely does not exist or serve this survey-site
E	Edit this meter number - the pre-populated number was incorrect
NI	Meter not verified, No Access
ND	Meter not verified, Access denied
NR	Meter not verified, Not readable
OT	Other – Describe observations in the Meter Notes Comments

5.1.8.5 Also serves Non-Surveyed area (Shared Services) #1 to #10

Tab: Meters	Data Type: Yes/No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there are any electric meters that **also serve off-site areas** (non-surveyed)? If the meter in question also provides services (directly or indirectly) to a location off-site, then check the box. The following two conditional questions will appear on the tablet. The questions related to Shared Services refer to energy leaving the survey-site and not cases where the survey-site is getting energy from a neighbor.

Several examples are given here.

1. *An owner of a building occupies 60% and leases 40% of the space to another business.* The entire building (1 meter) should be considered as the survey-site and information about the second business included in the survey. However, if no information can be obtained about the second business, then the energy used by the second business is a shared service.

2. *The property manager of a high-rise office building with a master meter has 20 tenants.* The building is one-survey-site and shared services are not considered for this scenario.

3. *There is an illuminated billboard next to a building that is powered through the meter on the building*. The billboard advertisement is not promoting the business in the building. The electrical energy going to the billboard is a shared service.

4. *A large high-rise building (survey-site) has a chiller in a central plant that produces chilled water for space cooling in the building and a neighboring low-rise office building.* This is a shared service.

5.1.8.6 Electric Meter - Shared Meter - % used by this Survey-Site #1 to #10 [Conditional]

Tab: Meters	Data Type: %	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what percent of the electrical energy is used by this survey-site (used by this customer)? An example could be an illuminated billboard at the side or front of a business that is not part of the businesses advertising but draws electricity from the customer's utility meter. If the customer is not sure, then ask if the customer has a sub meter that measures the amount of energy that leaves the survey-site? If yes, then ask for their records that show how much it measures and take a picture of that documentation. If they still don't know, then just have them estimate to the best of their ability what percent is used by the survey-site versus how much goes to other businesses (off survey-site). If the survey-site contact declines to answer and you have no estimate, then enter "..".

5.1.8.7 Shared Meter - Equipment Serving Non-Surveyed Areas – Shared Equipment Type #1 to #10 [Conditional]

Tab: Meters	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Identify the type of shared equipment by asking the facility maintenance department. Following is a list of shared equipment in the dropdown menu list. Select the one being listed for this entry.

1. Electric Chiller
2. Electricity
3. Electric Vehicles
4. Other

5.1.8.8 Gas Meter Number #1 to #7 (Table 17)

Tab: Meters	Data Type: String	Pre-Populated: If available	Can Edit: Yes

Collect or verify the natural gas meter(s) number for this survey-site. There may be multiple numbers on the utility gas meter. The utility meter number is the large number (or alphanumeric) near the utility name or logo. Enter the meter number into the CEUS Tool™. Make sure it is a utility meter and not a sub meter the customer has installed. Also take a picture of the meter showing the meter number. The picture needs to be in focus to see all the numbers on the meter. There may be more than one meter for this survey-site. If there is more than one meter for the survey-site, then collect information about each meter. The annual energy use in therms from the utility will be shown on the tablet for reference. Figure 28 has an example picture for a gas meter.

Figure 28. Natural Gas Meter (PG&E) with a SmartMeter attachment.

5.1.8.9 Gas Meter Account Number #1 to #7

Tab: Meters	Data Type: String	Pre-Populated: If available	Can Edit: Yes

Collect or verify the natural gas utility account number(s) for this survey-site. The surveyor will need to ask the survey-site contact to see a copy of the utility bills to find the account number. Enter the gas meter account number into the CEUS Tool™. There may be more than one gas account for this survey-site. If there is more than one account for the survey-site, then collect information for each.

5.1.8.10 Gas Meter Status Code #1 to #7

Tab: Meters	Data Type: Dropdown List	Pre-Populated: If available	Can Edit: Yes

Document the meter verification situation for each of the gas utility meters by selecting the dropdown menu selection that applies to this meter order entry. The status codes are the disposition status of collecting the meter numbers. There may be more than one gas meter so provide a status code for each meter number. Ask the survey-site contact if there are any gas meters that also serve off-site areas (non-surveyed)? If shared is selected, then it is assumed that it has been verified. Following are the status codes and descriptions.

V	Verified on-site
A	Add this meter
D	Delete this meter - definitely does not exist or serve this survey-site
E	Edit this meter number - the pre-populated number was incorrect
NI	Meter not verified, No Access
ND	Meter not verified, Access denied
NR	Meter not verified, Not readable
OT	Other = other - Describe observations in the Meter Notes Comments

5.1.8.11 Also serves Non-Surveyed area (Shared Services) #1 to #7

Tab: Meters	Data Type: Yes/No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there are any gas meters that **also serve off-site areas** (non-surveyed)? If the meter in question also provides services (directly or indirectly) to a location off-site then check the box. The following two conditional questions will appear on the tablet.

5.1.8.12 Shared Meter % used by this Survey-Site #1 to #7 [Conditional]

Tab: Meters	Data Type: %	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what percent of the natural gas energy is used by this survey-site (used by this customer)? If the customer is not sure, then ask if the customer has a sub meter that measures the amount to energy that leaves the survey-site? If yes, then ask for their records that show how much it measures and take a picture of that documentation. If they still don't know, then just have them estimate to the best of their ability what percent is used by the survey-site versus how much goes to other businesses (off survey-site). If the survey-site contact declines to answer and you have no estimate, then enter "..".

5.1.8.13 Shared Meter - Equipment Serving Non-Surveyed Areas – Shared Equipment Type #1 to #7 [Conditional]

Tab: Meters	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Identify the type of shared equipment by asking the facility maintenance department. Following is a list of shared equipment in the dropdown menu list. Select the one being listed for this entry.

1. Gas Absorption Chiller
2. Boiler (Water Heater)
3. Boiler (Steam)
4. Gas
5. Other:

5.1.9 Other Energy / Service Accounts

5.1.9.1 Does this survey-site have any Other Energy Service Accounts? (Table 18)

Tab: Other Energy	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there are any other energy services (besides electric and natural gas) that the customer purchases? An example might be a propane tank that is filled every two months. Or, they could purchase chilled water from a central chiller plant nearby. If yes, then the following five Other Energy Service questions will appear on the CEUS Tool™ display.

5.1.9.2 Other Energy Service Fuel Type #1 to #5 [Conditional]

Tab: Other Energy	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact what type of fuel is provided in the other energy services. Following is a list that can be selected from the dropdown menu. Enter one of these or type in the fuel service type if not listed.

Bottled Gas, LPG, Propane
Chilled Water
Steam
Hot Water
Biogas/Biofuel
Leased Community Solar
Other:

5.1.9.3 Other Energy Supplier Company Name #1 to #4 [Conditional]

Tab: Other Energy	Data Type: String	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact for the name of any other energy suppliers that provide energy to the survey-site. Type in the company name.

5.1.9.4 Other Energy Services Bills Available? #1 to #5 [Conditional]

Tab: Other Energy	Data Type: Yes/No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if bills are available for the other energy services. Enter a yes or no answer. If the answer is yes, ask to see the bills and take a picture of them or get a copy emailed. Obtain the billing information for the last 12 months. Take pictures of a year's worth of bills if available. Check the box for Yes.

5.1.9.5 Other Energy Service Meter/Account Number #1 to #5 [Conditional]

Tab: Other Energy	Data Type: String or N/A	Pre-Populated: No	Can Edit: Yes

If there is a meter or account for the other energy service, then enter the meter number and account number. Enter both if available and separate by a "/ ". Ask to see the meter if there is one to confirm the meter number.

5.1.9.6 Other Energy Service Annual Usage #1 to #5 [Conditional]

Tab: Other Energy	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask for the annual usage of the other energy source provided. If the customer has monthly bills, add up the usage from the last 12 bills. Enter the numeric quantity used.

5.1.9.7 Other Energy Service Units #1 to #5 [Conditional]

Tab: Other Energy	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Look at the bills and find out the units in which the energy service is provided. Select from the dropdown menu list.

BTU
Lbs. Steam
kWh
Therms
Cu ft (Cubic Feet)
Mcf (Million Cubic Feet)
Gallons
Other

5.1.10 Other Energy / On-Site Generation and Storage

5.1.10.1 Does this survey-site have any On-Site Power Generation or Energy Storage? (Table 19)

Tab: Other Energy	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there are any on-site power generation sources or energy storage. See the dropdown list of sources in the next question description. **Do not include emergency or backup power generators**. If the customer is large enough to have on-site power generation, they will have a facilities maintenance department that can answer the questions correctly in the event the survey-site contact does not know the details. If the customer has one or more generation sources, then check the box for

Yes and the following seven conditional on-site power generation questions will appear on the CEUS Tool™ display.

5.1.10.2 On-Site Generation or Storage Type #1 to #3 [Conditional]

Tab: Other Energy	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Find out from the customer what type of on-site power generation they have. Select from the dropdown menu list presented here. If Other, then type it in.

Internal Combustion Engine
Gas Turbine
Micro-turbine
Combined Cycle
Wind
Waste Heat Recovery
Back Pressure Turbine
Photovoltaic Solar Panels
Solar Hot Water
Thermal Energy Storage (usually ice)
Other:

5.1.10.3 On-Site Generation or Storage – What is Plant Generation Capacity (kW)? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact or facility maintenance department what the output capacity is of the generation system. The electrical output will be rated in kW. If the system is visible, there should be a nameplate with a rating of the output capacity. Enter the output as a numeric value.

5.1.10.4 On-Site Generation or Storage – Annual Equivalent Full Load Hours? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact or facility maintenance department what are the annual equivalent full load hours (FLH) for the generator. The maximum value it could be is 8,760 if the generator ran at 100% output capacity for every hour of the year. No system will run at that level. If the generator runs at 50% output for half of the year the annual FLH would be 2,190 hours (8,760 * 50% * 50%). Find out or have them estimate the annual FLH and enter the value.

5.1.10.5 On-Site Generation or Storage – CHP Thermal Energy Type? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

CHP is Combined Heat and Power. A generator produces excess heat that normally would be expelled to the outside. With a CHP system the excess heat is utilized in another process at the survey-site. Typically, it may be used to heat water for domestic use, for space heating, or some other industrial or manufacturing process. Select the type of usage for the excess heat from the dropdown menu list or type to describe Other.

Domestic Hot Water
Space Heating
Industrial Process

Other:

5.1.10.6 On-Site Generation or Storage – CHP Thermal Energy Usage? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: String	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact how much thermal energy is produced and used by the CHP process. Enter the annual (or other time frame) value for the energy used on-site and also include the units.

5.1.10.7 On-Site Generation or Storage – What % of generated electricity is sold back to the Utility? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: %	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact or facility maintenance department what percent of generated electricity is sold back to the utility. The facility department should have meter records of the amount of power generated and also the net or excess sold back to the utility. If they don't have a value, have them estimate the percent. Enter the value as a percent.

5.1.10.8 On-Site Generation or Storage – Is there Battery Storage for excess electric power generated? #1 to #3 [Conditional]

Tab: Other Energy	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact or facility maintenance department if there is battery storage for excess electrical power generated. Check the box for Yes or unchecked for No.

5.1.11 Survey Area Determination

This subsection asks questions to determine the area to be surveyed. It is a portion of the flowchart that was presented in Figure 3.

5.1.11.1 Can meters be verified…

Tab: Survey Area	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Verify (or attempt to verify) the utility meter(s) for the survey-site. Compare the pre-populated meter numbers with the meters found at the survey-site. If the meters cannot be accessed, then request to see a copy of the utility bill to verify the meter number(s). If the customer does not want to show the utility bill then read off the pre-populated meter number(s) and ask if they can verify those are correct. Follow the instructions in the displayed message (see table below).

Answer Options	**Messages**
Yes	Good! Continue to next question.
No	Proceed with caution! Go to Utility Customer is…

5.1.11.2 Meters found and…

Tab: Survey Area	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Compare the pre-populated meter numbers with the meters you have found at the survey-site. Select the dropdown option answer from the following tables that best describes the meter identification. Follow the instructions in the displayed message.

Answer Options	**Messages**
None of the meters match the meters listed in the Tool.	Call ADM for guidance.

Site's meters exclude meter(s) in the Tool.	Change Status Code for meter to 'Delete this Meter'.
Found additional meters that serve more than 5% of the survey-site.	Add this Meter and change Status Code for meter to 'Add this Meter'.
Meters exactly match meters in the Tool.	Excellent! Continue with survey area determination.

5.1.11.3 Utility Customer is…

Tab: Survey Area	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Investigate and identify if the utility customer is a property manager or an owner-occupied business. An owner-occupied business can include businesses that lease the space they occupy. Select one of the two dropdown options.

Answer Options	**Goes to Level Option**
a property manager.	Property Manager meter(s)…
an owner-occupied business.	Business meter(s)…

5.1.11.4 Property Manager meter(s)… [Conditional]

Tab: Survey Area	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Investigate and identify the areas served by the utility meter(s) listed for the Survey-Site. Speak with the property manager or a facility engineer to assist with this determination. Select the dropdown option answer from the following table that best describes the areas served by the property management meter(s). Follow the instructions in the displayed message.

Answer Options	**Messages**
are only for property manager and common area.	Survey only property management space and common area.
are serving one to three businesses at a contiguous location.	Survey all businesses.
are serving more than three business at a contiguous location.	Survey a sample of tenant businesses.

5.1.11.5 Business meters(s)… [Conditional]

Tab: Survey Area	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Investigate and identify the areas served by the utility meter(s) listed for the Survey-Site. Speak with the business manager or a facility engineer to assist with this determination. Select the dropdown option answer from the following table that best describes the areas served by the business meter(s). Follow the instructions in the displayed message.

Answer Options	**Messages**
Serve part of one building.	Survey the portion of the building that the business occupies.
serve one building.	Survey entire building.
serve multiple buildings at a contiguous location.	Survey all buildings.
serve a campus of buildings at a contiguous location.	Survey a sample of buildings on the campus.

5.1.12 Drawing

5.1.12.1 Survey-Site/Building Footprint Shapes - Features of the Drawing Tool (Table 20)

Tab: Drawing	Data Type: Drawing	Pre-Populated: No	Can Edit: Yes

The CEUS Tool™ data collection app comes with a grid-based drawing tool which is used to outline the building(s) and subdivide it into areas with different end-use fuel saturations. These areas are called "**end-use fuel partitions**". The tool calculates and displays the area of each partition, each drawing, and for the total survey-site (all drawings). A building will have partitions to identify heating, cooling, ventilation, and refrigeration. Refrigerated warehouses should be subdivided into refrigerated areas versus frozen storage areas. If the entire survey-site is heated and cooled by the same fuel type, then the identified fuels have 100% saturation at the survey-site. If the end-use fuel type saturation is not 100% for the survey-site, then a drawing must be created to identify the end-use fuel partitions. The tool also displays the area in the end-use by partition section (5.1.14.3). The drawings should be a reasonable representation of the building(s) and the end-use fuel type partitions. **The partitions will be identified according to the end-use fuel type.** If the survey-site has floor plans, these can provide a talking point to ask the survey-site contact if there are any different end-use fuel partition areas.

The screen shot in Figure 29 shows a simple building outline on the drawing tool grid and the menu options that are available. The drawing tool starts as a grid of points. The grid provides a snap action so lines can easily be drawn straight and perpendicular. The user can add line segments with the touch of a finger or stylus, connecting the points to draw exterior walls and partition interior spaces for fuel saturation. As each line segment is being drawn, the line is blue and the length of the line in feet is displayed in the upper left corner (see Figure 30). The user can change the scale of the drawing by tapping the "Select" feature on the drawing menu and then touching a line on the drawing to scale. The current length of the wall section is shown below the "Set Scale" option on the drawing menu (see Figure 31). Enter the measured number of feet and inches of the selected wall in the set scale box. This applies the same scaling to all the walls on this drawing. The area of the floor plan or partition is calculated and displayed on the end-use partition tab of the CEUS Tool™.

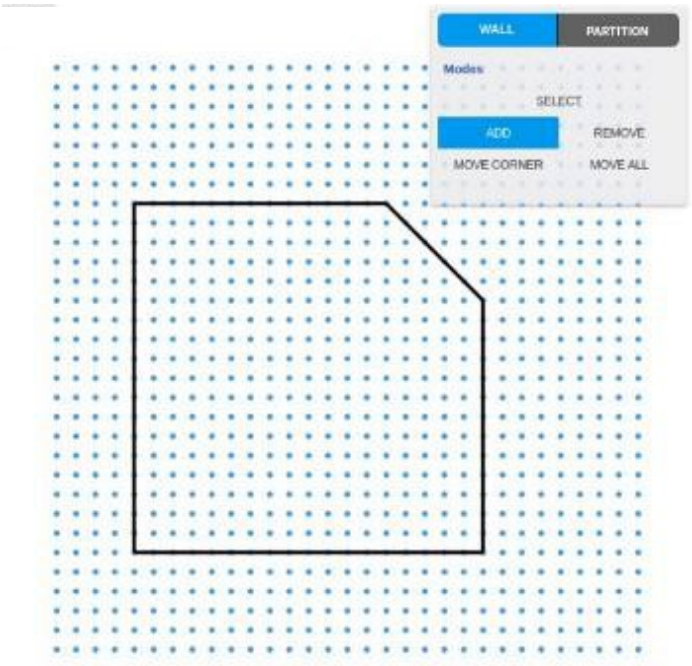


Figure 29. Simple shape floor plan with drawing tool grid and menu options.

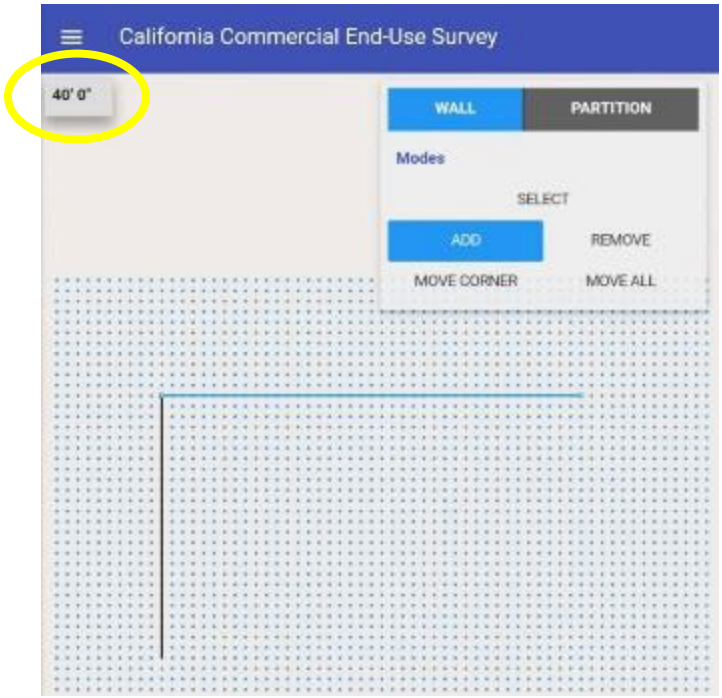


Figure 30. Drawing tool grid, menu options, and blue line being drawing, showing line length.

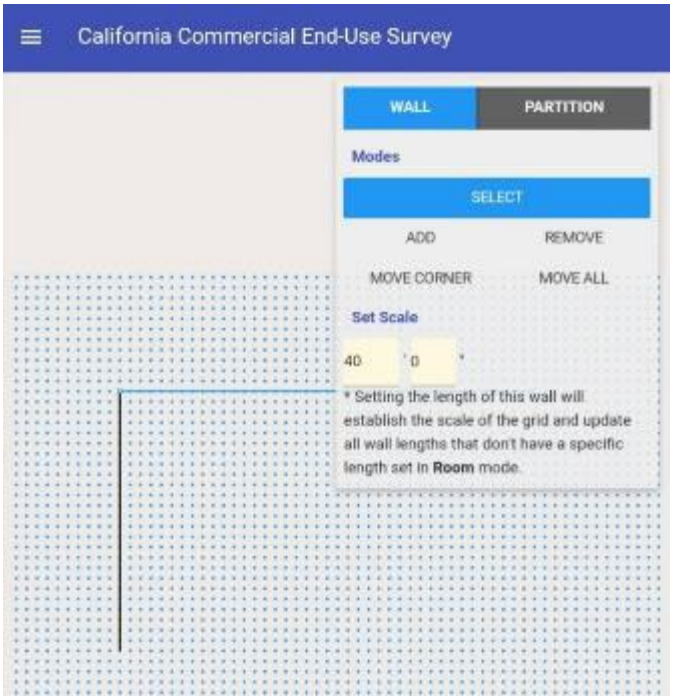


Figure 31. Drawing tool grid with blue line (selected) being scaled.

When beginning a new survey-site, the surveyor will use the drawing tool to first draw the exterior walls of the survey-site which separate the interior of the space from the outside or adjoining tenant spaces not part of the survey-site. For example, a strip mall has exterior walls but also has walls that separate suites from each other. If multiple buildings are part of the same survey-site, as in a school campus, each building at the survey-site can be drawn accordingly on separate drawing elements. If the survey-site has a small number of buildings (less than five) then they each should be drawn or represented. For campuses with many buildings, buildings with the same HVAC fuel type saturation can be aggregated together and represented as one.

Next, the newly drawn survey-site, or survey-site components in the case of a multi-building survey-site, will be partitioned into areas with different HVAC fuel type saturations. Interior walls can be drawn to create partitions in the building. For example, a corporate office with an attached unconditioned storage will be partitioned in the drawing tool as the HVAC fuel type for the spaces are different. For this example, the office is conditioned with roof-top packaged units with gas heating and electric cooling, but no HVAC for the storage, so no fuel used in the storage. However, if the storage area is ventilated with exhaust fans then the storage area will be identified as ventilated.

The partitioning could go to further subdivisions. For example, the storage area in the above example may have an 8’ x 10’ foreman’s office which is air conditioned only but not heated. A corner of the storage area will then be drawn to make a partition for an area with a different HVAC fuel type (electric cooling, and no gas heating) in the drawing tool. The example of partitions described are shown in Figure 32. The 8’ x 10’ dimensions of the foreman’s office are shown on the left drawing view. The unconditioned storage dimensions are shown on the right drawing view. The dimensions for each line can be entered. These entries override the scaling that is applied to the drawing. Care must be taken not to given dimensions that don’t fit the proportions of the drawing. For example, if you changed wall “A” dimension in the left drawing to 100 feet, that would not physically fit. The drawing tool would alert you

that you have entered a dimension that is not possible, and it will change the partition color to orange (see Figure 33). Any calculations, either for the total building or partitioned spaces using an external spreadsheet calculator or pencil and paper, should be captured with a picture to maintain documentation of how values were obtained. These will be loaded as a separate picture file associated with the survey-site ID.

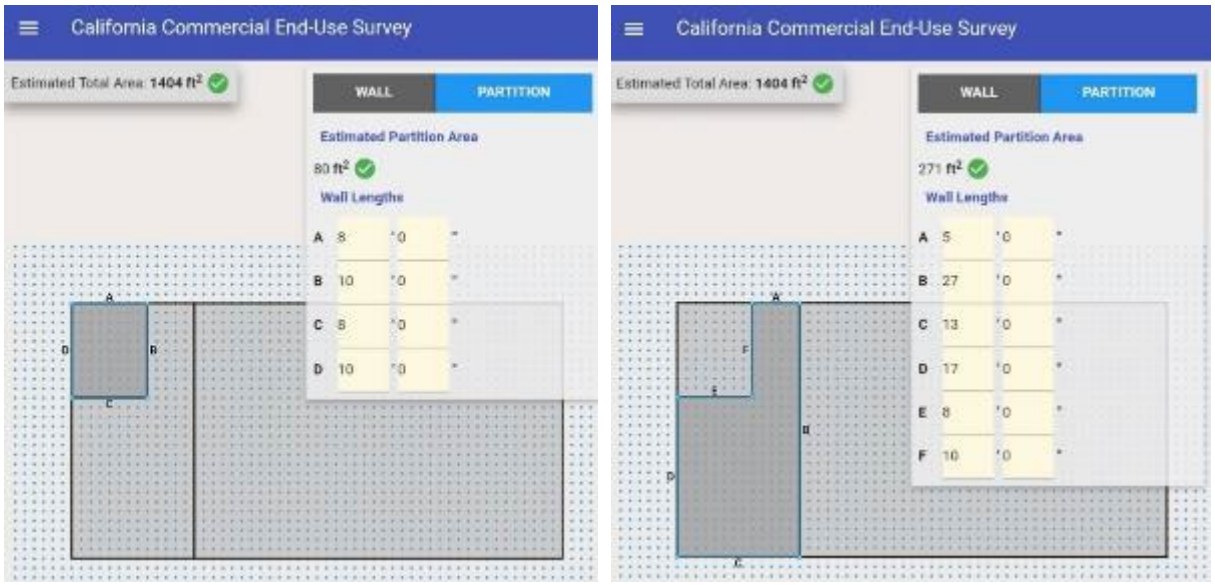


Figure 32. Building can be broken down into multiple HVAC Fuel Type Partitions.

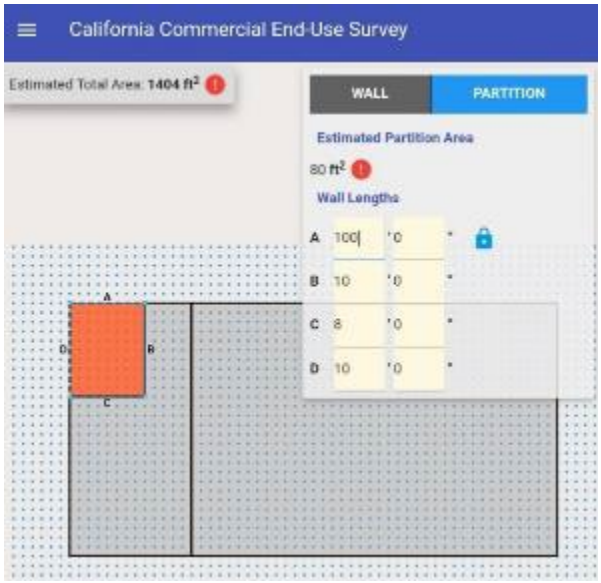


Figure 33. Building partition with one non-proportional dimension entered.

For refrigerated warehouse partitions: the freezer space, the refrigerated space, the regular conditioned space (such as an office), and non-conditioned areas will be drawn as separate partitions.

Structural features such as courtyards or atriums can be drawn in the tool. They must then be identified in the end-use partition section (5.1.14.2) as being “outside” or the area will be calculated as interior space in the square footage calculation.

Floor plans, screen shots of satellite view from Google Map, or any other photo can be placed as the background of the drawing tool using a feature called “Set Background”. Figure 34 shows an example of this feature. The outline of a building can be traced, so the proportions are correct. To use this option:

1. Place the image in the Photos tab;
2. Select the photo. The drawing tool will switch into background placement mode. On the top right, there are button options for
    a. Move: The photo can be moved around.
    b. Zoom: Swiping up shrinks the photo and swiping down makes it larger.
    c. Finish Placing: Once the user is satisfied with the size and position of the photo, clicking on the Finish Placing button will return the user to the typical drawing tool functions.

Figure 34. Example of satellite view picture as background for drawing.

5.1.12.2 Title #1 to #10 (Table 20)

Tab: Drawing	Data Type: String	Pre-Populated: No	Can Edit: Yes

Multiple drawings can be created for each survey-site. Each drawing can represent a building, a floor of a building, or part of a survey-site. Each drawing can have multiple rooms or partitions. Each drawing

should be titled to describe the area of the survey-site it represents, such a s “First floor”, “Floors 2-12”, “Main Building”, or “Annex building”. Type in a Title.

5.1.12.3 Number of Floors #1 to #10

Tab: Drawing	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Each drawing can represent one or multiple floors of a building. “Number of floors” is not asking how many floors tall the building is, it is asking how many floors of the building have the same footprint as the drawing. For example, the title “Floors 2-12” the answer should be 11 floors. Enter the number of floors the drawing represents.

5.1.12.4 Drawing Total Area #1 to #10

Tab: Drawing	Data Type: N/A	Pre-Populated: No	Can Edit: No

The area of each drawing is calculated and displayed near the bottom of each drawing summary. The area includes a multiplier for the number of floors entered. For example, “Floors 2-12” if the area of one floor was 10,000 sq ft then the total area for the drawing would be 110,000 sq ft.

5.1.12.5 Include in Total Area #1 to #10

Tab: Drawing	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Each drawing by default is included in the calculation of total square footage that is displayed as information at the top of the Drawing Summary page. The default is that the box is checked “Yes” to include the drawing in the total area calculation. To exclude a drawing from the total area calculation, uncheck the box, which is a “No” answer to the question. Areas to exclude from the total area are: courtyards, atriums, and car washes. Car washes should be excluded from the total area even if there is a roll up door that allows the drive through space to be enclosed during non-business hours. If the car wash is a separate building with no occupied area then do not include in drawing. Also see section 5.1.15.2 for marking partitioned areas as outside.

5.1.13 Square Footage

5.1.13.1 Exterior wall thickness (inches) (Table 21)

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

This question provides the surveyor the opportunity to enter the exterior wall thickness (in inches.) The default is 12 inches. This entry is provided for the situations where the best method of area calculation is using exterior linear dimension measurements of the building. The drawing tool will then calculate the interior dimensions of the building accordingly.

5.1.13.2 Survey-Site Area Method – Best Method

Tab: Square Footage	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Using the dropdown list, provide the best source for an accurate determination of the total floor space of the survey-site—excluding parking garages—and whether the area represents a measurement from the inside (interior) or outside (exterior). The available options are listed in order of priority; select the best available option. Floor plans are generally the best method, especially for larger more complex spaces, but may not always be available. Property management or leasing companies have accurate records of leased spaces, so collect a list of tenant space square footage for all tenants and unoccupied spaces. For small or simple buildings, direct measurement using a laser tape or a measuring wheel is

acceptable. A satellite view can be okay for large and single-story buildings, but an interview might be better than satellite for irregularly shaped and multi-story facilities. See section 4.4.6 for methods to determine square footage. Following is the dropdown list of options, in priority order.

1. Floor Plans – Interior
2. Floor Plans – Exterior
3. Floor Plans –Can't be determined if interior or exterior
4. Property Management leasing space records
5. On-site Distance Measurement – Interior
6. On-site Distance Measurement – Exterior
7. Satellite/Aerial (e.g., using web-based measurement tool)
8. Interviewed survey-site contact – Interior
9. Interviewed survey-site contact – Exterior
10. Interviewed survey-site contact – Can't be determined if interior or exterior

5.1.13.3 Survey-Site Area Square Feet [excluding parking garage] – Best Method

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Determine the total building floor square footage of the survey-site—excluding parking garage—using the best method just identified. Methods for gathering the square footage are described in section 4.4.6. When gathering the square footage, the interior square footage is preferred. Exclude the square footage of any parking garage that is part of the survey-site. Minor nocks, crannies, and extensions can be ignored if they are less than 50 square feet or less than two percent of the total square footage, whichever is more. When feasible collect this information from two different sources and document both. When making distance measurements make the measurement from the inside as the first choice. Use the drawing app on the CEUS TOOL™ to document distance measurements. (See section 5.1.12.1.) If there are multiple buildings on the survey-site include the area from all the buildings unless sub-sampling is being conducted. If the survey-site is the property management of an indoor shopping mall, for example, where each business has its own utility meter then the total square footage will be just for the common area (walkways, open gathering areas, restrooms, facility services, and mechanical rooms.) Enter the square footage of the survey-site.

5.1.13.4 Survey-Site Area Method – Second Best-Method (Table 22)

Tab: Square Footage	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Using the dropdown list provide the second-best source for determination of the total floor space of the survey-site—excluding parking garages—and whether the area represents a measurement from the inside (interior) or outside (exterior). The available options are listed in order of priority; select the best available option. Floor plans are generally the best method, especially for larger more complex spaces, but may not always be available. Property management or leasing companies have accurate records of leased spaces, so collect a list of tenant space square footage for all tenants and unoccupied spaces. For small or simple buildings, direct measurement using a laser tape or a measuring wheel is acceptable. A satellite view can be okay for large and single-story buildings, but an interview might be better than satellite for irregularly shaped and multi-story facilities. The dropdown list of options, in priority order, follow.

1. Floor Plans – Interior
2. Floor Plans – Exterior

3. Floor Plans – Can't be determined if interior or exterior
4. Property Management leasing space records
5. On-site Distance Measurement – Interior
6. On-site Distance Measurement – Exterior
7. Satellite/Aerial (e.g., using web-based measurement tool)
8. Interviewed survey-site contact – Interior
9. Interviewed survey-site contact – Exterior
10. Interviewed survey-site contact – Can't be determined if interior or exterior
11. I know that this information is not available or cannot be determined

5.1.13.5 Survey-Site Area Square Feet [excluding parking garage] – Second-Best Method

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Determine the total building floor square footage of the survey-site—excluding parking garage—using the second-best method just identified. Methods for gathering the square footage are described in section 4.4.6. When gathering the square footage, the interior square footage is preferred. Exclude the square footage of any parking garage that is part of the survey-site. Minor nocks, crannies, and extensions can be ignored if they are less than 50 square feet or less than two percent of the total square footage, whichever is more. When feasible collect this information from two different sources and document both. When making distance measurements make the measurement from the inside as the first choice. Use the drawing app on the CEUS TOOL™ to document distance measurements. (See section 5.1.12.1.) If there are multiple buildings on the survey-site include the area from all the buildings unless sub-sampling is being conducted. If the survey-site is the property management of an indoor shopping mall, for example, where each business has its own utility meter then the total square footage will be just for the common area (walkways, open gathering areas, restrooms, facility services and mechanical rooms.) Enter the square footage of the survey-site.

5.1.13.6 Does the Survey-Site have Unconditioned Space? (Table 23)

Tab: Square Footage	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the survey-site contact if there are any unconditioned areas in the survey-site building(s). Unconditioned means areas that are not heated or cooled. The areas to include in the measurement are warehouse, storage areas, mechanical rooms, or other areas that are part of the survey-site but not conditioned. If they represent less than 5% of the total survey-site square footage, then do not include them. If more than 5% of the area is unconditioned then check the box for Yes. The following four conditional questions will appear.

5.1.13.7 Survey-Site Unconditioned Area Method – Best Method [Conditional]

Tab: Square Footage	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Using the dropdown list provide the best source for determination of the total unconditioned floor space of the survey-site and whether the area represents a measurement from the inside (interior) or outside (exterior). The available options are listed in order of priority; select the best available option. Floor plans are good for larger more complex spaces. For small or simple buildings, direct measurement using a laser tape or measuring wheel is acceptable. A satellite view can be okay for large and single-story buildings, but an interview might be better than satellite for irregularly shaped and multi-story facilities. The dropdown list of options, in priority order, follow.

1. Floor Plans – Interior

2. Floor Plans – Exterior
3. Floor Plans – Can't be determined if interior or exterior
4. Property Management leasing space records
5. On-site Distance Measurement – Interior
6. On-site Distance Measurement – Exterior
7. Satellite/Aerial (e.g., using web-based measurement tool)
8. Interviewed survey-site contact – Interior
9. Interviewed survey-site contact – Exterior
10. Interviewed survey-site contact – Can't be determined if interior or exterior
11. Interviewed survey-site contact – No unconditioned space

5.1.13.8 Survey-Site Unconditioned Area Square Feet – Best Method [Conditional]

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Determine the total unconditioned square footage of the survey-site using the best method just identified. Unconditioned means areas that are not heated or cooled. The areas to include in the measurement are warehouse, storage areas, mechanical rooms, or other areas that are part of the survey-site but not conditioned. Exclude the square footage of any parking garage that is part of the survey-site. Only report if more than 5% of the total square footage. Methods for gathering the square footage are described in section 4.4.6. When gathering the square footage, the interior square footage is preferred. Minor nocks, crannies, and extensions can be ignored if they are less than 50 square feet or less than two percent of the total square footage, whichever is more. When feasible collect this information from two different sources and document both. When making distance measurements make the measurement from the inside as the first choice. Use the drawing app on the CEUS TOOL™ to document distance measurements. (See section 5.1.12.1.) If there are multiple buildings on the survey-site include the unconditioned area from all the buildings unless sub-sampling is being conducted. Enter the square footage of the unconditioned area of the survey-site.

5.1.13.9 Survey-Site Unconditioned Area – Second Best-Method [Conditional] (Table 24)

Tab: Square Footage	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

Using the dropdown list provide the second-best source for determination of the total unconditioned floor space of the survey-site and whether the area represents a measurement from the inside (interior) or outside (exterior). The available options are listed in order of priority; select the best available option. Floor plans are good for larger more complex spaces. For small or simple buildings, direct measurement using a laser tape or measuring wheel is acceptable. A satellite view can be okay for large and single-story buildings, but an interview might be better than satellite for irregularly shaped and multi-story facilities. The dropdown list of options, in priority order, follow.

1. Floor Plans – Interior
2. Floor Plans – Exterior
3. Floor Plans – Can't be determined if interior or exterior
4. Property Management leasing space records
5. On-site Distance Measurement – Interior
6. On-site Distance Measurement – Exterior
7. Satellite/Aerial (e.g., using web-based measurement tool)
8. Interviewed survey-site contact – Interior

9. Interviewed survey-site contact – Exterior
10. Interviewed survey-site contact – Can't be determined if interior or exterior
11. I know that this information is not available or cannot be determined

5.1.13.10 Survey-Site Unconditioned Area Square Feet – Second-Best Method [Conditional]

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

Unconditioned means areas that are not heated or cooled. The areas to include in the measurement are warehouse, storage areas, mechanical rooms, or other areas that are part of the survey-site but not conditioned. Exclude the square footage of any parking garage that is part of the survey-site. Methods for gathering the square footage are described in section 4.4.6. When gathering the square footage, the interior square footage is preferred. When feasible collect this information from two different sources and document both. When making distance measurements make the measurement from the inside as the first choice. Use the drawing app on the CEUS TOOL™ to document distance measurements. (See section 5.1.12.1.) If there are multiple buildings on the survey-site include the unconditioned area from all the buildings unless sub-sampling is being conducted. Enter the square footage of the unconditioned area of the survey-site.

5.1.13.11 Does the Survey-Site have parking garages? (Table 25)

Tab: Square Footage	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the site survey-contact if there are any parking garages that are on the same meter as the survey-site. If yes, then check the box for Yes. The following conditional question will appear.

5.1.13.12 If Survey-Site has a Parking Garage, What is the Total Parking Garage Floor Area? [Conditional]

Tab: Square Footage	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

If the survey-site has a parking garage, then determine or ask the area of the garage. The garage can be in the basement of a high rise, the lower levels of a high rise, or a separate or attached structure strictly used for vehicle parking. If the garage has parking on the top level of the structure, then include that area also. Enter the total square footage of the garage.

5.1.14 End-Use By Partition

5.1.14.1 Characterization for Fuel Saturation Partitions for heating and cooling End-Uses (Table 26)

Tab: End-Use	Data Type: N/A	Pre-Populated: No	Can Edit: No

This sub-section describes how to characterize survey-site partitions. It does not have a data field. A survey-site will be subdivided if the following condition exists.

> **END-USE FUEL SATURATION PARTITION:** Partitions are made to identify areas of a survey-site that are served by a different fuel type than the rest. Partitioning is required to identify areas where a different fuel type is used for the following end-uses: heating, cooling, ventilation, and refrigeration (only for refrigerated warehouses and for partitioning refrigerated and freezer areas). Also, areas of the survey-site that are not heated, cooled, or ventilated that are unconditioned areas, where the fuel type is "none", are partitioned as well. Fuel saturation for cooking is addressed separately starting in section 5.1.15.19 and is not partitioned.

Several examples are provided in Figure 35 through Figure 47 to help explain the various situations. The single dashed oval represents the survey-site boundary. The outer box represents the building(s). The dashed double lines represent divisions within the building that have spaces served by different HVAC fuels. The partitions can be comprised of multiple businesses if they are in one survey-site.

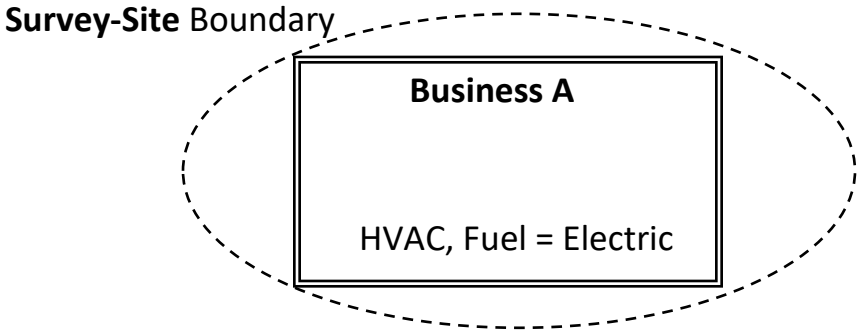


Figure 35. Simplest Case: 1 Building, 1 Business, 2 End-Uses using 1 Fuel, 1 Partition.

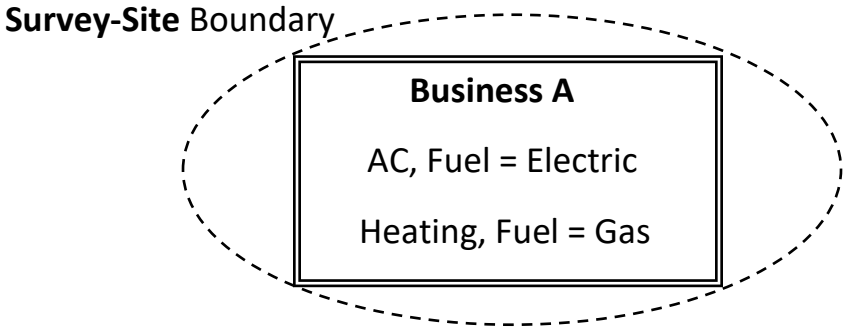


Figure 36. Simple Case: 1 Building, 1 Business, 2 End-Uses using 2 Fuels, 1 Partition.

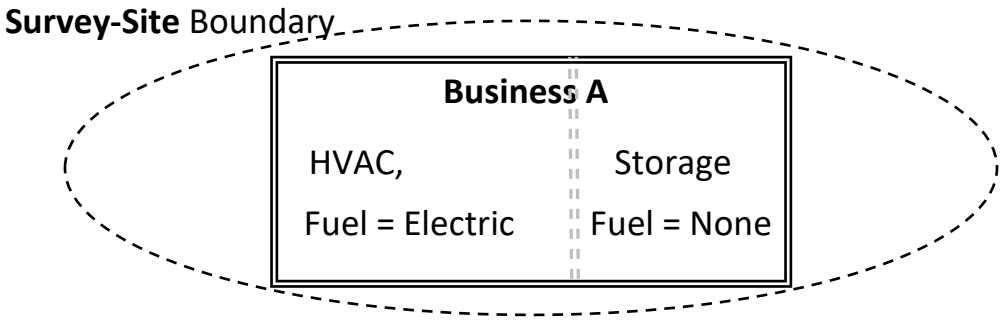


Figure 37. Simple Case: 1 Building, 1 Business, 2 End-Uses, 2 Fuel Partition (one being unconditioned).

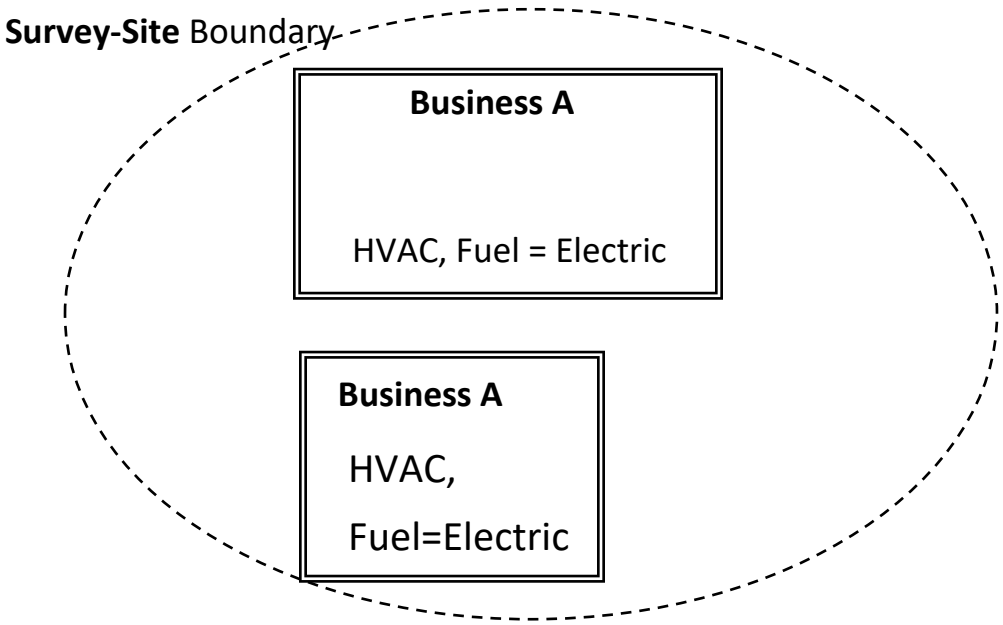


Figure 38. Simple Case: 2 Buildings, 1 Business, 2 End-Uses, 1 Fuel, 2 Partitions.

The followings are progressions of less simple cases. Although the diagram in Figure 39 is not complex it can be a simple representation of a complex survey-site, such as a multi-building resort lodge or a university campus, where instead of two buildings there are many, but still with one primary fuel. If the surveyor is unsure how to handle a particular situation, they should call and talk to their supervisor or the project manager on how to handle special case situations.

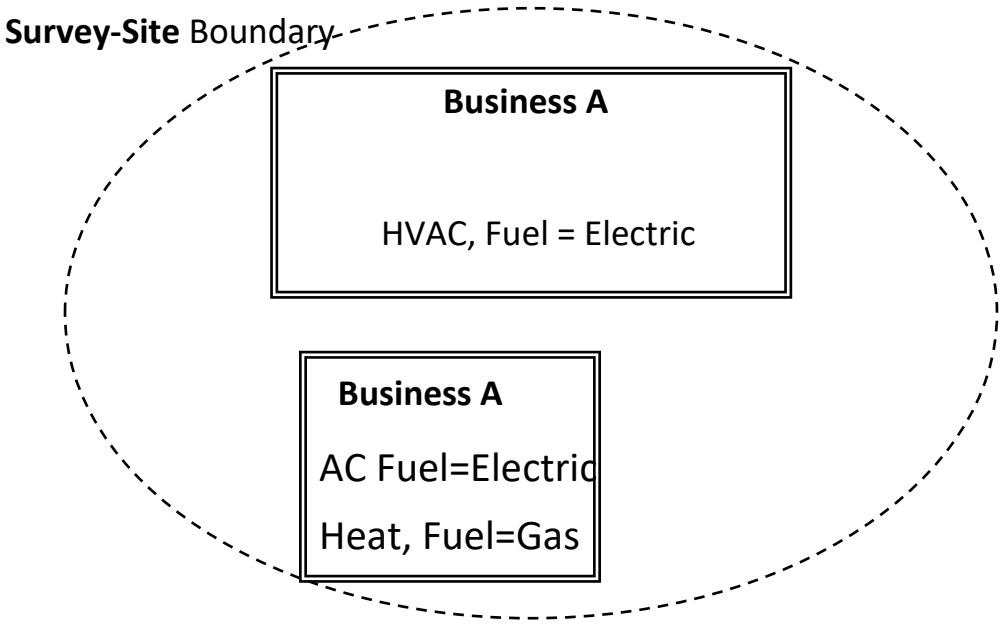


Figure 39. Less Simple Case: 2 Buildings, 1 Business, 2 End-Uses, 2 Fuels, 2 Partitions.

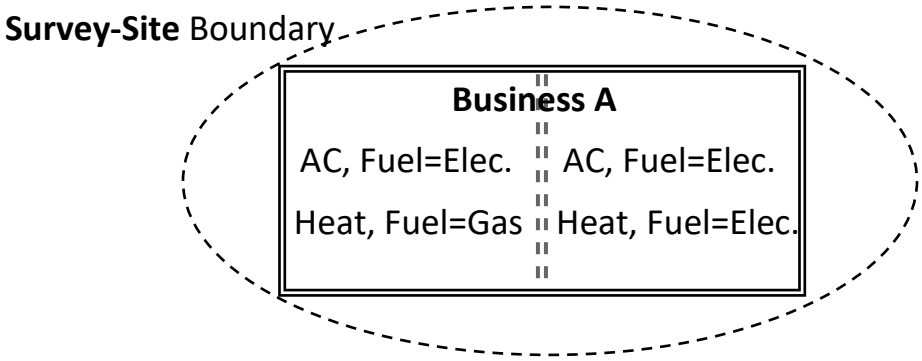


Figure 40. Less Simple Case: 1 Building, 1 Business, 2 End-Uses, 2 Fuels, 2 Partitions.

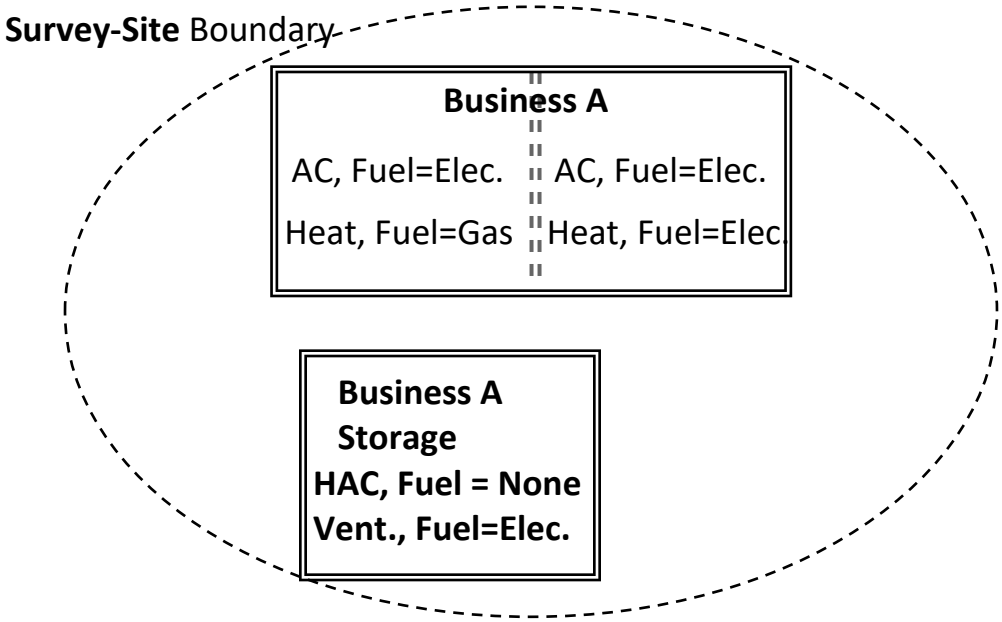


Figure 41. Less Simple Case: 2 Buildings, 1 Business, 3 End-Uses, 3 Fuels, 3 Partitions.

As an example, Figure 42 could be a high-rise building with ten tenants. Business A may be the property management company, Tenant 1 could be seven different law firms and Tenant 2 could be three different medical offices (two dentists and an ophthalmologist).

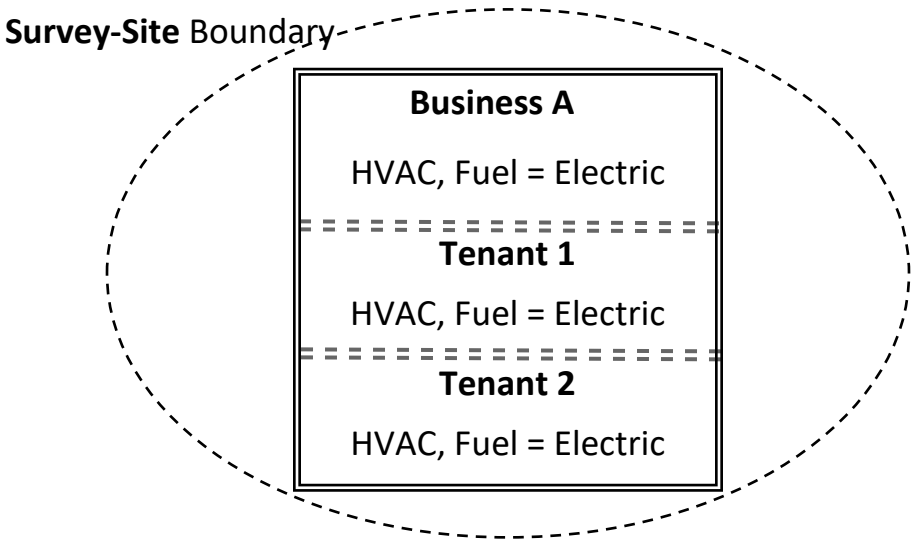


Figure 42. Multi-tenant building: 1 Building, 3 Businesses, 2 End-Uses, 1 Fuel, 1 Partition.

The example in Figure 43 is similar to Figure 42 but shown differently. It also could be a master metered high-rise building with multiple tenants.

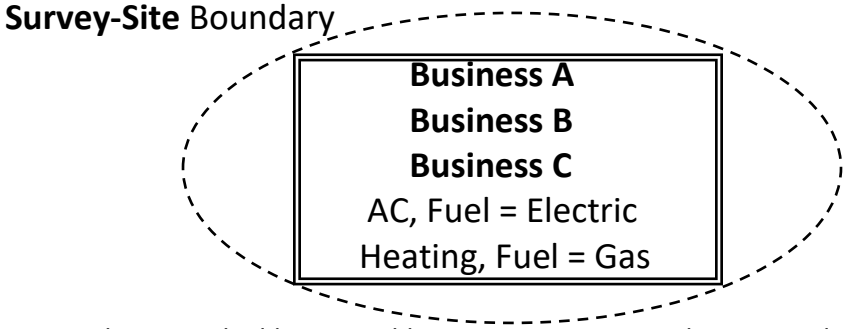


Figure 43. Multi-tenant building: 1 Building, 3 Businesses, 2 End-Use, 2 Fuels, 1 Partition.

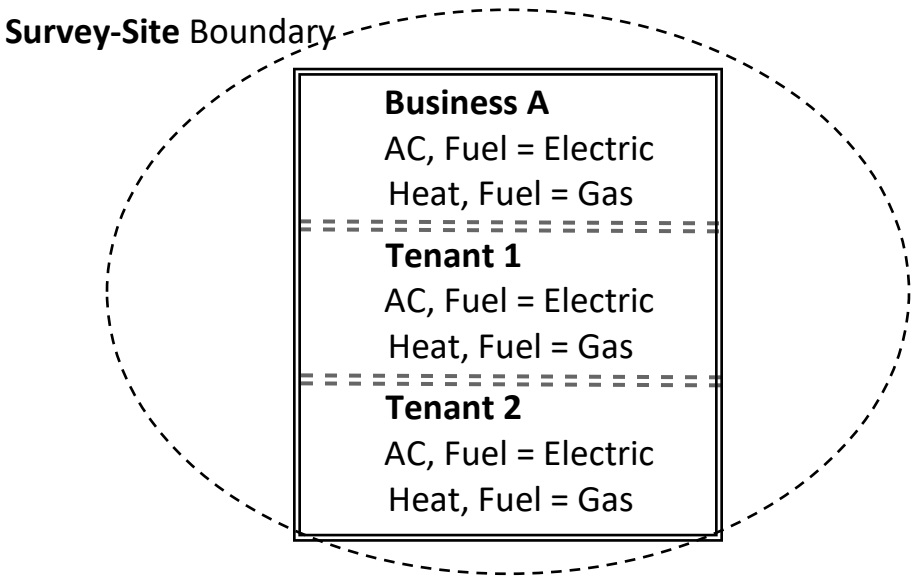


Figure 44. Multi-tenant building: 1 Building, 3 Businesses, 2 End-Uses, 2 Fuels, 1 Partition.

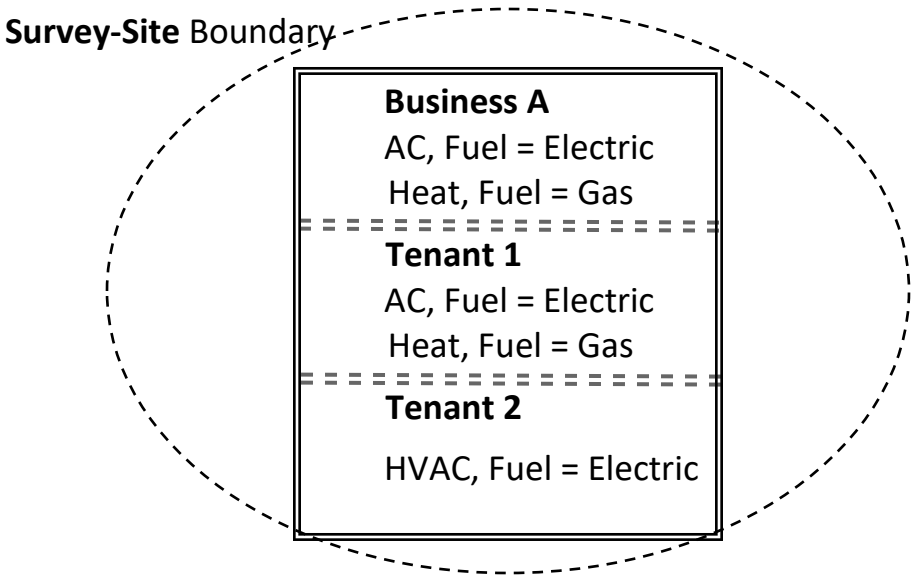


Figure 45. Multi-tenant building: 1 Building, 3 Businesses, 2 End-Uses, 2 Fuels, 2 Partitions.

Each end-use fuel partition area created in the drawing tool will need to be selected in turn and the heating, cooling, ventilation, and refrigeration end-use fuel questions answered. If the entire survey-site has the same heating and cooling system, then only one set of questions need to be answered for the heating and cooling system.

For refrigerated warehouse building types that have frozen or refrigerated space the partitioning will be used to identify if the space is used for frozen products, refrigerated products, or unconditioned storage. For the example in Figure 46, the warehouse has a refrigerated section, a frozen food section, and an office area that is conditioned. The fuel for refrigeration and freezing partitions are assumed to be electric and there will be no heating and no air conditioning cooling fuel for these partitions. The example shown in Figure 47 shows a less simple case where the building is divided into four areas: the office which is conditioned space, a refrigerated area, a frozen storage area, and a dry goods storage area that is not conditioned (and not ventilated).

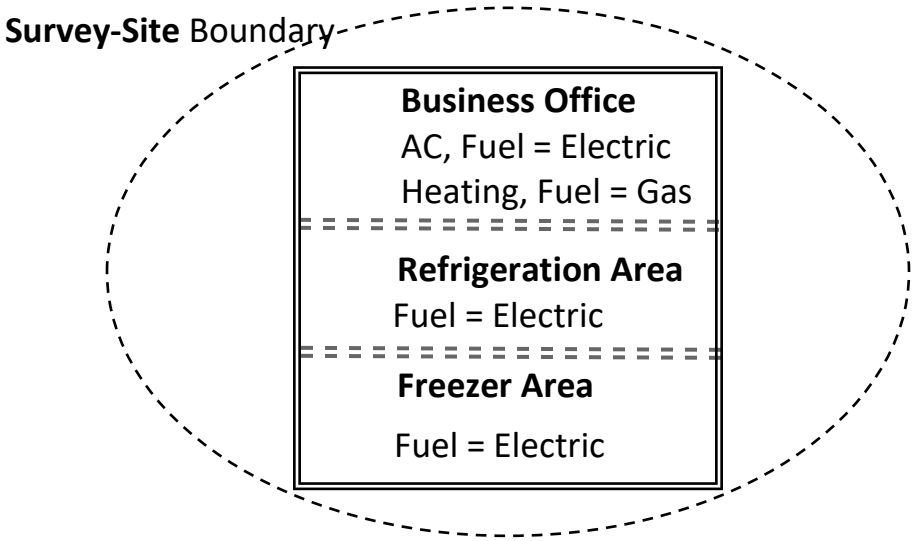


Figure 46. Refrigerated Warehouse Case: 2 Levels of Refrigeration, and 1 HVAC Partition (3 Partitions).

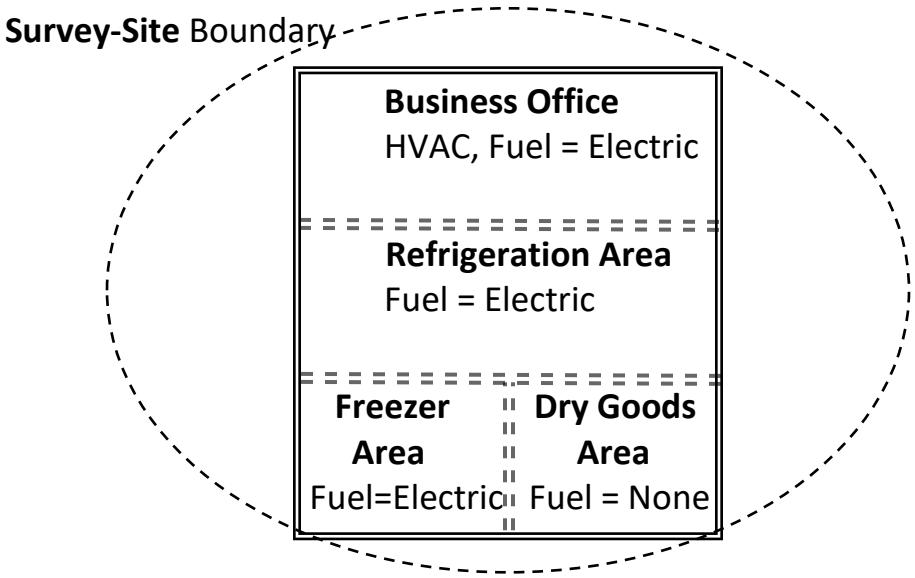


Figure 47. Refrigerated Warehouse: 2 Levels of Refrigeration, 1 HVAC, & 1 Non-Conditioned Partition (4 Partitions).

Now that the descriptions of characterization have been defined let's get back to data entry field descriptions and clarifications.

5.1.14.2 This area is outside, Partition #1 to #N (Table 26)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Each partition in the drawings can be identified as inside or outside. The default is that all partitions are inside (indoors.) This feature is useful for cases where there is a courtyard in a building footprint that is completely surrounded by the building but should not be counted in the building square footage. This feature can also be expanded to account for interior atriums that are multiple stories high but do not account for additional square footage (even though they may technically be indoors. This feature can also be used to mark car washes, which are considered outdoor space, even if they have roll up doors.

5.1.14.3 By Partition – Introduction for Floor Space, Square Feet, HVAC Fuel Type, Partition #1 to #N

Tab: End-Use	Data Type: N/A	Pre-Populated: No	Can Edit: No

This is an introductory section to describe the context of the end-use by partition sections that follow. It does not have a data field. The drawing(s) of the building(s) initially show the outline of the exterior walls (or some representation of the building(s) footprint. If different parts of the survey-site are served by different fuels for HVAC systems (or the survey-site is a refrigerated warehouse) then the drawing needs to be subdivided to represent the different areas. Select each partition one at a time and answer the set of questions listed in sections 5.1.14.4 to section 5.1.14.11 until all partition spaces have been completely entered. The floor space for each partitioned area is automatically calculated and displayed as "Calculated Partition Area" in the CEUS Tool™ along with the calculated percent of survey-site floor area. It is recognized that some drawings will not be accurate representations of the physical building or partitions. In those cases where the drawing calculation of area is not accurate the floor space of the partitioned area can be entered manually in the "Overrides" section to the question, either as square footage or as a percent of total survey-site area. Answering this question provides the surveyor a means to override the drawing area with a specific numeric entry of the floor area. Use methods described in section 4.4.6 for measuring the area. For the simplest cases where the entire survey-site has the same HVAC fuel type then the floor space will be the total floor area listed in section 5.1.13.3. An alternate is to answer the next question section 5.1.14.5 and enter the percent of the survey-site that this HVAC fuel type configuration represents. **Only one of either square footage or percent are allowed if the area override is used.**

Identify the primary heating and cooling fuel types for this partition. The partition area can also be used to identify if there is ventilation or the level of refrigeration for refrigerated warehouses. The fuel type configurations are listed in the heating and cooling questions that follow in sections 5.1.14.6 and 5.1.14.8.

We provide two similar example cases here. Example 1: A 25,000 square foot big box hardware retailer has 10 gas-packaged heating and air conditioning units on the roof and 5 gas-fired radiant heaters in a row over the cash register area. The entire store is heated with gas even though there are two different types of systems. The store is cooled using electricity as the fuel. For Example 1, there is no divider and the entire store is one end-use fuel partition. Enter gas as the heating fuel type and electricity as the cooling fuel type for the partition. Example 2: A 20,000 square foot hardware retailer has 10 packaged heat pump units on the roof and 5 gas-fired radiant heaters in a row over the cash register area. The gas radiant heaters are 20 feet on center with each other. The area heated by the gas radiant heaters is not separated by a wall to provide a defined zone, but the 20-foot spacing of the units implies they also

serve a 20-foot space in the perpendicular direction to the row of heaters. The area served by the gas heaters is 5' x 20' x 20' = 2,000 square feet, or 10% of the survey-site. Enter gas as the heating fuel type for this area partition. The other 90% of the store is heated by electric fuel. Enter electric as the heating fuel type for this area partition. The store is 100% cooled with electric fuel. Enter electric as the cooling fuel type for both area partitions. The packaged heat pump units are the primary heating and cooling source to list as primary type of system. In conclusion, Example 2 has two end-use fuel partitions. One partition has electricity as the heating and cooling fuel types and the other partition has gas as the heating fuel type and electricity as the cooling fuel type.

5.1.14.4 By Partition– Square Footage of Partition Area, Partition #1 to #N (Table 26)

Tab: End-Use	Data Type: %	Pre-Populated: Yes	Can Edit: Yes

The default area is the value displayed in "Calculated Partition Area" created by the drawing tool for this partition. Answering this question provides the surveyor an option to override the drawing area with an estimate specific to the floor area, for example, associated with heating fuel type for this partition. This question should only be filled in if the field surveyor does not believe the drawing accurately represents the partition. **Only one of either square footage or percent are allowed.**

5.1.14.5 By Partition– % of Survey-Site Area, Partition #1 to #N

Tab: End-Use	Data Type: %	Pre-Populated: Yes	Can Edit: Yes

The default percent of survey-site area is the value displayed in "Calculated Partition Area" created by the drawing tool for this partition. Answering this question provides the surveyor an option to override the drawing area percent with an estimate specific to the partition. This question should only be filled in if the field surveyor is not able to measure the square footage of this partition nor believes the drawing accurately represents the partition. For the simplest cases where entire survey-site has one fuel type configuration then it will be 100% of the survey-site floor area in the drawing. **Only one of either square footage or percent are allowed.**

5.1.14.6 By Partition – Primary Heating Fuel Type, Partition #1 to #N

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For each end-use partitioned area enter the heating fuel type. Select the fuel type from the dropdown list.

Natural Gas	Electricity
Propane or Other	Purchased Steam or Hot Water
Can't determine	None

Some hints for determining heating fuel type:

- Identification of the type of heating system in the following questions may help answer this question.
- Gas heating could be provided by a central plant boiler, gas packaged or gas roof-top units, gas-fired split-system, or gas-fired radiant space heaters. If they do not have natural gas service, then the answer cannot be natural gas.
- If the survey-site has natural gas service, then it is not likely they will heat using electricity.
- Electric heating could be provided by a packaged system with resistance heating elements, heat pumps, or electric resistance room heaters.

- If they do have natural gas service, then it is not likely they will heat using propane.
- Propane heating could be provided by a packaged system with propane furnace or propane fired split-system.
- If they do have natural gas service, then it is less likely they will be purchasing heat. Purchased steam or hot water are more likely for tenants in a high-rise building or densely packed facilities.
- Two examples are given here.

  1. *An office building has gas heating with electric reheat.* Since gas is the primary fuel source for heating then select Natural Gas.

  2. *A building has heat pumps with backup electric resistance elements.* Since both modes of operation use electricity, select Electricity.

5.1.14.7 By Partition – Information Source, Primary Heating Fuel Types, Partition #1 to #N

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For each end-use fuel partition identify the source of information for the heating fuel type. Select the information source from the dropdown list.

1. Saw heating equipment and verified
2. Verbal from survey-site contact
3. Assumed from monthly billing data
4. Best estimate
5. Other

5.1.14.8 By Partition – Primary Cooling Fuel Type, Partition #1 to #N

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For each end-use partition area enter the cooling system fuel type. Select the fuel type from the dropdown list.

Natural Gas	Electricity
Purchased/Shared Chiller Water	None
Can't determine	

Following are some hints for determining cooling fuel type.

Identification of the type of cooling system in the following questions may help answer this question.

Electric fuel for cooling is the most common. Electric cooling could be provided by chillers in a central plant, packaged air conditioner or heat pump, split-systems, window A/C, or evaporative coolers (sometimes referred to as swamp coolers.)

Purchased or shared chilled water are more likely for tenants in a high-rise building or densely packed facilities. Gas cooling is less common but can be provided by absorption chillers as part of a central plant.

5.1.14.9 By Partition – Information Source, Primary Cooling Fuel Type, Partition #1 to #N

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For each end-use fuel partition identify the source of information for the cooling fuel type. Select the information source from the dropdown list.

1. Saw cooling equipment and verified
2. Verbal from survey-site contact
3. Assumed from monthly billing data
4. Best estimate
5. Other

5.1.14.10 By Partition – Does Partitioned Area have mechanical ventilation or exhaust, Partition #1 to #N

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For each partition area identify if it has an air ventilation system or electric fans to exhausts air to the outside. The following questions on heating and cooling system type will assist in answering this question. Generally, any space that is heated or cooled will have ventilation or exhaust. An unconditioned warehouse could have exhaust fans and that would qualify as a yes. A warehouse with radiant heat and no exhaust fans would qualify as a no. Enter a yes or no answer.

5.1.14.11 By Partition – Refrigeration Level (Refrigerated Warehouse Only), Partition #1 to #N [Conditional]

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

This question only appears for refrigerated warehouses. Walk-in refrigerators or freezers with self-contained or remote refrigeration system are considered as part of the refrigerated space. A warehouse should only be considered a refrigerated warehouse if there is at least 3,000 square feet of refrigerated or frozen storage. (See section 5.1.3.5 for more definition.) Select from the dropdown menu list at what level of refrigeration the partition is maintained.

Frozen
Refrigerated
None

5.1.15 End-Use Fuel Saturation - Whole Survey-Site

Heating

5.1.15.1 Survey-Site – What is Primary Heating System type? (Table 27)

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For the survey-site identify what is the primary heating system type (across the entire survey-site). If the surveyor cannot identify the heating system, they should ask the survey-site contact or facility maintenance department what type of heating system is used for the space. Select from the following options in the dropdown menu list.

Boiler/hydronic
Packaged System / Heat Pump

Split System / Heat Pump
Ductless Mini-Split Heat Pump
Room Heating
Gas Pack
Other
None
Can't determine

Following are descriptions of the heating types and pictures of typical systems.

A. Boilers

Boilers heat water which is then piped to the spaces on the survey-site needing heat. They are generally natural gas-fired in California but could also use propane. They can be found in basements, mechanical rooms, rooftops, or even outside. The larger the building, the larger the boiler. As indicated in the pictures of Figure 48 and Figure 49, the large boilers look like cylinders laying on their side, while the small and even medium boilers are rectangular metal boxes. They all have a gas pipe leading to them, an exhaust vent coming out the top, hot and cold (less hot) water pipes, and electric power lines and control wiring.

Figure 48. Large Gas Boiler for Heating Water to Heat Space.

Figure 49. Medium (left) and Small (right) sized Boilers for Heating Water to Heat Space.

B. Packaged Heat / Heat Pump

Packaged heating units heat air that is delivered through air ducts to spaces on the survey-site needing heat. They generally use electricity or natural gas in California but could also use propane. They are most commonly found on the roof of buildings (and commonly referred to as rooftop units or RTUs). They can also be found outside at ground level next to a building. They come in different sizes and are generally packaged to also contain compressors for the cooling system. If they don't contain the cooling system, then they are referred to as furnaces and use gas or propane as fuel. Heat pumps use electricity as fuel.

They generally are found on single-story buildings but may also be found on two- or three-story buildings serving all floors. If they are found on taller buildings, they generally only serve an area on the top floor and are not the primary heating system type. Examples of gas-fired units are found in Figure 50 to Figure 52. They all have a metal boxy look to them. They may have an angled vent protruding on one side to bring outside air into the space. They all have a gas pipe leading to them (although generally no large combustion exhaust vent) and a shut-off valve on the gas line right next to the unit, electrical conduit lines leading to them, and generally a PVC or copper condensate line to drain away water from the air conditioning part of the system, and control wiring. Sometime for RTUs the gas line will come through the rooftop right next to the unit and sometimes the gas line will be run across the rooftop to serve multiple units.

Many rooftops will be off limits to the field surveyor since no ladder climbing is allowed for safety reasons. However, some rooftops can be accessed from stairways and access would be allowed. The RTUs on those roofs can be inspected to determine the type of system as long as the roof has a perimeter barrier of at least 42 inches high as discussed in section 4.1.1.3.

Figure 50. Rooftop Gas Packaged Unit (supplying heating and cooling).

Figure 51. Rooftop Gas Packaged Unit (supplying heating and cooling).

Figure 52. Gas Packaged Unit at ground level (supplying heating and cooling).

Packaged heating units can also have an electrical fuel source. These units heat air that is delivered through air ducts to spaces on the survey-site needing heat. There are two main types: heat pumps and electric resistance heaters. They are most commonly found on the roof of buildings (and commonly referred to as rooftop units or RTUs). They can also be found outside at ground level next to a building. They come in different sizes and are packaged to also contain compressors for the cooling system. They generally are found on single-story buildings but may also be found on two- or three-story buildings serving all floors. If they are found on taller buildings, they generally only serve an area on the top floor.

Examples of them are found in Figure 53 to Figure 55. They all have a metal boxy look to them. They may have an angled vent protruding on one side to bring outside air into the space. They all have electrical conduit lines leading to them, and generally a PVC or copper condensate line to drain away water from the air conditioning part of the system, and control wiring. There will be no gas line to the unit. Most packaged units without gas are heat pumps. Generally, the only way to identify if the unit has electric resistance heating elements is to find the information on the nameplate. Nameplates are notorious for being hard to read because they weather unless the unit is relatively new.

Figure 53. Rooftop Heat Pump Packaged Unit (supplying heating and cooling).

Figure 54. Rooftop Heat Pump Packaged Unit (supplying heating and cooling).

Figure 55. Packaged Heat Pump Unit at ground level (supplying heating and cooling).

C. Split System Heat / Heat Pump

Split system heating can be electric, gas, or propane but does not directly provide ventilation from outside air. The most common electric fuel source split system heating is heat pumps. However, not all heat pumps are split systems, since many are packaged heat pumps that have outside air intake for ventilation. Heat pumps are common for buildings that do not have gas or propane heating fuel sources. Electric resistance heating can be part of a split system, but typically only in conjunction with a heat pump. Heat pumps also provide cooling. The outdoor component can be found on the roof of buildings or at ground level near a building. They can be found on any size building. If they are on a large building, they may only serve a small zone. Examples of split system heat pumps are shown in Figure 56 to Figure 58. They all have a metal boxy look to them. Split systems do not have an outside air intake connected to the outside component. They all have a pair of refrigerant pipes leading to the outdoor unit, electrical conduit lines leading to them, and control wiring. They do not have gas lines leading to them.

Figure 56. Outdoor Compressor/Condenser Unit of a Split System Heat Pump Mounted on a Roof.

Figure 57. Outdoor Compressor/Condenser Unit of a Split System Heat Pump Mounted on the Ground.

Figure 58. Split System Indoor Fan Coil without Ducting.

Heating can also be provided by gas in a split system. Typically, these would be found in small commercial buildings and are similar to residential forced air furnace systems. The diagram in Figure 59 shows a forced air furnace. The furnace is generally in a closet or above the ceiling but can also be in a crawl space below the floor. Gas lines will lead to the furnace.

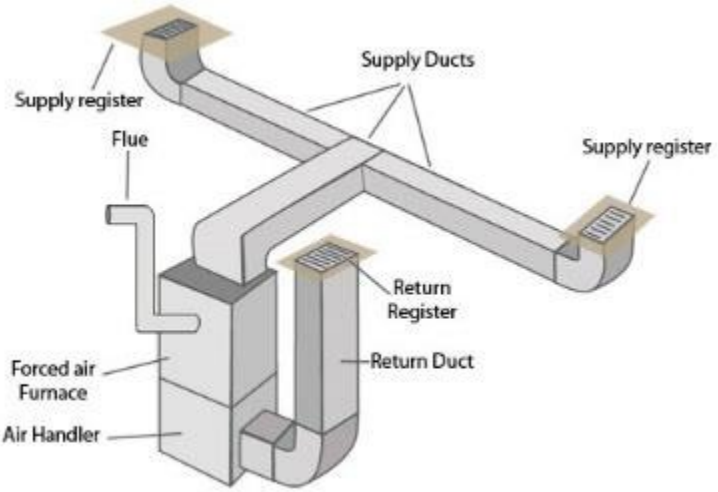


Figure 59. Diagram of Forced Air Gas Furnace Split System.

D. Ductless Mini-Split System Heat Pump

Ductless mini-split heat pumps are always electric and do not directly provide ventilation from outside air. The most common placement is in residential style buildings (often a retrofit in older homes that have been converted to businesses). Heat pumps provide cooling and heating. The outdoor compressor unit can be found on the roof of buildings or at ground level near a building. The indoor fan unit does not have any air ducts and is generally surface mounted on a wall. There is typically one indoor fan unit per heating zone. They generally are only used in small buildings or in small zones of a building. An examples of a ductless mini-split system heat pump is shown in Figure 60. Usually they have a remote control for the thermostat. They all have a pair of refrigerant pipes leading to the outdoor unit, electrical conduit lines leading to them, and control wiring. They do not have gas lines leading to them.

Figure 60. Indoor Fan (left) and Outdoor part (right) of Ductless Mini-Split Heat Pump.

E. Room Heat

Room heaters are as the name implies, located in the room they provide heat. They do not distribute heat to other parts of a building. They can be natural gas-fired, propane-fired, electric resistance, or

window mounted heat pump. None of these systems provide outside air ventilation. Some are found suspended from the ceiling (often in high bay areas such as check out registers in home improvement centers). They generally are self-contained and are not large compared to other types of heating or cooling systems. Some are wall mounted and some are mounted in exterior walls, much the same way a window air conditioning unit is mounted. Examples of room heaters are found in Figure 61 to Figure 66. Except for heat pumps, they only provide heating.

Figure 61. Gas-fired Heater mounted in High Bay Ceiling area.

Figure 62. Electric Heater for Room.

Figure 63. Gas-fired Infrared Heater providing heat from above.

Figure 64. Ceiling Mounted Gas-fired Infrared Heater (not on).

Figure 65. Wall Mounted Electric Heater.

Figure 66. Window Mounted Heat Pump.

Cooling

5.1.15.2 Survey-Site – What is Primary Cooling System type? (Table 27)

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For the entire business survey-site identify what is the primary cooling system type. Ask the survey-site contact or facility maintenance department what type of cooling system is used for this space. Select from the dropdown menu list that will have the following options.

Central Plant (Chiller)
Packaged System / Heat Pump
Split-system / Heat Pump
Ductless Mini-Split Heat Pump
Room Cooling
Swamp/Evaporative Cooler
None
Other: _____
Can't determine

A. Central Plant

Chillers are the cooling equipment for large facilities. The chillers can be located in a central plant (separate building for campus arrangements), in a basement mechanical room, in a rooftop penthouse, or outside at ground level. They generally cool water that is circulated in chilled water pipes to the various parts of the survey-site where cooling is needed. The chiller(s) may have a cooling tower nearby to disperse the heat removed from the water in the chilled water loop. Some will have air cooled condensers. Generally, there will be more than one chiller (either for backup or to stage them as they need more cooling.) Chillers can be electric or gas absorption. The electric chillers are centrifugal chillers, screw compressors chillers, and reciprocating compressor chillers. The gas absorption chiller is the only one that will have a large gas pipe leading to it. Reciprocating chillers often have more than one compressor feeding into a manifold. Examples of central plant cooling systems are shown in Figure 67 to Figure 70. Examples of cooling towers for chillers are shown in Figure 71 to Figure 73.

Figure 67. Centrifugal Chillers in Mechanical Room.

Figure 68. Screw Compressor Chiller.

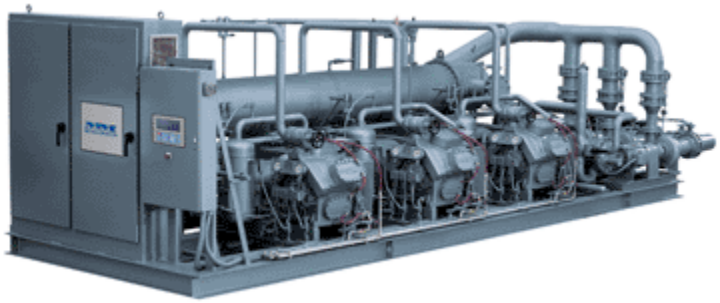


Figure 69. Reciprocating Compressor Chiller.

Figure 70. Gas Absorption Chiller.

Figure 71. Air Cooled Chillers.

Figure 72. Water Cooling Tower, Small.

Figure 73. Water Cooling Tower, Large.

B. Packaged Air Conditioning / Heat Pump

Packaged air conditioning units cool air that is delivered through air ducts to spaces on the survey-site needing cooling. They are powered by electricity. They are most commonly found on the roof of buildings (and commonly referred to as rooftop units or RTUs). They can also be found outside at ground level next to a building. Most buildings that have RTUs, have many of them. They come in different sizes.

They generally are found on single-story buildings but may also be found on two- or three- story buildings serving all floors. If they are found on taller buildings, they generally only serve an area on the top floor and are not the primary cooling system. Examples of packaged air conditioning units are shown in Figure 74 to Figure 76. They all have a metal boxy look to them. They all should bring outside air into the space, generally through an angled vent protruding on one side. They all have electrical conduit lines leading to them. The compressor units generally have a PVC or copper condensate line to drain away water from the air conditioning part of the system, and control wiring. Some have gas lines leading to them for gas heating. If there are no gas lines, then they are likely heat pumps.

Figure 74. Rooftop Packaged Air Conditioning Units.

Figure 75. Rooftop Packaged Air Conditioning Unit (with gas heat).

Figure 76. Small Rooftop Packaged Air Conditioning Unit.

C. Split System Air Conditioning

Split system air conditioning cools refrigerant that is delivered through pipes to spaces on the survey-site needing cooling. Inside the space there are indoor fan coils, usually in an overhead space, that blow air across the coils to cool the space. There can be ducting from the fan coil unit to the space, so it can serve more area. Split system heat pumps can also provide heating. Split systems are powered by electricity. The outdoor component can be found on the roof of buildings or at ground level near a building.

They can be found on any size building. Examples of packaged air conditioning units are shown in Figure 77 to Figure 83. They all have a metal boxy look to them. Split systems do not have an outside air intake connected to the outside component. They all have a pair of refrigerant pipes leading to the outdoor unit, electrical conduit lines leading to them, and control wiring. They do not have gas lines leading to them.

Figure 77. Outdoor Compressor/Condenser Unit of a Split System Mounted on a Roof.

Figure 78. Outdoor Compressor/Condenser Unit of Multiple Split Systems Mounted on a Roof.

Figure 79. Outdoor Compressor/Condenser Unit of a Split System Mounted on the Ground.

Figure 80. Split System Indoor Fan Coil with Ducting.

Figure 81. Split System Indoor Fan Coil without Ducting.

Figure 82. Split System Indoor Fan Coils Surface Mounted without Ducting.

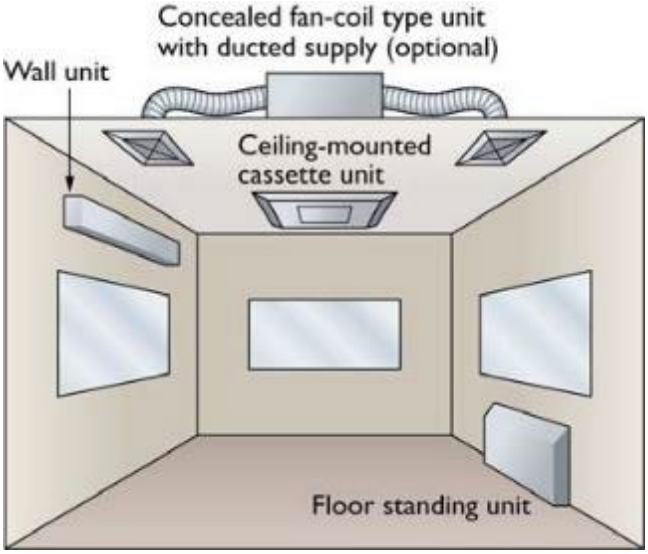


Figure 83. Diagram of Split System Indoor Fan Coil Deliver Options.

D. Ductless Mini-Split System Heat Pump

Ductless mini-split heat pumps are always electric and do not directly provide ventilation from outside air. The most common placement is in residential style buildings (often a retrofit in older homes that have been converted to businesses). Heat pumps provide cooling and heating. The outdoor compressor unit can be found on the roof of buildings or at ground level near a building. The indoor fan unit does not have any air ducts and is generally surface mounted on a wall. There is typically one indoor fan unit per cooling zone. They generally are only used in small buildings or in small zones of a building. An examples of a ductless mini-split system heat pump is shown in Figure 84. Usually they have a remote control for the thermostat. They all have a pair of refrigerant pipes leading to the outdoor unit, electrical conduit lines leading to them, and control wiring.

Figure 84. Indoor Fan (left) and Outdoor part (right) of Ductless Mini-Split Heat Pump.

E. Room Cooling

Room cooling, as the name implies, is located in the room it is cooling. They do not distribute cooling to other parts of a building. They are electric powered. A room cooling unit is self-contained and does not have air ducts. They can be mounted in a window or an exterior wall if they do not bring in outside air. They are not large compared to other types of cooling systems. A common example is the air conditioning unit in a motel room. These systems do not provide outside air ventilation. Examples of room coolers are found in Figure 85 to Figure 87. Except for heat pumps, they only provide cooling.

Figure 85. Under Window Mounted Air Conditioner.

Figure 86. Window Mounted Air Conditioner.

Figure 87. Portable Air Conditioner.

F. Swamp / Evaporative Cooler

Less common in commercial buildings are evaporative coolers which provide outside air ventilation. These will have a water pipe leading to them. Units that use outdoor air for evaporation are shown in Figure 88 and Figure 89. Some evaporative coolers can be found completely within a space and generally are portable and do not have water pipes leading to them. These have an onboard water tank that must be manually filled. They do not distribute cooling to other parts of a building. All Swamp or evaporative coolers have electric fan motors and as such are considered to have ventilation (even if not from outside). They are electric powered.

Figure 88. Roof Mounted Evaporative Cooler.

Figure 89. Side Mounted Evaporative Coolers.

Figure 90. Portable Evaporative Cooler.

Figure 91. Large Portable Evaporative Cooler.

Ventilation

5.1.15.3 Survey-Site – What type of Air Distribution System is used by the Central Plant in the Building? [Conditional] (Table 27)

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

If the cooling system type of central plant was selected, then an additional question will be asked to identify the air ventilation system type. A facility that has a central cooling plant will have a facility maintenance department that can easily answer the question. Select from the dropdown menu.

Dual Duct Variable Air Volume
Dual Duct Constant Air Volume
Single Duct Variable Air Volume
Single Duct Constant Air Volume
Fan Coil / Unit Ventilator
Other _____

Domestic Water Heating

5.1.15.4 Survey-Site – Is there hot water available at the survey-site? (Table 28)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department if Is there hot water available at the survey-site? . If at least some of the restrooms have hot water check the box for a Yes answer.

5.1.15.5 Survey-Site – What % of survey-site has access to Hot Water? [Conditional]

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what areas have access to hot water. Use the floor area partitions to identify areas that have access to hot water and calculate the percent of floor area based on those partitions versus the total survey-site square footage.

For example, if an elementary school has several buildings and the restrooms for the student classrooms do not have hot water, then those classroom buildings would not be included in the overall percentage of space with access to hot water. Enter the percent as a number from 0 to 100.

5.1.15.6 Survey-Site – What % of domestic water heated by Gas?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what type of fuel is used to heat the water. If natural gas is used, identify what percent of the domestic hot water is heated by gas. If there is no natural gas to this business, then the answer is 0%. The percentages provided by all the water heating fuel sources, except heat recovery, must add to 100%. Some examples of gas water heaters are provided in Figure 92.

Figure 92. Gas Water Heaters.

5.1.15.7 Survey-Site – What % of domestic water heated by Electricity?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what percent of the domestic hot water is heated by electricity. Electric water heaters can be small and sometimes located in ceiling spaces or hidden from view. Some examples of electric water heaters are provided in Figure 93.

Figure 93. Electric Water Heaters.

5.1.15.8 Survey-Site – What % of domestic water heated by Solar?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what percent of the domestic hot water is heated by solar. Solar water heating has multiple panels generally roof mounted with water pipes leading to them. The piping will then go to a storage tank that provides pre-heated water to the primary water heater. There will still be a primary water heater (and fuel type) in addition to the solar. Some examples of panels and tanks are provided in Figure 94 and Figure 95.

Figure 94. Solar Water Heater Panels.

Figure 95. Solar Hot Water Storage Tanks.

5.1.15.9 Survey-Site – What % of domestic water heated by Propane?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what percent of the domestic hot water is heated by propane. Propane water heaters will look just like gas water heaters, **so the only distinction is if the nameplate lists the fuel source for the burner.** If the water heater has a burner (flame) and the customer does not have an account with a natural gas supplier, then the water heater fuel is likely propane.

5.1.15.10 Survey-Site – What % of domestic water heated by Purchased / Shared Hot Water?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what percent of the domestic hot water is heated by purchased or shared hot water. For purchased hot water there may be no equipment to see or inspect except a hot water pipe coming from off the survey-site. Purchased or shared hot water is more likely for tenants in a high rise building or densely packed facilities.

5.1.15.11 Survey-Site – What % of domestic water heated by Heat Recovery?

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, ask the survey-site contact or facility maintenance department what percent of the domestic hot water is heated through heat recovery. This may just be an estimate because the facility may not meter this internal transfer of energy. Heat recovery may be from a combined heat and power (CHP) generation of electricity. Since the process is recovering heat from another fuel source, this entry is not included in the summation of water heater fuel sources. The waste heat from the process may be captured through heat exchangers for domestic hot water use. An example of a heat exchanger is shown in Figure 96.

Figure 96. Heat Exchanger.

5.1.15.12 By Survey-Site – Domestic Water Heating - Information Source

Tab: End-Use	Data Type: Dropdown List	Pre-Populated: No	Can Edit: Yes

For the domestic water heating fuel type identify the source of information. Select the information source from the dropdown list.

Saw water heating equipment and verified
Verbal from survey-site contact
Assumed from monthly billing data
Best estimate
Other

Office & IT Equipment

5.1.15.13 Survey-Site – Office Equipment – Is there any Office Equipment present? (Table 29)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there is any office equipment in use. Check the box for "Yes" if the site has office equipment including any computer, monitor, tablet, server, copier, fax machine, printer, telephone system, cash register, shredder, uninterruptable power supply, etc.

5.1.15.14 Survey-Site – Office Equipment – Are there any Web/IT Server Racks present? [Conditional] (Table 30)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there are any web or IT server racks present and in use. Select "Yes" if there are; otherwise select "No." One or two computers do not classify as servers. If the IT space is less than 100 square feet (10' x 10'), then answer "No" by unchecking the box. This question only becomes visible if the previous office equipment question was answered "Yes."

5.1.15.15 Survey-Site – Office Equipment – What is the Square Footage of the Server Space? [Conditional]

Tab: End-Use	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

If there are server racks, identify or measure the room or space they occupy. If the space is less than 100 square feet (10' x 10'), then do not include.

Exterior Lighting

5.1.15.16 Survey-Site – Exterior Lighting – Are there any Exterior Lights at The Survey-Site fed by the meter(s)? (Table 31)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there are any exterior lights. If there are exterior lights, determine if they are fed from the meter(s) serving the rest of the survey-site.

If the electrical room of the survey-site has panels identifying outdoor lighting circuits or timer control panels for the outdoor lights, then answer "Yes" by checking the box. Otherwise select "No" by unchecking the box. Exterior lights that are mounted on the exterior walls of a building or lighting under an overhang or porch area are typically on the electric meter serving the survey-site. However, lighting under a covered walkway in front of a strip mall is generally served by a common area meter and is not on the tenant's meter. If the survey-site is a tenant space, do not include exterior lighting that is provided by property management electric meter.

5.1.15.17 Survey-Site – Exterior Lighting – Are there minor Exterior Lights on this meter(s)?

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

This question only appears if the answer to "Are there any Exterior Lights at The Survey-Site fed by the meter(s)?" is "Yes". Minor exterior lights include lights that illuminate entryways, lights affixed to walls or overhangs, or pole-mounted fixtures (if fewer than ten). If the lights are on the meter but do not qualify as major exterior lights as defined in the next subsection, then they are minor exterior lights.

5.1.15.18 Survey-Site – Exterior Lighting – Are there any Major Exterior Lights, such as parking lot lights, at the Survey-Site Fed by the meter(s)? [Conditional]

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

This question only appears if the answer to "Are there any Exterior Lights at The Survey-Site fed by the meter(s)?" is "Yes". For the survey-site, survey to see if there are any **major** exterior lights. Major exterior lights could be such as for a large parking lot or outdoor security lighting more than just at the entryways. Canopy lights at gas stations would also qualify as major exterior lighting. If there are major exterior lights, determine if they are fed from the meter(s) serving the rest of the survey-site.

If the electrical room of the survey-site has panels identifying these outdoor lighting circuits or timer control panels for these outdoor lights, then answer "Yes" by checking the box. Otherwise select "No" by unchecking the box. For this survey, we will consider major to be at least 10 pole-mounted fixtures or parking garages of at least 20,000 square feet. *Note, a pole can have more than one fixture.* One example of major outdoor lighting is the car lots at an auto dealership. The lights in that situation are going to be on a meter associated with the survey-site. In the case of a shopping center, the parking lot lighting is often on a common area meter and not directly tied to any of the shops, unless it is on the anchor tenant meter, such as a grocery store. Outdoor security lighting along pathways and other open areas is another example of what could be major exterior lighting. The question for minor exterior lighting becomes irrelevant if there is major exterior lighting.

Cooking

5.1.15.19 Survey-Site – Cooking – Is there any Minor Cooking Equipment Present? (Table 32)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there is any minor cooking equipment present and active. Select "Yes" by checking the box if the cooking equipment includes residential ovens or stovetops, microwaves, coffee maker, toaster, countertop oven, etc. They could be in break rooms, conference rooms, etc. Otherwise select "No" and uncheck the box. If yes, the following conditional question appears.

5.1.15.20 Survey-Site – Cooking – % of Minor Cooking provided by Natural Gas? [Conditional]

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For survey-sites that have minor cooking equipment, estimate what percent of the minor cooking equipment uses natural gas. Ask the survey-site contact for an estimate of the fuel source breakdown for food preparation and cooking for natural gas. Or ask how many minor cooking appliances are fueled by natural gas and how many are electric. Use that ratio to develop the percentage. Enter as a percent from 0 to 100.

For example, if there is one gas range, one electric toaster, and two microwaves then the answer is 25% (1 gas / 4 electric).

5.1.15.21 Survey-Site – Cooking – Is there any Major Cooking Equipment present?

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there is any major cooking equipment present and active. Select "Yes" by checking the box if the cooking equipment includes professional or commercial grade equipment: ovens, ranges, broilers, fryers, etc., for mass food service preparation such as in restaurants, schools, hotels, hospitals, community centers, etc. Otherwise select "No" by unchecking the box. If yes, there will be follow up questions about the cooking equipment.

5.1.15.22 Survey-Site – Cooking – For non-restaurant survey-sites, what is the total Square Footage of the Kitchen and Dining Floor area? [Conditional]

Tab: End-Use	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

If the answer to the previous question is "Yes" **and the survey-site is not a restaurant**, then this question will appear in the Tool on the tablet. This question applies to sites that have a commercial cooking facility, such as a restaurant that is part of a hotel, a cafeteria at a school, a cafeteria at a hospital, a cafeteria in a large office building, a fast food restaurant in a Walmart, a food court in a Costco, or a bakery or coffee shop in a grocery store. The square footage should include the kitchen area and dining area (if applicable). If the restaurant or kitchen has its own meter and is not part of the survey-site, then do not include it. Enter the measured square footage for the kitchen and dining area.

5.1.15.23 Survey-Site – Cooking – Is all the Commercial Grade Cooking Equipment Electric? [Conditional]

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

Ask the manager or chef if all the commercial grade cooking equipment at the survey-site is electric? **Select a yes or no answer.** If yes check the box, and all the commercial grade cooking equipment is electric in the kitchen, then the following questions (sections 5.1.15.24 to 5.1.15.27) of equipment inventory are not needed and will not be asked. If the answer is no, then inventory the major cooking and identify the fuel source for each piece of cooking equipment.

5.1.15.24 Survey-Site – Cooking – % of Major Cooking provided by Electricity. ***[Conditional]***

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, provide an estimate of what percent of the cooking uses electricity. You must ask the survey-site contact or the head chef for an estimate of the fuel source breakdown for food preparation and cooking between natural gas, electricity, and other. If there is major cooking equipment, the percent use of natural gas and electricity should add to 100%. An exception would be if the kitchen has propane-fired equipment or a wood-fired barbecue pit in or near the kitchen, and they have a percent of cooking energy use provided by that fuel source. The percent of cooking provided by a fuel type should be based on the chef's estimate of cooking energy used by the fuel type (i.e. electricity) versus total cooking energy use. If no estimate is provided ask what are the top meal items sold and what cooking fuel is used to prepare them. Then ask the original question again. If they answer the question about the most popular food items prepared, but not the percent of cooking by fuel type make your own best estimate based on what you see.

5.1.15.25 Survey-Site – Cooking – % of Major Cooking provided by Natural Gas. ***[Conditional]***

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, provide an estimate of what percent of the cooking uses natural gas. You must ask the survey-site contact or the head chef for an estimate of the fuel source breakdown for food preparation and cooking between natural gas, electricity, and other. If there is major cooking equipment, the percent use of natural gas and electricity should add to 100%. An exception would be if the kitchen has propane-fired equipment or a wood-fired barbecue pit in or near the kitchen. The percent of cooking provided by a fuel type should be based on the chef's estimate of cooking energy used by the fuel type (i.e. natural gas) versus total cooking energy use. If no estimate is provided ask what are the top meal items sold and what cooking fuel is used to prepare them. Then ask the original question again. If they answer the question about the most popular food items prepared, but not the percent of cooking by this fuel type then make your own best estimate based on what you see.

5.1.15.26 Survey-Site – Cooking – % of Major Cooking provided by Propane or Other. ***[Conditional]***

Tab: End-Use	Data Type: %	Pre-Populated: No	Can Edit: Yes

For the survey-site, provide an estimate of what percent of the cooking uses propane gas (LPG) or other fuel source. You must ask the survey-site contact or the head chef for an estimate of the fuel source breakdown for food preparation by the equipment using propane or other fuel sources. Make sure the total fuel source percentages add to 100%. The percent of cooking provided by a fuel type should be based on the chef's estimate of cooking energy used by the fuel type (i.e. propane or other fuel) versus total cooking energy use. If no estimate is provided ask what are the top meal items sold and what cooking fuel is used to prepare them. Then ask the original question again. If they answer the question about the most popular food items prepared, but not the percent of cooking by this fuel type then make your own best estimate based on what you see.

5.1.15.27 Survey-Site – Cooking – List the Commercial Grade Cooking Equipment by Fuel Type. ***[Conditional]***

Tab: End-Use	Data Type: Table	Pre-Populated: No	Can Edit: Yes

The intent for this question is to provide a secondary source to quantify the percent of cooking energy use attributed to fuel types, particularly gas and electric. Go through the kitchen with the manager or chef and identify the commercial grade cooking equipment quantities and the fuel source for each. If they cannot provide answers to (5.1.15.24 to 5.1.15.26) then this will become the primary allocation of cooking by fuel type. Use the table below to categorize the equipment. **If they have a piece of**

equipment, which is not used or rarely used, then enter a zero in the inventory. If there are two of the same equipment and they only use one then enter one in the inventory but include that there are two in the notes. If there are none of an equipment type then leave entry blank. An example of other fuel source could be propane or wood for a wood-fired barbecue pit in or near the kitchen. The CEUS Tool™ will calculate an estimate of percent of fuel use by fuel type based on the quantity of items entered into the inventory table.

Table 9. Table of Commercial Grade Cooking Equipment

Cooking Equipment Type	Quantity Electric	Quantity Gas	Quantity Other Fuel
BBQ			
Broiler			
Charbroiler			
Coffee Maker			
Dishwasher			
Fryer			
Griddle / Grill			
Hot Food Table / Hot Plates / Food Warmer			
Microwave			
Mixer			
Oven			
Range / Cooktop			
Rotisserie			
Soup Pots / Kettle			
Steamer			
Toaster			
Other major equipment			

Examples of various types of commercial grade cooking equipment are shown in Figure 98 to Figure 113.

Figure 97. Broilers.

Figure 98. Charbroilers.

Figure 99. Ovens, Convection and Bakery.

Figure 100. Ovens, Rack and Conveyor.

Figure 101. Microwave Ovens.

Figure 102. Ranges: Multi-burner with oven, and Countertop.

Figure 103. Fryers.

Figure 104. Griddle and Sandwich Grill.

Figure 105. Rotisseries.

Figure 106. Toasters.

Figure 107. Coffee Makers.

Figure 108. Kettles and Soup Pot.

Figure 109. Steamers.

Figure 110. Hot Food Table, Hot Food Buffet, Food Warmer.

Figure 111. Hot Plate Table, Food Warmer Trays, Heated Display Warmer.

Figure 112. Mixers.

Figure 113. Dishwashers and Sanitizers.

Refrigeration

5.1.15.28 Survey-Site – Refrigeration – Is there any residential refrigeration Equipment present at the survey-site?

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

This question is asked if the only box checked in the refrigeration table is self-contained refrigerated units. Now identify if any of these units are residential style refrigerators (which can have a freezer compartment). Check the box for yes if the any refrigeration at the survey-site is in the form of residential style refrigerators, such as found in many break rooms. Mini-frigs also qualify for this category. However, if there are refrigerated soda vending machines they are not considered for this question.

5.1.15.29 Survey-Site – Refrigeration – Is there any Commercial Refrigeration Equipment present? (Table 33)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there is any commercial refrigeration equipment. Select "Yes" by checking the box if there is and "No" by unchecking the box if no commercial refrigeration exists. Refrigeration equipment is used where temperatures are maintained below 55 ^{o}F. That includes walk-in refrigerators and freezer used for storage of anything from flowers, vegetables, dairy, beverages, meat, ice, frozen foods, to ice cream.

5.1.15.30 Survey-Site – Refrigeration – Identify what types and levels of Refrigeration are present. [Conditional]

Tab: End-Use	Data Type: Check Box Table	Pre-Populated: No	Can Edit: Yes

Identify the type and level of refrigeration present at the survey-site. A freezer is a space maintained at below 32 ^{o}F. Refrigeration typically runs between 33 ^{o}F and 55 ^{o}F. In the table below select all the types and levels of refrigeration that are present at the site by checking the check box.

System Types	Walk-In Refrigeration	Walk-In Freezer	Non-Residential Refrigerated units	Freezer units
Central / Remote Compressors	☐	☐	☐	☐
Self-contained	☐	☐	☐	☐

The term "central compressors" or "remote refrigeration" refers to a refrigeration system where the compressor(s) are located in a different area than the cold storage. Figure 114 to Figure 120 show the two parts of a central or remote refrigeration system (compressors and cold storage). In this context, refrigeration also refers to any level of product cooling, from cool dairy cases to ice cream freezer cases. Ice makers at soda fountains in fast food restaurants are generally connected to a remote compressor. Refrigeration can be for any size storage, whether it is a small one-door case with drinks to a large walk-in storage room for frozen goods. Walk-in refers to a room-sized space with a door that a person can walk into, whereas units refers to cases, glass door display cases, boxes (like residential refrigerators or freezers). Walk-ins do not need to be separate partitions in the drawing.

Central or remote refrigeration compressor racks are sometimes found in the compressor room, which for some full-size grocery stores is in a second level mezzanine area toward the back of the store. In other facilities, the compressors may be found on the roof or at ground level outside the back of the building. Refrigerant lines in grocery stores are run underground/overhead to refrigerated or frozen food display cases and walk-ins to keep them invisible to the customers.

Figure 114. Central or Remote Refrigeration Rack with Multiple Compressors.

Figure 115. Central or Remote Refrigeration Rack with Multiple Compressors.

Figure 116. Remote Refrigeration Rack with Single Compressor.

Figure 117. Refrigerated Glass Door Cases served by Central/Remote Compressor Rack (not in picture).

Figure 118. Refrigerated Open Cases served by Central/Remote Compressor Rack (not in picture).

Figure 119. Refrigerated Coffin Cases served by Central/Remote Compressor Rack (not in picture).

Figure 120. Evaporator Fan Unit in Walk-In Cooler served by Central/Remote Compressor Rack, not shown.

The term "**self-contained refrigeration**" refers to a refrigeration system where all components are built into one unit. The simplest example is the refrigerator in a residential kitchen. These systems plug into a power outlet and can be moved (not as portable as some appliances) and there is no hard connection of power or refrigeration lines. Some may have a water line to supply refrigerators with an ice maker. Self-contained units can be refrigerators, refrigerated display cases, soda vending machines, cold sandwich case vending machines, freezers, ice makers, or even walk-ins, etc. Ice makers found in hallways near rooms at hotels and motels are usually self-contained. Although ice makers can also be connected to remote compressors, the key is if there are any refrigerant lines leading to the ice maker making it unmovable. Another factor in identifying self-contained refrigeration units, especially refrigerated display cases, is if they have vents on the top or bottom, such as those shown in Figure 121. Hotel room mini-refrigerators are self-contained. Refrigerators in break rooms are self-contained. Residential style refrigerators often show no sign of vents. Example pictures of various self-contained refrigeration units are shown in Figure 121 to Figure 125.

Figure 121. Self-Contained Refrigeration Display Cases.

Figure 122. Self-Contained Ice Maker and Drink Vending Machine (left), Room Refrigerator (right).

Figure 123. Residential Refrigerator / Freezer Unit.

Figure 124. Self-contained Horizontal Residential Style Freezer.

Figure 125. Self-contained Walk-In Cooler or Freezer, Compressor on roof of the cooler.

5.1.15.31 Survey-Site – Refrigeration – How much Floor Space (in sq ft) is Refrigerated Storage?

Tab: End-Use	Data Type: Numeric	Pre-Populated: No	Can Edit: Yes

For survey-sites that are not refrigerated warehouse, restaurant, or food stores find out how much of the floor space is occupied by refrigerated storage, whether it is a refrigerated section of the building, a walk-in refrigerator or freezers, or other large refrigerated system. This question does not apply to restaurant-type areas such as cafeterias at schools, high-rise offices, or hospitals, or a restaurant in a hotel. Cafeterias are effectively restaurants within other building types so there is no need to measure the square footage of the refrigerated space. This question is geared to other non-conventional uses of refrigeration such as a laboratory that keeps frozen samples, a morgue at the police station, a floral nursery that keeps flowers cold (but something larger than just typical display cases at the local florist), cold storage of blood at a blood center, etc. Only include if the refrigerated (or freezer) storage area is more than five percent (5%) of the total survey-site area. Measure the area of all the cold storage and enter the value in square feet.

Air Compressors

5.1.15.32 Survey-Site – Air Compressors – Are there any Air Compressors present? (Table 34)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there are any air compressors. Also ask the survey-site contact. Select “Yes” by checking the box if there is and “No” by unchecking the box if no air compressors exist for the survey-site. Air compressors are used in automotive repair shops, woodworking shops, buildings with pneumatic HVAC controls, dry cleaners, dentists, paint shops, etc. An air compressor has a motor

that runs a compressor that fills a tank with pressurized air. **Note: the air compressor must have an air reservoir storage tank to be counted.** Example pictures are shown in Figure 126 to Figure 127.

Figure 126. Air Compressors.

Figure 127. Air Compressors.

Motors

5.1.15.33 Survey-Site – Motors – Are there any Motors excluding above mentioned? (Table 35)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there are any motors—excluding motors for refrigeration, air compressors, and HVAC (which includes air handler fan motors, chilled water pump motors, condenser water pump motors, cooling tower fan motors, chiller or compressor motors) or cooking. Also ask the

survey-site contact. Select “Yes” if there is and “No” if no other motors exist at the survey-site. Motors that would apply include any listed in Table 10. **Note: the motor should be at least six inches in diameter.** Example pictures of these applications are shown in Figure 128 to Figure 133. Any motors included for this question should not be included in the miscellaneous equipment or compressor questions. Any motors not covered by the categories listed in Table 10 are covered in the next Section 5.1.15.34, as miscellaneous equipment.

Table 10. Table of Motor Applications to Qualify for this Question

Water pump (Pool, Well, Fountain, etc.)
Conveyor
Vacuum
Mixer
Elevator
Escalator
Fan motor

Figure 128. Motor on a Water Pump.

Figure 129.Motor on a Parts delivery Conveyor.

Figure 130.Vacuum Pump Motor.

Figure 131.Mixer Motor.

Figure 132.Elevator Motor – All a surveyor needs to know is that there is an Elevator. Same for Escalator.

Figure 133.Fan Motor.

5.1.15.34 Survey-Site – Miscellaneous Equipment – Is there Electric Misc. Equipment? (Table 36)

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No		Can Edit: Yes

For the survey-site, survey to see if there is any electric powered miscellaneous equipment. Also ask the survey-site contact. Select "Yes" if there is and "No" if no other electric miscellaneous equipment exists for the survey-site. Miscellaneous equipment refers to anything that uses energy that is not addressed in the previous questions (sections 5.1.14.6 to section 5.1.15.33). Any equipment included for this question should not be included in the motors and compressors questions. Examples of miscellaneous equipment that could be included are listed in Table 11, but not restricted to these items. No picture examples are given because there could be many more than feasible to show. If a motor is attached to a piece of equipment and is exposed such that the nameplate information can easily be viewed and is more than six inches in diameter then the motor should be listed in the motor equipment section (5.1.15.33) not the miscellaneous equipment section.

Table 11. Examples of Miscellaneous Electric Equipment

Electronics	Service/Retail	Shop Equipment	Laundry	Building Equipment	Space Comfort
Stereo System	Scanners	Shop Equipment, etc.	Clothes Dryer	Hand Dryers, Battery chargers	Air Cleaner
Theater Systems	Vending Machines (Non-Refrigerated)	Forklifts	Clothes Washer	Trash Compactor, Shredder	Ceiling or Portable Fan
Broadcasting equipment	ATM Machines, Video Games	Battery Charger	Ironing	Pool Heaters, Pool pumps	Portable Heaters
TV, VCR	Medical	Kiln / Welder		Security Alarm	Exhaust fans
Radio, clock	Dryer / Dehydrator	Trash Compactor			Humidifier

5.1.15.35 Survey-Site – Miscellaneous Equipment – Is there Natural Gas Misc. Equipment?

Tab: End-Use	Data Type: Yes / No	Pre-Populated: No	Can Edit: Yes

For the survey-site, survey to see if there is any gas-powered miscellaneous equipment. Also ask the survey-site contact. Select "Yes" if there is and "No" if no other gas miscellaneous equipment exists for the survey-site. Miscellaneous equipment refers to anything that uses energy that is not addressed in the previous questions (sections 5.1.14.6 to section 5.1.15.33). Examples of miscellaneous equipment that could be included are listed in Table 12, but not restricted to these items.

Table 12. Examples of Miscellaneous Gas Equipment

Service/Retail	Shop Equipment	Laundry	Building Equipment
Dryer	Kiln / Welder	Clothes Dryer	Pool Heaters
Dehydrator	Shop Equipment		Incinerator
Cremation			Lanterns / Fireplaces

This is the conclusion of end-use load questions for the survey-site.

5.1.16 Photos and Notes

5.1.16.1 Survey-Site Photo Log #1 to #99 (Table 37)

Tab: Photos & Notes	Data Type: String	Pre-Populated: No	Can Edit: Yes

Ask if there are any restrictions for taking pictures; if so, where do they apply? Do not take pictures with people in them unless the people cannot be identified (no faces). A standard picture filename convention with ".JPG" extension has been adopted. The filename starts with the survey-site ID, then surveyor's tablets ID, date and time, and surveyor's selection of photo category and ending in a sequential number. This information will be used to auto generate a photo filename where each picture in a category will also have a 01 to 99 sequential number at the end of the filename. Photo filenames will be stored in the database and the pictures will be stored independently but grouped in folders by survey-site.

This set of entries is for the documentation of pictures taken at the survey-site. Please take extensive photos of building(s), elevations (outside view), and of the interior spaces showing the main activities of the survey-site. Refer to Table 13 for the type of pictures that should be taken. Use the camera on the tablet to take pictures so they are documented and transferred with the rest of the survey-site information. The surveyor should take as many pictures as possible to capture the information needed about the survey-site and document them by creating a description associated with each photo ID. When possible include pictures of HVAC equipment, water heater, and lighting. Any documentation that is not automatically included in the CEUS Tool™ needs to be captured and include via pictures or screenshots. This additional information documentation can be surveyor notes, scribblings, or sketches created on paper or notepad. Also include calculations whether on paper or screenshots of spreadsheet calculations or use of OneNote. See Table 13 for a list of pictures to take.

Table 13. List of Photo Categories and Types of Photos to Take at each Survey-Site

Photo Category	Types of Photos to Take
Building Exterior	Front with business name, main entrance, all elevations, signage, address number, overhang adjustment areas, etc.
Business Hours	Signage on door or window that shows hours business is open, seasonal schedules, etc.
Meters	All utility electric and gas meters showing meter number in focus.
Utility Bills	Bills for all energy services: electric, gas, propane, purchased steam, purchased chilled water, etc.
Floor Plans	Site plans, floor plan drawings, emergency exit drawings.
Satellite View	Screen shots/captures of satellite or aerial views with scale or area measurements.
Business Activity	Photos that help document the type of business, activity, or uniqueness.
Equipment	HVAC system equipment, water heater, lighting
Other	Anything else related to the survey-site or events that happened on visit. Include notepad sketches, notes, and calculations. Also screenshots of spreadsheet calculations, OneNote notes, or other data gathered.

5.1.16.2 General Comments and Notes

Tab: Photos & Notes	Data Type: String	Pre-Populated: No	Can Edit: Yes

This question and entry are to make notes and document anything unique about this survey-site or items of information that need to be documented. It can also be used to clarify the answer of "Other" from previous questions. There is a 65,000-character limit to an entry; however, multiple comment entries can be made.

5.1.17 Complete Survey

5.1.17.1 Complete Survey

The last tab is an automated review of the completeness of the survey. The example in Figure 134 shows the summary of a survey-site that has not had very much entered. The list of tabs and the numbers highlighted in yellow are the location and number of questions that are still required to be entered before a survey is considered completed. Once there are no more pending questions then the surveyor may check the "Survey Completed" box. At that stage the survey-site moves to the "Surveys Ready for Submission" holding area.

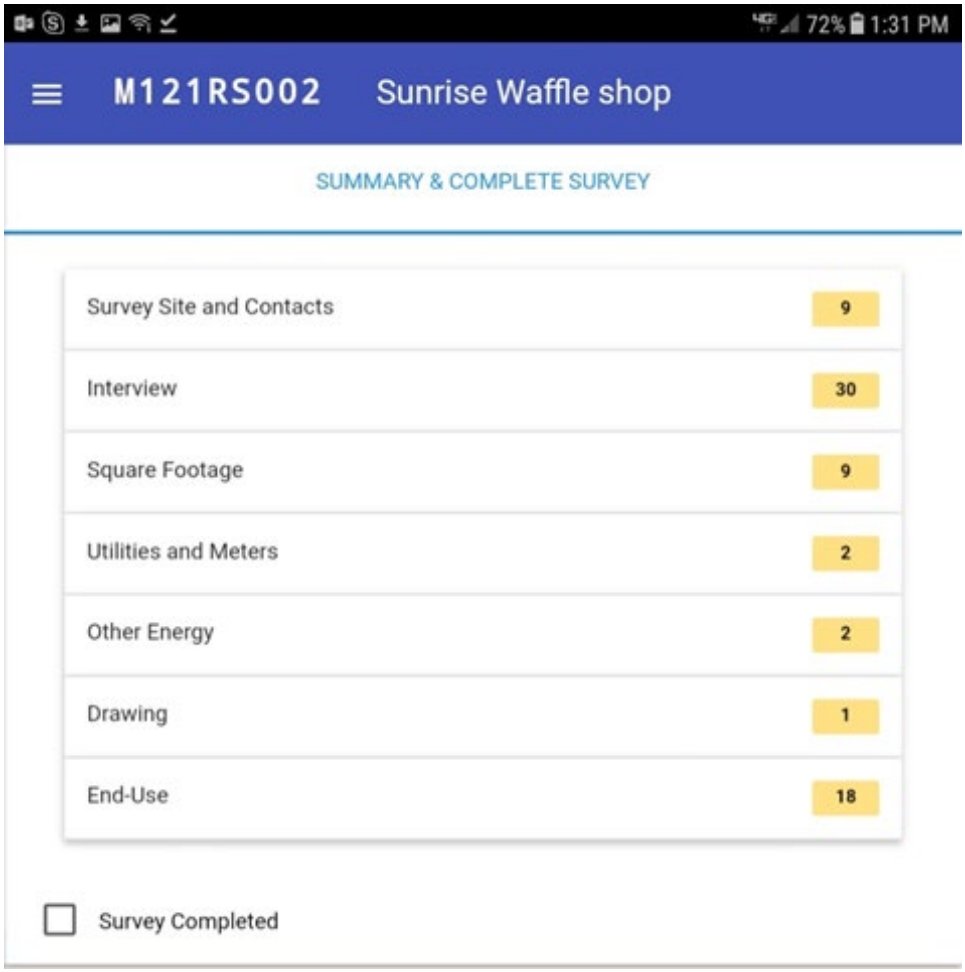


Figure 134.Example of CEUS Tool's Summary and Complete Survey Tab.

5.1.17.2 Submission of Surveys

On the Site List of the CEUS Tool™ all the sites ready for submission will be waiting in a holding area in the CEUS Tool™ on the tablet. A count of the number of sites ready for submission will be highlighted in orange on the right side. The survey-sites can either be selectively submitted or all that are ready can be submitted together. After a survey-site has been submitted, entries can be revised by claiming the site again only if the "survey completed" box was not checked. If a site was submitted as completed but needs to be revised to make appropriate changes, the surveyor needs to contact their supervisor, so the supervisor can release that site, so it can be claimed again. After making revisions, the surveyor needs to be sure to resubmit the survey-site.

6 APPENDIX A - NAICS

6.1 NAICS DESCRIPTION AND SUB CATEGORIES

The following table lists the commercial 2017 NAICS codes and the subdivisions that are used in the drilldown list for the NAICS determination.

Level 1	Level 2	Level 3
11 Agriculture, Forestry, Fishing, and Hunting		
	Support Activities for Crop Production	
		Cotton Ginning - 115111
		Soil Preparation, Planting, and Cultivating – 115112
		Crop Harvesting, Primarily by Machine – 115113
		Postharvest Crop Activities (except Cotton Ginning) – 115114
		Farm Labor Contractors and Crew Leaders – 115115
		Farm Management Services – 115116
	Support Activities for Animal Production	
		Support Activities for Animal Production – 115210
	Support Activities for Forestry	
		Support Activities for Forestry – 115310
42 Wholesale Trade		
	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	
		Automobile and Other Motor Vehicle Merchant Wholesalers - 423110
		Motor Vehicle Supplies and New Parts Merchant Wholesalers - 423120
		Tire and Tube Merchant Wholesalers - 423130
		Motor Vehicle Parts (Used) Merchant Wholesalers - 423140
	Furniture and Home Furnishing Merchant Wholesalers	
		Furniture Merchant Wholesalers - 423210
		Home Furnishing Merchant Wholesalers - 423220
	Lumber and Other Construction Materials Merchant Wholesalers	
		Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers - 423310
		Brick, Stone, and Related Construction Material Merchant Wholesalers - 423320
		Roofing, Siding, and Insulation Material Merchant Wholesalers - 423330
		Other Construction Material Merchant Wholesalers - 423390
	Professional and Commercial Equipment and Supplies Merchant Wholesalers	
		Photographic Equipment and Supplies Merchant Wholesalers - 423410
		Office Equipment Merchant Wholesalers - 423420
		Computer and Computer Peripheral Equipment and Software Merchant Wholesalers - 423430
		Other Commercial Equipment Merchant Wholesalers - 423440

Level 1	Level 2	Level 3
		Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers - 423450
		Ophthalmic Goods Merchant Wholesalers - 423460
		Other Professional Equipment and Supplies Merchant Wholesalers - 423490
	Metal and Mineral (except Petroleum) Merchant Wholesalers	
		Metal Service Centers and Other Metal Merchant Wholesalers - 423510
		Coal and Other Mineral and Ore Merchant Wholesalers - 423520
	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	
		Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers - 423610
		Household Appliances, Electric Housewares, and Consumer Electronics Merchant Wholesalers - 423620
		Other Electronic Parts and Equipment Merchant Wholesalers - 423690
	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	
		Hardware Merchant Wholesalers - 423710
		Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers - 423720
		Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers - 423730
		Refrigeration Equipment and Supplies Merchant Wholesalers - 423740
	Machinery, Equipment, and Supplies Merchant Wholesalers	
		Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers - 423810
		Farm and Garden Machinery and Equipment Merchant Wholesalers - 423820
		Industrial Machinery and Equipment Merchant Wholesalers - 423830
		Industrial Supplies Merchant Wholesalers - 423840
		Service Establishment Equipment and Supplies Merchant Wholesalers - 423850
		Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers - 423860
	Miscellaneous Durable Goods Merchant Wholesalers	
		Sporting and Recreational Goods and Supplies Merchant Wholesalers - 423910
		Toy and Hobby Goods and Supplies Merchant Wholesalers - 423920
		Recyclable Material Merchant Wholesalers - 423930
		Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers - 423940
		Other Miscellaneous Durable Goods Merchant Wholesalers - 423990
	Paper and Paper Product Merchant Wholesalers	
		Printing and Writing Paper Merchant Wholesalers - 424110

Level 1	Level 2	Level 3
		Stationery and Office Supplies Merchant Wholesalers - 424120
		Industrial and Personal Service Paper Merchant Wholesalers - 424130
	Drugs and Druggists' Sundries Merchant Wholesalers	
		Drugs and Druggists' Sundries Merchant Wholesalers - 424210
	Apparel, Piece Goods, and Notions Merchant Wholesalers	
		Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers - 424310
		Men's and Boys' Clothing and Furnishings Merchant Wholesalers - 424320
		Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers - 424330
		Footwear Merchant Wholesalers - 424340
	Grocery and Related Product Merchant Wholesalers	
		General Line Grocery Merchant Wholesalers - 424410
		Packaged Frozen Food Merchant Wholesalers - 424420
		Dairy Product (except Dried or Canned) Merchant Wholesalers - 424430
		Poultry and Poultry Product Merchant Wholesalers - 424440
		Confectionery Merchant Wholesalers - 424450
		Fish and Seafood Merchant Wholesalers - 424460
		Meat and Meat Product Merchant Wholesalers - 424470
		Fresh Fruit and Vegetable Merchant Wholesalers - 424480
		Other Grocery and Related Products Merchant Wholesalers - 424490
	Farm Product Raw Material Merchant Wholesalers	
		Grain and Field Bean Merchant Wholesalers - 424510
		Livestock Merchant Wholesalers - 424520
		Other Farm Product Raw Material Merchant Wholesalers - 424590
	Chemical and Allied Products Merchant Wholesalers	
		Plastics Materials and Basic Forms and Shapes Merchant Wholesalers - 424610
		Other Chemical and Allied Products Merchant Wholesalers - 424690
	Petroleum and Petroleum Products Merchant Wholesalers	
		Petroleum Bulk Stations and Terminals - 424710
		Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals) - 424720
	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	
		Beer and Ale Merchant Wholesalers - 424810
		Wine and Distilled Alcoholic Beverage Merchant Wholesalers - 424820
	Miscellaneous Nondurable Goods Merchant Wholesalers	
		Farm Supplies Merchant Wholesalers - 424910
		Book, Periodical, and Newspaper Merchant Wholesalers - 424920
		Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers - 424930
		Tobacco and Tobacco Product Merchant Wholesalers - 424940

Level 1	Level 2	Level 3
		Paint, Varnish, and Supplies Merchant Wholesalers - 424950
		Other Miscellaneous Nondurable Goods Merchant Wholesalers - 424990
	Wholesale Electronic Markets and Agents and Brokers	
		Business to Business Electronic Markets - 425110
		Wholesale Trade Agents and Brokers - 425120
44-45 Retail Trade		
	Motor Vehicle and Parts Dealers	
		New Car Dealers - 441110
		Used Car Dealers - 441120
		Recreational Vehicle Dealers - 441210
		Boat Dealers - 441222
		Motorcycle, ATV, and All Other Motor Vehicle Dealers - 441228
		Automotive Parts and Accessories Stores - 441310
		Tire Dealers - 441320
	Furniture and Home Furnishings Stores	
		Furniture Stores - 442110
		Floor Covering Stores - 442210
		Window Treatment Stores - 442291
		All Other Home Furnishings Stores - 442299
	Electronics and Appliance Stores	
		Household Appliance Stores - 443141
		Electronics Stores - 443142
	Building Material and Garden Equipment and Supplies Dealers	
		Home Centers - 444110
		Paint and Wallpaper Stores - 444120
		Hardware Stores - 444130
		Other Building Material Dealers - 444190
		Outdoor Power Equipment Stores - 444210
		Nursery, Garden Center, and Farm Supply Stores - 444220
	Food and Beverage Stores	
		Supermarkets and Other Grocery (except Convenience) Stores - 445110
		Convenience Stores - 445120
		Meat Markets - 445210
		Fish and Seafood Markets - 445220
		Fruit and Vegetable Markets - 445230
		Baked Goods Stores - 445291
		Confectionery and Nut Stores - 445292
		All Other Specialty Food Stores - 445299
		Beer, Wine, and Liquor Stores - 445310

Level 1	Level 2	Level 3
	Health and Personal Care Stores	
		Pharmacies and Drug Stores - 446110
		Cosmetics, Beauty Supplies, and Perfume Stores - 446120
		Optical Goods Stores - 446130
		Food (Health) Supplement Stores - 446191
		All Other Health and Personal Care Stores - 446199
	Gasoline Stations	
		Gasoline Stations with Convenience Stores - 447110
		Gasoline Stations without Convenience Stores - 447190
	Clothing and Clothing Accessories Stores	
		Men's Clothing Stores - 448110
		Women's Clothing Stores - 448120
		Children's and Infants' Clothing Stores - 448130
		Family Clothing Stores - 448140
		Clothing Accessories Stores - 448150
		Other Clothing Stores - 448190
		Shoe Stores - 448210
		Jewelry Stores - 448310
		Luggage and Leather Goods Stores - 448320
	Sporting Goods, Hobby, Musical Instrument, and Book Stores	
		Sporting Goods Stores - 451110
		Hobby, Toy, and Game Stores - 451120
		Sewing, Needlework, and Piece Goods Stores - 451130
		Musical Instrument and Supplies Stores - 451140
		Book Stores - 451211
		News Dealers and Newsstands - 451212
	General Merchandise Stores	
		Department Stores - 452210
		Warehouse Clubs and Supercenters - 452311
		All Other General Merchandise Stores - 452319
	Miscellaneous Store Retailers	
		Florists - 453110
		Office Supplies and Stationery Stores - 453210
		Gift, Novelty, and Souvenir Stores - 453220
		Used Merchandise Stores - 453310
		Pet and Pet Supplies Stores - 453910
		Art Dealers - 453920
		Manufactured (Mobile) Home Dealers - 453930
		Tobacco Stores - 453991
		All Other Miscellaneous Store Retailers (except Tobacco Stores) - 453998

Level 1	Level 2	Level 3
	Nonstore Retailers	
		Electronic Shopping and Mail-Order Houses - 454110
		Vending Machine Operators - 454210
		Fuel Dealers - 454310
		Other Direct Selling Establishments - 454390
49 Warehousing		
	Warehousing and Storage	
		General Warehousing and Storage - 493110
		Refrigerated Warehousing and Storage - 493120
		Farm Product Warehousing and Storage - 493130
		Other Warehousing and Storage - 493190
51 Information		
	Motion Picture and Sound Recording Industries	
		Motion Picture and Video Production - 512110
		Motion Picture and Video Distribution - 512120
		Motion Picture Theaters (except Drive-Ins) - 512131
		Drive-In Motion Picture Theaters - 512132
		Teleproduction and Other Postproduction Services - 512191
		Other Motion Picture and Video Industries - 512199
		Music Publishers - 512230
		Sound Recording Studios - 512240
		Record Production and Distribution - 512250
		Other Sound Recording Industries - 512290
	Data Processing, Hosting, and Related Services	
		Data Processing, Hosting, and Related Services - 518210
	Other Information Services	
		News Syndicates - 519110
		Libraries and Archives - 519120
		All Other Information Services - 519190
52 Finance and Insurance		
	Monetary Authorities-Central Bank	
		Monetary Authorities-Central Bank - 521110
	Credit Intermediation and Related Activities	
		Commercial Banking - 522110
		Savings Institutions - 522120
		Credit Unions - 522130
		Other Depository Credit Intermediation - 522190
		Credit Card Issuing - 522210

Level 1	Level 2	Level 3
		Sales Financing - 522220
		Consumer Lending - 522291
		Real Estate Credit - 522292
		International Trade Financing - 522293
		Secondary Market Financing - 522294
		All Other Nondepository Credit Intermediation - 522298
		Mortgage and Nonmortgage Loan Brokers - 522310
		Financial Transactions Processing, Reserve, and Clearinghouse Activities - 522320
		Other Activities Related to Credit Intermediation - 522390
	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	
		Investment Banking and Securities Dealing - 523110
		Securities Brokerage - 523120
		Commodity Contracts Dealing - 523130
		Commodity Contracts Brokerage - 523140
		Securities and Commodity Exchanges - 523210
		Miscellaneous Intermediation - 523910
		Portfolio Management - 523920
		Investment Advice - 523930
		Trust, Fiduciary, and Custody Activities - 523991
		Miscellaneous Financial Investment Activities - 523999
	Insurance Carriers and Related Activities	
		Direct Life Insurance Carriers - 524113
		Direct Health and Medical Insurance Carriers - 524114
		Direct Property and Casualty Insurance Carriers - 524126
		Direct Title Insurance Carriers - 524127
		Other Direct Insurance (except Life, Health, and Medical) Carriers - 524128
		Reinsurance Carriers - 524130
		Insurance Agencies and Brokerages - 524210
		Claims Adjusting - 524291
		Third Party Administration of Insurance and Pension Funds - 524292
		All Other Insurance Related Activities - 524298
	Funds, Trusts, and Other Financial Vehicles	
		Pension Funds - 525110
		Health and Welfare Funds - 525120
		Other Insurance Funds - 525190
		Open-End Investment Funds - 525910
		Trusts, Estates, and Agency Accounts - 525920
		Other Financial Vehicles - 525990

Level 1	Level 2	Level 3
53 Real Estate and Rental and Leasing		
	Real Estate	
		Lessors of Residential Buildings and Dwellings - 531110
		Lessors of Nonresidential Buildings (except Miniwarehouses) - 531120
		Lessors of Nonresidential Buildings – PM in the Building - 531121
		Lessors of Nonresidential Buildings – PM not in the Building - 531122
		Lessors of Miniwarehouses and Self-Storage Units - 531130
		Lessors of Other Real Estate Property - 531190
		Offices of Real Estate Agents and Brokers - 531210
		Residential Property Managers – 531311 (CEUS: 4+ floors)
		Nonresidential Property Managers - 531312
		Offices of Real Estate Appraisers - 531320
		Other Activities Related to Real Estate - 531390
	Rental and Leasing Services	
		Passenger Car Rental - 532111
		Passenger Car Leasing - 532112
		Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing - 532120
		Consumer Electronics and Appliances Rental - 532210
		Formal Wear and Costume Rental - 532281
		Video Tape and Disc Rental - 532282
		Home Health Equipment Rental - 532283
		Recreational Goods Rental - 532284
		All Other Consumer Goods Rental - 532289
		General Rental Centers - 532310
		Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing - 532411
		Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing - 532412
		Office Machinery and Equipment Rental and Leasing - 532420
		Other Commercial and Industrial Machinery and Equipment Rental and Leasing - 532490
	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	
		Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) - 533110
54 Professional, Scientific, and Technical Services		
	Legal Services	
		Offices of Lawyers - 541110
		Offices of Notaries - 541120
		Title Abstract and Settlement Offices - 541191

Level 1	Level 2	Level 3
		All Other Legal Services - 541199
	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	
		Offices of Certified Public Accountants - 541211
		Tax Preparation Services - 541213
		Payroll Services - 541214
		Other Accounting Services - 541219
	Architectural, Engineering, and Related Services	
		Architectural Services - 541310
		Landscape Architectural Services - 541320
		Engineering Services - 541330
		Drafting Services - 541340
		Building Inspection Services - 541350
		Geophysical Surveying and Mapping Services - 541360
		Surveying and Mapping (except Geophysical) Services - 541370
		Testing Laboratories - 541380
	Specialized Design Services	
		Interior Design Services - 541410
		Industrial Design Services - 541420
		Graphic Design Services - 541430
		Other Specialized Design Services - 541490
	Computer Systems Design and Related Services	
		Custom Computer Programming Services - 541511
		Computer Systems Design Services - 541512
		Computer Facilities Management Services - 541513
		Other Computer Related Services - 541519
	Management, Scientific, and Technical Consulting Services	
		Administrative Management and General Management Consulting Services - 541611
		Human Resources Consulting Services - 541612
		Marketing Consulting Services - 541613
		Process, Physical Distribution, and Logistics Consulting Services - 541614
		Other Management Consulting Services - 541618
		Environmental Consulting Services - 541620
		Other Scientific and Technical Consulting Services - 541690
	Scientific Research and Development Services	
		Research and Development in Nanotechnology - 541713
		Research and Development in Biotechnology (except Nanobiotechnology) - 541714
		Research & Development in the Physical, Engineering, & Life Sciences (except Nanotechnology & Biotechnology) - 541715

Level 1	Level 2	Level 3
		Research and Development in the Social Sciences and Humanities - 541720
	Advertising, Public Relations, and Related Services	
		Advertising Agencies - 541810
		Public Relations Agencies - 541820
		Media Buying Agencies - 541830
		Media Representatives - 541840
		Outdoor Advertising - 541850
		Direct Mail Advertising - 541860
		Advertising Material Distribution Services - 541870
		Other Services Related to Advertising - 541890
	Other Professional, Scientific, and Technical Services	
		Marketing Research and Public Opinion Polling - 541910
		Photography Studios, Portrait - 541921
		Commercial Photography - 541922
		Translation and Interpretation Services - 541930
		Veterinary Services - 541940
		All Other Professional, Scientific, and Technical Services - 541990
55 Management of Companies and Enterprises		
	Management of Companies and Enterprises	
		Offices of Bank Holding Companies - 551111
		Offices of Other Holding Companies - 551112
		Corporate, Subsidiary, and Regional Managing Offices - 551114
56 Administrative, Support, Waste Management, & Remediation Services		
	Office Administrative Services	
		Office Administrative Services - 561110
	Facilities Support Services	
		Facilities Support Services - 561210
	Employment Services	
		Employment Placement Agencies - 561311
		Executive Search Services - 561312
		Temporary Help Services - 561320
		Professional Employer Organizations - 561330
	Business Support Services	
		Document Preparation Services - 561410
		Telephone Answering Services - 561421
		Telemarketing Bureaus and Other Contact Centers - 561422
		Private Mail Centers - 561431
		Other Business Service Centers (including Copy Shops) - 561439
		Collection Agencies - 561440

Level 1	Level 2	Level 3
		Credit Bureaus - 561450
		Repossession Services - 561491
		Court Reporting and Stenotype Services - 561492
		All Other Business Support Services - 561499
	Travel Arrangement and Reservation Services	
		Travel Agencies - 561510
		Tour Operators - 561520
		Convention and Visitors Bureaus - 561591
		All Other Travel Arrangement and Reservation Services - 561599
	Investigation and Security Services	
		Investigation Services - 561611
		Security Guards and Patrol Services - 561612
		Armored Car Services - 561613
		Security Systems Services (except Locksmiths) - 561621
		Locksmiths - 561622
	Services to Buildings and Dwellings	
		Exterminating and Pest Control Services - 561710
		Janitorial Services - 561720
		Landscaping Services - 561730
		Carpet and Upholstery Cleaning Services - 561740
		Other Services to Buildings and Dwellings - 561790
	Other Support Services	
		Packaging and Labeling Services - 561910
		Convention and Trade Show Organizers - 561920
		All Other Support Services - 561990
61 Educational Services		
	Elementary and Secondary Schools	
		Elementary and Secondary Schools - 611110
	Junior Colleges	
		Junior Colleges - 611210
	Colleges, Universities, and Professional Schools	
		Colleges, Universities, and Professional Schools - 611310
	Business Schools and Computer and Management Training	
		Business and Secretarial Schools - 611410
		Computer Training - 611420
		Professional and Management Development Training - 611430
	Technical and Trade Schools	
		Cosmetology and Barber Schools - 611511
		Flight Training - 611512

Level 1	Level 2	Level 3
		Apprenticeship Training - 611513
		Other Technical and Trade Schools - 611519
	Other Schools and Instruction	
		Fine Arts Schools - 611610
		Sports and Recreation Instruction - 611620
		Language Schools - 611630
		Exam Preparation and Tutoring - 611691
		Automobile Driving Schools - 611692
		All Other Miscellaneous Schools and Instruction - 611699
	Educational Support Services	
		Educational Support Services - 611710
62 Health Care and Social Assistance		
	Offices of Physicians	
		Offices of Physicians (except Mental Health Specialists) - 621111
		Offices of Physicians, Mental Health Specialists - 621112
	Offices of Dentists	
		Offices of Dentists - 621210
	Offices of Other Health Practitioners	
		Offices of Chiropractors - 621310
		Offices of Optometrists - 621320
		Offices of Mental Health Practitioners (except Physicians) - 621330
		Offices of Physical, Occupational and Speech Therapists, and Audiologists - 621340
		Offices of Podiatrists - 621391
		Offices of All Other Miscellaneous Health Practitioners - 621399
	Outpatient Care Centers	
		Family Planning Centers - 621410
		Outpatient Mental Health and Substance Abuse Centers - 621420
		HMO Medical Centers - 621491
		Kidney Dialysis Centers - 621492
		Freestanding Ambulatory Surgical and Emergency Centers - 621493
		All Other Outpatient Care Centers - 621498
	Medical and Diagnostic Laboratories	
		Medical Laboratories - 621511
		Diagnostic Imaging Centers - 621512
	Home Health Care Services	
		Home Health Care Services - 621610
	Other Ambulatory Health Care Services	
		Ambulance Services - 621910

Level 1	Level 2	Level 3
		Blood and Organ Banks - 621991
		All Other Miscellaneous Ambulatory Health Care Services - 621999
	Hospitals	
		General Medical and Surgical Hospitals - 622110
		Psychiatric and Substance Abuse Hospitals - 622210
		Specialty (except Psychiatric and Substance Abuse) Hospitals - 622310
	Nursing and Residential Care Facilities	
		Nursing Care Facilities (Skilled Nursing Facilities) - 623110
		Residential Intellectual and Developmental Disability Facilities - 623210
		Residential Mental Health and Substance Abuse Facilities - 623220
		Continuing Care Retirement Communities - 623311
		Assisted Living Facilities for the Elderly - 623312
		Other Residential Care Facilities - 623990
	Social Assistance	
		Child and Youth Services - 624110
		Services for the Elderly and Persons with Disabilities - 624120
		Other Individual and Family Services - 624190
		Community Food Services - 624210
		Temporary Shelters - 624221
		Other Community Housing Services - 624229
		Emergency and Other Relief Services - 624230
		Vocational Rehabilitation Services - 624310
		Child Day Care Services - 624410
71 Arts, Entertainment, and Recreation		
	Performing Arts, Spectator Sports, and Related Industries	
		Theater Companies and Dinner Theaters - 711110
		Dance Companies - 711120
		Musical Groups and Artists - 711130
		Other Performing Arts Companies - 711190
		Sports Teams and Clubs - 711211
		Racetracks - 711212
		Other Spectator Sports - 711219
		Promoters of Performing Arts, Sports, and Similar Events with Facilities - 711310
		Promoters of Performing Arts, Sports, and Similar Events without Facilities - 711320
		Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures - 711410
		Independent Artists, Writers, and Performers - 711510
	Museums, Historical Sites, and Similar Institutions	

Level 1	Level 2	Level 3
		Museums - 712110
		Historical Sites - 712120
		Zoos and Botanical Gardens - 712130
		Nature Parks and Other Similar Institutions - 712190
	Amusement, Gambling, and Recreation Industries	
		Amusement and Theme Parks - 713110
		Amusement Arcades - 713120
		Casinos (except Casino Hotels) - 713210
		Other Gambling Industries - 713290
		Golf Courses and Country Clubs - 713910
		Skiing Facilities - 713920
		Marinas - 713930
		Fitness and Recreational Sports Centers - 713940
		Bowling Centers - 713950
		All Other Amusement and Recreation Industries - 713990
72 Accommodation and Food Services		
	Accommodation	
		Hotels (except Casino Hotels) and Motels - 721110
		Casino Hotels - 721120
		Bed-and-Breakfast Inns - 721191
		All Other Traveler Accommodation - 721199
		RV (Recreational Vehicle) Parks and Campgrounds - 721211
		Recreational and Vacation Camps (except Campgrounds) - 721214
		Rooming and Boarding Houses, Dormitories, and Workers' Camps - 721310
	Food Services and Drinking Places	
		Food Service Contractors - 722310
		Caterers - 722320
		Mobile Food Services - 722330
		Drinking Places (Alcoholic Beverages) - 722410
		Full-Service Restaurants - 722511
		Limited-Service Restaurants - 722513
		Cafeterias, Grill Buffets, and Buffets - 722514
		Snack and Nonalcoholic Beverage Bars - 722515
81 Other Services (except Public Administration)		
	Automotive Repair and Maintenance	
		General Automotive Repair - 811111
		Automotive Exhaust System Repair - 811112
		Automotive Transmission Repair - 811113
		Other Automotive Mechanical and Electrical Repair and Maintenance - 811118

Level 1	Level 2	Level 3
		Automotive Body, Paint, and Interior Repair and Maintenance - 811121
		Automotive Glass Replacement Shops - 811122
		Automotive Oil Change and Lubrication Shops - 811191
		Car Washes - 811192
		All Other Automotive Repair and Maintenance - 811198
	Electronic and Precision Equipment Repair and Maintenance	
		Consumer Electronics Repair and Maintenance - 811211
		Computer and Office Machine Repair and Maintenance - 811212
		Communication Equipment Repair and Maintenance - 811213
		Other Electronic and Precision Equipment Repair and Maintenance - 811219
	Commercial & Industrial Machinery & Equipment (except Automotive & Electronic) Repair & Maintenance	
		Commercial & Industrial Machinery & Equipment (except Automotive & Electronic) Repair & Maintenance - 811310
	Personal and Household Goods Repair and Maintenance	
		Home and Garden Equipment Repair and Maintenance - 811411
		Appliance Repair and Maintenance - 811412
		Reupholstery and Furniture Repair - 811420
		Footwear and Leather Goods Repair - 811430
		Other Personal and Household Goods Repair and Maintenance - 811490
	Personal Care Services	
		Barber Shops - 812111
		Beauty Salons - 812112
		Nail Salons - 812113
		Diet and Weight Reducing Centers - 812191
		Other Personal Care Services - 812199
	Death Care Services	
		Funeral Homes and Funeral Services - 812210
		Cemeteries and Crematories - 812220
	Dry cleaning and Laundry Services	
		Coin-Operated Laundries and Drycleaners - 812310
		Dry cleaning and Laundry Services (except Coin-Operated) - 812320
		Linen Supply - 812331
		Industrial Launderers - 812332
	Other Personal Services	
		Pet Care (except Veterinary) Services - 812910
		Photofinishing Laboratories (except One-Hour) - 812921
		One-Hour Photofinishing - 812922
		Parking Lots and Garages - 812930
		All Other Personal Services - 812990

Level 1	Level 2	Level 3
	Religious, Grant making, Civic, Professional, and Similar Organizations	
		Religious Organizations - 813110
		Grant making Foundations - 813211
		Voluntary Health Organizations - 813212
		Other Grant making and Giving Services - 813219
		Human Rights Organizations - 813311
		Environment, Conservation and Wildlife Organizations - 813312
		Other Social Advocacy Organizations - 813319
		Civic and Social Organizations - 813410
		Business Associations - 813910
		Professional Organizations - 813920
		Labor Unions and Similar Labor Organizations - 813930
		Political Organizations - 813940
		Other Similar Organizations (except Business, Professional, Labor, and Political Organizations) - 813990
92 Public Administration		
	Executive, Legislative, and Other General Government Support	
		Executive Offices - 921110
		Legislative Bodies - 921120
		Public Finance Activities - 921130
		Executive and Legislative Offices, Combined - 921140
		American Indian and Alaska Native Tribal Governments - 921150
		Other General Government Support - 921190
	Justice, Public Order, and Safety Activities	
		Courts - 922110
		Police Protection - 922120
		Legal Counsel and Prosecution - 922130
		Correctional Institutions - 922140
		Parole Offices and Probation Offices - 922150
		Fire Protection - 922160
		Other Justice, Public Order, and Safety Activities - 922190
	Administration of Human Resource Programs	
		Administration of Education Programs - 923110
		Administration of Public Health Programs - 923120
		Administration of Human Resource Programs (except Education, Public Health, & Veterans' Affairs Programs) - 923130
		Administration of Veterans' Affairs - 923140
	Administration of Environmental Quality Programs	

Level 1	Level 2	Level 3
		Administration of Air and Water Resource and Solid Waste Management Programs - 924110
		Administration of Conservation Programs - 924120
	Administration of Housing Programs, Urban Planning, and Community Development	
		Administration of Housing Programs - 925110
		Administration of Urban Planning and Community and Rural Development - 925120
	Administration of Economic Programs	
		Administration of General Economic Programs - 926110
		Regulation and Administration of Transportation Programs - 926120
		Regulation and Administration of Communications, Electric, Gas, and Other Utilities - 926130
		Regulation of Agricultural Marketing and Commodities - 926140
		Regulation, Licensing, and Inspection of Miscellaneous Commercial Sectors - 926150
	Space Research and Technology	
		Space Research and Technology - 927110
	National Security and International Affairs	
		International Affairs - 928120