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END-USE LOAD AND CONSUMER ASSESSMENT PROGRAM:

COMMERCIAL CHARACTERISTICS RESURVEY

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1.0 INTRODUCTION

The End-use Load and Consumer Assessment Program (ELCAP) has collected vast amounts of metered electric end-use data for a large sample of commercial buildings in the Pacific Northwest. A companion to this data is an ELCAP Commercial Characteristics Survey that contains a variety of information about each building in the project. This information relates to the physical characteristics of the building as well as operational and equipment load details. In order to provide some detail as to the type and magnitude of change in these commercial buildings since beginning the metering program, a one time extensive update of these original surveys was completed.

Most commercial buildings, their occupants, or operation will change with time in some manner or another. In some cases an entire building will be renovated for new or completely different tenant(s) involving a change in virtually every aspect of the survey. For other buildings a much more stable environment exists and only minor changes will be seen. It can be valuable to understand the type and magnitude of changes that occur in a commercial building. Regional forecasting as well as individual building energy assessment can benefit from this type of information. By itself this data can give an insight into the direction of change occurring in commercial buildings. This data can also be used in conjunction with corresponding metered end use data. This comparison can provide a look at the type and magnitude of change in energy use associated with particular characteristics changes.

A set of 78 buildings from the ELCAP Base study and 22 buildings that were end-use metered as part of the Commercial Audit Program (CAP) were initially identified as potential resurvey sites. Of the 100 sites, eight were not resurveyed for reasons ranging from owner resistance or refusal to total building removal (see Section 2.0). Two other buildings were only partially resurveyed since only partial original surveys existed. Each site available for resurvey was visited by personnel familiar with the original survey format. A comparison was made between the original survey and existing conditions (Section 4.0). Each major area of the buildings characteristics

was examined for changes including structure, heating, ventilation and air conditioning (HVAC) systems and distribution, lighting, operation hours and occupancy, equipment, and tenant and business changes. After completion of some verification and consistency checks each resurvey was considered complete (paper copy). To assure compatibility with other sources in the future, an electronic version of the resurvey change information was created (Section 5.0). Blank input files were prepared and filled with the resurvey data that differed from the original survey. These completed files comprise the electronic version of the resurvey.

2.0 OBSERVATIONS

This section includes a discussion of some basic building change information. More detailed and useful observations could be made after more thorough analysis of this data was performed but this was beyond the scope of this project.

Table 2.1 shows the cumulative changes in each area by building type. The numbers represent the number of buildings in a building type that experienced a change, increase, or reduction in that particular area. This table does not include the eight sites that were not resurveyed since no change data is available for them. Also not included is information on a new site which became part of the CAP program after the original surveys were completed (complete new survey). (See Section 2.1 for change type descriptions and individual building change statistics).

Many useful observations can be made by comparing the amount of change occurring in each of the building types resurveyed. The major observations are noted as follows.

- The majority of change occurs in the "plug" or equipment category followed by operations and lighting.
- The retail building type generally sees the most change overall.
- Offices experience the most tenant and operational changes but generally have very stable lighting.

TABLE 2.1. Cumulative Changes for Building Types by Change Area

BLDG TYPE	TOTAL SITES	SITES WITH CHANGES IN EACH AREA						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
OFFICE	22	3	2	17	2	11	10	0
RETAIL	24	4	0	22	9	9	6	3
GROCERY	13	2	1	12	6	8	3	1
WAREHOUSE	11	2	6	10	5	4	5	2
RESTAURANT	11	3	2	8	4	7	1	0
HOTEL	2	0	0	1	1	1	0	0
SCHOOL	3	0	0	3	1	2	1	0
OTHER	3	0	0	2	1	0	0	0
UNIVERSITY	2	0	0	2	0	0	1	0
TOTAL	91	14	11	77	29	42	27	6

- Retail and warehouse structures are most likely to experience complete business changes.
- Warehouses experience a lot of HVAC and lighting changes (apparently a product of much tenant change).

Additional observations were made during the course of the resurvey activity that are not obvious from the compiled data.

- Many office equipment items including printers (laser), and computers are increasingly more energy intensive because of increased capabilities. In some cases this causes their capacity to increase (laser printers = 3X line printers). In many cases, however, similar items have reduced in capacity with the same function such as terminals (100 watts versus 65 watts) and adding machines (60 watts versus 5 to 20 watts). Most of this new equipment is also much smaller and there is usually much more of it.
- Virtually all major HVAC, structure, and lighting changes are directly associated with tenant changes.

- Several office areas exhibited increased cooling loads beyond HVAC capabilities apparently because of increased equipment load usage (increased portable fan use). Occupant comments also tended to confirm this observation.
- The primary equipment increases are seen in offices (more automation) and groceries (deli, juice, health, bank, video, quick food).

It is important to note that these observations are only a small part of the kind of information that can be derived from this type of complete resurvey information. Much more informative insights might be gained by detailed comparison of the original survey, resurvey, and metered data. This kind of analysis will not be possible until the resurvey data is available for comparison in a compatible format to the original survey data.

2.1 CHANGE DESCRIPTIONS AND DATA

The changes found in commercial buildings can be categorized into several distinct areas. Any permanent or non-seasonal change can usually be placed in one of these categories. For this resurvey seven different areas of change were identified.

1. Structure - This includes any additions or reductions in building space, addition or deletion of insulation, upgrades of building components (windows, etc.), and any other structural changes that may effect energy use.

2. HVAC - This includes any changes, additions, or deletions to any space heating, cooling, or ventilating equipment or distribution systems.

3. Plugs - This includes general increases or reductions of all business and building equipment. It is not restricted to "plug-in" items but includes all electric consumption items other than HVAC and lights.

4. Lighting - This includes changes, reductions, or additions of all interior or exterior lighting (virtually all interior).

5. Operation - This refers to changes in operating hours and schedules as well as levels of employees, customers, and/or guests.

6. Tenants - This includes any tenant change, addition, or reduction.

7. Business Type - This refers to an actual change in type of operation (i.e. clothing retail to manufacturing). Changes between identical businesses such as one bank to a different bank are not included.

Only changes, additions, or reductions of notable size were included. Changes such as minor equipment changes, temporary or seasonal operational changes were not considered of sufficient impact to be noted. Much more detail is available in the actual resurvey information for each building.

Similarly each building can be categorized by business type into one of nine different building types. The building types used in the resurvey as well as the original survey are: office (OFF), retail (DGR), grocery (GRO), warehouse (WAR), restaurant (RES), hotel (HTM), school (SCH), other (OTH), and university (UNI).

Tables 2.2 through 2.7 include more specific indications of change by site for each building type. Again, the eight sites with no resurvey and the one new survey site are not included. In each table "C" = change or replacement only, "+" = increase or addition (may include changes), and "-" = decrease or reduction (may include changes).

TABLE 2.2. Type and Quantity of Change - Offices

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
299	OFF	+	+	+			+	
444	OFF			+	+			
595	OFF	C		+				
458	OFF			+		+	C	
717	OFM			+		+	C	
602	OFG			-		-		
600	OFB			-		+		
298	OFP			+				
731	OFB			-			+	
283	OFF			C		+	C	
547	OFB					-		
538	OFG			+			C	
451	OFF			-		-	-	
548	OFP			+		+		
697	OFG		+	+	+	+	+	
714	OFM			+			C	
601	OFB	C				+		
565	OFB					-		
607	OFB							
747	OFB							
456	OFM			+				
738	OFM			+			C	

Site 451 - This building is vacant but HVAC (at least fans) are still operating.

Site 607 - This site's original survey included only HVAC, construction, and lighting. Since only a small, incomplete part of the original tenant/plug load information existed, none was considered in the resurvey. No changes were noted in the HVAC, construction, and lighting.

Site 747 - This site's original (obtained during verification) survey included only HVAC, construction, hot water, and lighting. Since no original tenant/plug load information existed, none was considered in the resurvey. No changes were noted in the HVAC, construction, hot water, and lighting.

TABLE 2.3. Type and Quantity of Change - Retail

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
591	DGR			+		+		
716	DGR			+	-	-		
582	DGR			+		-	C	C
148	DGR			+				
449	DGR	+		+	+			
532	DGR			+				
610	DGR				+			
681	DGR			-	+			
447	DGR			+	+			
571	DGR			+				
751	DGR			+	+			
12	DGR			+		+	+	
443	DGR	C		+			C	
569	DGR			+	+			
735	DGR			+	+	+	C	
287	DGR					+		
566	DGR			+				
556	DGR			+				
546	DGR			+		+		
744	DGR			-		-		
289	DGR	+		+	+		C	C
723	DGR	C		-		C	C	C
544	DGR			+				
293	DGR			+				

Site 148 - The tenant in half of the building did not want to allow a detailed look at equipment etc. However, the area is small and virtually all visible without access. Most was observed to be unchanged.

TABLE 2.4. Type and Quantity of Change - Grocery

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
560	GRO			+	+	+		
297	GRO			+	+			
7	GRO	+		+	+	+		
450	GRO			-	-	-	C	
588	GRO			+	C			
690	GRO			+		-		
284	GRO			+		+	C	
285	GRO				C	-		
594	GRO			-		+	C	C
37	GRO			+		-		
587	GRO			+				
724	GRO	+	+	+				
597	GRO			+				

TABLE 2.5. Type and Quantity of Change - Warehouse

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
550	WAR		C	+	+	C	C	C
736	WAR					+		
446	WAR			+	+	+	+	
586	WAR			+				
448	WAR			+			+	
282	WAR	+	+	+	+	+		
40	WAR	+	+	+				
294	WAR			+	+		+	
460	WAR		+	+				
300	WAR		-	+	+		C	C
707	WAR		C	C				

Site 40 - This warehouse has essentially doubled in size with the completion of a new addition. Since the addition is not metered only the portion of the building actually metered was resurveyed.

TABLE 2.6. Type and Quantity of Change - Restaurant

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
445	RES	C	C	+	+	+		
559	RES			+				
564	RES			C		+		
281	RES			+	+			
292	RES					-		
598	RES	+			+			
441	RES					+		
9	RES					+		
593	RES	+		-		-	C	
535	RES		-	+				
705	RES			+				

TABLE 2.7. Type and Quantity of Change - Hotel, School, Other, University

SITE ID	BLDG TYPE	AREAS OF CHANGE						
		STRUCTURE	HVAC	PLUGS	LIGHTING	OPERATION	TENANTS	BUSINESS TYPE
555	HTM				+			
41	HTM			C		-		
753	SCH			+				
558	SCH			+		+		
756	SCH			+		+		
13	OTH			+				
722	OTH							
752	OTH			+	C			
562	UNI			-				
691	UNI			+			C	

The eight sites not resurveyed are listed in Table 2.8 with notes concerning their status.

TABLE 2.8. Status of Sites Not Resurveyed

SITE ID	BLDG TYPE	STATUS
533	GRO	Building has been boarded up and no access was allowed.
580	WAR	The site contact declined a site visit but stated that no changes had occurred in the building or equipment except for the addition of a fax machine.
457	RES	The tenant at this site is currently in the middle of a major remodel and the business is temporarily closed.
11	RES	This site has been totally renovated to a new style of restaurant. Metering equipment was removed prior to remodel and no data is available for the "new" site.
534	HTM	The site contact declined a site visit but stated that no known changes had occurred in the building or equipment.
8	OTH	The building has been torn down.
295	DGR	This site has been converted to a seldom accessed warehouse. Metering equipment was removed prior to conversion and no data is available for the "new" site.
286	OFG	This site has been renovated and converted to a private school. Metering equipment was removed prior to remodel and no data is available for the "new" site.
541	GRO	This site is a grocery that actually moved out of one building and into a new one. The monitoring equipment was reinstalled in the new building. Since data was being collected in this new building, a new survey was done to provide corresponding characteristics data.

3.0 RESURVEY SITE SELECTION

Early in the project a ranking of potential resurvey sites was initiated. This was done to assure that the sites of most interest would be resurveyed if all sites could not be done. Of primary interest would be sites with major energy changes that could be associated with characteristics

changes. Several types of information were used to determine which buildings would provide the most useful information when resurveyed. The Commercial Vacancy/Changeover analysis (Lucas et al. 1990) was a primary source for this task. For each building the ELCAP data for plug load, interior lighting, and exterior lighting end uses was visually examined to identify any long term changes in use. The HVAC end uses were not used because of seasonal variations in that end use. Notes from various site visits that indicated changes being made in the building were compared with the noted metered data changes to match any energy and characteristics changes.

In addition to the natural changes in buildings the possible effects of a concurrent building retrofit project was also considered. The Commercial Retrofit End Use Study (CREUS) dealt with a subset of the ELCAP metered CAP sites. Buildings within this study were targeted for possible energy related retrofits. In these situations it would be valuable to have "before" and "after" characteristics to go with the metered data being collected.

The final order in which buildings were to be resurveyed was based primarily on the magnitude of any observed changes and how much was already known about the change. Buildings were grouped according to the following criteria.

1. Major energy changes but no known site visit information to confirm the type and magnitude of change.
2. Noted smaller energy changes or changes occurring prior to any known site visit information.
3. Significant energy changes apparently caused by known building changes based on site visit information.
4. No noticeable energy changes or without sufficient energy data available at the time the study was done to make a valid determination.

In each of the four groups any sites that were in the CREUS and/or CAP programs were identified as a priority within that group.

4.0 RESURVEY PROCEDURE

The Commercial Site Resurvey was designed to provide a complete second "snapshot" of the physical characteristics of the ELCAP commercial buildings. To that end all parts of the original commercial survey format were addressed. All entries in the survey forms were checked against what was found at the site and the differences noted. Particular attention was paid to the connected load and tenant portions of the survey as equipment and tenant changes were expected to comprise the majority of change in the buildings.

4.1 RESURVEY FORMS

A (black and white) copy of the original survey forms was used as the resurvey format. Each completed form of the original survey served as the corresponding form for the resurvey. Each of these sets of resurvey forms also included a cover sheet indicating it's status as a resurvey. In addition, each final resurvey was identified (from originals) with three (3) wide red lines marked on each of it's four edges.

4.2 SITE VISIT RESURVEY PROCESS

For the buildings in the Seattle area an initial appointment with the current building contact was be made by a Seattle City Light (SCL) staff member assigned as the ELCAP commercial site relations coordinator. Those sites in other cities were contacted and resurveyed by PNL staffm members. At this time the purpose of the proposed visit was explained and a time arranged for a site visit at the building contacts convenience. If a building owner/contact was unwilling to allow access to the building for resurvey, this was reported to the PNL resurvey coordinator. If only portions of the resurvey activity (i.e. tenant contact, power switching) were a problem then every effort was made to assure the contact that the resurvey would be performed around these restrictions. During the site visit(s) each section of the survey was systematically checked with the current state of the building and it's occupants. Contact with tenants and building employees was kept to a minimum so as not to disrupt normal business activity.

As differences were noted in each portion of the survey, the original information was lined through in **RED** and the new information (if any) recorded next to it also in red. The survey protocols and procedures that were in effect at the time of the original surveys was applied here to provide as much consistency as possible between the two surveys.

4.3 SPECIFIC PROCEDURAL NOTES

4.3.1 Tenant Information

Whenever possible, original zone boundaries were not changed. Enlarged zones were treated as the original zone plus a new zone with similar attributes. Building additions were treated in this manner paying close attention to HVAC and/or refrigeration systems that serve the new area. Zones that had tenant or functional use changes were moved to the appropriate tenant form and added sequentially as a new zone or re-coded as each case merits. Wherever possible, the zone boundaries and sizes remained the same. New air temperature information was not included.

4.3.2 Sketches

Zone, tenant, and dimension changes were noted on the sketch sheets. Liberal use of margin notes concerning structural changes was encouraged.

4.3.3 Central Systems

Any changes to central systems were considered carefully. Some original system designations are system combinations or other derivatives of various system parts. It was important to thoroughly understand the present system prior to visiting the site in order to be able to discern actual system changes. Wherever possible, original systems were left intact while treating new additions as additional systems or additional equipment portions of existing systems.

4.3.4 Connected Load

The connected load "sitesheets" completed in the field during the first survey were used and red-lined for this part of the resurvey. The additional detail found on the "sitesheets" was useful in identifying individual

equipment. The "worksheets" used for data base encoding were sometimes referred to for equipment types used and px/end-use information. Specific cases/examples of the treatment of load changes follow.

- If the equipment in a load (in a specific zone) did not change (or change it's equipment **type**) it retained the original load number and had all other changes made in red. This includes new equipment of the same **type** that replaces old in the same general function and location.
- If a specific original identifiable piece of equipment was moved to another location (same tenant or not) it also retained the original load number and had other information changed in red.
- Equipment that no longer existed in the building was lined out. New equipment was added with a NEW load number. Old load numbers of no longer existing equipment were not reused.

In tracking down and assigning circuits and metering end uses for new or moved equipment, an effort was made to identify it's panel and circuit and record them on the "sitesheets". Any other useful information such as similar equipment or other equipment plugged in the same plug circuit was noted. This was often helpful in estimating correct channels and end uses on the "worksheets". If actual verification could not be made, an estimate (if appropriate) using the equipments proximity to other equipment that is identified to a circuit was made.

4.4 RESURVEY FINALIZATION AND CONSISTENCY CHECK

After all available information was gathered and recorded on the forms the information was checked for consistency with other resurvey inputs past survey practice and prepared for future encoding to a database format.

5.0 RESURVEY COMPATIBILITY AND DATA CODES

The Commercial Resurvey was completed using the same basic protocols as the original ELCAP survey. This makes both surveys completely compatible in

format and general content. As with the original survey all required changes and inputs were made within the established format. This format is well documented in the ELCAP working report entitled, "Commercial Study Handbook Number Four: Building Characteristics Data Collection" (April 1986).

An important part of the resurvey process was the identification of the electric circuit(s) and associated end use(s) for the various electric loads in the building. During the original survey virtually every load's circuit was identified in conjunction with the metering equipment installation process. During the resurvey process a less disruptive process was needed to identify circuits and end uses. New major equipment was usually always identified on existing panel documentation. In most cases much of the miscellaneous equipment was identifiable based on it's location by zone. In some cases multiple circuits may exist for certain end uses within an area or zone. In these cases a circuit would be estimated or left blank. However, in virtually all cases an end use was assigned based on actual knowledge or reasonable estimation. In this manner the resurvey differs from the original in that only actual verified inputs were made to the original survey.

The original survey format and code provisions were initially prepared in 1986. At that time the exact nature of the types of buildings and associated equipment to be surveyed was not known. Because of this it was necessary at times to embellish the original codes with additional or current items to properly account for equipment in some buildings. This was done during the verification and consistency check of the original survey (1986/1987). Surprisingly, these additions were relatively few. Virtually all were in the equipment code area where it was simply impossible to identify codes for all possible items prior to beginning the actual surveys.

During the resurvey visits equipment items were found that at first appeared to be additional items. In actuality most fit in one of the original codes. Most of the noted differences were a matter of size, or modernization compared to original equipment. Only two equipment items were found in the resurvey that were given a new code. Fax machines were coded as "DPT025" and an oil stove was given a code of "SPH013". The only other resurvey addition

was a building use zone code of "509" for a "work room". Other items such as laser printers could have been assigned new codes since they are a newer technology compared to most printers existing during the original survey. It was determined for items such as these that the original code would be used to avoid confusion. In many cases unit capacity information for these items is available to distinguish them.

Appendix A contains detailed listings of the new codes used in the resurvey activity.

6.0 ELECTRONIC VERSION OF CHANGES

An electronic version of the survey changes was created in order to assure that a backup to the paper resurveys existed. This electronic version was also created as a possible intermediate step in loading the data into the existing characteristics database that contains the original survey information.

Each survey form or input that was used for encoding the original survey was roughly recreated as a WP5.0 file. Sometimes the actual data base input actually requires only a small part of the form. In these cases the file was made to more closely match actual data base input. Each resurvey (M)odification, (D)eletion, or (I)nsertion could then be logged on the appropriate file. The "M", "D", and "I" codes were used within the forms to identify the mode of the information. Each completed file was then saved (with a unique name) as an ASCII text file. In this way all of the resurvey information that was different from the original was recorded electronically without recoding the entire resurvey. This tends to be very efficient for the many cases where only a small portion of the survey (1% to 10%) would change.

At some future point a program could be written to apply this resurvey information to a copy of the original survey. This would create a complete resurvey without the need to re-input entire sets of forms from scratch. The files were initially set up to easily work with the existing characteristics database. With effective programming these electronic files could be used to update most any version of the original survey.

A set of input rules was created to assure that all inputs to these WP5.0 files was consistent and would be useful in the future. This consisted of initial general notes as well as specific notes with each input file. See Appendix B for copies of the electronic version general rules, WP5.0 files, and resurvey blank forms.

7.0 REFERENCES

Lucas, R. G., Z. T. Taylor, N. E. Miller, and R. G. Pratt. 1990. Characterization of Changes in Commercial Building Structure, Equipment, and Occupants. PNL-7361, Pacific Northwest Laboratory, Richland, Washington.

APPENDIX A

NEW CODES USED IN THE RESURVEY ACTIVITY

APPENDIX A

DATA CODES

Since the original code listings are lengthy and exist in the survey handbook, only updates are shown here. These updates include all known new codes (from both surveys) that do not appear in the original handbook. All other codes have remained as originally defined.

Additional Equipment Codes

EQUIPMENT_CODE	DESCRIPTION
DPT018	Teletype Equipment
DPT019	Disk/Cartridge Cleaner/Rewinder
DPT020	Blueprint Equip
DPT021	Electric File Equip
DPT022	Modem
DPT023	Bank Machine
DPT024	Date Stamper
EXL005	Mixed Incandescent/Fluorescent Lighting
FDP018	Grill/Griddle
FDP019	Gas Control Valve
FDP020	Smokehouse Equip
HVA015	Air Dryer
HVA016	Humidifier
HVA017	Vacuum Pump
INL006	Mixed Incandescent/Fluorescent Lighting
LAB003	X-Ray Machine
LAB004	Adjustable Exam Furniture
LAB005	Medical Exam Equipment
LAB006	X-Ray Processing/Duplication
LAB007	Lab Sanitizer/Autoclave
LAB008	Lab Processing Equipment
MAT018	Letter/Pkg Opening Equip/Hole Punch
MAT019	Money Counter
SAN009	Steam Cleaner/Shampooer
SAN010	Floor Polisher
SAN011	Dry Cleaner
SHC005	Heat/Cool Wall/Window Unit
SHP006	Chain saw/Elec
SHP007	Demagnetizer/Magnetic Equipment
SHP008	Shop Press/Forming Machine
SHP009	Electronic Equipment
SHP010	Process Tank-Heat
SHP011	Cranes

Additional Equipment Codes (Cont.)

EQUIPMENT_CODE	DESCRIPTION
SHW005	Domestic HW Heat Exchanger/Preheat
SPH011	Woodstove
SPH012	Artificial Fireplace
SPH013	Oil Stove
SPE021	Hair Dryer/Curling Iron/Hair Equip
SPE022	Projectors,Audio/Visual/Art Equip
SPE023	Transformer
SPE024	Sewing Machine/Tailor Equip
SPE025	Transformers/Elec. Pwr Controller
SPE026	Aquarium. Htr/Lts./Equip
SPE027	Generator/Compressor
SPE028	Elec. Fence

Additional Building Use Zone Codes

USE_ZONE_CODE	DESCRIPTION
113	Detention Area
114	Pharmacy
115	Laundry
508	TV/Radio Studio & Control
608	Loading Dock

Additional Equipment Control Codes

USE_CONTROL_CODE	DESCRIPTION
7	Thermostatic/Timeclock
8	Timeclock/Photocell
9	Therm. w/Night Set Back/Timeclock

Equipment Control Code Numbers

New end-use codes were not created for purposes of the surveys. These were created as a part of the electric-use metering for each building circuit. Part of the survey format includes an indication of each electric loads connected circuit and associated end-use code. The original surveys were coded with the code numbers current at the time. During the course of the ELCAP project a major reorganization of the code numbering for end uses was done. This was required to add additional new end uses but changed all of the

original code numbers. No changes were made to the survey end-use code numbers. When it came time to code the resurvey it was decided that the same original numbering would be used. This was done to be consistent between surveys. It was realized that it should be a simple matter to convert both sets of survey code numbers to the "new" values. This would be most sensible at a time when both sets of survey data were located in the same database. Since original numbers exist in both surveys and "new" numbers exist with the metered data it is helpful to be able to convert from one to the other for comparisons of metered data and equipment characteristics. In the following listing the "ORIG CODE" is the one used in both surveys.

NEW CODE	ORIG CODE	END-USE
31	30	HEATING
33	31	COOLING
34	32	VENTILATION
35	33	AUXILIARIES
36	34	MIXED HVAC
37	35	INTERIOR LIGHTING
38	36	EXTERIOR LIGHTING
39	37	REFRIGERATION
40	38	WATER HEATING
46	39	RECEPTACLES
47	40	VERTICAL TRANSPORT
48	41	FOOD PREPARATION
50	42	MATERIAL HANDLING
51	43	DATA PROCESSING
52	44	RECREATION
53	45	SANITATION
54	46	LABORATORY
55	47	SHOP
56	50	GENERAL-MIXED
57	49	UNKNOWN
58	48	SPECIALTY 1
59	59	SPECIALTY 2
60	60	SPECIALTY 3
61	61	SPECIALTY 4
62	62	SPECIALTY 5

APPENDIX B

ELECTRONIC INPUT FILES AND RESURVEY FORMS

APPENDIX B

ELECTRONIC INPUT FILES AND RESURVEY FORMS

The general input "rules" and each of the WP5.0 files are shown below. Following these are reproductions of the resurvey blank forms indicating which input file was used to record the change information.

General Notes File:

Commercial Resurvey Flat File Input

The input files for the Commercial Resurvey are:

SXXX.INF	SXXXNX.HV1	SXXX.MOD	SXXXNX.TN4	SXXX.TN2
SXXXNX.HV2	SXXXNX.HV3	SXXX.BLD	SXXXNX.HV5	SXXX.TNT
SXXXNX.HV4	SXXXNX.CNL	SXXX.UA1	SXXXNX.HRS	SXXXNX.TN3

The Sxxx.INF file must be completed for each site. All other files are to be completed **only** if any changes , additions, or deletions have been made to the corresponding paper forms (**red** markings). For each input file only enter information on data that has either been newly INPUT, MODIFIED, or DELETED **(UNLESS OTHERWISE NOTED AT THE HEAD OF EACH FILE).** If new data has been added it should be flagged with an "I" and entered in the appropriate spaces. If data has been changed flag with an "M" and enter (usually entire line or section) in appropriate spaces. If data has been deleted (red-lined) flag with a "D" and enter (usually) first input of deleted line or section. **In all cases follow the specific instructions at the head of each file. In some input files all items must be listed if a main code is changed. In some others an apparent change to the data must be treated as a separate deletion and insertion.**

Filenames are of the form "SxxxNx.AAA or Sxxx.AAA with AAA being extension that defines what resurvey form it corresponds to. The "xxx" in each completed file is to be replaced with the "DI" number noted on the resurvey cover sheet. The single x is a sequential value (i.e. the first file of it's kind for a specific site "DI" gets a "1", the second a "2", etc.). This is used primarily because of multiple tenants and systems within one site.

Completed files must be saved as ASCII files (not Word Perfect).

Completed files should <u>not</u> be stored on the same disk as the original "blank" input forms. This will help prevent an original file being overwritten.

Input Files:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.INF - USE TABS. **THIS FORM MUST BE COMPLETED IN ENTIRETY FOR EACH SITE.** Note that "Form Completed By" and "Source of Building Plans.." are not entered. "Contractor Name" is the same for each site. For "Date Completed" use the "Final Check By" date on the cover sheet of the resurvey. If no resurvey was done use NA for Date Completed. In this file use an "X" flag for any item that is not an "I", "M", or "D". SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG	DATA
Contractor Name:	M	SCL/PNL
Date Completed: (use date at bottom of cover sheet)	M	
Site ID (letters):	X	
Site ID (numbers):	X	
Street Address:		
City:		
State (abbrev.):		
Zipcode:		
Site Owner:		
Phone:		
Num. of Struct.:		

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.BLD - USE TABS. Note: use a simple "Y" or "N" for "Building Plans Available" (IF USED). SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG	DATA
Gross Floor Area:		
Bldg Plans Avlbl:		
Number of Tenants:		
Year Built:		
Number of Stories:		

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.MOD - USE TABS. Note that NO flag is used in this file. All inputs will be new inserts. SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

========== FIRST SET ==========

ARCHITECTURAL

Descrip:
Year Made:
Floor ft^2:

MECHANICAL

Descrip:
Year Made:
Floor ft^2:

ELEC/LIGHTING

Descrip:
Year Made:
Floor ft^2:

========== SECOND SET (if needed) ==========

ARCHITECTURAL

Descrip:
Year Made:
Floor ft^2:

MECHANICAL

Descrip:
Year Made:
Floor ft^2:

ELEC/LIGHTING

Descrip:
Year Made:
Floor ft^2:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.UA1 - USE TABS. For this file put "flag" code in space directly before value for each input (i.e. "M70" for a modification of that data to a value of 70, "I346" for a new data input of 346, and "D193" for a deletion of that data. SAVE THIS FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	N	NE	E	SE	S	SW	W	NW	HOR
A-Wall Area:									
UA:									
C-Code:									
B-Wall Area:									
UA:									
C-Code:									
Roof Area:									
UA:									
C-Code:									
floor Area:									
UA:									
C-Code:									
window Area:									
UA:									
C-Code:									
doors Area:									
UA:									
C-Code:									

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HRS - USE TABS. NOTE: "Tenant Code" must be input if any inputs are made to this form. Use a flag of "X" for "Tenant Code" if it is not changed, added, or deleted. For the actual daily inputs (M-HOL) in this file put the "flag" code in the space directly before value for all inputs (i.e. "M0830" for a modification of that data to a value of 0830, "I1500" for a new data input of 1500, and "D1930" for a deletion of that data. If all data has been deleted you only need to input the "Tenant Code" (first line) and associated "D" flag. **If a "Tenant Code" value has been lined out and replaced with another, this must be treated as - one a deletion of on tenant's info and two the insertion of a new tenant's info.** SAVE AS AN ASCII FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG	DATA
Tenant Code:		
Occ Year:		
Tenant Contact:		
Phone #:		

SET 1

	FLAG	DATA
Sch Begin Mnth:		
Sch End Month:		

	M	T	W	TH	F	SAT	SUN	HOL
Hour Open:								
Hour Close:								
Peak Empl:								
Avg Empl:								
Peak Cust:								
Avg Cust:								

SET 2 (if needed)

	FLAG	DATA
Sch Begin Mnth:		
Sch End Month:		

	M	T	W	TH	F	SAT	SUN	HOL
Hour Open:								
Hour Close:								
Peak Empl:								
Avg Empl:								
Peak Cust:								
Avg Cust:								

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.TNT - USE TABS. NOTE: if tenant is deleted you only need to input "D" flag and "T-CODE" for that line. Otherwise input all data on line for an "M" or "I". **If a "t-code" has been lined out and replaced with information on a new tenant, this must be treated as two separate entries - one a deletion of the old tenant and two an insertion of another.** SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

FLAG T-CODE TENANT NAME CONTACT NAME PHONE #

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
Sxxx.TN2 - USE TABS. if a line is deleted only input "flag" and "t-code" for that line. Otherwise input entire line if "flag" of "I" or "M". **If a "t-code" has been lined out and replaced with information on a new tenant, this must be treated as two separate entries - one a deletion of the old tenant and two an insertion of another.** SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

FLAG T-CODE TYPE OF BUSINESS T-AREA YEAR SIC-CODE

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.TN3 - **USE ARROWS TO AVOID MOVING "USE-ZONE" VALUES.** NOTE: The "Tenant Code" must always be entered (use flag of "X" if "I", "M", or "D" do not apply). If all info has been deleted input only the "D" flag and "Tenant Code" (first line). Remember to input all values for any individual line that is either deleted, modified, or newly input. Use a simple "Y" or "N" for the "zone unconditioned?" field. **If a "Tenant Code" has been lined out and replaced with another, this must be treated as - one a complete deletion of a tenant's info and two an insertion of a new tenant's info.** SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

FLAG TENANT CODE

Tenant Code:

FLAG	M-ZONE	USE-ZONE	Z-CODE	AREA-FT^2	C-HEIGHT	(no input here)	ZONE-UNC
		A					
		B					
		C					
		D					
		E					
		F					
		G					
		H					
		I					
		J					

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.TN4 - USE TABS. The "Tenant Code" (from other form) must be input (use "X" for flag if no other flag applies). Flag used on the Tenant Code Line applies to the rest of information in the file. For a deletion of all the info just put in the "Tenant Code" and associated "D" flag. If a "Tenant Code" has been lined out and replaced with a new one (may be done on diff. form), this must be treated as - one a deletion of the old tenant's info and - two an insertion of the new tenant's info. If changes are a modification it would be treated as Deletion and than an Insertion. SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG DATA								
Tenant Code:									
	A	B	C	D	E	F	G	H	I	J
Channel #:										
PX Number:										
H from Flr:										
Near Therm: ("Y"/"N")										

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.CNL - USE TABS. NOTE: "Tenant Code" and "PX No." must always be entered if any insert, modification, or deletion is made to that sheet.

INFORMATION FOR ONLY ONE TENANT MAY BE PUT IN EACH FILE. IF A PAPER FORM HAS MIXED TENANTS THEY MUST BE INPUT ON SEPARATE FILES. iNFORMATION FOR THE SAME TENANT FROM SEPARATE FORMS MAY BE INPUT IN ONE FILE IF THIS IS CONVENIENT.

Always input both the Old and New "Tenant Code" and "PX No" if they are modified. Use an "X" for flag on "Tenant Code" and "PX No." if they are not an "I", "M", or "D". **If the "Tenant Code" is lined out and replaced by another, then any loads on that sheet must have their load numbers listed (in this case an "X" can be used for flag if nothing else applies).** If a line is to be deleted, only input the "flag" and "load number". If part of a line is to be modified, input the entire line with an "M" flag. SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG	NEW DATA	OLD DATA
Tenant Code:			
PX No.:			

FLAG	LD #	EQ-CODE	TCAP	FUEL	ZONE	CNTR	EUSE	FD-1	FD-2	FD-3	PROX	ITEMS

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HV1 - USE TABS. On this file you only need to put in each load number (regardless of position in table) on a separate line if it is a modification , input, or deletion and input appropriate flag. **If a "LOAD" has been lined out and replaced with a new number this must be treated as two separate entries - one a deletion of the old "LOAD" and two an insertion of another.** SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND A FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
FLAG LOAD #

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HV2 - USE TABS. After making any set-up inputs you only need to put in each load number with fuel types (regardless of position in table) on a separate line if it is a modification , input, or deletion and input appropriate flag. NOTE: "System Number" must always be entered if any insert, modification, or deletion is made to that system. Use an "X" for flag on "System Number" if it is not an "I", "M", or "D". SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
FLAG DATA

System Number:
System Type:
(H,C,HC,
V,R)

FLAG LOAD # P-FUEL SEC-FUEL

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HV3 - USE TABS. After making any set-up inputs you only need to put in each load number with its count (regardless of position in each table) on a separate line if it is a modification , input, or deletion and input appropriate flag. NOTE: "System Number" must always be entered if any insert, mod, or deletion is made to that system. Use an "X" for flag when putting in "System Number" if it is not an "I", "M", or "D". SAVE AS ASCII TEXT FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
FLAG DATA

System Number:
Econ Used:
(use T(temp),
E(enth), or
N(none))

AUXILIARY EQUIPMENT

FLAG LOAD # COUNT

CONSERVATION EQUIPMENT

FLAG LOAD # COUNT

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HV4 - USE TABS. For this file put "flag" code in space directly before value for all inputs except system number (i.e. "IFRG" for a new data input of FRG, "DLMG" for a deletion (modification is not used in this file except for "System Number"). If a "ten-*" has been lined out and replaced with a new tenant, this must be treated as two separate entries - one a deletion of the old tenant and two an insertion of another. You must input "System Number" if any changes or deletions are made to the paper form (use "X" if not an "I", or "D". SAVE AS AN ASCII FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

FLAG DATA

System Number:

	Ten-1	Ten-2	Ten-3	Ten-4	Ten-5	Ten-6	Ten-7	Ten-8	Ten-9	Ten10	Ten11	Ten12
A												
B												
C												
D												
E												
F												
G												
H												
I												
J												

	Ten13	Ten14	Ten15	Ten16	Ten17	Ten18	Ten19	Ten20	Ten21	Ten22	Ten23	Ten24
A												
B												
C												
D												
E												
F												
G												
H												
I												
J												

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
SxxxNx.HV5 - USE TABS. Always input the "System Number" and "Flag" ("D", "M", or "I"). For this file one flag will apply to all inputs. Therefore all info must be entered regardless of flag. For all inputs other than "system Number" and "Flag" simply input an "X" or the data in the appropriate space as found on the paper forms. SAVE AS AN ASCII FILE WITH "DI" FROM COVER SHEET (3 CHAR.) IN PLACE OF "XXX" AND SEQUENTIAL FORM NUMBER IN PLACE OF "X" WHEN COMPLETED.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

	FLAG	DATA
System Number:		

1. Primary Distribution System

AIR

	CON-VOL	VAR-VOL	T-RHT?	ELEC	WATR	STEAM	CAPAC
Single Duct							
Dual Duct							
Multi-Zone							

WATER

	1	2	3	4
Num of Pipes				

STEAM

	1	2
Num of Pipes		

2. Secondary Distribution System

AIR

	CON-VOL	VAR-VOL	T-RHT?	ELEC	WATR	STEAM	CAPAC
Single Duct							
Dual Duct							
Multi-Zone							

WATER

	MARK
F-Coil w/Vent	
F-Coil wo/Vent	
Radiator	
Hydronic Slab	

STEAM

	MARK
F-Coil w/Vent	
F-Coil wo/Vent	
Radiator	

COMMERCIAL CHARACTERISTICS RE-SURVEY

SITE _____ PX #_____ DI #_____

INPUT TO ALL FILES IN PLACE OF "XXX" IN FILENAME

SITE VISIT BY _____ ON _____

FINAL CHECK BY _____ ON _____

INPUT TO "SXXX.INF"

ELCAP BUILDING CHARACTERISTICS SURVEY PACKAGE

COVER SHEET

"SXXX.INF"

1. Contractor Name:_____
2. Form Completed By:_____
3. Date Completed:____/____/____
4. Site I. D.:_____
5. Principal Address:_____

   _____
6. Site Owner:_____ Phone:(___)___-_____
7. Source of building plans, if any:_____
8. Number of Structures:_____

"SXXX.TNT"

9. Tenant Contacts:

Tenant Code	Tenant Name	Contact Name	Phone No.
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____
			(___)___-_____

BUILDING CHARACTERISTICS SUMMARY

I. Building Data

1. Gross Floor Area (SF)_____

2. Building Plans Available? ____Yes ____No

3. Tenant Information:

Number of Tenants=_____

"SXXX.TN2"

3-Char. Tenant Code	Type of Business	Tenant Gross Floor Area (SF)	Year Occup Began	4-dig. SIC Code
EXT				

"SXXX.BLD"

4. Year building was built: _____

5. Number of stories: _____

Sitesheet #2

BUILDING MODIFICATIONS AND ADDITIONS

Year built: _____

"SXXX.MOD"

	Architectural	Mechanical	Electrical/ Lighting
Modification:			
Description			
Year Made			
SF Floor Area Affected			
Addition:			
Description			
Year Made			
SF Floor Area Affected or Added			
Modification:			
Description			
Year Made			
SF Floor Area Affected			
Addition:			
Description			
Year Made			
SF Floor Area Affected or Added			
Modification:			
Description			
Year Made			
SF Floor Area Affected			
Addition:			
Description			
Year Made			
SF Floor Area Affected or Added			

"SXXX.UA1"

BUILDING CHARACTERISTICS SUMMARY

IV. Envelope Data (exterior components only)

Orientation	N	NE	E	SE	S	SW	W	NW	HOR
Above grade walls- Net Area									
Total UA									
Construction code									
Below grade walls- Net Area									
Total UA									
Construction code									
Roof/Ceiling- Area									
Total UA									
Construction code									
Floor- Area									
Total UA									
Construction code									
Windows- Area									
Total UA									
Construction code									
Doors- Area									
Total UA									
Construction code									

V. Additional Information:
1. Attach the building Connected Load Inventory Worksheets.
2. Attach Sitesheet #2 - Building Modifications and Additions.

Site ID # ________
By ______ on ______
Page ______ of ______

Sitesheet #4

Tenant Code:______

TENANT OCCUPANCY WORKSHEET

Year Occupancy Began ______

Tenant Contact Name: ________________
Phone No: ________________

"SXXX.HRS"

Schedule during months of________________

Days	M	T	W	TH	F	SAT	SUN	HOL
Hour open								
Hour close								
Peak no. of employees								
Avg. no. of employees								
Peak no. of customers								
Avg. no. of customers								

Schedule during months of________________

Days	M	T	W	TH	F	SAT	SUN	HOL
Hour open								
Hour close								
Peak no. of employees								
Avg. no. of employees								
Peak no. of customers								
Avg. no. of customers								

Schedule during months of________________

Days	M	T	W	TH	F	SAT	SUN	HOL
Hour open								
Hour close								
Peak no. of employees								
Avg. no. of employees								
Peak no. of customers								
Avg. no. of customers								

"SXXXNX.TN3"

TENANT INFORMATION

(To be completed for each tenant in the building)

1. Tenant Code:_____ 2. Building Use Zone Data:

Meas. Plan Zone	Use Zone No.	*Use Zone Code	Floor Area (SF)	Avg. Ceiling Ht. (FT)	Measured Air Temperature			Check if zone uncon-ditioned
					Deg.F	Time	Date	
	A							
	B							
	C							
	D							
	E							
	F							
	G							
	H							
	I							
	J							

TENANT INFORMATION (CONT'D)

Tenant Code:_____

3. HVAC Data

"SXXXNX.HV1"

Tenant unitary HVAC equipment (Enter equipment load number under the zone the equipment is located in):

	Use Zone									
	A	B	C	D	E	F	G	H	I	J
Electric Baseboard										
Unit Heaters										
Window A/C										
Unit Heat Pump - Air/air										
Unit heat pump - Air/water										
Unit Ventilation										
Other:_____										

4. Temperature Sensor Locations:

Enter the sensor channel number, the PX number of the FDAS the sensor is connected to, the height from the floor, and whether the sensor is located adjacent to a thermostat for each building use zone that contains a temperature sensor.

"SXXXNX.TN4"

	Building Use Zone									
	A	B	C	D	E	F	G	H	I	J
Channel Number										
PX Number										
Height from Floor (FT)										
Near thermostat [Y/N]?										

5. Attach Tenant Occupancy Schedule (Sitesheet #4).

6. Attach tenant Connected Loads Inventory Worksheet.

Tenant Code _____

PX No._____

CONNECTED LOAD INVENTORY WORKSHEET

Load no.	Equipment Code	Total Cap.(kW)	Fuel Code	Use Zone	Control Code	End Use	FDAS Channel Nos.			Proxy Load No.

"SXXX NX.CNL"

"SXXXNX.HV2"

BUILDING CHARACTERISTICS SUMMARY

II. HVAC and Refrigeration Central System Description
(Complete 1 description for each different central system)

1. Central System Number: _____
2. System Type (check one):
   ____Heating ____Cooling ____Heating & Cooling
   ____Ventilation only ____Refrigeration
3. Major Equipment
   Enter requested load numbers from the Connected Load Inventory Worksheets for the equipment associated with this system.

	Load No.	Fuel types primary	Fuel types secondary
Heating			
Water Boiler			
Steam Boiler			
Furnace			
Resistance Heaters			
Air-source Heat Pump			
Water-source Heat Pump			
Other:			
Cooling			
Direct Expansion			
Chiller			
Evaporative Cooler			
Air-source Heat Pump			
Water-source Heat Pump			
Other:			
Ventilation			
Supply/Ventilation Fan			
Other:			
Refrigeration			
Central Compressor			
Other:			

Fuel type codes:
0 = Other_____
1 = Electric
2 = Gas
3 = Fuel oil #____
*4 = Steam
*5 = Hot water
*6 = Chilled water
*Either purchased from off-site or generated in a separate building on-site.

"SXXXNX.HV3"

Central system no.:_____

4. Auxiliary Equipment (Enter the number of pieces of each auxiliary equipment type, and the equipment load number(s), if applicable.)

Aux. Equipment	Count	load nos	Conservation Equipment	Count	load nos
Pumps			Air/air heat exch.		
Air compressors			Refr. hot gas reclaim		
Heat exchangers			Double bundle condensor		
Heat Rejection fan			Air/water heat exch.		
Supply/ Ventilation fan			Storage		
Exhaust fan			Solar assist		
Return/ Circulation fan			Other_____		
Other_____			Other_____		

5. Is an economizer cycle used? ____Yes ____No

If yes, check control type: ____Temperature ____Enthalpy

"SXXXNX.HV4"

6. Tenant building use zones served by this system:

Use Zone	Three-character Tenant Codes								
A									
B									
C									
D									
E									
F									
G									
H									
I									
J									

Central system no.:_____

"SXXXNX.HV5"

BUILDING CHARACTERISTICS SUMMARY

III. HVAC Distribution System Description:

1. Primary Distribution System:

AIR

	Constant Volume	Variable Volume	Terminal Re-heat?	Re-heat Coil Fuel type Elec.	Water	Steam	Re-heat Coil capacity
Single duct							
Dual duct							
Multi-zone							

WATER
(check one)
Number of pipes: ___1 ___2 ___3 ___4

STEAM
Number of pipes: ___1 ___2

2. Secondary Distribution System

AIR

	Constant Volume	Variable Volume	Terminal Re-heat?	Re-heat Coil Fuel type Elec.	Water	Steam	Re-heat Coil capacity
Single duct							
Dual duct							
Multi-zone							

WATER
Fan coil unit with ventilation___ Fan coil unit without ventilation___
Radiator___ Hydronic slab___

STEAM
Fan coil unit with ventilation___ Fan coil unit without ventilation___
Radiator___

DISTRIBUTION

(2) Bonneville Power Administration

Mark Miller
Diane Hollister

(1) Seattle City Light

Adele Mertz

(3) Pacific Northwest Laboratory

Eric Richman (2)
ELCAP Project Files