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Appendices A-D

California Commercial Saturation Survey

Prepared for
California Public Utilities Commission

Itron, Inc.
11236 El Camino Real
San Diego, California 92130

(858) 724-2620

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Legal Notice

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Appendix A

Mapping NAICS to Business Type

The sample of sites for the CSS and CMST telephone and on-site surveys was developed using the California IOU electric non-residential frames. Mapping the IOU account level NAICs to business types was one of the first steps of the sample development. The NAICs to business type mapping was created by Itron in direct consultation with the CPUC, IOUs, and the DEER Team (Study Team). The development reviewed previous NAICs to business type mapping developed by the IOUs, the California Energy Commission, and a mapping provided by the DEER Team.

For the CSS and CMST studies, Itron combined the IOU Customer Information System with the IOU billing data for 2010. The account level data set included each account's NAICs code and their annual electricity consumption. These data were aggregated to the NAICs code level and sorted by annual consumption. The Itron and the Study Team manually reviewed the NAICs to business type mapping for those NAICs codes representing 99% of the CA IOU non-residential annual electricity consumption. The group compared the mappings from previous NAICs to business type mappings and conferred on mappings where previous mappings were in disagreement, resolving these NAICs to business type mappings. The NAICs to business type mappings associated with the remaining 1% of the non-residential electric consumption were resolved by Itron using a similar approach as described above.

The NAICs to business type mapping used for the CSS and CMST studies are listed below.

Table A-1: NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
RE2200	Master metered multifamily	Misc. - Res Common
RE1100	Individually metered single family	Misc. - Res Common
RE1000	Individually metered account (type unknown)	Misc. - Res Common
999999	Unclassified establishments	Unclassified
999990	Unclassified establishments	Unclassified
999900	Non-classifiable Establishments	Unclassified
928120	International Affairs	Office
928110	National Security	Not in Study - TCU
927110	Space Research and Technology	Office
926150	Regulation, Licensing, and Inspection of Miscellaneous Commercial Sectors	Misc.
926140	Regulation of Agricultural Marketing and Commodities	Office
926130	Regulation and Administration of Communications, Electric, Gas, and Other Utilities	Misc.
926120	Regulation and Administration of Transportation Programs	Office
926110	Administration of General Economic Programs	Office
925120	Administration of Urban Planning and Community and Rural Development	Office
925110	Administration of Housing Programs	Office
924120	Administration of Conservation Programs	Office
924110	Administration of Air and Water Resource and Solid Waste Management Programs	Office
923140	Administration of Veterans' Affairs	Office
923130	Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs)	Office
923120	Administration of Public Health Programs	Office
923110	Administration of Education Programs	Office
923100	Administration of Human Resource Programs	Office
922800	Decorative Lighting (Xmas Trees, Fountains, etc.)	Misc.
922700	Buildings & Surrounding Areas - Exterior Lighting	Not in Study - Street Light
922610	Street and Highway Lighting, not further classified	Not in Study - Street Light
922600	Street & Highway Lighting, Road Sign Lights (Freeway Exits, etc.)	Not in Study - Street Light
922500	Traffic Control	Not in Study - Street Light

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
922199	Street and Highway Lighting, not further classified	Not in Study - Street Light
922198	Street and Highway Lighting, not further classified	Not in Study - Street Light
922190	Other Justice, Public Order, and Safety Activities	Misc.
922160	Fire Protection	Misc.
922150	Parole Offices and Probation Offices	Misc.
922140	Correctional Institutions	Misc.
922130	Legal Counsel and Prosecution	Misc.
922120	Police Protection	Misc.
922110	Courts	Office
922100	Justice, Public Order, and Safety Activities	Misc.
922000	Justice, Public Order, and Safety Activities	Misc.
921191	Community Services	Office
921190	Other General Government Support	Office
921150	American Indian and Alaska Native Tribal Governments	Office
921140	Executive and Legislative Offices, Combined	Office
921130	Public Finance Activities	Office
921120	Legislative Bodies	Office
921110	Executive Offices	Office
921100	Executive, Legislative, and Other General Government	Office
921000	Executive, Legislative, and Other General Government	Office
920000	Public Administration	Office
814110	Private Households	Misc. - Res Common
813990	Other Similar Organizations (except Business, Professional, Labor, and Political Organizations)	Office
813940	Political Organizations	Office
813930	Labor Unions and Similar Labor Organizations	Office
813920	Professional Organizations	Office
813910	Business Associations	Office
813900	Business, Professional, Labor, Political, and Simi	Office
813410	Civic and Social Organizations	Misc.
813400	Civic and Social Organizations	Misc.
813319	Other Social Advocacy Organizations	Office
813312	Environment, Conservation and Wildlife Organizations	Office
813311	Human Rights Organizations	Office
813310	Social Advocacy Organizations	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
813300	Social Advocacy Organizations	Office
813219	Other Grant-making and Giving Services	Office
813212	Voluntary Health Organizations	Office
813211	Grant-making Foundations	Office
813210	Grant-making and Giving Services	Office
813200	Grant-making and Giving Services	Office
813110	Religious Organizations	Misc. - Assembly
813100	Religious Organizations	Misc.
813000	Religious, Grant-making, Civic, Professional, and S	Misc.
812990	All Other Personal Services	Misc.
812938	Carpet and Upholstery Cleaning Services	Office
812932	SCE Parking Lots & Garages-Public	Misc.
812931	Public Parking Lots Lighting	Misc.
812930	Parking Lots and Garages	Misc.
812922	One-Hour Photofinishing	Misc.
812921	Photofinishing Laboratories (except One-Hour)	Misc.
812920	Photofinishing	Misc.
812910	Pet Care (except Veterinary) Services	Misc.
812332	Industrial Launderers	Misc.
812331	Linen Supply	Misc.
812320	Dry-cleaning and Laundry Services (except Coin-Operated)	Misc.
812310	Coin-Operated Laundries and Drycleaners	Misc.
812300	Dry-cleaning and Laundry Services	Misc.
812220	Cemeteries and Crematories	Misc.
812210	Funeral Homes and Funeral Services	Misc.
812200	Death Care Services	Misc.
812199	Other Personal Care Services	Misc.
812191	Diet and Weight Reducing Centers	Misc.
812190	Other Personal Care Services	Misc.
812113	Nail Salons	Misc.
812112	Beauty Salons	Misc.
812111	Barber Shops	Misc.
812110	Hair, Nail, and Skin Care Services	Misc.
812100	Personal Care Services	Misc.
811490	Other Personal and Household Goods Repair and Maintenance	Misc.
811430	Footwear and Leather Goods Repair	Misc.

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
811420	Reupholstery and Furniture Repair	Misc.
811412	Appliance Repair and Maintenance	Misc.
811411	Home and Garden Equipment Repair and Maintenance	Misc.
811410	Home and Garden Equipment and Appliance Repair and	Misc.
811400	Personal and Household Goods Repair and Maintenance	Misc.
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	Misc.
811300	Commercial and Industrial Machinery and Equipment	Misc.
811219	Other Electronic and Precision Equipment Repair and Maintenance	Misc.
811213	Communication Equipment Repair and Maintenance	Misc.
811212	Computer and Office Machine Repair and Maintenance	Misc.
811211	Consumer Electronics Repair and Maintenance	Misc.
811210	Electronic and Precision Equipment Repair and Main	Misc.
811200	Electronic and Precision Equipment Repair and Main	Misc.
811198	All Other Automotive Repair and Maintenance	Misc.
811192	Car Washes	Misc.
811191	Automotive Oil Change and Lubrication Shops	Misc.
811190	Other Automotive Repair and Maintenance	Misc.
811122	Automotive Glass Replacement Shops	Misc.
811121	Automotive Body, Paint, and Interior Repair and Maintenance	Misc.
811120	Automotive Body, Paint, Interior, and Glass Repair	Misc.
811118	Other Automotive Mechanical and Electrical Repair and Maintenance	Misc.
811113	Automotive Transmission Repair	Misc.
811112	Automotive Exhaust System Repair	Misc.
811111	General Automotive Repair	Misc.
811110	Automotive Mechanical and Electrical Repair and Ma	Misc.
811100	Automotive Repair and Maintenance	Misc.
811000	Repair and Maintenance	Misc.
810000	Other Services (except Public Administration)	Misc.
722410	Drinking Places (Alcoholic Beverages)	Restaurant
722330	Mobile Food Services	Misc.
722320	Caterers	Restaurant
722310	Food Service Contractors	Misc.
722300	Special Food Services	Misc.
722213	Snack and Nonalcoholic Beverage Bars	Restaurant
722212	Cafeterias, Grill Buffets, and Buffets	Restaurant
722211	Limited-Service Restaurants	Restaurant

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
722210	Limited-Service Eating Places	Restaurant
722200	Limited-Service Eating Places	Restaurant
722110	Full-Service Restaurants	Restaurant
722100	Full-Service Restaurants	Restaurant
722000	Food Services and Drinking Places	Restaurant
721310	Rooming and Boarding Houses	Not in Study
721300	Rooming and Boarding Houses	Not in Study
721214	Recreational and Vacation Camps (except Campgrounds)	Not in Study
721211	RV (Recreational Vehicle) Parks and Campgrounds	Not in Study
721210	RV (Recreational Vehicle) Parks and Recreational C	Not in Study
721200	RV (Recreational Vehicle) Parks and Recreational C	Not in Study
721199	All Other Traveler Accommodation	Hotel
721191	Bed-and-Breakfast Inns	Hotel
721120	Casino Hotels	Hotel
721110	Hotels (except Casino Hotels) and Motels	Hotel
721100	Traveler Accommodation	Hotel
721000	Accommodation	Hotel
720000	Accommodation and Food Services	Hotel
713990	All Other Amusement and Recreation Industries	Misc.
713950	Bowling Centers	Misc.
713940	Fitness and Recreational Sports Centers	Misc.
713930	Marinas	Misc.
713920	Skiing Facilities	Misc.
713910	Golf Courses and Country Clubs	Not in Study
713900	Other Amusement and Recreation Industries	Misc.
713290	Other Gambling Industries	Misc.
713210	Casinos (except Casino Hotels)	Misc.
713120	Amusement Arcades	Misc.
713110	Amusement and Theme Parks	Misc.
713000	Amusement, Gambling, and Recreation Industries	Misc.
712190	Nature Parks and Other Similar Institutions	Misc.
712130	Zoos and Botanical Gardens	Misc.
712120	Historical Sites	Misc.
712110	Museums	Misc.
712100	Museums, Historical Sites, and Similar Institution	Misc.
711510	Independent Artists, Writers, and Performers	Misc.
711500	Independent Artists, Writers, and Performers	Misc.

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	Misc.
711320	Promoters of Performing Arts, Sports, and Similar Events without Facilities	Misc.
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities	Misc.
711300	Promoters of Performing Arts, Sports, and Similar	Misc.
711219	Other Spectator Sports	Misc.
711212	Racetracks	Misc.
711211	Sports Teams and Clubs	Misc.
711210	Spectator Sports	Misc.
711190	Other Performing Arts Companies	Misc.
711130	Musical Groups and Artists	Misc.
711120	Dance Companies	Misc.
711110	Theater Companies and Dinner Theaters	Misc.
711100	Performing Arts Companies	Misc.
711000	Performing Arts, Spectator Sports, and Related Industries	Misc.
710000	Arts, Entertainment, and Recreation	Misc.
700000	Miscellaneous Building	Misc.
624410	Child Day Care Services	Misc.
624310	Vocational Rehabilitation Services	Office
624230	Emergency and Other Relief Services	Office
624229	Other Community Housing Services	Office
624221	Temporary Shelters	Misc.
624220	Community Housing Services	Office
624210	Community Food Services	Misc.
624200	Community Food and Housing, and Emergency and Other Relief Services	Office
624190	Other Individual and Family Services	Office
624120	Services for the Elderly and Persons with Disabilities	Office
624110	Child and Youth Services	Office
624100	Individual and Family Services	Office
624000	Social Assistance	Office
623990	Other Residential Care Facilities	Health Care - Care
623900	Other Residential Care Facilities	Health Care - Care
623312	Homes for the Elderly	Health Care - Care
623311	Continuing Care Retirement Communities	Health Care - Care

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
623310	Community Care Facilities for the Elderly	Health Care - Care
623300	Community Care Facilities for the Elderly	Health Care - Care
623220	Residential Mental Health and Substance Abuse Facilities	Health Care - Care
623210	Residential Mental Retardation Facilities	Health Care - Care
623200	Residential Mental Retardation, Mental Health and	Health Care - Care
623110	Nursing Care Facilities	Health Care - Care
623100	Nursing Care Facilities	Health Care - Care
623000	Nursing and Residential Care Facilities	Health Care - Care
622312	Specialty Hospitals 100 Beds Or More	Health Care - Hospital
622311	Specialty Hospitals Less Than 100 Beds	Health Care - Hospital
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals	Health Care - Hospital
622212	Psychiatric Hospitals 100 Beds Or More	Health Care - Hospital
622211	Psychiatric Hospitals Less Than 100 Beds	Health Care - Hospital
622210	Psychiatric and Substance Abuse Hospitals	Health Care - Hospital
622200	Psychiatric and Substance Abuse Hospitals	Health Care - Hospital
622112	General Medical & Surgical Hospitals 100 Beds Or M	Health Care - Hospital
622111	General Medical & Surgical Hospitals Less Then 100	Health Care - Hospital
622110	General Medical and Surgical Hospitals	Health Care - Hospital
622100	General Medical and Surgical Hospitals	Health Care - Hospital
622000	Hospitals	Health Care - Hospital
621999	All Other Miscellaneous Ambulatory Health Care Services	Health Care - Med Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
621991	Blood and Organ Banks	Health Care - Med Office
621990	All Other Ambulatory Health Care Services	Health Care - Med Office
621910	Ambulance Services	Misc.
621610	Home Health Care Services	Office
621512	Diagnostic Imaging Centers	Health Care - Med Office
621511	Medical Laboratories	Misc.
621510	Medical and Diagnostic Laboratories	Misc.
621500	Medical and Diagnostic Laboratories	Misc.
621498	All Other Outpatient Care Centers	Health Care - Med Office
621493	Freestanding Ambulatory Surgical and Emergency Centers	Health Care - Med Office
621492	Kidney Dialysis Centers	Health Care - Med Office
621491	HMO Medical Centers	Health Care - Med Office
621490	Other Outpatient Care Centers	Health Care - Med Office
621420	Outpatient Mental Health and Substance Abuse Centers	Health Care - Med Office
621410	Family Planning Centers	Health Care - Med Office
621400	Outpatient Care Centers	Health Care - Med Office
621399	Offices of All Other Miscellaneous Health Practitioners	Health Care - Med Office
621391	Offices of Podiatrists	Health Care - Med Office
621390	Offices of All Other Health Practitioners	Health Care - Med Office
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists	Health Care - Med Office
621330	Offices of Mental Health Practitioners (except Physicians)	Health Care - Med Office
621320	Offices of Optometrists	Health Care - Med Office
621310	Offices of Chiropractors	Health Care - Med Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
621300	Offices of Other Health Practitioners	Health Care - Med Office
621210	Offices of Dentists	Health Care - Med Office
621112	Offices of Physicians, Mental Health Specialists	Health Care - Med Office
621111	Offices of Physicians (except Mental Health Specialists)	Health Care - Med Office
621110	Offices of Physicians	Health Care - Med Office
621100	Offices of Physicians	Health Care - Med Office
621000	Ambulatory Health Care Services	Health Care - Med Office
620000	Health Care and Social Assistance	Health Care - Med Office
611710	Educational Support Services	Office
611699	All Other Miscellaneous Schools and Instruction	Misc.
611692	Automobile Driving Schools	Misc.
611691	Exam Preparation and Tutoring	Misc.
611690	All Other Schools and Instruction	Misc.
611630	Language Schools	Misc.
611620	Sports and Recreation Instruction	Misc.
611610	Fine Arts Schools	Misc.
611600	Other Schools and Instruction	Misc.
611519	Other Technical and Trade Schools	Misc.
611513	Apprenticeship Training	Misc.
611512	Flight Training	Misc.
611511	Cosmetology and Barber Schools	Misc.
611510	Technical and Trade Schools	Misc.
611500	Technical and Trade Schools	Misc.
611430	Professional and Management Development Training	Misc.
611420	Computer Training	Misc.
611410	Business and Secretarial Schools	Misc.
611400	Business Schools and Computer and Management Train	Misc.
611312	Colleges, Universities, and Professional Schools	College
611311	Colleges, Universities & Professional Schools - Pr	College
611310	Colleges, Universities, and Professional Schools	College
611300	Colleges, Universities, and Professional Schools	College

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
611212	SCE Community College-Private	College
611211	Junior Colleges & Technical Institutions - Private	College
611210	Junior Colleges	College
611119	Unified School Districts (Garages, Offices, etc.)	School
611117	Junior & High Schools Combined	School
611116	Elementary And High Schools Combined	School
611115	Junior High Schools (7 &/Or 8&9 &/Or 10) - Private	School
611114	Junior High Schools (7 &/Or 8&9 &/Or 10) - Public	School
611113	Secondary Schools - Private	School
611112	Secondary Schools - Public	School
611111	Elementary Schools - Private	School
611110	Elementary and Secondary Schools	School
611100	Elementary and Secondary Schools	School
611000	Educational Services	School
562998	All Other Miscellaneous Waste Management Services	Not in Study - TCU
562991	Septic Tank and Related Services	Not in Study - TCU
562920	Materials Recovery Facilities	Not in Study - TCU
562910	Remediation Services	Not in Study
562219	Other Nonhazardous Waste Treatment and Disposal	Not in Study - TCU
562213	Solid Waste Combustors and Incinerators	Not in Study - TCU
562212	Solid Waste Landfill	Not in Study - TCU
562211	Hazardous Waste Treatment and Disposal	Not in Study - TCU
562210	Waste Treatment and Disposal	Not in Study - TCU
562119	Other Waste Collection	Not in Study - TCU
562112	Hazardous Waste Collection	Not in Study - TCU
562111	Solid Waste Collection	Not in Study - TCU
562000	Waste Management and Remediation Services	Not in Study - TCU
561990	All Other Support Services	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
561920	Convention and Trade Show Organizers	Office
561910	Packaging and Labeling Services	Office
561790	Other Services to Buildings and Dwellings	Office
561740	Carpet and Upholstery Cleaning Services	Office
561738	Landscaping Services	Office
561730	Landscaping Services	Office
561720	Janitorial Services	Office
561710	Exterminating and Pest Control Services	Office
561700	Security Systems Services (except Locksmiths)	Office
561622	Locksmiths	Office
561621	Security Systems Services (except Locksmiths)	Office
561620	Security Guards and Patrol Services	Office
561613	Armored Car Services	Office
561612	Security Guards and Patrol Services	Office
561611	Investigation Services	Office
561610	All Other Travel Arrangement and Reservation Services	Office
561600	Convention and Visitors Bureaus	Office
561599	All Other Travel Arrangement and Reservation Services	Office
561591	Convention and Visitors Bureaus	Office
561520	Tour Operators	Office
561510	Travel Agencies	Office
561500	Court Reporting and Stenotype Services	Office
561499	All Other Business Support Services	Office
561492	Court Reporting and Stenotype Services	Office
561491	Repossession Services	Office
561490	Collection Agencies	Office
561450	Credit Bureaus	Office
561440	Collection Agencies	Office
561439	Other Business Service Centers (including Copy Shops)	Office
561431	Private Mail Centers	Office
561430	Telephone Answering Services	Office
561422	Telemarketing Bureaus and Other Contact Centers	Office
561421	Telephone Answering Services	Office
561420	Business Support Services	Office
561410	Document Preparation Services	Office
561400	Temporary Help Services	Office
561330	Professional Employer Organizations	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
561320	Temporary Help Services	Office
561310	Facilities Support Services	Office
561300	Facilities Support Services	Office
561210	Facilities Support Services	Office
561110	Office Administrative Services	Office
561100	Administrative and Support and Waste Management an	Office
561000	Corporate, Subsidiary, and Regional Managing Offices	Office
560000	Offices of Other Holding Companies	Office
551114	Corporate, Subsidiary, and Regional Managing Offices	Property Managers
551112	Offices of Other Holding Companies	Office
551111	Offices of Bank Holding Companies	Office
541990	All Other Professional, Scientific, and Technical Services	Office
541940	Veterinary Services	Misc.
541930	Translation and Interpretation Services	Office
541922	Commercial Photography	Misc.
541921	Photography Studios, Portrait	Misc.
541920	Photographic Services	Misc.
541910	Marketing Research and Public Opinion Polling	Office
541900	Advertising Material Distribution Services	Office
541890	Other Services Related to Advertising	Office
541870	Advertising Material Distribution Services	Misc.
541860	Direct Mail Advertising	Office
541858	Display Advertising	Office
541850	Display Advertising	Office
541840	Media Representatives	Office
541830	Media Buying Agencies	Office
541820	Public Relations Agencies	Office
541811	Billboards - Lighting And Operations	Office
541810	Advertising Agencies	Office
541800	Advertising and Related Services	Office
541720	Research and Development in the Social Sciences and Humanities	Office
541710	Research and Development in the Physical, Engineer	Office
541700	Scientific Research and Development Services	Office
541690	Other Scientific and Technical Consulting Services	Office
541620	Environmental Consulting Services	Office
541618	Other Management Consulting Services	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
541614	Process, Physical Distribution, and Logistics Consulting Services	Office
541613	Marketing Consulting Services	Office
541612	Human Resources Consulting Services	Office
541611	Administrative Management and General Management Consulting Services	Office
541610	Management Consulting Services	Office
541600	Management, Scientific, and Technical Consulting S	Office
541519	Other Computer Related Services	Office
541513	Computer Facilities Management Services	Office
541512	Computer Systems Design Services	Office
541511	Custom Computer Programming Services	Office
541510	Computer Systems Design and Related Services	Office
541500	Computer Systems Design and Related Services	Office
541490	Other Specialized Design Services	Office
541430	Graphic Design Services	Office
541420	Industrial Design Services	Office
541410	Interior Design Services	Office
541400	Specialized Design Services	Office
541380	Testing Laboratories	Misc.
541370	Surveying and Mapping (except Geophysical) Services	Misc.
541360	Geophysical Surveying and Mapping Services	Office
541350	Building Inspection Services	Office
541340	Drafting Services	Office
541330	Engineering Services	Office
541320	Landscape Architectural Services	Misc.
541310	Architectural Services	Office
541300	Architectural, Engineering, and Related Services	Office
541219	Other Accounting Services	Office
541214	Payroll Services	Office
541213	Tax Preparation Services	Office
541211	Offices of Certified Public Accountants	Office
541210	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	Office
541200	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	Office
541199	All Other Legal Services	Office
541191	Title Abstract and Settlement Offices	Office
541120	Offices of Notaries	Office
541110	Offices of Lawyers	Office
541100	Legal Services	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
541000	Professional, Scientific, and Technical Services	Office
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	Office
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	Not in Study - TCU
532420	Office Machinery and Equipment Rental and Leasing	Not in Study - TCU
532412	Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing	Not in Study - TCU
532411	Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing	Not in Study - TCU
532410	Construction, Transportation, Mining, and Forestry	Not in Study - TCU
532400	Commercial and Industrial Machinery and Equipment	Not in Study - TCU
532310	General Rental Centers	Misc.
532299	All Other Consumer Goods Rental	Misc.
532292	Recreational Goods Rental	Misc.
532291	Home Health Equipment Rental	Misc.
532290	Other Consumer Goods Rental	Misc.
532230	Video Tape and Disc Rental	Misc.
532220	Formal Wear and Costume Rental	Misc.
532210	Consumer Electronics and Appliances Rental	Misc.
532200	Consumer Goods Rental	Misc.
532120	Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing	Misc.
532112	Passenger Car Leasing	Misc.
532111	Passenger Car Rental	Misc.
532110	Passenger Car Rental and Leasing	Misc.
532000	Rental and Leasing Services	Misc.
531390	Other Activities Related to Real Estate	Office
531320	Offices of Real Estate Appraisers	Office
531312	Nonresidential Property Managers	Property Managers
531311	Residential Property Managers	Misc. - Res Common
531310	Real Estate Property Managers	Property Managers
531300	Activities Related to Real Estate	Office
531210	Offices of Real Estate Agents and Brokers	Office
531191	Vacant Building, No Tenant	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
531190	Lessors of Other Real Estate Property	Office
531150	Combined Real Estate, Developers, Contractors, etc	Office
531130	Lessors of Miniwarehouses and Self-Storage Units	Property Managers
531129	Lessors of Nonresidential Buildings	Property Managers
531128	Lessors of Nonresidential Buildings	Property Managers
531123	Multi-Tenant Offices	Property Managers
531122	Offices, Single Or Multi-Tenant	Office
531121	Shopping Centers and Plazas: Retail Sales & Associated Operations	Office
531120	Lessors of Nonresidential Buildings (except Mini warehouses)	Property Managers
531119	SCE Lessors-Residential Buildings-Other Common Area	Misc. - Res Common
531115	SCE Lessors NFC	Office
531114	SCE Lessors NFC	Property Managers
531113	SCE Lessors-Residential Buildings-Laundry Facilities	Misc. - Res Common
531112	Lessors of Residential Buildings and Dwellings	Misc. - Res Common
531111	Lessors of Residential Buildings and Dwellings	Office
531110	Lessors of Residential Buildings and Dwellings	Property Managers
531100	Lessors of Real Estate	Property Managers
531000	Real Estate	Office
530000	Real Estate and Rental and Leasing	Misc.
525990	Other Financial Vehicles	Office
525930	Real Estate Investment Trusts	Office
525920	Trusts, Estates, and Agency Accounts	Office
525910	Open-End Investment Funds	Office
525190	Other Insurance Funds	Office
525120	Health and Welfare Funds	Office
525110	Pension Funds	Office
525000	Funds, Trusts, and Other Financial Vehicles	Office
524298	All Other Insurance Related Activities	Office
524292	Third Party Administration of Insurance and Pension Funds	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
524291	Claims Adjusting	Office
524290	Other Insurance Related Activities	Office
524210	Insurance Agencies and Brokerages	Office
524200	Agencies, Brokerages, and Other Insurance Related	Office
524130	Reinsurance Carriers	Office
524128	Other Direct Insurance (except Life, Health, and Medical) Carriers	Office
524127	Direct Title Insurance Carriers	Office
524126	Direct Property and Casualty Insurance Carriers	Office
524120	Direct Insurance (except Life, Health, and Medical	Office
524114	Direct Health and Medical Insurance Carriers	Office
524113	Direct Life Insurance Carriers	Office
524100	Insurance Carriers	Office
524000	Insurance Carriers and Related Activities	Office
523999	Miscellaneous Financial Investment Activities	Office
523991	Trust, Fiduciary, and Custody Activities	Office
523930	Investment Advice	Office
523920	Portfolio Management	Office
523910	Miscellaneous Intermediation	Office
523900	Other Financial Investment Activities	Office
523210	Securities and Commodity Exchanges	Office
523140	Commodity Contracts Brokerage	Office
523130	Commodity Contracts Dealing	Office
523120	Securities Brokerage	Office
523110	Investment Banking and Securities Dealing	Office
523100	Securities and Commodity Contracts Intermediation	Office
523000	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	Office
522390	Other Activities Related to Credit Intermediation	Office
522320	Financial Transactions Processing, Reserve, and Clearinghouse Activities	Office
522310	Mortgage and Nonmortgage Loan Brokers	Office
522300	Activities Related to Credit Intermediation	Office
522298	All Other Non-depository Credit Intermediation	Office
522294	Secondary Market Financing	Office
522293	International Trade Financing	Office
522292	Real Estate Credit	Office
522291	Consumer Lending	Office
522290	Other Non-depository Credit Intermediation	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
522220	Sales Financing	Office
522210	Credit Card Issuing	Office
522200	Non-depository Credit Intermediation	Office
522190	Other Depository Credit Intermediation	Office
522130	Credit Unions	Office
522120	Savings Institutions	Office
522110	Commercial Banking	Office
522100	Depository Credit Intermediation	Office
522000	Credit Intermediation and Related Activities	Office
521110	Monetary Authorities - Central Bank	Office
520000	Finance and Insurance	Office
519190	All Other Information Services	Misc.
519120	Libraries and Archives	Misc.
519110	News Syndicates	Misc.
518210	Data Processing, Hosting, and Related Services	Misc.
518112	Web Search Portals	Misc.
518111	Internet Service Providers	Misc.
518110	Internet Service Providers and Web Search Portals	Misc.
518100	Internet Service Providers and Web Search Portals	Misc.
518000	Internet Service Providers, Web Search Portals, an	Misc.
517910	Other Telecommunications	Not in Study - TCU
517510	Cable and Other Program Distribution	Not in Study - TCU
517500	Cable and Other Program Distribution	Not in Study - TCU
517410	Satellite Telecommunications	Not in Study - TCU
517310	Telecommunications Resellers	Not in Study - TCU
517212	Cellular and Other Wireless Telecommunications	Not in Study - TCU
517211	Paging	Not in Study - TCU
517210	Wireless Telecommunications Carriers (except Satellite)	Not in Study - TCU
517110	Wired Telecommunications Carriers	Not in Study - TCU
517100	Wired Telecommunications Carriers	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
517000	Telecommunications	Not in Study - TCU
516110	Internet Publishing and Broadcasting	Not in Study - TCU
515210	Cable and Other Subscription Programming	Not in Study - TCU
515120	Television Broadcasting	Not in Study - TCU
515112	Radio Stations	Not in Study - TCU
515111	Radio Networks	Not in Study - TCU
515110	Radio Networks and Stations	Not in Study - TCU
515100	Radio and Television Broadcasting	Not in Study - TCU
515000	Broadcasting (except Internet)	Not in Study - TCU
514210	Data Processing Services	Misc.
514199	All Other Information Services	Misc.
514191	On-Line Information Services	Misc.
514120	Libraries and Archives	Misc.
514110	News Syndicates	Misc.
513390	Other Telecommunications	Not in Study - TCU
513340	Satellite Telecommunications	Not in Study - TCU
513330	Telecommunications Resellers	Not in Study - TCU
513322	Cellular and Other Wireless Telecommunications	Not in Study - TCU
513321	Paging	Not in Study - TCU
513310	Wired Telecommunications Carriers	Not in Study - TCU
513220	Cable and Other Program Distribution	Not in Study - TCU
513120	Television Broadcasting	Not in Study - TCU
513112	Radio Stations	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
513111	Radio Networks	Not in Study - TCU
512290	Other Sound Recording Industries	Misc.
512240	Sound Recording Studios	Misc.
512230	Music Publishers	Misc.
512220	Integrated Record Production/Distribution	Misc.
512210	Record Production	Misc.
512200	Sound Recording Industries	Misc.
512199	Other Motion Picture and Video Industries	Misc.
512191	Teleproduction and Other Postproduction Services	Misc.
512190	Postproduction Services and Other Motion Picture a	Misc.
512132	Drive-In Motion Picture Theaters	Misc.
512131	Motion Picture Theaters (except Drive-Ins)	Misc.
512130	Motion Picture and Video Exhibition	Misc.
512120	Motion Picture and Video Distribution	Misc.
512110	Motion Picture and Video Production	Misc.
512100	Motion Picture and Video Industries	Misc.
512000	Motion Picture and Sound Recording Industries	Misc.
511210	Software Publishers	Office
511199	All Other Publishers	Industrial
511191	Greeting Card Publishers	Industrial
511190	Other Publishers	Industrial
511140	Directory and Mailing List Publishers	Industrial
511130	Book Publishers	Industrial
511120	Periodical Publishers	Industrial
511110	Newspaper Publishers	Industrial
511100	Newspaper, Periodical, Book, and Database Publishers	Industrial
511000	Publishing Industries	Industrial
510000	Information	Misc.
500000	Customer Service	Misc.
493190	Other Warehousing and Storage	Warehouse
493130	Farm Product Warehousing and Storage	Warehouse
493120	Refrigerated Warehousing and Storage	Warehouse
493110	General Warehousing and Storage	Warehouse
493100	Warehousing and Storage	Warehouse
493000	Warehousing and Storage	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
492210	Local Messengers and Local Delivery	Not in Study - TCU
492110	Couriers and Express Delivery Services	Not in Study - TCU
492000	Couriers and Messengers	Not in Study - TCU
491110	Postal Service	Office
488999	All Other Support Activities for Transportation	Not in Study - TCU
488991	Packing and Crating	Not in Study - TCU
488510	Freight Transportation Arrangement	Not in Study - TCU
488490	Other Support Activities for Road Transportation	Not in Study - TCU
488410	Motor Vehicle Towing	Not in Study - TCU
488400	Support Activities for Road Transportation	Not in Study - TCU
488390	Other Support Activities for Water Transportation	Not in Study - TCU
488330	Navigational Services to Shipping	Not in Study - TCU
488320	Marine Cargo Handling	Not in Study - TCU
488310	Port and Harbor Operations	Not in Study - TCU
488300	Support Activities for Water Transportation	Not in Study - TCU
488211	Railroad Signals & Switches - Operation Of	Not in Study - TCU
488210	Support Activities for Rail Transportation	Not in Study - TCU
488190	Other Support Activities for Air Transportation	Not in Study - TCU
488119	Other Airport Operations	Not in Study - TCU
488111	Air Traffic Control	Not in Study - TCU
488110	Airport Operations	Not in Study - TCU
488100	Support Activities for Air Transportation	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
487990	Scenic and Sightseeing Transportation, Other	Not in Study - TCU
487210	Scenic and Sightseeing Transportation, Water	Not in Study - TCU
487110	Scenic and Sightseeing Transportation, Land	Not in Study - TCU
486990	All Other Pipeline Transportation	Not in Study - TCU
486910	Pipeline Transportation of Refined Petroleum Products	Not in Study - TCU
486210	Pipeline Transportation of Natural Gas	Not in Study - TCU
486110	Pipeline Transportation of Crude Oil	Not in Study - TCU
486000	Pipeline Transportation	Not in Study - TCU
485999	All Other Transit and Ground Passenger Transportation	Not in Study - TCU
485991	Special Needs Transportation	Not in Study - TCU
485990	Other Transit and Ground Passenger Transportation	Not in Study - TCU
485510	Charter Bus Industry	Not in Study - TCU
485410	School and Employee Bus Transportation	Not in Study - TCU
485320	Limousine Service	Not in Study - TCU
485310	Taxi Service	Not in Study - TCU
485210	Interurban and Rural Bus Transportation	Not in Study - TCU
485200	Interurban and Rural Bus Transportation	Not in Study - TCU
485119	Other Urban Transit Systems	Not in Study - TCU
485113	Bus and Other Motor Vehicle Transit Systems	Not in Study - TCU
485112	Commuter Rail Systems	Not in Study - TCU
485111	Mixed Mode Transit Systems	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
485110	Urban Transit Systems	Not in Study - TCU
485000	Transit and Ground Passenger Transportation	Not in Study - TCU
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	Not in Study - TCU
484220	Specialized Freight (except Used Goods) Trucking, Local	Not in Study - TCU
484210	Used Household and Office Goods Moving	Not in Study - TCU
484200	Specialized Freight Trucking	Not in Study - TCU
484122	General Freight Trucking, Long-Distance, Less Than Truckload	Not in Study - TCU
484121	General Freight Trucking, Long-Distance, Truckload	Not in Study - TCU
484120	General Freight Trucking, Long-Distance	Not in Study - TCU
484110	General Freight Trucking, Local	Not in Study - TCU
484100	General Freight Trucking	Not in Study - TCU
484000	Truck Transportation	Not in Study - TCU
483212	Inland Water Passenger Transportation	Not in Study - TCU
483211	Inland Water Freight Transportation	Not in Study - TCU
483114	Coastal and Great Lakes Passenger Transportation	Not in Study - TCU
483113	Coastal and Great Lakes Freight Transportation	Not in Study - TCU
483112	Deep Sea Passenger Transportation	Not in Study - TCU
483111	Deep Sea Freight Transportation	Not in Study - TCU
483110	Deep Sea, Coastal, and Great Lakes Water Transport	Not in Study - TCU
483000	Water Transportation	Not in Study - TCU
482118	Railroad Signals & Switches	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
482112	Short Line Railroads	Not in Study - TCU
482111	Line-Haul Railroads	Not in Study - TCU
482110	Rail Transportation	Not in Study - TCU
482000	Rail Transportation	Not in Study - TCU
481219	Other Nonscheduled Air Transportation	Not in Study - TCU
481212	Nonscheduled Chartered Freight Air Transportation	Not in Study - TCU
481211	Nonscheduled Chartered Passenger Air Transportation	Not in Study - TCU
481210	Nonscheduled Air Transportation	Not in Study - TCU
481200	Nonscheduled Air Transportation	Not in Study - TCU
481112	Scheduled Freight Air Transportation	Not in Study - TCU
481111	Scheduled Passenger Air Transportation	Not in Study - TCU
481110	Scheduled Air Transportation	Not in Study - TCU
481000	Air Transportation	Not in Study - TCU
480000	Transportation and Warehousing	Not in Study - TCU
454390	Other Direct Selling Establishments	Misc.
454319	Other Fuel Dealers	Misc.
454312	Liquefied Petroleum Gas (Bottled Gas) Dealers	Misc.
454311	Heating Oil Dealers	Misc.
454210	Vending Machine Operators	Misc.
454113	Mail-Order Houses	Misc.
454112	Electronic Auctions	Misc.
454111	Electronic Shopping	Misc.
454110	Electronic Shopping and Mail-Order Houses	Misc.
454100	Electronic Shopping and Mail-Order Houses	Misc.
453998	All Other Miscellaneous Store Retailers (except Tobacco Stores)	Retail
453991	Tobacco Stores	Retail
453990	All Other Miscellaneous Store Retailers	Retail

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
453930	Manufactured (Mobile) Home Dealers	Retail
453920	Art Dealers	Retail
453910	Pet and Pet Supplies Stores	Retail
453900	Other Miscellaneous Store Retailers	Retail
453310	Used Merchandise Stores	Retail
453220	Gift, Novelty, and Souvenir Stores	Retail
453210	Office Supplies and Stationery Stores	Retail
453200	Office Supplies, Stationery, and Gift Stores	Retail
453110	Florists	Retail
453000	Miscellaneous Store Retailers	Retail
452990	All Other General Merchandise Stores	Retail
452910	Warehouse Clubs and Supercenters	Retail
452900	Other General Merchandise Stores	Retail
452112	Discount Department Stores	Retail
452111	Department Stores (except Discount Department Stores)	Retail
452110	Department Stores	Retail
452100	Department Stores	Retail
452000	General Merchandise Stores	Retail
451220	Prerecorded Tape, Compact Disc, and Record Stores	Retail
451212	News Dealers and Newsstands	Retail
451211	Book Stores	Retail
451210	Book Stores and News Dealers	Retail
451140	Musical Instrument and Supplies Stores	Retail
451130	Sewing, Needlework, and Piece Goods Stores	Retail
451120	Hobby, Toy, and Game Stores	Retail
451110	Sporting Goods Stores	Retail
451000	Sporting Goods, Hobby, Book, and Music Stores	Retail
450000	Retail Trade	Retail
448320	Luggage and Leather Goods Stores	Retail
448310	Jewelry Stores	Retail
448210	Shoe Stores	Retail
448190	Other Clothing Stores	Retail
448150	Clothing Accessories Stores	Retail
448140	Family Clothing Stores	Retail
448130	Children's and Infants' Clothing Stores	Retail
448120	Women's Clothing Stores	Retail
448110	Men's Clothing Stores	Retail

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
448100	Clothing Stores	Retail
448000	Clothing and Clothing Accessories Stores	Retail
447198	Other Gasoline Stations	Misc.
447190	Other Gasoline Stations	Misc.
447110	Gasoline Stations with Convenience Stores	Food/Liquor
447100	Gasoline Stations	Misc.
447000	Gasoline Stations	Misc.
446199	All Other Health and Personal Care Stores	Retail
446191	Food (Health) Supplement Stores	Retail
446190	Other Health and Personal Care Stores	Retail
446130	Optical Goods Stores	Retail
446120	Cosmetics, Beauty Supplies, and Perfume Stores	Retail
446110	Pharmacies and Drug Stores	Retail
445310	Beer, Wine, and Liquor Stores	Food/Liquor
445299	All Other Specialty Food Stores	Food/Liquor
445292	Confectionery and Nut Stores	Food/Liquor
445291	Baked Goods Stores	Food/Liquor
445290	Other Specialty Food Stores	Food/Liquor
445230	Fruit and Vegetable Markets	Food/Liquor
445220	Fish and Seafood Markets	Food/Liquor
445210	Meat Markets	Food/Liquor
445200	Specialty Food Stores	Food/Liquor
445120	Convenience Stores	Food/Liquor
445110	Supermarkets and Other Grocery (except Convenience) Stores	Food/Liquor
445100	Grocery Stores	Food/Liquor
445000	Food and Beverage Stores	Food/Liquor
444220	Nursery, Garden Center, and Farm Supply Stores	Retail
444210	Outdoor Power Equipment Stores	Retail
444200	Lawn and Garden Equipment and Supplies Stores	Retail
444190	Other Building Material Dealers	Retail
444130	Hardware Stores	Retail
444120	Paint and Wallpaper Stores	Retail
444110	Home Centers	Retail
444100	Building Material and Supplies Dealers	Retail
444000	Building Material and Garden Equipment and Suppliers	Retail
443130	Camera and Photographic Supplies Stores	Retail
443120	Computer and Software Stores	Retail

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
443112	Radio, Television, and Other Electronics Stores	Retail
443111	Household Appliance Stores	Retail
443110	Appliance, Television, and Other Electronics Store	Retail
443100	Electronics and Appliance Stores	Retail
442299	All Other Home Furnishings Stores	Retail
442291	Window Treatment Stores	Retail
442290	Other Home Furnishings Stores	Retail
442210	Floor Covering Stores	Retail
442200	Home Furnishings Stores	Retail
442110	Furniture Stores	Retail
442000	Furniture and Home Furnishings Stores	Retail
441320	Tire Dealers	Misc.
441310	Automotive Parts and Accessories Stores	Retail
441300	Automotive Parts, Accessories, and Tire Stores	Retail
441229	All Other Motor Vehicle Dealers	Retail
441222	Boat Dealers	Retail
441221	Motorcycle, ATV, and Personal Watercraft Dealers	Retail
441220	Motorcycle, Boat, and Other Motor Vehicle Dealers	Retail
441210	Recreational Vehicle Dealers	Retail
441200	Other Motor Vehicle Dealers	Retail
441120	Used Car Dealers	Retail
441110	New Car Dealers	Retail
441100	Automobile Dealers	Retail
441000	Motor Vehicle and Parts Dealers	Retail
440000	Retail Trade	Retail
425120	Wholesale Trade Agents and Brokers	Warehouse
425110	Business to Business Electronic Markets	Warehouse
424990	Other Misc.ellaneous Nondurable Goods Merchant Wholesalers	Warehouse
424950	Paint, Varnish, and Supplies Merchant Wholesalers	Warehouse
424940	Tobacco and Tobacco Product Merchant Wholesalers	Warehouse
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers	Warehouse
424920	Book, Periodical, and Newspaper Merchant Wholesalers	Warehouse
424910	Farm Supplies Merchant Wholesalers	Warehouse
424900	Miscellaneous Nondurable Goods Merchant Wholesaler	Warehouse
424820	Wine and Distilled Alcoholic Beverage Merchant Wholesalers	Warehouse
424810	Beer and Ale Merchant Wholesalers	Warehouse
424800	Alcoholic Beverage Merchant Wholesalers	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	Warehouse
424710	Petroleum Bulk Stations and Terminals	Not in Study
424700	Petroleum and Petroleum Products Merchant Wholesale	Warehouse
424690	Other Chemical and Allied Products Merchant Wholesalers	Warehouse
424610	Plastics Materials and Basic Forms and Shapes Merchant Wholesalers	Warehouse
424590	Other Farm Product Raw Material Merchant Wholesalers	Warehouse
424520	Livestock Merchant Wholesalers	Warehouse
424510	Grain and Field Bean Merchant Wholesalers	Warehouse
424500	Farm Product Raw Material Merchant Wholesalers	Warehouse
424490	Other Grocery and Related Products Merchant Wholesalers	Warehouse
424480	Fresh Fruit and Vegetable Merchant Wholesalers	Warehouse
424470	Meat and Meat Product Merchant Wholesalers	Warehouse
424460	Fish and Seafood Merchant Wholesalers	Warehouse
424450	Confectionery Merchant Wholesalers	Warehouse
424440	Poultry and Poultry Product Merchant Wholesalers	Warehouse
424430	Dairy Product (except Dried or Canned) Merchant Wholesalers	Warehouse
424420	Packaged Frozen Food Merchant Wholesalers	Warehouse
424410	General Line Grocery Merchant Wholesalers	Warehouse
424400	Grocery and Related Product Wholesalers	Warehouse
424340	Footwear Merchant Wholesalers	Warehouse
424330	Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers	Warehouse
424320	Men's and Boys' Clothing and Furnishings Merchant Wholesalers	Warehouse
424310	Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers	Warehouse
424300	Apparel, Piece Goods, and Notions Merchant Wholesalers	Warehouse
424210	Drugs and Druggists' Sundries Merchant Wholesalers	Warehouse
424130	Industrial and Personal Service Paper Merchant Wholesalers	Warehouse
424120	Stationery and Office Supplies Merchant Wholesalers	Warehouse
424110	Printing and Writing Paper Merchant Wholesalers	Warehouse
424100	Paper and Paper Product Merchant Wholesalers	Warehouse
424000	Merchant Wholesalers, Nondurable Goods	Warehouse
423990	Other Miscellaneous Durable Goods Merchant Wholesalers	Warehouse
423940	Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers	Warehouse
423930	Recyclable Material Merchant Wholesalers	Warehouse
423920	Toy and Hobby Goods and Supplies Merchant Wholesalers	Warehouse
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
423900	Miscellaneous Durable Goods Merchant Wholesalers	Warehouse
423860	Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers	Warehouse
423850	Service Establishment Equipment and Supplies Merchant Wholesalers	Warehouse
423840	Industrial Supplies Merchant Wholesalers	Warehouse
423830	Industrial Machinery and Equipment Merchant Wholesalers	Warehouse
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	Warehouse
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	Warehouse
423800	Machinery, Equipment, and Supplies Merchant Wholes	Warehouse
423740	Refrigeration Equipment and Supplies Merchant Wholesalers	Warehouse
423730	Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers	Warehouse
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	Warehouse
423710	Hardware Merchant Wholesalers	Warehouse
423700	Hardware, and Plumbing and Heating Equipment and S	Warehouse
423690	Other Electronic Parts and Equipment Merchant Wholesalers	Warehouse
423620	Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers	Warehouse
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	Warehouse
423600	Electrical and Electronic Goods Merchant Wholesale	Warehouse
423520	Coal and Other Mineral and Ore Merchant Wholesalers	Warehouse
423510	Metal Service Centers and Other Metal Merchant Wholesalers	Warehouse
423490	Other Professional Equipment and Supplies Merchant Wholesalers	Warehouse
423460	Ophthalmic Goods Merchant Wholesalers	Warehouse
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	Warehouse
423440	Other Commercial Equipment Merchant Wholesalers	Warehouse
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	Warehouse
423420	Office Equipment Merchant Wholesalers	Warehouse
423410	Photographic Equipment and Supplies Merchant Wholesalers	Warehouse
423400	Professional and Commercial Equipment and Supplies	Warehouse
423390	Other Construction Material Merchant Wholesalers	Warehouse
423330	Roofing, Siding, and Insulation Material Merchant Wholesalers	Warehouse
423320	Brick, Stone, and Related Construction Material Merchant Wholesalers	Warehouse
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	Warehouse
423300	Lumber and Other Construction Materials Merchant W	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
423220	Home Furnishing Merchant Wholesalers	Warehouse
423210	Furniture Merchant Wholesalers	Warehouse
423140	Motor Vehicle Parts (Used) Merchant Wholesalers	Warehouse
423130	Tire and Tube Merchant Wholesalers	Warehouse
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	Warehouse
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	Warehouse
423100	Motor Vehicle and Motor Vehicle Parts and Supplies	Warehouse
423000	Merchant Wholesalers, Durable Goods	Warehouse
422990	Other Miscellaneous Nondurable Goods Wholesalers	Warehouse
422950	Paint, Varnish, and Supplies Wholesalers	Warehouse
422940	Tobacco and Tobacco Product Wholesalers	Warehouse
422930	Flower, Nursery Stock, and Florists' Supplies Wholesalers	Warehouse
422920	Book, Periodical, and Newspaper Wholesalers	Warehouse
422910	Farm Supplies Wholesalers	Warehouse
422820	Wine and Distilled Alcoholic Beverage Wholesalers	Warehouse
422810	Beer and Ale Wholesalers	Warehouse
422720	Petroleum and Petroleum Products Wholesalers (except Bulk Stations and Terminals)	Warehouse
422710	Petroleum Bulk Stations and Terminals	Not in Study
422690	Other Chemical and Allied Products Wholesalers	Warehouse
422610	Plastics Materials and Basic Forms and Shapes Wholesalers	Warehouse
422590	Other Farm Product Raw Material Wholesalers	Warehouse
422520	Livestock Wholesalers	Warehouse
422510	Grain and Field Bean Wholesalers	Warehouse
422490	Other Grocery and Related Products Wholesalers	Warehouse
422480	Fresh Fruit and Vegetable Wholesalers	Warehouse
422470	Meat and Meat Product Wholesalers	Warehouse
422460	Fish and Seafood Wholesalers	Warehouse
422450	Confectionery Wholesalers	Warehouse
422440	Poultry and Poultry Product Wholesalers	Warehouse
422430	Dairy Product (except Dried or Canned) Wholesalers	Warehouse
422420	Packaged Frozen Food Wholesalers	Warehouse
422410	General Line Grocery Wholesalers	Warehouse
422340	Footwear Wholesalers	Warehouse
422330	Women's, Children's, and Infants' Clothing and Acc	Warehouse
422320	Men's and Boys' Clothing and Furnishings Wholesale	Warehouse
422310	Piece Goods, Notions, and Other Dry Goods Wholesale	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
422210	Drugs and Druggists' Sundries Wholesalers	Warehouse
422130	Industrial and Personal Service Paper Wholesalers	Warehouse
422120	Stationery and Office Supplies Wholesalers	Warehouse
422110	Printing and Writing Paper Wholesalers	Warehouse
421990	Other Miscellaneous Durable Goods Wholesalers	Warehouse
421940	Jewelry, Watch, Precious Stone, and Precious Metal	Warehouse
421930	Recyclable Material Wholesalers	Warehouse
421920	Toy and Hobby Goods and Supplies Wholesalers	Warehouse
421910	Sporting and Recreational Goods and Supplies Whole	Warehouse
421860	Transportation Equipment and Supplies (except Motor Vehicle) Wholesalers	Warehouse
421850	Service Establishment Equipment and Supplies Whole	Warehouse
421840	Industrial Supplies Wholesalers	Warehouse
421830	Industrial Machinery and Equipment Wholesalers	Warehouse
421820	Farm and Garden Machinery and Equipment Wholesaler	Warehouse
421810	Construction and Mining (except Oil Well) Machinery	Warehouse
421740	Refrigeration Equipment and Supplies Wholesalers	Warehouse
421730	Warm Air Heating and Air-Conditioning Equipment an	Warehouse
421720	Plumbing and Heating Equipment and Supplies (Hydro	Warehouse
421710	Hardware Wholesalers	Warehouse
421690	Other Electronic Parts and Equipment Wholesalers	Warehouse
421620	Electrical Appliance, Television, and Radio Set Wholesalers	Warehouse
421610	Electrical Apparatus and Equipment, Wiring Supplies	Warehouse
421520	Coal and Other Mineral and Ore Wholesalers	Warehouse
421510	Metal Service Centers and Offices	Warehouse
421490	Other Professional Equipment and Supplies Wholesale	Warehouse
421460	Ophthalmic Goods Wholesalers	Warehouse
421450	Medical, Dental, and Hospital Equipment and Supplies	Warehouse
421440	Other Commercial Equipment Wholesalers	Warehouse
421430	Computer and Computer Peripheral Equipment and Software Wholesalers	Warehouse
421420	Office Equipment Wholesalers	Warehouse
421410	Photographic Equipment and Supplies Wholesalers	Warehouse
421390	Other Construction Material Wholesalers	Warehouse
421330	Roofing, Siding, and Insulation Material Wholesaler	Warehouse
421320	Brick, Stone, and Related Construction Material Wholesaler	Warehouse
421310	Lumber, Plywood, Millwork, and Wood Panel Wholesaler	Warehouse
421220	Home Furnishing Wholesalers	Warehouse
421210	Furniture Wholesalers	Warehouse

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
421140	Motor Vehicle Parts (Used) Wholesalers	Warehouse
421130	Tire and Tube Wholesalers	Warehouse
421120	Motor Vehicle Supplies and New Parts Wholesalers	Warehouse
421110	Automobile and Other Motor Vehicle Wholesalers	Warehouse
420000	Wholesale Trade	Warehouse
400000	Trade	Warehouse
339999	All Other Miscellaneous Manufacturing	Industrial
339995	Burial Casket Manufacturing	Industrial
339994	Broom, Brush, and Mop Manufacturing	Industrial
339993	Fastener, Button, Needle, and Pin Manufacturing	Industrial
339992	Musical Instrument Manufacturing	Industrial
339991	Gasket, Packing, and Sealing Device Manufacturing	Industrial
339990	All Other Miscellaneous Manufacturing	Industrial
339950	Sign Manufacturing	Industrial
339944	Carbon Paper and Inked Ribbon Manufacturing	Industrial
339943	Marking Device Manufacturing	Industrial
339942	Lead Pencil and Art Good Manufacturing	Industrial
339941	Pen and Mechanical Pencil Manufacturing	Industrial
339932	Game, Toy, and Children's Vehicle Manufacturing	Industrial
339931	Doll and Stuffed Toy Manufacturing	Industrial
339930	Doll, Toy, and Game Manufacturing	Industrial
339920	Sporting and Athletic Goods Manufacturing	Industrial
339914	Costume Jewelry and Novelty Manufacturing	Industrial
339913	Jewelers' Material and Lapidary Work Manufacturing	Industrial
339912	Silverware and Hollowware Manufacturing	Industrial
339911	Jewelry (except Costume) Manufacturing	Industrial
339910	Jewelry and Silverware Manufacturing	Industrial
339900	Other Miscellaneous Manufacturing	Industrial
339116	Dental Laboratories	Industrial
339115	Ophthalmic Goods Manufacturing	Industrial
339114	Dental Equipment and Supplies Manufacturing	Industrial
339113	Surgical Appliance and Supplies Manufacturing	Industrial
339112	Surgical and Medical Instrument Manufacturing	Industrial
339111	Laboratory Apparatus and Furniture Manufacturing	Industrial
339110	Medical Equipment and Supplies Manufacturing	Industrial
339100	Medical Equipment and Supplies Manufacturing	Industrial
339000	Miscellaneous Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
337920	Blind and Shade Manufacturing	Industrial
337910	Mattress Manufacturing	Industrial
337215	Showcase, Partition, Shelving, and Locker Manufacturing	Industrial
337214	Office Furniture (except Wood) Manufacturing	Industrial
337212	Custom Architectural Woodwork and Millwork Manufacturing	Industrial
337211	Wood Office Furniture Manufacturing	Industrial
337210	Office Furniture (including Fixtures) Manufacturing	Industrial
337129	Wood Television, Radio, and Sewing Machine Cabinet Manufacturing	Industrial
337127	Institutional Furniture Manufacturing	Industrial
337125	Household Furniture (except Wood and Metal) Manufacturing	Industrial
337124	Metal Household Furniture Manufacturing	Industrial
337122	Non-upholstered Wood Household Furniture Manufacturing	Industrial
337121	Upholstered Household Furniture Manufacturing	Industrial
337120	Household and Institutional Furniture Manufacturing	Industrial
337110	Wood Kitchen Cabinet and Countertop Manufacturing	Industrial
337100	Household and Institutional Furniture and Kitchen	Industrial
337000	Furniture and Related Product Manufacturing	Industrial
336999	All Other Transportation Equipment Manufacturing	Industrial
336991	Motorcycle, Bicycle, and Parts Manufacturing	Industrial
336612	Boat Building	Industrial
336611	Ship Building and Repairing	Industrial
336610	Ship and Boat Building	Industrial
336510	Railroad Rolling Stock Manufacturing	Industrial
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing	Industrial
336415	Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing	Industrial
336414	Guided Missile and Space Vehicle Manufacturing	Industrial
336413	Other Aircraft Parts and Auxiliary Equipment Manufacturing	Industrial
336412	Aircraft Engine and Engine Parts Manufacturing	Industrial
336411	Aircraft Manufacturing	Industrial
336410	Aerospace Product and Parts Manufacturing	Industrial
336399	All Other Motor Vehicle Parts Manufacturing	Industrial
336391	Motor Vehicle Air-Conditioning Manufacturing	Industrial
336390	Other Motor Vehicle Parts Manufacturing	Industrial
336370	Motor Vehicle Metal Stamping	Industrial
336360	Motor Vehicle Seating and Interior Trim Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	Industrial
336340	Motor Vehicle Brake System Manufacturing	Industrial
336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	Industrial
336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing	Industrial
336321	Vehicular Lighting Equipment Manufacturing	Industrial
336312	Gasoline Engine and Engine Parts Manufacturing	Industrial
336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing	Industrial
336300	Motor Vehicle Parts Manufacturing	Industrial
336214	Travel Trailer and Camper Manufacturing	Industrial
336213	Motor Home Manufacturing	Industrial
336212	Truck Trailer Manufacturing	Industrial
336211	Motor Vehicle Body Manufacturing	Industrial
336210	Motor Vehicle Body and Trailer Manufacturing	Industrial
336120	Heavy Duty Truck Manufacturing	Industrial
336112	Light Truck and Utility Vehicle Manufacturing	Industrial
336111	Automobile Manufacturing	Industrial
336100	Motor Vehicle Manufacturing	Industrial
336000	Transportation Equipment Manufacturing	Industrial
335999	All Other Miscellaneous Electrical Equipment and Component Manufacturing	Industrial
335991	Carbon and Graphite Product Manufacturing	Industrial
335932	Noncurrent-Carrying Wiring Device Manufacturing	Industrial
335931	Current-Carrying Wiring Device Manufacturing	Industrial
335929	Other Communication and Energy Wire Manufacturing	Industrial
335921	Fiber Optic Cable Manufacturing	Industrial
335912	Primary Battery Manufacturing	Industrial
335911	Storage Battery Manufacturing	Industrial
335910	Battery Manufacturing	Industrial
335900	Other Electrical Equipment and Component Manufacturing	Industrial
335314	Relay and Industrial Control Manufacturing	Industrial
335313	Switchgear and Switchboard Apparatus Manufacturing	Industrial
335312	Motor and Generator Manufacturing	Industrial
335311	Power, Distribution, and Specialty Transformer Manufacturing	Industrial
335310	Electrical Equipment Manufacturing	Industrial
335228	Other Major Household Appliance Manufacturing	Industrial
335222	Household Refrigerator and Home Freezer Manufacturing	Industrial
335221	Household Cooking Appliance Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
335212	Household Vacuum Cleaner Manufacturing	Industrial
335211	Electric Housewares and Household Fan Manufacturing	Industrial
335129	Other Lighting Equipment Manufacturing	Industrial
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	Industrial
335121	Residential Electric Lighting Fixture Manufacturing	Industrial
335120	Lighting Fixture Manufacturing	Industrial
335110	Electric Lamp Bulb and Part Manufacturing	Industrial
335000	Electrical Equipment, Appliance, and Component Man	Industrial
334613	Magnetic and Optical Recording Media Manufacturing	Industrial
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	Industrial
334611	Software Reproducing	Industrial
334519	Other Measuring and Controlling Device Manufacturing	Industrial
334518	Watch, Clock, and Part Manufacturing	Industrial
334517	Irradiation Apparatus Manufacturing	Industrial
334516	Analytical Laboratory Instrument Manufacturing	Industrial
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	Industrial
334514	Totalizing Fluid Meter and Counting Device Manufacturing	Industrial
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	Industrial
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	Industrial
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	Industrial
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	Industrial
334500	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	Industrial
334419	Other Electronic Component Manufacturing	Industrial
334418	Printed Circuit Assembly (Electronic Assembly) Manufacturing	Industrial
334417	Electronic Connector Manufacturing	Industrial
334416	Electronic Coil, Transformer, and Other Inductor Manufacturing	Industrial
334415	Electronic Resistor Manufacturing	Industrial
334414	Electronic Capacitor Manufacturing	Industrial
334413	Semiconductor and Related Device Manufacturing	Industrial
334412	Bare Printed Circuit Board Manufacturing	Industrial
334411	Electron Tube Manufacturing	Industrial
334410	Semiconductor and Other Electronic Component Manufacturing	Industrial
334400	Semiconductor and Other Electronic Component Manufacturing	Industrial
334310	Audio and Video Equipment Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
334290	Other Communications Equipment Manufacturing	Industrial
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Industrial
334210	Telephone Apparatus Manufacturing	Industrial
334200	Communications Equipment Manufacturing	Industrial
334119	Other Computer Peripheral Equipment Manufacturing	Industrial
334113	Computer Terminal Manufacturing	Industrial
334112	Computer Storage Device Manufacturing	Industrial
334111	Electronic Computer Manufacturing	Industrial
334110	Computer and Peripheral Equipment Manufacturing	Industrial
334100	Computer and Peripheral Equipment Manufacturing	Industrial
334000	Computer and Electronic Product Manufacturing	Industrial
333999	All Other Miscellaneous General Purpose Machinery Manufacturing	Industrial
333997	Scale and Balance Manufacturing	Industrial
333996	Fluid Power Pump and Motor Manufacturing	Industrial
333995	Fluid Power Cylinder and Actuator Manufacturing	Industrial
333994	Industrial Process Furnace and Oven Manufacturing	Industrial
333993	Packaging Machinery Manufacturing	Industrial
333992	Welding and Soldering Equipment Manufacturing	Industrial
333991	Power-Driven Hand-tool Manufacturing	Industrial
333990	All Other General Purpose Machinery Manufacturing	Industrial
333924	Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing	Industrial
333923	Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	Industrial
333922	Conveyor and Conveying Equipment Manufacturing	Industrial
333921	Elevator and Moving Stairway Manufacturing	Industrial
333920	Material Handling Equipment Manufacturing	Industrial
333913	Measuring and Dispensing Pump Manufacturing	Industrial
333912	Air and Gas Compressor Manufacturing	Industrial
333911	Pump and Pumping Equipment Manufacturing	Industrial
333910	Pump and Compressor Manufacturing	Industrial
333900	Other General Purpose Machinery Manufacturing	Industrial
333618	Other Engine Equipment Manufacturing	Industrial
333613	Mechanical Power Transmission Equipment Manufacturing	Industrial
333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	Industrial
333611	Turbine and Turbine Generator Set Units Manufacturing	Industrial
333518	Other Metalworking Machinery Manufacturing	Industrial
333516	Rolling Mill Machinery and Equipment Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
333515	Cutting Tool and Machine Tool Accessory Manufacturing	Industrial
333514	Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	Industrial
333513	Machine Tool (Metal Forming Types) Manufacturing	Industrial
333512	Machine Tool (Metal Cutting Types) Manufacturing	Industrial
333511	Industrial Mold Manufacturing	Industrial
333510	Metalworking Machinery Manufacturing	Industrial
333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	Industrial
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	Industrial
333412	Industrial and Commercial Fan and Blower Manufacturing	Industrial
333411	Air Purification Equipment Manufacturing	Industrial
333410	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	Industrial
333319	Other Commercial and Service Industry Machinery Manufacturing	Industrial
333315	Photographic and Photocopying Equipment Manufacturing	Industrial
333314	Optical Instrument and Lens Manufacturing	Industrial
333313	Office Machinery Manufacturing	Industrial
333312	Commercial Laundry, Dry cleaning, and Pressing Machine Manufacturing	Industrial
333311	Automatic Vending Machine Manufacturing	Industrial
333310	Commercial and Service Industry Machinery Manufacturing	Industrial
333298	All Other Industrial Machinery Manufacturing	Industrial
333295	Semiconductor Machinery Manufacturing	Industrial
333294	Food Product Machinery Manufacturing	Industrial
333293	Printing Machinery and Equipment Manufacturing	Industrial
333292	Textile Machinery Manufacturing	Industrial
333291	Paper Industry Machinery Manufacturing	Industrial
333220	Plastics and Rubber Industry Machinery Manufacturing	Industrial
333210	Sawmill and Woodworking Machinery Manufacturing	Industrial
333132	Oil and Gas Field Machinery and Equipment Manufacturing	Industrial
333131	Mining Machinery and Equipment Manufacturing	Industrial
333120	Construction Machinery Manufacturing	Industrial
333112	Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing	Industrial
333111	Farm Machinery and Equipment Manufacturing	Industrial
333110	Agricultural Implement Manufacturing	Industrial
333100	Agriculture, Construction, and Mining Machinery Ma	Industrial
333000	Machinery Manufacturing	Industrial
332999	All Other Miscellaneous Fabricated Metal Product Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
332998	Enameled Iron and Metal Sanitary Ware Manufacturing	Industrial
332997	Industrial Pattern Manufacturing	Industrial
332996	Fabricated Pipe and Pipe Fitting Manufacturing	Industrial
332995	Other Ordnance and Accessories Manufacturing	Industrial
332994	Small Arms Manufacturing	Industrial
332993	Ammunition (except Small Arms) Manufacturing	Industrial
332992	Small Arms Ammunition Manufacturing	Industrial
332991	Ball and Roller Bearing Manufacturing	Industrial
332919	Other Metal Valve and Pipe Fitting Manufacturing	Industrial
332913	Plumbing Fixture Fitting and Trim Manufacturing	Industrial
332912	Fluid Power Valve and Hose Fitting Manufacturing	Industrial
332911	Industrial Valve Manufacturing	Industrial
332910	Metal Valve Manufacturing	Industrial
332900	Other Fabricated Metal Product Manufacturing	Industrial
332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	Industrial
332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	Industrial
332811	Metal Heat Treating	Industrial
332810	Coating, Engraving, Heat Treating, and Allied Activity	Industrial
332722	Bolt, Nut, Screw, Rivet, and Washer Manufacturing	Industrial
332721	Precision Turned Product Manufacturing	Industrial
332720	Turned Product and Screw, Nut, and Bolt Manufacturing	Industrial
332710	Machine Shops	Industrial
332700	Machine Shops; Turned Product; and Screw, Nut, and	Industrial
332618	Other Fabricated Wire Product Manufacturing	Industrial
332612	Spring (Light Gauge) Manufacturing	Industrial
332611	Spring (Heavy Gauge) Manufacturing	Industrial
332510	Hardware Manufacturing	Industrial
332439	Other Metal Container Manufacturing	Industrial
332431	Metal Can Manufacturing	Industrial
332420	Metal Tank (Heavy Gauge) Manufacturing	Industrial
332410	Power Boiler and Heat Exchanger Manufacturing	Industrial
332323	Ornamental and Architectural Metal Work Manufacturing	Industrial
332322	Sheet Metal Work Manufacturing	Industrial
332321	Metal Window and Door Manufacturing	Industrial
332320	Ornamental and Architectural Metal Products Manufacturing	Industrial
332313	Plate Work Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
332312	Fabricated Structural Metal Manufacturing	Industrial
332311	Prefabricated Metal Building and Component Manufacturing	Industrial
332310	Plate Work and Fabricated Structural Product Manufacturing	Industrial
332300	Architectural and Structural Metals Manufacturing	Industrial
332214	Kitchen Utensil, Pot, and Pan Manufacturing	Industrial
332213	Saw Blade and Handsaw Manufacturing	Industrial
332212	Hand and Edge Tool Manufacturing	Industrial
332211	Cutlery and Flatware (except Precious) Manufacturing	Industrial
332117	Powder Metallurgy Part Manufacturing	Industrial
332116	Metal Stamping	Industrial
332115	Crown and Closure Manufacturing	Industrial
332114	Custom Roll Forming	Industrial
332112	Nonferrous Forging	Industrial
332111	Iron and Steel Forging	Industrial
332110	Iron and Steel Forging	Industrial
332000	Fabricated Metal Product Manufacturing	Industrial
331528	Other Nonferrous Foundries (except Die-Casting)	Industrial
331525	Copper Foundries (except Die-Casting)	Industrial
331524	Aluminum Foundries (except Die-Casting)	Industrial
331522	Nonferrous (except Aluminum) Die-Casting Foundries	Industrial
331521	Aluminum Die-Casting Foundries	Industrial
331520	Nonferrous Metal Foundries	Industrial
331513	Steel Foundries (except Investment)	Industrial
331512	Steel Investment Foundries	Industrial
331511	Iron Foundries	Industrial
331500	Foundries	Industrial
331492	Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)	Industrial
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding	Industrial
331423	Secondary Smelting, Refining, and Alloying of Copper	Industrial
331422	Copper Wire (except Mechanical) Drawing	Industrial
331421	Copper Rolling, Drawing, and Extruding	Industrial
331419	Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum)	Industrial
331400	Nonferrous Metal (except Aluminum) Production and	Industrial
331319	Other Aluminum Rolling and Drawing	Industrial
331316	Aluminum Extruded Product Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
331315	Aluminum Sheet, Plate, and Foil Manufacturing	Industrial
331314	Secondary Smelting and Alloying of Aluminum	Industrial
331312	Primary Aluminum Production	Industrial
331222	Steel Wire Drawing	Industrial
331221	Rolled Steel Shape Manufacturing	Industrial
331220	Rolling and Drawing of Purchased Steel	Industrial
331210	Iron and Steel Pipe and Tube Manufacturing from Purchased Steel	Industrial
331200	Steel Product Manufacturing from Purchased Steel	Industrial
331112	Electrometallurgical Ferroalloy Product Manufacturing	Industrial
331111	Iron and Steel Mills	Industrial
331000	Primary Metal Manufacturing	Industrial
330000	Manufacturing	Industrial
327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing	Industrial
327993	Mineral Wool Manufacturing	Industrial
327992	Ground or Treated Mineral and Earth Manufacturing	Industrial
327991	Cut Stone and Stone Product Manufacturing	Industrial
327990	All Other Nonmetallic Mineral Product Manufacturing	Industrial
327910	Abrasive Product Manufacturing	Industrial
327420	Gypsum Product Manufacturing	Industrial
327410	Lime Manufacturing	Industrial
327390	Other Concrete Product Manufacturing	Industrial
327332	Concrete Pipe Manufacturing	Industrial
327331	Concrete Block and Brick Manufacturing	Industrial
327330	Concrete Pipe, Brick, and Block Manufacturing	Industrial
327320	Ready-Mix Concrete Manufacturing	Industrial
327310	Cement Manufacturing	Industrial
327300	Cement and Concrete Product Manufacturing	Industrial
327215	Glass Product Manufacturing Made of Purchased Glass	Industrial
327213	Glass Container Manufacturing	Industrial
327212	Other Pressed and Blown Glass and Glassware Manufacturing	Industrial
327211	Flat Glass Manufacturing	Industrial
327210	Glass and Glass Product Manufacturing	Industrial
327200	Glass and Glass Product Manufacturing	Industrial
327125	Non-clay Refractory Manufacturing	Industrial
327124	Clay Refractory Manufacturing	Industrial
327123	Other Structural Clay Product Manufacturing	Industrial
327122	Ceramic Wall and Floor Tile Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
327121	Brick and Structural Clay Tile Manufacturing	Industrial
327120	Clay Building Material and Refractories Manufacturing	Industrial
327113	Porcelain Electrical Supply Manufacturing	Industrial
327112	Vitreous China, Fine Earthenware, and Other Pottery Product Manufacturing	Industrial
327111	Vitreous China Plumbing Fixture and China and Earthenware Bathroom Accessories Manufacturing	Industrial
327110	Pottery, Ceramics, and Plumbing Fixture Manufacturing	Industrial
327100	Clay Product and Refractory Manufacturing	Industrial
327000	Nonmetallic Mineral Product Manufacturing	Industrial
326299	All Other Rubber Product Manufacturing	Industrial
326291	Rubber Product Manufacturing for Mechanical Use	Industrial
326220	Rubber and Plastics Hoses and Belting Manufacturing	Industrial
326212	Tire Retreading	Industrial
326211	Tire Manufacturing (except Retreading)	Industrial
326210	Tire Manufacturing	Industrial
326200	Rubber Product Manufacturing	Industrial
326199	All Other Plastics Product Manufacturing	Industrial
326192	Resilient Floor Covering Manufacturing	Industrial
326191	Plastics Plumbing Fixture Manufacturing	Industrial
326190	Other Plastics Product Manufacturing	Industrial
326160	Plastics Bottle Manufacturing	Industrial
326150	Urethane and Other Foam Product (except Polystyrene) Manufacturing	Industrial
326140	Polystyrene Foam Product Manufacturing	Industrial
326130	Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing	Industrial
326122	Plastics Pipe and Pipe Fitting Manufacturing	Industrial
326121	Unlaminated Plastics Profile Shape Manufacturing	Industrial
326113	Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing	Industrial
326112	Plastics Packaging Film and Sheet (including Laminated) Manufacturing	Industrial
326111	Plastics Bag and Pouch Manufacturing	Industrial
326100	Plastics Product Manufacturing	Industrial
325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	Industrial
325992	Photographic Film, Paper, Plate, and Chemical Manufacturing	Industrial
325991	Custom Compounding of Purchased Resins	Industrial
325920	Explosives Manufacturing	Industrial
325910	Printing Ink Manufacturing	Industrial
325620	Toilet Preparation Manufacturing	Industrial
325613	Surface Active Agent Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
325612	Polish and Other Sanitation Good Manufacturing	Industrial
325611	Soap and Other Detergent Manufacturing	Industrial
325610	Soap and Cleaning Compound Manufacturing	Industrial
325600	Soap, Cleaning Compound, and Toilet Preparation Ma	Industrial
325520	Adhesive Manufacturing	Industrial
325510	Paint and Coating Manufacturing	Industrial
325414	Biological Product (except Diagnostic) Manufacturing	Industrial
325413	In-Vitro Diagnostic Substance Manufacturing	Industrial
325412	Pharmaceutical Preparation Manufacturing	Industrial
325411	Medicinal and Botanical Manufacturing	Industrial
325410	Pharmaceutical and Medicine Manufacturing	Industrial
325400	Pharmaceutical and Medicine Manufacturing	Industrial
325320	Pesticide and Other Agricultural Chemical Manufacturing	Industrial
325314	Fertilizer (Mixing Only) Manufacturing	Industrial
325312	Phosphates Fertilizer Manufacturing	Industrial
325311	Nitrogenous Fertilizer Manufacturing	Industrial
325310	Fertilizer Manufacturing	Industrial
325300	Pesticide, Fertilizer, and Other Agricultural Chemicals	Industrial
325222	Non-cellulosic Organic Fiber Manufacturing	Industrial
325221	Cellulosic Organic Fiber Manufacturing	Industrial
325212	Synthetic Rubber Manufacturing	Industrial
325211	Plastics Material and Resin Manufacturing	Industrial
325210	Resin and Synthetic Rubber Manufacturing	Industrial
325199	All Other Basic Organic Chemical Manufacturing	Industrial
325193	Ethyl Alcohol Manufacturing	Industrial
325188	All Other Basic Inorganic Chemical Manufacturing	Industrial
325182	Carbon Black Manufacturing	Industrial
325181	Alkalies and Chlorine Manufacturing	Industrial
325132	Synthetic Organic Dye and Pigment Manufacturing	Industrial
325131	Inorganic Dye and Pigment Manufacturing	Industrial
325130	Synthetic Dye and Pigment Manufacturing	Industrial
325120	Industrial Gas Manufacturing	Industrial
325110	Petrochemical Manufacturing	Industrial
325100	Basic Chemical Manufacturing	Industrial
325000	Chemical Manufacturing	Industrial
324199	All Other Petroleum and Coal Products Manufacturing	Industrial
324191	Petroleum Lubricating Oil and Grease Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
324122	Asphalt Shingle and Coating Materials Manufacturing	Industrial
324121	Asphalt Paving Mixture and Block Manufacturing	Industrial
324110	Petroleum Refineries	Industrial
323122	Prepress Services	Industrial
323121	Trade-binding and Related Work	Industrial
323119	Other Commercial Printing	Industrial
323118	Blank book, Loose-leaf Binders, and Devices Manufacturing	Industrial
323117	Books Printing	Industrial
323116	Manifold Business Forms Printing	Industrial
323115	Digital Printing	Industrial
323114	Quick Printing	Industrial
323113	Commercial Screen Printing	Industrial
323112	Commercial Flexographic Printing	Industrial
323111	Commercial Gravure Printing	Industrial
323110	Commercial Lithographic Printing	Industrial
323100	Printing and Related Support Activities	Industrial
323000	Printing and Related Support Activities	Industrial
322299	All Other Converted Paper Product Manufacturing	Industrial
322291	Sanitary Paper Product Manufacturing	Industrial
322233	Stationery, Tablet, and Related Product Manufacturing	Industrial
322232	Envelope Manufacturing	Industrial
322231	Die-Cut Paper and Paperboard Office Supplies Manufacturing	Industrial
322226	Surface-Coated Paperboard Manufacturing	Industrial
322225	Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses	Industrial
322224	Uncoated Paper and Multiwall Bag Manufacturing	Industrial
322222	Coated and Laminated Paper Manufacturing	Industrial
322221	Coated and Laminated Packaging Paper Manufacturing	Industrial
322215	Non-folding Sanitary Food Container Manufacturing	Industrial
322214	Fiber Can, Tube, Drum, and Similar Products Manufacturing	Industrial
322213	Setup Paperboard Box Manufacturing	Industrial
322212	Folding Paperboard Box Manufacturing	Industrial
322211	Corrugated and Solid Fiber Box Manufacturing	Industrial
322210	Paperboard Container Manufacturing	Industrial
322200	Converted Paper Product Manufacturing	Industrial
322130	Paperboard Mills	Industrial
322121	Paper (except Newsprint) Mills	Industrial
322120	Paper Mills	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
322110	Pulp Mills	Industrial
322100	Pulp, Paper, and Paperboard Mills	Industrial
322000	Paper Manufacturing	Industrial
321999	All Other Miscellaneous Wood Product Manufacturing	Industrial
321992	Prefabricated Wood Building Manufacturing	Industrial
321991	Manufactured Home (Mobile Home) Manufacturing	Industrial
321920	Wood Container and Pallet Manufacturing	Industrial
321918	Other Millwork (including Flooring)	Industrial
321912	Cut Stock, Re-sawing Lumber, and Planning	Industrial
321911	Wood Window and Door Manufacturing	Industrial
321910	Millwork	Industrial
321900	Other Wood Product Manufacturing	Industrial
321219	Reconstituted Wood Product Manufacturing	Industrial
321214	Truss Manufacturing	Industrial
321213	Engineered Wood Member (except Truss) Manufacturing	Industrial
321212	Softwood Veneer and Plywood Manufacturing	Industrial
321211	Hardwood Veneer and Plywood Manufacturing	Industrial
321210	Veneer, Plywood, and Engineered Wood Product Manufacturing	Industrial
321114	Wood Preservation	Industrial
321113	Sawmills	Industrial
321000	Wood Product Manufacturing	Industrial
320000	Manufacturing	Industrial
316999	All Other Leather Good and Allied Product Manufacturing	Industrial
316993	Personal Leather Good (except Women's Handbag and Purse) Manufacturing	Industrial
316992	Women's Handbag and Purse Manufacturing	Industrial
316991	Luggage Manufacturing	Industrial
316990	Other Leather and Allied Product Manufacturing	Industrial
316219	Other Footwear Manufacturing	Industrial
316214	Women's Footwear (except Athletic) Manufacturing	Industrial
316213	Men's Footwear (except Athletic) Manufacturing	Industrial
316212	House Slipper Manufacturing	Industrial
316211	Rubber and Plastics Footwear Manufacturing	Industrial
316210	Footwear Manufacturing	Industrial
316110	Leather and Hide Tanning and Finishing	Industrial
315999	Other Apparel Accessories and Other Apparel Manufacturing	Industrial
315993	Men's and Boys' Neckwear Manufacturing	Industrial
315992	Glove and Mitten Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
315991	Hat, Cap, and Millinery Manufacturing	Industrial
315299	All Other Cut and Sew Apparel Manufacturing	Industrial
315292	Fur and Leather Apparel Manufacturing	Industrial
315239	Women's and Girls' Cut and Sew Other Outerwear Manufacturing	Industrial
315234	Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket, and Skirt Manufacturing	Industrial
315233	Women's and Girls' Cut and Sew Dress Manufacturing	Industrial
315232	Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing	Industrial
315231	Women's and Girls' Cut and Sew Lingerie, Loungewear, and Nightwear Manufacturing	Industrial
315230	Women's and Girls' Cut and Sew Apparel Manufacturing	Industrial
315228	Men's and Boys' Cut and Sew Other Outerwear Manufacturing	Industrial
315225	Men's and Boys' Cut and Sew Work Clothing Manufacturing	Industrial
315224	Men's and Boys' Cut and Sew Trouser, Slack, and Jean Manufacturing	Industrial
315223	Men's and Boys' Cut and Sew Shirt (except Work Shirt) Manufacturing	Industrial
315222	Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Manufacturing	Industrial
315221	Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing	Industrial
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	Industrial
315212	Women's, Girls', and Infants' Cut and Sew Apparel Contractors	Industrial
315211	Men's and Boys' Cut and Sew Apparel Contractors	Industrial
315210	Cut and Sew Apparel Contractors	Industrial
315200	Cut and Sew Apparel Manufacturing	Industrial
315191	Outerwear Knitting Mills	Industrial
315190	Other Apparel Knitting Mills	Industrial
315119	Other Hosiery and Sock Mills	Industrial
315000	Apparel Manufacturing	Industrial
314999	All Other Miscellaneous Textile Product Mills	Industrial
314992	Tire Cord and Tire Fabric Mills	Industrial
314991	Rope, Cordage, and Twine Mills	Industrial
314912	Canvas and Related Product Mills	Industrial
314911	Textile Bag Mills	Industrial
314900	Other Textile Product Mills	Industrial
314129	Other Household Textile Product Mills	Industrial
314121	Curtain and Drapery Mills	Industrial
314120	Curtain and Linen Mills	Industrial
314110	Carpet and Rug Mills	Industrial
314100	Textile Furnishings Mills	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
313320	Fabric Coating Mills	Industrial
313312	Textile and Fabric Finishing (except Broad woven Fabric) Mills	Industrial
313311	Broad woven Fabric Finishing Mills	Industrial
313310	Textile and Fabric Finishing Mills	Industrial
313249	Other Knit Fabric and Lace Mills	Industrial
313241	Weft Knit Fabric Mills	Industrial
313230	Nonwoven Fabric Mills	Industrial
313222	Schiffli Machine Embroidery	Industrial
313221	Narrow Fabric Mills	Industrial
313210	Broad woven Fabric Mills	Industrial
313111	Yarn Spinning Mills	Industrial
313000	Textile Mills	Industrial
312229	Other Tobacco Product Manufacturing	Industrial
312140	Distilleries	Industrial
312130	Wineries	Industrial
312120	Breweries	Industrial
312113	Ice Manufacturing	Industrial
312112	Bottled Water Manufacturing	Industrial
312111	Soft Drink Manufacturing	Industrial
312110	Soft Drink and Ice Manufacturing	Industrial
312100	Beverage Manufacturing	Industrial
311999	All Other Miscellaneous Food Manufacturing	Industrial
311991	Perishable Prepared Food Manufacturing	Industrial
311990	All Other Food Manufacturing	Industrial
311942	Spice and Extract Manufacturing	Industrial
311941	Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	Industrial
311940	Seasoning and Dressing Manufacturing	Industrial
311930	Flavoring Syrup and Concentrate Manufacturing	Industrial
311920	Coffee and Tea Manufacturing	Industrial
311919	Other Snack Food Manufacturing	Industrial
311911	Roasted Nuts and Peanut Butter Manufacturing	Industrial
311910	Snack Food Manufacturing	Industrial
311900	Other Food Manufacturing	Industrial
311830	Tortilla Manufacturing	Industrial
311823	Dry Pasta Manufacturing	Industrial
311822	Flour Mixes and Dough Manufacturing from Purchased Flour	Industrial
311821	Cookie and Cracker Manufacturing	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
311820	Cookie, Cracker, and Pasta Manufacturing	Industrial
311813	Frozen Cakes, Pies, and Other Pastries Manufacturing	Industrial
311812	Commercial Bakeries	Industrial
311811	Retail Bakeries	Food/Liquor
311810	Bread and Bakery Product Manufacturing	Industrial
311800	Bakeries and Tortilla Manufacturing	Industrial
311712	Fresh and Frozen Seafood Processing	Industrial
311711	Seafood Canning	Industrial
311615	Poultry Processing	Industrial
311613	Rendering and Meat Byproduct Processing	Industrial
311612	Meat Processed from Carcasses	Industrial
311611	Animal (except Poultry) Slaughtering	Industrial
311610	Animal Slaughtering and Processing	Industrial
311600	Animal Slaughtering and Processing	Industrial
311520	Ice Cream and Frozen Dessert Manufacturing	Industrial
311514	Dry, Condensed, and Evaporated Dairy Product Manufacturing	Industrial
311513	Cheese Manufacturing	Industrial
311512	Creamery Butter Manufacturing	Industrial
311511	Fluid Milk Manufacturing	Industrial
311510	Dairy Product (except Frozen) Manufacturing	Industrial
311500	Dairy Product Manufacturing	Industrial
311423	Dried and Dehydrated Food Manufacturing	Industrial
311422	Specialty Canning	Industrial
311421	Fruit and Vegetable Canning	Industrial
311420	Fruit and Vegetable Canning, Pickling, and Drying	Industrial
311412	Frozen Specialty Food Manufacturing	Industrial
311411	Frozen Fruit, Juice, and Vegetable Manufacturing	Industrial
311410	Frozen Food Manufacturing	Industrial
311400	Fruit and Vegetable Preserving and Specialty Food	Industrial
311340	Non-chocolate Confectionery Manufacturing	Industrial
311330	Confectionery Manufacturing from Purchased Chocolate	Industrial
311320	Chocolate and Confectionery Manufacturing from Cacao Beans	Industrial
311313	Beet Sugar Manufacturing	Industrial
311312	Cane Sugar Refining	Industrial
311300	Sugar and Confectionery Product Manufacturing	Industrial
311230	Breakfast Cereal Manufacturing	Industrial
311225	Fats and Oils Refining and Blending	Industrial

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
311223	Other Oilseed Processing	Industrial
311222	Soybean Processing	Industrial
311221	Wet Corn Milling	Industrial
311220	Starch and Vegetable Fats and Oils Manufacturing	Industrial
311213	Malt Manufacturing	Industrial
311212	Rice Milling	Industrial
311211	Flour Milling	Industrial
311200	Grain and Oilseed Milling	Industrial
311119	Other Animal Food Manufacturing	Industrial
311111	Dog and Cat Food Manufacturing	Industrial
311110	Animal Food Manufacturing	Industrial
311000	Food Manufacturing	Industrial
310000	Manufacturing	Industrial
300000	Manufacturing	Industrial
238990	All Other Specialty Trade Contractors	Not in Study - Mining
238910	Site Preparation Contractors	Not in Study - Mining
238390	Other Building Finishing Contractors	Not in Study - Mining
238350	Finish Carpentry Contractors	Not in Study - Mining
238340	Tile and Terrazzo Contractors	Not in Study - Mining
238330	Flooring Contractors	Not in Study - Mining
238320	Painting and Wall Covering Contractors	Not in Study - Mining
238310	Drywall and Insulation Contractors	Not in Study - Mining
238300	Building Finishing Contractors	Not in Study - Mining
238290	Other Building Equipment Contractors	Not in Study - Mining
238220	Plumbing, Heating, and Air-Conditioning Contractors	Misc.
238210	Electrical Contractors and Other Wiring Installation Contractors	Misc.
238200	Building Equipment Contractors	Not in Study - Mining
238190	Other Foundation, Structure, and Building Exterior Contractors	Not in Study - Mining

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
238170	Siding Contractors	Not in Study - Mining
238160	Roofing Contractors	Not in Study - Mining
238150	Glass and Glazing Contractors	Not in Study - Mining
238140	Masonry Contractors	Not in Study - Mining
238130	Framing Contractors	Not in Study - Mining
238120	Structural Steel and Precast Concrete Contractors	Not in Study - Mining
238110	Poured Concrete Foundation and Structure Contractors	Not in Study - Mining
238000	Specialty Trade Contractors	Not in Study - Mining
237990	Other Heavy and Civil Engineering Construction	Not in Study - Mining
237310	Highway, Street, and Bridge Construction	Not in Study
237210	Land Subdivision	Office
237130	Power and Communication Line and Related Structures Construction	Not in Study - Mining
237120	Oil and Gas Pipeline and Related Structures Construction	Not in Study - Mining
237110	Water and Sewer Line and Related Structures Construction	Not in Study - Mining
237100	Utility System Construction	Not in Study - Mining
237000	Heavy and Civil Engineering Construction	Not in Study - Mining
236220	Commercial and Institutional Building Construction	Not in Study - Mining
236210	Industrial Building Construction	Not in Study - Mining
236200	Nonresidential Building Construction	Not in Study - Mining
236118	Residential Remodelers	Not in Study - Mining
236117	New Housing Operative Builders	Not in Study - Mining
236116	New Multifamily Housing Construction (except Operative Builders)	Not in Study - Mining

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
236115	New Single-Family Housing Construction (except Operative Builders)	Not in Study - Mining
236110	Residential Building Construction	Not in Study - Mining
236100	Residential Building Construction	Not in Study - Mining
236000	Construction of Buildings	Not in Study - Mining
235990	All Other Special Trade Contractors	Misc.
235950	Building Equipment and Other Machinery Installation	Not in Study - Mining
235940	Wrecking and Demolition Contractors	Not in Study - Mining
235930	Excavation Contractors	Not in Study - Mining
235920	Glass and Glazing Contractors	Not in Study - Mining
235910	Structural Steel Erection Contractors	Not in Study - Mining
235810	Water Well Drilling Contractors	Not in Study - Mining
235710	Concrete Contractors	Not in Study - Mining
235610	Roofing, Siding, and Sheet Metal Contractors	Not in Study - Mining
235520	Floor Laying and Other Floor Contractors	Not in Study - Mining
235510	Carpentry Contractors	Not in Study - Mining
235430	Tile, Marble, Terrazzo, and Mosaic Contractors	Not in Study - Mining
235420	Drywall, Plastering, Acoustical, and Insulation Co	Not in Study - Mining
235410	Masonry and Stone Contractors	Not in Study - Mining
235310	Electrical Contractors	Misc.
235210	Painting and Wall Covering Contractors	Not in Study - Mining
235110	Plumbing, Heating, and Air-Conditioning Contractor	Misc.
234998	SCE Temporary Power for Construction	Misc.
234990	All Other Heavy Construction	Not in Study - Mining

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
234930	Industrial Non-building Structure Construction	Not in Study - Mining
234920	Power and Communication Transmission Line Construction	Not in Study - Mining
234910	Water, Sewer, and Pipeline Construction	Not in Study - Mining
234120	Bridge and Tunnel Construction	Not in Study - Mining
234110	Highway and Street Construction	Not in Study
233320	Commercial and Institutional Building Construction	Misc.
233310	Manufacturing and Industrial Building Construction	Not in Study - Mining
233220	Multifamily Housing Construction	Not in Study - Mining
233210	Single Family Housing Construction	Misc.
233110	Land Subdivision and Land Development	Not in Study - Mining
231543	Temporary Services For Construction	Not in Study - Mining
231531	General Contractor	Not in Study - Mining
230000	Construction	Misc.
221330	Steam and Air-Conditioning Supply	Not in Study - TCU
221320	Sewage Treatment Facilities	Not in Study - TCU
221312	Irrigation Systems	Not in Study - Agriculture
221311	Water Supply	Not in Study - Agriculture
221310	Water Supply and Irrigation Systems	Not in Study - Agriculture
221300	Water, Sewage and Other Systems	Not in Study - TCU
221210	Natural Gas Distribution	Not in Study - TCU
221200	Natural Gas Distribution	Not in Study - TCU
221198	SCE Corporate Facilities-Edison International	Not in Study - TCU
221122	Electric Power Distribution	Not in Study - TCU

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
221121	Electric Bulk Power Transmission and Control	Not in Study - TCU
221119	Other Electric Power Generation	Not in Study - TCU
221112	Fossil Fuel Electric Power Generation	Not in Study - TCU
221111	Hydroelectric Power Generation	Not in Study - TCU
221110	Electric Power Generation	Not in Study - TCU
221100	Electric Power Generation, Transmission And Distribution	Not in Study - TCU
221000	Utilities	Not in Study - TCU
213115	Support Activities for Nonmetallic Minerals (except Fuels)	Not in Study - Mining
213114	Support Activities for Metal Mining	Not in Study - Mining
213112	Support Activities for Oil and Gas Operations	Not in Study - Mining
213111	Drilling Oil and Gas Wells	Not in Study - Mining
213110	Support Activities for Mining	Not in Study - Mining
213100	Support Activities for Mining	Not in Study - Mining
213000	Support Activities for Mining	Not in Study - Mining
212399	All Other Nonmetallic Mineral Mining	Not in Study - Mining
212393	Other Chemical and Fertilizer Mineral Mining	Not in Study - Mining
212392	Phosphate Rock Mining	Not in Study - Mining
212391	Potash, Soda, and Borate Mineral Mining	Not in Study - Mining
212325	Clay and Ceramic and Refractory Minerals Mining	Not in Study - Mining
212322	Industrial Sand Mining	Not in Study - Mining
212321	Construction Sand and Gravel Mining	Not in Study - Mining

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
212320	Sand, Gravel, Clay, and Ceramic and Refractory Min	Not in Study - Mining
212319	Other Crushed and Broken Stone Mining and Quarrying	Not in Study - Mining
212313	Crushed and Broken Granite Mining and Quarrying	Not in Study - Mining
212312	Crushed and Broken Limestone Mining and Quarrying	Not in Study - Mining
212311	Dimension Stone Mining and Quarrying	Not in Study - Mining
212310	Stone Mining and Quarrying	Not in Study - Mining
212300	Nonmetallic Mineral Mining and Quarrying	Not in Study - Mining
212299	All Other Metal Ore Mining	Not in Study - Mining
212234	Copper Ore and Nickel Ore Mining	Not in Study - Mining
212221	Gold Ore Mining	Not in Study - Mining
212210	Iron Ore Mining	Not in Study - Mining
212000	Mining (except Oil and Gas)	Not in Study - Mining
211112	Natural Gas Liquid Extraction	Not in Study - Mining
211111	Crude Petroleum and Natural Gas Extraction	Not in Study - Mining
211110	Oil and Gas Extraction	Not in Study - Mining
211100	Oil and Gas Extraction	Not in Study - Mining
210000	Mining	Not in Study - Mining
115310	Support Activities for Forestry	Office
115210	Support Activities for Animal Production	Office
115116	Farm Management Services	Office
115115	Farm Labor Contractors and Crew Leaders	Office
115114	Postharvest Crop Activities (except Cotton Ginning)	Not in Study - Agriculture
115113	Crop Harvesting, Primarily by Machine	Office
115112	Soil Preparation, Planting, and Cultivating	Office

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
115111	Cotton Ginning	Not in Study - Agriculture
115110	Support Activities for Crop Production	Office
115000	Support Activities for Agriculture and Forestry	Office
114210	Hunting and Trapping	Not in Study - Agriculture
114200	Hunting and Trapping	Not in Study - Agriculture
114119	Other Marine Fishing	Not in Study - Agriculture
114112	Shellfish Fishing	Not in Study - Agriculture
114111	Finfish Fishing	Not in Study - Agriculture
113310	Logging	Industrial
113210	Forest Nurseries and Gathering of Forest Products	Not in Study - Agriculture
113110	Timber Tract Operations	Not in Study - Agriculture
113000	Forestry and Logging	Not in Study - Agriculture
112990	All Other Animal Production	Not in Study - Agriculture
112930	Fur-Bearing Animal and Rabbit Production	Not in Study - Agriculture
112920	Horses and Other Equine Production	Not in Study - Agriculture
112910	Apiculture	Not in Study - Agriculture
112900	Other Animal Production	Not in Study - Agriculture
112519	Other Aquaculture	Not in Study - Agriculture
112512	Shellfish Farming	Not in Study - Agriculture
112511	Finfish Farming and Fish Hatcheries	Not in Study - Agriculture
112510	Animal Aquaculture	Not in Study - Agriculture
112500	Animal Aquaculture	Not in Study - Agriculture
112420	Goat Farming	Not in Study - Agriculture

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
112410	Sheep Farming	Not in Study - Agriculture
112400	Sheep and Goat Farming	Not in Study - Agriculture
112390	Other Poultry Production	Not in Study - Agriculture
112340	Poultry Hatcheries	Not in Study - Agriculture
112330	Turkey Production	Not in Study - Agriculture
112320	Broilers and Other Meat Type Chicken Production	Not in Study - Agriculture
112310	Chicken Egg Production	Not in Study - Agriculture
112300	Poultry and Egg Production	Not in Study - Agriculture
112210	Hog and Pig Farming	Not in Study - Agriculture
112120	Dairy Cattle and Milk Production	Not in Study - Agriculture
112112	Cattle Feedlots	Not in Study - Agriculture
112111	Beef Cattle Ranching and Farming	Not in Study - Agriculture
112110	Beef Cattle Ranching and Farming, including Feedlot	Not in Study - Agriculture
112100	Cattle Ranching and Farming	Not in Study - Agriculture
112000	Animal Production	Not in Study - Agriculture
111998	All Other Miscellaneous Crop Farming	Not in Study - Agriculture
111992	Peanut Farming	Not in Study - Agriculture
111991	Sugar Beet Farming	Not in Study - Agriculture
111990	All Other Crop Farming	Not in Study - Agriculture
111940	Hay Farming	Not in Study - Agriculture
111920	Cotton Farming	Not in Study - Agriculture

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
111910	Tobacco Farming	Not in Study - Agriculture
111900	Other Crop Farming	Not in Study - Agriculture
111422	Floriculture Production	Not in Study - Agriculture
111421	Nursery and Tree Production	Not in Study - Agriculture
111420	Nursery and Floriculture Production	Not in Study - Agriculture
111419	Other Food Crops Grown Under Cover	Not in Study - Agriculture
111411	Mushroom Production	Not in Study - Agriculture
111410	Food Crops Grown Under Cover	Not in Study - Agriculture
111400	Greenhouse, Nursery, and Floriculture Production	Not in Study - Agriculture
111339	Other Non-citrus Fruit Farming	Not in Study - Agriculture
111336	Fruit and Tree Nut Combination Farming	Not in Study - Agriculture
111335	Tree Nut Farming	Not in Study - Agriculture
111334	Berry (except Strawberry) Farming	Not in Study - Agriculture
111333	Strawberry Farming	Not in Study - Agriculture
111332	Grape Vineyards	Not in Study - Agriculture
111331	Apple Orchards	Not in Study - Agriculture
111330	Non-citrus Fruit and Tree Nut Farming	Not in Study - Agriculture
111320	Citrus (except Orange) Groves	Not in Study - Agriculture
111310	Orange Groves	Not in Study - Agriculture
111300	Fruit and Tree Nut Farming	Not in Study - Agriculture
111219	Other Vegetable (except Potato) and Melon Farming	Not in Study - Agriculture

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
111211	Potato Farming	Not in Study - Agriculture
111210	Vegetable and Melon Farming	Not in Study - Agriculture
111199	All Other Grain Farming	Not in Study - Agriculture
111191	Oilseed and Grain Combination Farming	Not in Study - Agriculture
111190	Other Grain Farming	Not in Study - Agriculture
111160	Rice Farming	Not in Study - Agriculture
111150	Corn Farming	Not in Study - Agriculture
111140	Wheat Farming	Not in Study - Agriculture
111130	Dry Pea and Bean Farming	Not in Study - Agriculture
111120	Oilseed (except Soybean) Farming	Not in Study - Agriculture
111110	Soybean Farming	Not in Study - Agriculture
111100	Oilseed and Grain Farming	Not in Study - Agriculture
111000	Crop Production	Not in Study - Agriculture
110000	Agriculture, Forestry, Fishing and Hunting	Not in Study - Agriculture
100000	Agriculture, Forestry, Fishing and Hunting	Not in Study - Agriculture
3900	Apt. - Miscellaneous Residential	Misc. - Res Common
3700	Apt. - Outdoor Lighting (Walkway, etc.)	Misc. - Res Common
3400	Apt. - Residential Hotels	Misc. - Res Common
3300	Apt. - Public Housing	Misc. - Res Common
3200	Apt. - Residential Second Service	Misc. - Res Common
3000	Apt. - Residential - Miscellaneous	Misc. - Res Common

Table A-1 (Cont'd): NAICS to Business Type Mapping

NAICS	NAICs 6-Digit Description	CSS Bldg. Type
2900	Apt. - Other Residential Uses (swimming pools, laundry rooms, etc.)	Misc. - Res Common
2700	Apt. - Outdoor Lighting (Walkway, etc.)	Misc. - Res Common
2600	Apt. - Water Supply (Separately Metered)	Misc. - Res Common
2400	Apt. - Multiples - Master Metered	Misc. - Res Common
2300	Apt. - Multiples - Individually Metered	Misc. - Res Common
2200	Apt. - Singles - Master Metered	Misc. - Res Common
2100	Apt. - Singles - Individually Metered	Misc. - Res Common
2000	Residential - Apartment Buildings, Condominiums, Townhouses	Misc. - Res Common
1900	Other Residential Uses (Swimming Pools, Laundry Rooms, etc.)	Misc. - Res Common
1700	Trailer - Outdoor Lighting (Walkway, etc.)	Misc. - Res Common
1600	Trailer - Water Supply (Separately Metered)	Misc. - Res Common
1200	Trailer- Singles - Master Metered	Misc. - Res Common
1100	Trailer- Singles - Individually Metered	Misc. - Res Common
1000	Trailer Courts and Mobile Home Parks	Misc. - Res Common

Appendix B

CSS Telephone and On-Site Samples

The sample design form the CSS on-site survey was derived from those sites responding to the CSS/CMST telephone survey. This Appendix presents information on the sample design for the telephone and on-site surveys.

The sample design for the CSS/CMST telephone survey was developed using the IOU nonresidential electric frame; the NAICS codes found in the Customer Information System (CIS), site aggregation methodologies developed in concert with the Data Management Work Order (WO009), and input provided by the DEER team, the IOUs and the CPUC, and other work order evaluation teams.[1] The team used these data to review and map the usage of sites to business type descriptions based on the purpose of the CSS and CMST studies. The nonresidential frame, augmented with defined business types and program participation flags, forms the input data basis for these nonresidential population surveys.

B.1 Telephone Survey Sample Design

The goal of the telephone survey sample design is to develop a representative sample of the nonresidential population. The telephone survey's primary objective is to help develop an on-site sample that provides the desired level of statistical precision for estimating a wide range of commercial customer characteristics largely represented by the share of sites purchasing high priority measures and the saturation of electricity consuming end-uses and measures. Given that the primary purpose of the telephone survey is to recruit a representative sample for the on-site surveys, the final telephone survey sample design was adjusted during the survey process to successfully fulfill this objective.

The telephone survey sample design incorporates 14 business types: colleges and universities, food and liquor stores, non-hospital health care, hospitals, hotels and motels, industrial, miscellaneous, offices, property managers, restaurants, retail, k-12 schools, warehouses, and unclassified and undefined.[2] The business type strata were further disaggregated by the three

[1] The initial nonresidential data represented all nonresidential customers with IOU electric accounts in 2010. In 2012, the evaluation team received information on 2011 nonresidential customers. Customers who were in the 2011 but not the 2010 data were added to the group on nonresidential customers.

[2] Unclassified and undefined buildings represent records in the CIS that the IOUs have classified using an unclassified or undefined building type or records with no NAICs code.

electric IOUs and five usage strata (very small, small, medium, large, and unknown)[3] to produce 210 unique strata. If a site was in the 2010 frame and had electric usage, then their usage stratum was based on their 2010 usage. For sites without usage in 2010 or that were added in the 2011 frame, the site's 2011 usage was used to determine their size stratum. Sites whose annual usage was over 1,750,000 kWh were classified as Large. Sites with usage from 300,000 kWh to 1,750,00 kWh were classified as Medium, sites with usage from 40,000 to 300,000 kWh were Small sites, and sites with usage less than 40,000 kWh were designated as Very Small. Sites with no kWh in 2010 were classified as Unknown usage levels. Some of these sites were later found to have usage reported in the 2011 billing data. If no usage was found in the 2010 or 2011 billing data, the site had no kWh usage.

The telephone survey quota was originally developed based equally upon the usage and number of unique sites. In other words, two separate quotas were calculated by strata based first, on kWh, and then by counts. These two quotas were then averaged for each stratum. The sample design was also dependent upon ensuring that there were an adequate number of sites, but not too many, for each IOU/business type combination and the design allocated a target number of sites by IOU. Over time, some strata were oversampled in order to achieve sufficient survey recruits for the on-site survey in those strata. As additional sites were needed to ensure adequate on-site strata, the quota for the telephone survey was simply increased.

The tables below list the number of sites in the nonresidential frame by IOU, business type/size, the telephone survey quota, the number of sites pulled, the number of sites sent to the CATI telephone survey center, and the number of telephone survey completes achieved.

In the tables below, the number of sites pulled represents the number of sites pulled from the non-residential frame to be reviewed to determine if they have sufficient information to be sent to the telephone CATI center to be dialed for the survey. Once a site is pulled, the site is checked to determine if the site includes a telephone contact number. Sites are also checked to determine if their telephone number is a duplicate of a telephone number previously sent as part of the survey. If the site does not have a telephone number or if the telephone number is a duplicate, the sites would participate in a "reverse lookup" where the site's name and address are used to try to determine a telephone number specific to the site name and service address. Sites that pass the data checks are sent to CATI to be dialed for the survey. There can be a substantial drop off in the number of sites available between the pulled and sent phase of the process.

For Large and Medium sized sites, the number of sites pulled is generally very close to the number of sites in the frame. In an attempt to reach the telephone survey quota for Medium and Large sized sites, the research team generally pulled all or nearly all of the sites in the frame,

[3] The unknown usage category represents accounts found in the CIS that do not have a matching record in the billing data.

these strata were census strata. Many of the Large and Medium sites have telephone numbers in the CIS that represent corporate representatives who are responsible for paying the electric bill. The corporate telephone number leads to many duplicate telephone numbers that were looked up during the reverse lookup process. Unfortunately, the site-specific number for Large and Medium sites commonly led to the site redirecting the call to the corporate number. In an attempt to increase the phone survey completes for Large and Medium sites, the IOUs were asked to provide the study with contact names and telephone numbers used by account executives to discuss DSM opportunities. Additional contact names and telephone numbers were received from all three utilities.[4] The new information was very helpful in some situations. For Large and Medium sized sites where the number of sites is very close or matches the number of sites pulled, the sites sent to CATI may be substantially lower due to the duplication of phone numbers.[5] Many of the large grocery stores, for example, have the same site contact within the CIS. The additional information the IOUs provided with updated site contacts and telephone numbers was helpful in reducing this issue.

[4] All three utilities provided Itron with updated contact information for Medium and Large sites. Each utility, however, was able to provide Itron with a different share of the information requested. SCE provided Itron with all of the information requested, leading to a significantly increased ability to reach Large and Medium sized sites. PG&E provided Itron with a significant amount of the requested information, leading to a substantial improvement in the Study's ability to reach sites. SDG&E provided Itron with less of the requested information, leading to the Study having difficulty contacting Large and Medium sites in SDG&E's territory. The ability to contact sites for the telephone survey directly impacts the on-site recruits, quotas, and accomplishments.

[5] For census stratum, the number of sites pulled is occasionally slightly less than the number of sites in the frame because the extended period associated with the study. The number of sites represents the number of sites originally in the frame, but sites available to be pulled can decline when sites go out of business.

Table B-1: PG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
PGE	College	Large	65	33	61	16	0
PGE	College	Medium	84	34	84	30	5
PGE	College	Small	135	2	36	23	4
PGE	College	Unknown	187	2	68	16	2
PGE	College	Very Small	125	2	88	30	1
PGE	Food/Liquor	Large	439	60	437	393	17
PGE	Food/Liquor	Medium	1,003	142	998	785	88
PGE	Food/Liquor	Small	6,261	56	1,977	1,346	58
PGE	Food/Liquor	Unknown	467	2	58	44	2
PGE	Food/Liquor	Very Small	2,488	50	1,462	1,059	50
PGE	Health Care	Large	65	36	62	33	8
PGE	Health Care	Medium	778	65	776	499	65
PGE	Health Care	Small	2,366	45	1,383	893	46
PGE	Health Care	Unknown	649	7	259	161	7
PGE	Health Care	Very Small	12,012	115	3,182	2,665	115
PGE	Health Care - Hospital	Large	130	64	130	57	3
PGE	Health Care - Hospital	Medium	56	9	51	22	3
PGE	Health Care - Hospital	Small	25	0	3	0	0
PGE	Health Care - Hospital	Unknown	50	2	44	13	1
PGE	Health Care - Hospital	Very Small	29	0	1	1	0
PGE	Hotel	Large	107	26	104	72	12
PGE	Hotel	Medium	567	21	342	245	23
PGE	Hotel	Small	1,606	18	253	230	19
PGE	Hotel	Unknown	211	3	16	7	3
PGE	Hotel	Very Small	956	7	154	133	8
PGE	Industrial	Large	802	215	799	417	43
PGE	Industrial	Medium	1,548	38	590	499	38
PGE	Industrial	Small	3,397	23	329	290	30
PGE	Industrial	Unknown	822	5	82	60	5
PGE	Industrial	Very Small	6,166	20	551	477	18

Table B-1 (Cont'd): PG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
PGE	Miscellaneous	Large	245	96	241	142	30
PGE	Miscellaneous	Medium	1,642	117	1,636	927	151
PGE	Miscellaneous	Small	12,225	59	777	628	72
PGE	Miscellaneous	Unknown	5,525	8	219	143	9
PGE	Miscellaneous	Very Small	58,396	158	3,360	2,735	163
PGE	Office	Large	387	45	382	229	60
PGE	Office	Medium	1,530	114	1,524	867	137
PGE	Office	Small	8,078	120	3,778	1,867	115
PGE	Office	Unknown	4,141	8	210	126	9
PGE	Office	Very Small	34,090	115	2,429	1,733	119
PGE	Property Managers	Large	419	81	412	189	28
PGE	Property Managers	Medium	1,264	62	1,262	620	52
PGE	Property Managers	Small	3,790	30	638	467	41
PGE	Property Managers	Unknown	773	7	192	114	7
PGE	Property Managers	Very Small	10,555	43	946	700	46
PGE	Restaurant	Large	17	9	15	8	0
PGE	Restaurant	Medium	1,206	30	1,204	417	31
PGE	Restaurant	Small	15,167	113	3,427	2,488	107
PGE	Restaurant	Unknown	1,327	6	387	264	4
PGE	Restaurant	Very Small	7,825	40	1,643	1,298	40
PGE	Retail	Large	284	45	284	57	24
PGE	Retail	Medium	1,784	66	1,784	515	76
PGE	Retail	Small	6,129	85	2,636	1,308	77
PGE	Retail	Unknown	1,564	4	53	40	4
PGE	Retail	Very Small	18,058	74	1,439	1,235	77
PGE	School	Large	68	15	65	56	11
PGE	School	Medium	1,243	115	1,240	740	113
PGE	School	Small	2,413	57	1,725	627	57
PGE	School	Unknown	650	4	90	27	3
PGE	School	Very Small	1,056	25	1,030	477	23

Table B-1 (Cont'd): PG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
PGE	Unknown	Large	75	16	74	31	3
PGE	Unknown	Medium	732	9	245	153	19
PGE	Unknown	Small	11,201	37	1,111	827	47
PGE	Unknown	Unknown	16,628	30	1,185	796	22
PGE	Unknown	Very Small	103,696	195	5,619	4,444	186
PGE	Warehouse	Large	164	162	160	118	19
PGE	Warehouse	Medium	806	91	772	594	104
PGE	Warehouse	Small	3,366	110	2,807	1,770	98
PGE	Warehouse	Unknown	880	3	45	28	4
PGE	Warehouse	Very Small	9,299	95	2,374	1,769	86

Table B-2: SCE Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SCE	College	Large	73	36	72	33	3
SCE	College	Medium	111	33	103	68	6
SCE	College	Small	177	4	129	72	4
SCE	College	Unknown	24	0	0	0	0
SCE	College	Very Small	272	2	102	63	3
SCE	Food/Liquor	Large	490	64	484	358	32
SCE	Food/Liquor	Medium	1,241	104	1,212	837	93
SCE	Food/Liquor	Small	6,362	60	2,674	1,842	73
SCE	Food/Liquor	Unknown	89	1	26	18	1
SCE	Food/Liquor	Very Small	3,122	25	540	485	25
SCE	Health Care	Large	69	13	68	58	14
SCE	Health Care	Medium	836	95	822	735	97
SCE	Health Care	Small	2,818	59	2,601	2,207	62
SCE	Health Care	Unknown	156	1	35	26	1
SCE	Health Care	Very Small	15,422	97	2,937	2,567	101

Table B-2 (Cont'd): SCE Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SCE	Health Care - Hospital	Large	152	67	147	107	12
SCE	Health Care - Hospital	Medium	109	5	102	79	5
SCE	Health Care - Hospital	Small	136	1	29	21	1
SCE	Health Care - Hospital	Unknown	10	0	0	0	0
SCE	Health Care - Hospital	Very Small	122	1	23	16	1
SCE	Hotel	Large	122	29	120	104	15
SCE	Hotel	Medium	569	24	503	471	25
SCE	Hotel	Small	1,279	16	203	186	16
SCE	Hotel	Unknown	19	0	1	1	0
SCE	Hotel	Very Small	842	6	81	76	9
SCE	Industrial	Large	1,012	70	989	846	70
SCE	Industrial	Medium	2,568	143	2,462	2,220	135
SCE	Industrial	Small	6,329	28	548	510	33
SCE	Industrial	Unknown	234	1	18	11	1
SCE	Industrial	Very Small	13,961	31	524	486	33
SCE	Miscellaneous	Large	276	45	275	236	49
SCE	Miscellaneous	Medium	2,097	57	1,467	1,198	56
SCE	Miscellaneous	Small	16,031	96	2,901	2,214	133
SCE	Miscellaneous	Unknown	4,987	6	431	235	6
SCE	Miscellaneous	Very Small	122,538	193	4,756	3,937	184
SCE	Office	Large	241	57	234	183	36
SCE	Office	Medium	1,144	84	1,113	938	107
SCE	Office	Small	7,557	127	6,010	4,831	147
SCE	Office	Unknown	4,649	12	967	186	11
SCE	Office	Very Small	43,313	153	3,425	2,671	168
SCE	Property Managers	Large	371	15	359	260	15
SCE	Property Managers	Medium	1,777	75	1,714	1,412	68
SCE	Property Managers	Small	8,710	62	2,114	1,675	54

Table B-2 (Cont'd): SCE Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SCE	Property Managers	Unknown	2,489	7	599	431	4
SCE	Property Managers	Very Small	34,570	116	3,831	3,132	112
SCE	Restaurant	Large	17	5	17	15	0
SCE	Restaurant	Medium	2,005	53	1,885	1,633	53
SCE	Restaurant	Small	19,170	133	3,360	3,080	131
SCE	Restaurant	Unknown	295	2	47	33	1
SCE	Restaurant	Very Small	10,032	40	1,498	1,305	41
SCE	Retail	Large	487	52	483	129	40
SCE	Retail	Medium	2,599	115	2,527	1,633	113
SCE	Retail	Small	8,583	75	2,500	1,838	86
SCE	Retail	Unknown	393	4	103	81	4
SCE	Retail	Very Small	28,751	101	2,745	2,605	112
SCE	School	Large	175	30	175	169	23
SCE	School	Medium	1,794	135	1,791	1,493	141
SCE	School	Small	1,910	55	1,585	1,128	59
SCE	School	Unknown	54	0	8	3	0
SCE	School	Very Small	883	12	569	326	12
SCE	Unknown	Large	2	0	2	1	0
SCE	Unknown	Medium	54	1	31	24	1
SCE	Unknown	Small	1,884	18	682	471	16
SCE	Unknown	Unknown	1,823	4	412	211	3
SCE	Unknown	Very Small	50,957	250	11,361	9,158	234
SCE	Warehouse	Large	177	403	177	160	29
SCE	Warehouse	Medium	1,014	140	954	898	124
SCE	Warehouse	Small	4,866	237	4,017	3,119	242
SCE	Warehouse	Unknown	190	3	40	33	2
SCE	Warehouse	Very Small	15,353	165	4,064	3,457	158

Table B-3: SDG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SDGE	College	Large	17	8	17	10	3
SDGE	College	Medium	41	16	41	19	5
SDGE	College	Small	66	19	64	29	5
SDGE	College	Unknown	62	3	57	15	2
SDGE	College	Very Small	68	3	61	31	1
SDGE	Food/Liquor	Large	124	28	124	51	2
SDGE	Food/Liquor	Medium	305	32	304	229	24
SDGE	Food/Liquor	Small	1,638	60	1,633	1,179	41
SDGE	Food/Liquor	Unknown	129	1	57	45	5
SDGE	Food/Liquor	Very Small	727	35	704	612	32
SDGE	Health Care	Large	27	14	26	21	7
SDGE	Health Care	Medium	203	23	201	183	29
SDGE	Health Care	Small	683	30	585	545	33
SDGE	Health Care	Unknown	224	9	79	70	5
SDGE	Health Care	Very Small	3,767	39	891	850	39
SDGE	Health Care – Hospital	Large	31	16	26	21	1
SDGE	Health Care – Hospital	Medium	51	30	50	32	1
SDGE	Health Care – Hospital	Small	96	3	93	61	2
SDGE	Health Care – Hospital	Unknown	31	0	13	8	0
SDGE	Health Care – Hospital	Very Small	105	2	92	68	3
SDGE	Hotel	Large	66	27	63	49	6
SDGE	Hotel	Medium	177	13	166	139	13
SDGE	Hotel	Small	312	6	102	95	7
SDGE	Hotel	Unknown	67	1	16	13	2
SDGE	Hotel	Very Small	257	3	72	64	3
SDGE	Industrial	Large	141	20	140	113	12
SDGE	Industrial	Medium	382	33	381	335	27
SDGE	Industrial	Small	1,105	48	902	826	51
SDGE	Industrial	Unknown	270	1	61	55	2
SDGE	Industrial	Very Small	2,626	23	377	362	30

Table B-3 (Cont'd): SDG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SDGE	Miscellaneous	Large	49	24	46	37	9
SDGE	Miscellaneous	Medium	393	34	391	356	33
SDGE	Miscellaneous	Small	2,866	29	497	450	32
SDGE	Miscellaneous	Unknown	1,161	2	111	94	6
SDGE	Miscellaneous	Very Small	14,295	82	2,138	1,961	88
SDGE	Office	Large	200	29	196	147	17
SDGE	Office	Medium	731	65	729	610	71
SDGE	Office	Small	4,694	40	889	758	40
SDGE	Office	Unknown	2,713	9	209	149	4
SDGE	Office	Very Small	20,296	66	1,525	1,206	66
SDGE	Property Managers	Large	41	12	41	35	4
SDGE	Property Managers	Medium	314	24	314	231	22
SDGE	Property Managers	Small	1,543	35	1,350	1,153	28
SDGE	Property Managers	Unknown	722	3	193	140	8
SDGE	Property Managers	Very Small	5,334	64	1,803	1,467	76
SDGE	Restaurant	Large	3	1	3	2	0
SDGE	Restaurant	Medium	463	30	462	398	32
SDGE	Restaurant	Small	4,534	68	1,885	1,682	60
SDGE	Restaurant	Unknown	374	4	109	95	2
SDGE	Restaurant	Very Small	2,297	20	482	457	20
SDGE	Retail	Large	101	32	99	57	8
SDGE	Retail	Medium	588	32	587	364	27
SDGE	Retail	Small	2,544	45	1,317	1,147	45
SDGE	Retail	Unknown	562	4	134	107	3
SDGE	Retail	Very Small	7,328	61	1,350	1,275	63
SDGE	School	Large	21	5	20	19	2
SDGE	School	Medium	353	72	350	313	39
SDGE	School	Small	449	30	448	297	24
SDGE	School	Unknown	141	1	42	32	3
SDGE	School	Very Small	272	18	262	193	14

Table B-3 (Cont'd): SDG&E Telephone Survey Sample Design and Completes

IOU	Business Type	Business Size	CIS Frame Number of Sites	Phone Survey Quota	Sites Pulled	Sites Sent to CATI	Phone Survey Completes
SDGE	Unknown	Large	3	1	2	2	0
SDGE	Unknown	Medium	31	2	26	22	2
SDGE	Unknown	Small	229	7	124	111	7
SDGE	Unknown	Unknown	861	4	154	125	6
SDGE	Unknown	Very Small	5,726	75	2,323	1,993	49
SDGE	Warehouse	Large	17	8	17	17	4
SDGE	Warehouse	Medium	102	32	96	87	8
SDGE	Warehouse	Small	737	55	650	595	43
SDGE	Warehouse	Unknown	215	6	63	59	5
SDGE	Warehouse	Very Small	2,394	35	701	661	37

B.2 On-Site Sample Design

The on-site sample design was dependent on the sites contacted during the telephone survey. The on-site survey quota was developed based equally upon the usage and number of unique sites recruited for an on-site during the telephone survey. In other words, two separate quotas were calculated by strata based first, on kWh, and then by counts. These two quotas were then averaged for each stratum. The sample design was also dependent upon ensuring that there were an adequate number of sites, but not too many, for each IOU/business type combination and the design allocated a target number of sites by IOU. The development of the quota was dependent on recruiting sites as part of the telephone survey. The difficulty contacting Large and Medium sized sites during the telephone survey impacted the development of the on-site survey quota and the completion of on-sites.

The CSS on-site survey sample design incorporates 8 business types: food and liquor stores, non-hospital health care, miscellaneous, offices, restaurants, retail, k-12 schools, and warehouses.[6] The site level business types employed during the on-site sample design represent the telephone survey business type, a business type variable developed during the telephone survey. The telephone survey business type was the same as the CIS business type for the majority of businesses. Sites that were designated as property management or unknown business type, however, were all updated with business types that represent the business activity

[6] The telephone survey incorporated 14 business types. The CIS business types were updated during the telephone survey. Sites were recruited for the on-site survey based on their updated, telephone survey business type.

undertaken at the site. In addition, businesses with incorrect NAICs codes and business types had their business types updated for the development of the on-site survey sample design.

The business type strata were further disaggregated by the three electric IOUs and five usage strata (very small, small, medium, large, and unknown)[7] to produce 120 unique strata. If a site was in the 2010 frame and had electric usage, then their usage stratum was based on their 2010 usage. For sites without usage in 2010 or that were added in the 2011 frame, the site's 2011 usage was used to determine their size stratum. Sites whose annual usage was over 1,750,000 kWh were classified as Large. Sites with usage from 300,000 kWh to 1,750,00 kWh were classified as Medium, sites with usage from 40,000 to 300,000 kWh were Small sites, and sites with usage less than 40,000 kWh were designated as Very Small. Sites with no kWh in 2010 were classified as Unknown usage levels. Some of these sites were later found to have usage reported in the 2011 billing data. If no usage was found in the 2010 or 2011 billing data, the site had no kWh usage.

[7] The unknown usage category represents accounts found in the CIS that do not have a matching record in the billing data. During the on-site data collection, meter numbers were collected on-site. The collection of meter numbers leads to the development of an annual consumption for each site in the on-site survey. The analysis strata, therefor, do not include a strata with unknown usage while the strata is maintained for sample design and weighting purposes.

Table B-4: PG&E On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
PGE	Food/Liquor	Large	17	7	6	6
PGE	Food/Liquor	Medium	88	23	31	25
PGE	Food/Liquor	Small	58	20	25	21
PGE	Food/Liquor	Unknown	2	0	3	0
PGE	Food/Liquor	Very Small	50	5	8	2
PGE	Health Care	Large	8	4	1	0
PGE	Health Care	Medium	65	25	26	16
PGE	Health Care	Small	46	11	13	12
PGE	Health Care	Unknown	7	2	1	0
PGE	Health Care	Very Small	115	22	26	23
PGE	Miscellaneous	Large	30	5	14	4
PGE	Miscellaneous	Medium	151	40	68	37
PGE	Miscellaneous	Small	72	30	52	30
PGE	Miscellaneous	Unknown	9	1	6	0
PGE	Miscellaneous	Very Small	163	27	70	27
PGE	Office	Large	60	18	28	14
PGE	Office	Medium	137	43	61	41
PGE	Office	Small	115	25	25	21
PGE	Office	Unknown	9	1	8	0
PGE	Office	Very Small	119	26	49	29
PGE	Restaurant	Large	0	0	0	0
PGE	Restaurant	Medium	31	10	15	9
PGE	Restaurant	Small	107	39	55	44
PGE	Restaurant	Unknown	4	2	1	0
PGE	Restaurant	Very Small	40	13	24	12
PGE	Retail	Large	24	9	21	8
PGE	Retail	Medium	76	13	61	19
PGE	Retail	Small	77	27	31	26
PGE	Retail	Unknown	4	2	3	0
PGE	Retail	Very Small	77	30	40	31
PGE	School	Large	11	5	6	5
PGE	School	Medium	113	44	56	43
PGE	School	Small	57	24	27	25
PGE	School	Unknown	3	0	3	0
PGE	School	Very Small	23	5	13	4

Table B-4 (Cont'd): PG&E On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
PGE	Warehouse	Large	19	10	5	3
PGE	Warehouse	Medium	104	17	18	11
PGE	Warehouse	Small	98	17	12	9
PGE	Warehouse	Unknown	4	1	2	0
PGE	Warehouse	Very Small	86	19	20	16

Table B-5: SCE On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
SCE	Food/Liquor	Large	32	12	23	7
SCE	Food/Liquor	Medium	93	20	57	22
SCE	Food/Liquor	Small	73	17	37	22
SCE	Food/Liquor	Unknown	1	0	0	0
SCE	Food/Liquor	Very Small	25	5	10	3
SCE	Health Care	Large	14	2	5	2
SCE	Health Care	Medium	97	20	29	21
SCE	Health Care	Small	62	15	20	12
SCE	Health Care	Unknown	1	0	0	0
SCE	Health Care	Very Small	101	18	23	19
SCE	Miscellaneous	Large	49	5	9	4
SCE	Miscellaneous	Medium	56	22	38	15
SCE	Miscellaneous	Small	133	43	66	41
SCE	Miscellaneous	Unknown	6	2	3	0
SCE	Miscellaneous	Very Small	184	41	105	44
SCE	Office	Large	36	12	15	9
SCE	Office	Medium	107	30	44	35
SCE	Office	Small	147	32	45	29
SCE	Office	Unknown	11	1	2	0
SCE	Office	Very Small	168	32	63	35
SCE	Restaurant	Large	0	0	0	0
SCE	Restaurant	Medium	53	16	23	20
SCE	Restaurant	Small	131	36	58	44
SCE	Restaurant	Unknown	1	0	0	0
SCE	Restaurant	Very Small	41	10	20	7

Table B-5 (Cont'd): SCE On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
SCE	Retail	Large	40	12	29	9
SCE	Retail	Medium	113	26	34	24
SCE	Retail	Small	86	33	35	29
SCE	Retail	Unknown	4	0	0	0
SCE	Retail	Very Small	112	50	78	52
SCE	School	Large	23	15	14	13
SCE	School	Medium	141	44	59	44
SCE	School	Small	59	11	17	9
SCE	School	Unknown	0	0	0	0
SCE	School	Very Small	12	1	2	0
SCE	Warehouse	Large	29	5	13	4
SCE	Warehouse	Medium	124	25	34	22
SCE	Warehouse	Small	242	27	35	30
SCE	Warehouse	Unknown	2	0	0	0
SCE	Warehouse	Very Small	158	17	17	15

Table B-6: SDG&E On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
SDGE	Food/Liquor	Large	2	5	0	0
SDGE	Food/Liquor	Medium	24	6	15	7
SDGE	Food/Liquor	Small	41	11	16	12
SDGE	Food/Liquor	Unknown	5	1	1	0
SDGE	Food/Liquor	Very Small	32	3	6	0
SDGE	Health Care	Large	7	1	2	0
SDGE	Health Care	Medium	29	8	11	6
SDGE	Health Care	Small	33	8	11	7
SDGE	Health Care	Unknown	5	0	2	0
SDGE	Health Care	Very Small	39	10	17	10
SDGE	Miscellaneous	Large	9	5	7	4
SDGE	Miscellaneous	Medium	33	12	32	11
SDGE	Miscellaneous	Small	32	13	27	13
SDGE	Miscellaneous	Unknown	6	1	3	0
SDGE	Miscellaneous	Very Small	88	17	47	16

Table B-6 (Cont'd): SDG&E On-Site Survey Sample Design and Completes

IOU	Business Type	Business Size	Phone Survey Completes	CSS Onsite Quota	CSS Onsite Recruits	CSS Onsite Completes
SDGE	Office	Large	17	6	4	2
SDGE	Office	Medium	71	14	16	8
SDGE	Office	Small	40	5	16	9
SDGE	Office	Unknown	4	0	5	0
SDGE	Office	Very Small	66	12	30	14
SDGE	Restaurant	Large	0	0	0	0
SDGE	Restaurant	Medium	32	5	12	7
SDGE	Restaurant	Small	60	18	34	20
SDGE	Restaurant	Unknown	2	1	1	0
SDGE	Restaurant	Very Small	20	7	13	7
SDGE	Retail	Large	8	9	2	3
SDGE	Retail	Medium	27	7	8	8
SDGE	Retail	Small	45	10	15	9
SDGE	Retail	Unknown	3	1	2	0
SDGE	Retail	Very Small	63	14	25	15
SDGE	School	Large	2	2	0	0
SDGE	School	Medium	39	15	16	10
SDGE	School	Small	24	7	9	7
SDGE	School	Unknown	3	0	0	0
SDGE	School	Very Small	14	3	4	1
SDGE	Warehouse	Large	4	4	3	1
SDGE	Warehouse	Medium	8	4	3	2
SDGE	Warehouse	Small	43	11	7	3
SDGE	Warehouse	Unknown	5	0	2	0
SDGE	Warehouse	Very Small	37	7	8	12

Appendix C

CSS On-Site Survey Form

The on-site survey form and field codes form used for the CSS on-site survey is provided below.

2011-2013 Commercial Saturation Survey / Commercial Market Share Tracking On-Site Inventory Survey Form

General Site Information (from phone survey & IOU tracking database) tbl_SiteInfo and tbl_PS_SiteInfo

Itron SiteID	SiteID	CSS Site	CSSSite	Task	TaskToBill
Sample Strata	SampleStrata	CMST	CMSTSite		
		Tracking Sheet Only: CMST Revised:	☐ TVs ☐ LF ☐ HVAC		

Corporate (Multi-Site) Name	Organization	***Yellow fields → tbl_PS_SiteInfo***	
Business Name (CIS)	Business		
Storefront Name			
Service Address	SiteAddress1		
City	SiteCity	Zip Code	SiteZip
CORRECTIONS TO SITE INFORMATION			
Revised Corp. (Multi-Site) Name	OrganizationRev		
Revised Business Name	BusinessRev		
Revised Service Address	SiteAddress1Rev		
Revised City	SiteCityRev	Revised Zip	SiteZipRev

Site Contact Information

PS Completion Date:	PhoneSurveyDate	Length (min)	PhoneSurveyLength	Respondent	PhoneSurveyRespondent

	Contacted	Contact Name	Phone Number	Alternate Phone	Email Address
OS Primary	☐	ApptContact1	ApptContact1Phone	ApptContact1AltPhone	ApptContact1EMail
OS Back-up	☐	ApptContact2	ApptContact2Phone	ApptContact2AltPhone	ApptContact2EMail
OS Other	☐	ApptContact3	ApptContact3Phone	ApptContact3AltPhone	ApptContact3EMail

Note: Use the "Contacted" check box to indicate the actual contact(s) for the site visit.

Scheduling Notes/Special Instructions for On-site Visit:

Site contact prefers hard-schedule or dropping by:	SCHEDULE
Days of the Week / Times of the Day to schedule appt:	VISIT_CALL
Days of the Week / Times of the Day to drop by for appt:	VISIT_DROP_BY

Survey Tracking Information

Survey Company:	SurveyCompany		Assigned Surveyor's Initials:	Surveyor_Installer_Initials	Surveyor_Installer_Initials
Survey Travel Mileage:	TravelMilage	miles	Total Travel Time	TotalTravelTime	hrs
Survey Duration (24 hr clock)	Start: SurveyStart		Survey Duration (24 hr clock)	End: SurveyEnd	
Total Onsite Time	TotalTime	hrs	Total Time to Fill Out Survey Form	TotalTimeFillOut	hrs

	Date:	Initials
Field survey completed:	OnsiteCompleteDate	OnsiteCompleteInitial
Survey received from surveyor:	SurveyRcvdDate	SurveyRcvdInitial
Initial QC check completed:	QC1CompleteDate	QC1CompleteInitial
Survey sent back to surveyor (*if needed*):	ReturnedDate	ReturnedInitial
Received from surveyor (*if needed*):	SurveyRcvdItronDate	SurveyRcvdItronInitial
Itron QC completed:	QC2CompleteDate	QC2CompleteInitial
Data entry completed:	DataEntryCompleteDate	DataEntryCompleteInitial

IOU EE Measure Summary – HVAC Tracking Data

If this site participated in IOU energy efficiency programs since 2009, the measures received for those programs are listed in this table. **tbl_PS_PurchasesHVAC**

Item #	Program Year	Program Type	High Impact Measure Category	IOU Measure Description	Quantity of Units	Unit Basis

Self-Reported Recently Purchased CMST Measures Summary – HVAC

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will need to be verified and dispositioned on site using the CMST verification form.

Recently Purchased Package HVAC Units Summary

Item #	Year Installed	Cooling Type	Efficiency Rating	Efficiency Rating Basis	Age of Replaced Units	Quantity of Units Purchased
	CL14	*CL10*	*CL19*	*CL20*	*CL25*	*CL12*

HVAC On-Site CMST Measure Confirmation **tbl_OS_SiteInfo**

Installed Measures	
Total # of HVAC systems purchased since January 2009 found onsite	NumHVACPurch
I certify that I have double checked with the site contact that I have captured all recently purchased HVAC systems.	OS_CheckedHVACPurch

Comments:OS_EEComments_HVAC _____

IOU EE/DR/DG Program Participation and CSS Measures Summary Sheet

IOU DR/DG Program Participation Summary **NO DATA ENTRY on this Form, Not in ACCESS**

If this site participated in any IOU demand response (DR) or direct generation (DG) programs for the 10-12 program years, that participation is noted in this table. This table may not be all inclusive, so even if this table is empty, the field surveyor should ask the site contact if they are aware of any IOU program participation, then note the year of participation and record any additional information about the end use, type and location of equipment in comments.

Source	DR / DG	Various Fields to be filled out based on data available

IOU EE Measure Summary – Tracking Data

If this site participated in IOU energy efficiency programs since 2006, the measures received for those programs are listed in this table.

Program Year	Program Type	High Impact Measure Category	IOU Measure Description	Quantity of Units	Unit Basis

IOU EE Measure Summary – Linear Fluorescent Tracking Data

If this site participated in IOU energy efficiency programs since 2009, the measures received for those programs are listed in this table. **tbl_PS_PurchasesLinFluor**

Item #	Program Year	Program Type	High Impact Measure Category	IOU Measure Description	Quantity of Units	Unit Basis

Self-Reported Recently Purchased CMST Measures Summary – Linear Fluorescents

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will need to be verified and dispositioned on site using the CMST verification form.

Recently Upgraded Linear Fluorescent Lighting Summary

Item #	Year Installed	Lighting Type	Age of Replaced Units	Quantity of Units Purchased	Unit Basis (fix or lamps)
	LI19	*LSP2*	*LI26*	*LMSP2*	

Linear Fluorescent On-Site CMST Measure Confirmation **tbl_OS_SiteInfo**

Installed Measures	
Total # of Linear Fluorescent fixtures purchased since January 2009 found installed on site	OS_NumLinFluorPurch
I certify that I have double checked with the site contact that I have captured all recently purchased Linear Fluorescents.	OS_CheckedLinFluorPurch

Comments:*OS_EEComments_LF*_____

_____

_____

_____

_____

Recently Purchased CMST Measures Summary - Televisions

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will need to be verified and dispositioned on site using the CMST verification form.

Recently Purchased TVs Summary tbl_PS_PurchasesTV

Item #	Television Type	Size (Diagonal ")	Qty of TVs Purchased	Year Purchased
	TV5	*TV6*	*TV4*	

TV On-Site CMST Measure Confirmation tbl_OS_SiteInfo

Installed Measures		
Total Number of TVs Purchased since January 2009 (*from Phone Survey)*	(A)	OS_NumTVPurch_Phone
Total # of TVs purchased since January 2009 found installed on site:	(B)	OS_NumTVPurch
Are (A) and (B) significantly different? (over 25% difference)		OS_TotalTVsDiffFromPurch
I certify that I have double checked with the site contact that I have captured all recently purchased televisions.		OS_CheckedTVPurch

*Comments:*OS_EEComments_TV _____

_____

_____

_____

_____

_____

Premise-Level General Information tbl_OS_SiteInfo & tbl_PS_SiteInfo

PRIMARY BUSINESS TYPE CODE *(do not leave blank)*:	OS_BusinessType	*(Use **3-number** codes from Business Type Table)*

Phone Survey	**Phone Survey Business Type:**	*FM050* ***Yellow fields → tbl_PS_SiteInfo***
	Detailed Business Type:	*FM050a-j*

Premise Business Type Description

Primary Product or Service: Give a brief description about the type of work and/or primary product/service. What is the primary activity(ies) that occur here and *what makes this premise **unique** from other businesses of this type*?	OS_BusinessTypeDscr
Recent Survey Area Changes since Jan 2009: Give a brief description about any changes at this site *other than CMST measures* that *significantly* impacted energy use.	OS_SurveyAreaChgs

Premise General Information

Is this premise owner-occupied (**O**) or leased/rented (**L**)?	*CC4*	Revised	OS_OwnLeaseRev
How many full-time equivalent employees work at this premise?	*FM070*	Revised	OS_FTERev
What kind of premise is this? **B** = 1 building, single footprint **SM** = Small multi-building (*survey all*) **P** = Part of a building **MF** = 1 building w/ multiple footprints **CM** = Campus (*subsample*) **OT** = Other	OS_PremiseType		
What is the total occupied floor area of this premise?	*CC2a / CC2b* ft^2	Revised	OS_TotalSqFtRev
-- If the premise has an enclosed parking garage, what is the floor area? (exclude from above ft^2)			OS_ParkingSqFt
What percent of the total floor area is heated or cooled?	*CC2c / CC2d* %	Revised	OS_PctCondRev
How many buildings are part of this premise?	*CC1a*	Revised	OS_NumBldgsRev
What year was this business established at this location?	*CC12a*	Revised	OS_YearEstRev
What year was the majority of the facility built?	*CC8*	Revised	OS_YearBuiltRev
Is there a pool at the facility?	OS_Pool		

Business-Type Specific Information

Lodging	Total number of useable rooms/residential units	OS_LDG_UsableRooms
	Average % of rooms occupied	OS_LDG_PctRoomsOcc
	Is keycard system present? (If so, circle all end-uses it controls)	**OS_LDG_KeycardControls_Lighting** **OS_LDG_KeycardControls_HVAC** **OS_LDG_KeycardControls_NA**
Office	Average % of occupied (non-vacant) space	OS_OFF_PctOccSpace
Hospital	Number of beds in hospital	OS_HSP_NumBeds
	Average % of beds occupied	OS_HSP_PctOccBeds
Education	Average number of enrolled students (e.g. ADA)	OS_EDU_NumEnrolled
Data Center	Sq footage of Data Center	OS_DC_SqFt
	Temperature Cooling Setpoint	OS_DC_CoolSetpoint
	HVAC Type	OS_DC_HVACType
Restaurants	% of current cooking equipment that was purchased	OS_RST_PctCookPurchUsed

second-hand	
Meals Served (Circle all that apply): B=Breakfast L=Lunch D=Dinner	OS_RST_MealsServed_Brk OS_RST_MealsServed_Lnch OS_RST_MealsServed_Dnr

Electric Accounts and Meters tbl_OS_MeterAcctNew & tbl_PS_MeterNumbers

Utility / Provider OS_ElecUtil OS_ElecUtilOthr & tbl_OS_MeterAcctStatus				
Direct Access Site			Yellow fields → tbl_PS_MeterNumbers	
Method of meter number verification: **B**=Verified Bills **M**=Verified Meter *(circle one)*				OS_ElecMtrNumVerified
Item #	**Meter Number:**	**Account Number:**	**Meter Status Code**	**Address** *(for multiple buildings only)*
Item	tbl_PS_MeterNumbers	AccountID	tbl_OS_MeterAcctStatus	Address

Natural Gas Accounts and Meters ☐ N/A OS_NA_GasAccountsMeters

Utility / Provider OS_GasUtil OS_GasUtilOthr				
Method of meter number verification: **B**=Verified Bills **M**=Verified Meter *(circle one)*				OS_GasMtrNumVerified
Item #	**Meter Number:**	**Account Number:**	**Meter Status Code**	**Address** *(for multiple buildings only)*
	MeterNumber	AccountID	MeterStatusCode	Address

Meter Status Codes: **V** = Verified pre-populated meter **A** = Add meter that was found on site but not prepopulated here.
D = Delete meter that was listed here but not found onsite **NI** = Not verified meter – inaccessible; Explain in comments
OT = Other Situation: Explain in comments

Other Energy Service Accounts ☐ N/A

(If bills are available, attach copy to survey form) tbl_OS_SiteInfo

OS_NA_OtherEnergySrvcAcct

Fuel Type	**Bills Available?**	**Utility/Provider**
Bottled Gas (LPG)	OS_LPG_Bills	OS_LPG_Provider
Other: OS_OTH_Type	OS_OTH_Bills	OS_OTH_Provider

Comments: OS_AcctMtrComments _____

Revised: 10/25/12

Shared Serv's &/or Elec/Gas Meters tbl_OS_SiteInfo

☐ N/A
OS_NA_SharedSrvcElecGasMeters

The shared service situation is: **N**= Needs explanation (use comment block) **P** = This site provides services to another site that was not part of the on-site survey. **R** = This site receives services from another site that was not part the on-site survey	OS_SS_Type
The shared service impacts these utility services (circle all): **E**=Electricity **G**=Natural Gas **F**=Fuel Oil **L**=LPG **OT**=Other (describe in comments)	OS_SS_Elec OS_SS_Gas OS_SS_Foil OS_SS_LPG OS_SS_Oth

Briefly describe the shared services and list the affected meters, if known: OS_SS_Comments

On-Site Power Generation tbl_OS_OnSitePowerGen

☐ N/A
OS_NA_OnSitePower

Cogeneration, self-generation, solar cell/photovoltaic system, and emergency generators. Solar thermal (i.e. water heating) technologies are not recorded here, as these are only electric generation systems.

		Item #	Item	
Emergency / Backup	Is this primarily an emergency generator/backup system?		PrimaryBackup	Y N
	-- How often is it tested? (e.g. once a month, twice a year)		TestFrequency	
Currently Operational? (Yes, even if only down temporarily for maintenance)			CurrentlyOperational	Y N
- If NO, is this system permenantly out of service?			PermenantlyOutOfService	Y N
Serves: Specific Buildings (note Building IDs) or **P** = Entire Premise			BuildingsServed	
Technology Type: **I**=Internal Combustion Engine **G**=Gas Turbine **M**=Microturbine **PV**=SolarArray/Photovoltaic **F**=Fuel Cell **W**=Wind **O**=Other			TechType	I G M PV F W O
Fuel Type (if applicable): **N**=Natural Gas **BG**=BioGas **NB**=Both NatGas&BioGas **D**=Diesel **F**=Fuel oil **GA**=Gasoline **O**=Other			FuelType	G BG NB D F GA O
Cycle Type (if applicable): **S**=Single **C**=Combined **NA**=NA			CycleType	S C NA
Quantity of similar units:			Quantity	
What year did the unit/plant begin operation?			YearOper	
Did the system receive any utility or Federal incentives?			Incentives	
What is the unit's (or for PV plant's) generation capacity? (kW)			GenCapKW	
Manufacturer (if **PV**: Panel Manufacturer)			Manuf	
Model # (if **PV**: Panel Model #)			Model	
System Operation				
FOSSIL-FUELED	**COGEN:** Use of heat generated (if applicable, select all that apply): **C**=Chilled water **D**=Domestic hot water **S**=Space Heat **P**=Pool **PR**=Process **N**=None **O**=Other		Cogen	C D S P PR N O
	Unit (s) used for utility Demand Response (DR) programs?		UsedForDR	Y N
	What percent of generated electricity is sold back to the utility? (0 if none)		PctSoldBack	%
	Average operating hours per day (If seasonal, describe operation below)		AvgOperHoursPerDay	
	Number of operating days per year		DaysPerYearOper	
	Does system have dedicated utility metering? If yes list inputs/outputs metered in comments		UtilityMeter	Y N UNK
Does system have Performance Metering/Monitoring?			PerformanceMeter	Y N UNK
PV Technology	Roof Mounted (**R**), Ground Mounted (**G**), or Carport (**C**)		PVRoofMounted	R G C
	PV mounting type: **F**=Fixed **S**=Single axis **D**=Dual axis		PVMountType	F S D

Other Energy Services/Generation Notes: OS_OnSitePGenComments

Premise/Site-Plan Sketch **No Data Entry**

*This sketch should provide a high-level view of the premise and its surroundings as it is actually configured. Attach site plans and floor plans available from other sources. Sketch all buildings and the closest streets/roadways in both directions. Mark the orientation of of the front of the building. For **multiple building** sites, use letters to identify the different building IDs. Indicate where meters are located, and the boundaries of different Component Survey areas. Use multiple sheets/drawings if necessary. A site map or site plans can be used in place of this, as long meter locations and streets can be shown.*

Premise/Site-Plan sketch comments:

Premise-Level Schedule Definitions *tbl_Holidays*

Standard Holidays *(check all that apply)*

☐ N/A
Check Box

Indicate below which, if any, standard holidays that the business is closed or operation deviates drastically from normal/typical operations, and indicate on the Schedule Sets Form what the holiday operation hours are. Indicate any additional holidays in the comment block.

New Year's Eve	☐	July 4th Celebrated	☐
New Year's Day	☐	Labor Day	☐
New Year's Day Celebrated	☐	Columbus Day	☐
Martin Luther King Day	☐	Veterans' Day	☐
Presidents' Day	☐	Thanksgiving	☐
St. Patrick's Day	☐	Thanksgiving Friday	☐
Easter Sunday	☐	Christmas Eve	☐
Memorial Day	☐	Christmas Day	☐
Flag Day	☐	Christmas Day Celebrated	☐
July 4th	☐	Caesar Chavez Day	☐
Other (1) Other1desc	☐	Other (2) Other2desc	☐

Seasonal Operation Periods

☐ N/A
Check Box

Define seasonal operation periods for significant periods of time where business hours and/or equipment operation differs significantly from normal or typical business hours and/or equipment operation. To indicate seasonal operation periods, provide a brief description of the period (e.g. "spring break", "winter break", "summer break", "extended holiday hours"), and list the beginning/ending months (1-12) and days for up to three time periods.

Typical Schedule			Seasonal Time Period					
1			2			3		
Description OS_TypicalOper1Desc			Description OS_Seas2OperDesc			Description OS_Seas3OperDesc		
Begin Month/Day	OS_TypicalOper1MoStart	OS_TypicalOper1DyStart	Begin Month/Day	OS_Seas2Oper1MoStart	OS_Seas2Oper1DyStart	Begin Month/Day	OS_Seas3Oper1MoStart	OS_Seas3Oper1DyStart
End Month/Day	OS_TypicalOper1MoEnd	OS_TypicalOper1DyEnd	End Month/Day	OS_Seas2Oper1MoEnd	OS_Seas2Oper1DyEnd	End Month/Day	OS_Seas3Oper1MoEnd	OS_Seas3Oper1DyEnd
Begin Month/Day	OS_TypicalOper2MoStart	OS_TypicalOper2DyStart	Begin Month/Day	OS_Seas2Oper2MoStart	OS_Seas2Oper2DyStart	Begin Month/Day	OS_Seas3Oper2MoStart	OS_Seas3Oper2DyStart
End Month/Day	OS_TypicalOper2MoEnd	OS_TypicalOper2DyEnd	End Month/Day	OS_Seas2Oper2MoEnd	OS_Seas2Oper2DyEnd	End Month/Day	OS_Seas3Oper2MoEnd	OS_Seas3Oper2DyEnd

Holiday and Seasonal Operation Comments:

OS_Holiday_Seasonal_Schd_Comments _____

_____

_____

_____

_____

_____

Business Schedule

tbl_BusinessHours

Primary Business Hours

Operation Type = Normal or Seasonal (dropdown)

Define typical operation for all Day Types listed below and specify hours in military time (00 to 24). For partial (i.e. not full) operation days, also indicate the approximate % of full operation as Partial Op %.

Day Type	From Phone Survey	Corrected Business Hours	Closed All Day?	Open 24 hrs?	PartialOp %
DOW	Yellow fields are	from StartTime_ to_EndTime	Closed	Open24	PartOp
Tuesday	tbl_PS_BusinessSchd	from StartTime_ to_ EndTime	Closed	Open24	PartOp
Wednesday	from _____ to _____	from StartTime_ to_ EndTime	Closed	Open24	PartOp
Thursday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Friday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Saturday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Sunday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Holidays	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp

Seasonal Operation Business Hours – Time Period 2

N/A Seasonal Busines Hours

Day Type	From Phone Survey	Corrected Business Hours	Closed All Day?	Open 24 hrs?	PartialOp %
DOW	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Tuesday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Wednesday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Thursday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Friday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Saturday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Sunday	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Holidays	from _____ to _____	from StartTime _ to_ EndTime	Closed	Open24	PartOp

Seasonal Operation Business Hours – Time Period 3

N/A Seasonal Busines Hours

Day Type	Business Hours	Closed All Day?	Open 24 hrs?	PartialOp%
DOW	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Tuesday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Wednesday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Thursday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Friday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Saturday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Sunday	from StartTime _ to_ EndTime	Closed	Open24	PartOp
Holidays	from StartTime _ to_ EndTime	Closed	Open24	PartOp

Hourly Operation Schedules
tbl_ScheduleGroup & tbl_ScheduleGroupDetail

*Use this form to specify **Lighting**, **Television**, and **HVAC** hourly schedules. Indicate the applicable daytypes for each day type schedule, and account for all day types including holidays. Specify the % Equipment On for Lighting and TVs. For **HVAC**, specify the schedule in degrees (°F) for both heating and for cooling in separate schedules. If no thermostat setting is available, estimate an approximate temperature. For **Lighting**, if seasonal schedules apply, create separate schedules for them, and make sure to specify which season the schedule applies to. (Do the same for HVAC only for school vacation time periods). Also for **Lighting**, do not just automatically assume all lights go off at night. Be sure to take into account security lighting that may stay on all night (think store-fronts) and other areas that may not always get turned off.*

EndUse: OL = Outside Lighting **IL** = Indoor Lighting **HC** = HVAC Cooling **HH** = HVAC Heating **TV** = Television

Hour	12-1	1-2	2-3	3-4	5-6	6-7	7-8	8-9	9-10	10-11	11-12

Schedule # ScheduleGroup **LtgCtrlType** ControlType **EndUse** EndUse **Description** SchdDesc

Applicable DayTypes		% Equipment On ScheduleType OR Thermostat °F											
Item	AM	Hr1	Hr2	Hr3	Hr4	Hr5	Hr6	Hr7	Hr8	Hr9	Hr10	Hr11	Hr12
	PM	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23	Hr24
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule # _____ **LtgCtrlType**___ **EndUse**_____ **Description**_____

Applicable DayTypes		% Equipment On OR Thermostat °F (*Circle one*)											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Schedule # _____ **LtgCtrlType**___ **EndUse**_____ **Description**_____

Applicable DayTypes		% Equipment On OR Thermostat °F (*Circle one*)											
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												
M T W T F S S H	AM												
	PM												

Building Shell Construction and Windows tbl_OS Bldg_Shell

Windows / Fenestration							
(record glass doors here too)		Item	Item	#__	#__	#__	#__	#__
Operable Window?		OperableWindow		Y N	Y N	Y N	Y N	Y N
# of Panes (1, 2, 3)		NumPanes						
Film/Glazing Type	C=Clear T=Tinted R=Reflective O = Opaque L = LowE	FilmGlazingType						
Window Frame Type	M=Metal W=Wood V=Vinyl O=Other	FrameType						
Interior shading type	F=Fixed M=Moveable N=None	InteriorShadingType						
% of Window to Wall Installed on:		PctWtoWFront						
		PctWtoWLeft						
		PctWtoWBack						
		PctWtoWRight						

Building Shell Construction					
EXTERIOR WALL	Exterior Wall Construction **Code**		ExtWallType		
	Exterior Wall dimensions in inches	Ex. 2x4, 2x6, 4, 6, 12, etc	ExtWallDim		
	Masonry walls: Furred Interior Type?	W =Wood M=Metal N=None	ExtWallMasonry	W M N	W M N
	Exterior Insulation?		ExtWallExtInsulation	Y N NA	Y N NA
	Cavity Insulation?		ExtWallCavityInsulation	Y N NA	Y N NA
	Interior Insulation?		ExtWallInteriorInsulation	Y N NA	Y N NA
ROOF \ CEILING	Attic / No Attic / Mixed	A=Attic N=No Attic M=Mixed	AtticType	A N M	A N M
	Sloped / Flat / Mixed Roof?	S=Sloped F=Flat M=Mixed	RoofType	S F M	S F M
	External Surface Type **Code**		RoofExternalSurface		
	Roof Surface Color	D=Dark M=Medium L=Light OR C=Cool Roof G=Green Roof S=Solar Roof Tiles OT=Other	RoofColor	D M L C G S OT	D M L C G S OT
	-- If cool roof, list Manufacturer of material or surface treatment		RoofManuf		
	Roof/Ceiling Insulation Present?		RoofInteriorInsulation	Y N NA	Y N NA
	Radiant Barrier Present?		RoofRadiantBarrier	Y N NA	Y N NA
	Suspended Ceiling?		RoofSuspendedCeiling	Y N NA	Y N NA
	-- Suspened Ceiling Insulation Present?		RoofSuspendedCeilingInsul	Y N NA	Y N NA
FLOOR	Floor Construction Type **Code**		FlrConsType		
	Primary Finish Type	V=Vinyl C=Carpet S=Stone/Ceramic W=Wood N=None OT=Other	FlrFinishType FlrFinishTypeOthr		

☐ N/A
OS_NA_Skylights

tbl_OS_Bldg_Skylights

Skylights Bldg ID		#__	#__	#__
	Quantity of Skylights	Quantity		
Skylight Shape	D=Domed F=Flat/Pyramid S=Solartube	Shape	D F S	D F S
Glazing Type	G=Glass P=Plastic	GlazingType		

Color	**C**=Clear **W**=White **O**=Other	Color	C W O	C W O
Edge Type	**C**=With a Curb **N**=Without a Curb	EdgeType	C N	C N

Code	External Roof Surface Type	Code	Floor Construction Types	Code	Exterior Wall Construction Code
AS	Asphalt Roll/Shingle	S	Slab-on-grade	WF	Wood Frame
BU	Built-Up Surface	G	Slab above open garage	MF	Metal Frame
CT	Clay/cement Tile	C	Crawlspace	CON	Solid Concrete
RB	Rubber (urethane, etc)	U	Uncond. Basement	BLO	Concrete Block/ CMU
WS	Wood/fiberglass shingle	CS	Conditioned Space	BRIC	Brick
MT	Metal/Sheet	OT	Other	Air	Air
BF	Bituminous felt			CN	Conditioned Space (Adiabatic)
CN	Conditioned Space (Adiabatic)			OT	Other
OT	Other				

Building-Specific General Information

Building ID BldgID

tbl_OS_Bldg_GeneralInfo

BUILDING ACTIVITY TYPE CODE:	BldgType	*(Use **2- letter** codes from Business Activity Type Lookup Table)*

Building Type Description

Description: Briefly describe this building and its uses (e.g. Admin Office building of a large campus, kitchen for a fast-food restaurant, etc.)	BldgTypeDescr

Building General Information

Building Type: **B** = 1 building, single footprint **MB**=Multiple Buildings **P** = Part of a building **OT** = Other		Footprint
	Total **represented** floor area	TotalSurveyedSqFt
	Total number of floors	NumFloors
	Is there a parking garage below the bottom floor?	Parking
	Floor-to-floor (or floor-to-roof) height, ft. *(do not leave blank)*	Flr2FlrHt
	Floor-to-ceiling height, ft *(do not leave blank)*	Flr2CeilingHt
	Daylighting controls used?	DaylightCtrls
	General Compass Direction of Front Entrance (*N, S, E, W, etc.*)	Orientation
If the premise has multiple buildings…	What year was the majority of the building survey area built?	YearBuilt
	What is the total floor area of this building type?	TotalSqFt
	What % of the total floor area is heated or cooled of the surveyed building?	PctCondSqFt
	Total number of buildings of this building type	NumBldgs

Activity Area Definitions

Activity Area ID# Assignments *Identify an Area ID# for each distinct Activity Area type within the surveyed area. Indicate each area on the Site Plan sketch, Form 6. Also consider lighting system controls and operation when defining these areas.*

*If an area is **vacant**, add the identifier "**V**" to the end of the Activity Area Code.*

Conditioned Space Type Codes

CH = Cooled & Heated **CL** = Only Cooled **HT** = Only Heated **ECH** = EvapCooled & Heated **ECL** = Only EvapCool

NU = HVAC present but not used **RF** = Refrigerated **UN** = Unconditioned **OU** = Outside **OT** = Other (describe in comments)

Area ID#	Building ID #	Activity Area Code (*AA Code*)	Surveyor's Description of Area	% of Total Represented Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Actually Surveyed	Total Represented Qty of this Area Type On-site	End-Uses *NOT* Surveyed (*all that apply - Explain*)	Similar to these Area ID groups (*MM-MT Only*)
AreaID	BldgID	ActivityArea Code	SurveyorDesc	PctofTotalBldgFloor Area	Check Boxes	CondSpaceType	QtySqFtActArea Surveyed	QtySqFtActAreaOnSite	Check Boxes	SimilarAct Areas
2					W S				LT OF TV	
3					W S				LT OF TV	
4					W S				LT OF TV	
5					W S				LT OF TV	
6					W S				LT OF TV	
7					W S				LT OF TV	
8					W S				LT OF TV	
9					W S				LT OF TV	
10					W S				LT OF TV	
11					W S				LT OF TV	
12					W S				LT OF TV	
13					W S				LT OF TV	
14					W S				LT OF TV	
15					W S				LT OF TV	
16					W S				LT OF TV	
17					W S				LT OF TV	
18					W S				LT OF TV	
19					W S				LT OF TV	
20					W S				LT OF TV	
21					W S				LT OF TV	
22					W S				LT OF TV	
23					W S				LT OF TV	
24					W S				LT OF TV	
25					W S				LT OF TV	

COMMENTS:

Energy Management System tbl_OS_EMS N/A ☐

Complete this form whenever an energy management system is found on site. In addition, make sure that an EMS control type is indicated on the end use equipment forms for any EMS controlled equipment. For "OT" (other) responses, please provide a comment in the comment block.

When was the EMS system physically installed: **N**=New (<=5 yrs) **O**=Old (>5 yrs) **OT** = Other (describe)			EMSVintage
When was the last time the EMS system was updated? (year)			EMSLastUpdated
EMS controls: **A** = All/entire premise **P** = Part of premise **O** = Other/unknown			EMSCtrls
Which end uses does the EMS control? *(circle all that apply)* **IL** = Inside Lighting **OL** = Outside Lighting **HV** =HVAC units **CP** = Central Plant (chiller, boiler, etc.) **AX** = HVAC auxiliary pumps/fans **WH** = Domestic/Service Water heating **PR** = Process equipment (describe) **OG** = On-site generation **OT** = Other (describe in comments)			EMSCtrls_ILCP_AX EMSCtrls_OLOG EMSCtrls_HV EMSCtrls_CP EMSCtrls_AX EMSCtrls_WH EMSCtrls_PR EMSCtrls_OG EMSCtrls_OT
EMS is controlled and operated by: **O**=On-site Personnel **C**=Central headquarters (off site) **T**=External third-party **OT = Other**			EMSCtrldBy
EMS has central control computer front end?			EMSCentralComputer
Who is the EMS manufacturer and/or service provider? *Provide additional comments if needed.*	**Front End:** EMSFrontendMfgr	**Controls:** EMSControllerMfgr	
Contact information for EMS expert (*if different than site contact*)	EMSContact		
External Network communication link: **HE**=In house network **IV**= Internet/VPN **M**=Modem/Telephone dial up **S**=Standalone (no network access) **OT**=Other (*explain*)			EMSNetComLink EMSNetComLinkDescr
Is end use operation/control data available? *(Trend data may be available for export. If so, use this data to fill out survey schedules Forms.)*			EMSCtrlDataAvailable
EMS system layout: **S** = Single Central Controller **D**= Distributed Control			EMSLayout
Key System Metrics			
Number of Points Per Controlled System (*both Input & Output):*			KSM_NumPoints
End/control point device type (*Circle all that apply – note predominant type in comments)*: **PN**= Pneumatic **E**=Electronic/DDC **OT** = Other (*describe*)_____			KSM_DeviceType_PN KSM_DeviceType_E KSM_DeviceType_OT KSM_DeviceType_OTOth
Control Capability features (*Circle all that apply*): **B** = Basic Control (time & temp) **D** = Data Trending **O** =Optimized start/ stop **R** = Reset Optimization **DL**= Demand Limiting or load limiting			KSM_CtrlFeatures_B KSM_CtrlFeatures_D KSM_CtrlFeatures_O KSM_CtrlFeatures_R KSM_CtrlFeatures_DL
Is the EMS used for Demand Response (DR) control?			EMS_DRCtrl
-- For which Demand Response Program is the EMS used?			EMS_DRProgramUsed
-- Estimate of DR-controlled kW reduction			EMS_DR_kW
-- The DR decision to turn off equipment is made by: *(circle all that apply)* **E** = EMS algorithm (semi-auto) **O** = On-site operator (manually) **C** = Central HQ (remotely) **A** = Automatic signal from utility(auto DR) **OT** = Other (describe)_____			EMS_DR_C EMS_DR_A EMS_DR_E EMS_DR_O EMS_DR_OTOthr

Revised: 10/25/12

-- What are the Demand Response strategies *(circle all that apply)* **TR**= Temperature Reset **TL**= Turn lights off **DL**= Dim Lighting **CR**= Chiller reset **FSR**= Fan speed reduction **PR**= Cycling Process load	EMS_DRStrat_TR EMS_DRStrat_TL EMS_DRStrat_DL EMS_DRStrat_CR EMS_DRStrat_FSR EMS_DRStrat_PR
-- What electrical loads are included in the DR control: *(circle all that apply)* **IL** = Inside Lighting **OL** = Outside Lighting **HV** =HVAC units **CP** = Central Plant (chiller, boiler, etc.) **AX** = HVAC auxiliary pumps/fans **WH** = Water heating **PR** = Process equipment (describe) **OG** = On-site generation **OT** = Other (describe)	EMS_DRLds_IL EMS_DRLds_OL EMS_DRLds_HV EMS_DRLds_CP EMS_DRLds_AX EMS_DRLds_WH EMS_DRLds_PR EMS_DRLds_OG EMS_DRLds_OT
-- Does the EMS activate on-site generators during peak hours?	EMS_OnsiteGen

Comments:_____OS_EMSComments_____

HVAC Systems tbl_OS_HVACSystems

HVAC NOT SURVEYED *(explain in comments)* tbl_OS_SiteInfo	Check Box	**NO HVAC ONSITE**	Check Box

	Item #	Item				
	HVAC Typical Schedule # (cooling | heating)	TypicalSchdCooling	TypicalSchdHeating			
	Schools: Season Schedule (vacation) (cooling | heating)	SeasonalSchdCooling	SeasonalSchdHeating			
	Building ID *or* Area ID served	BldgAreaID				
	Units are *operational* and actively used by customer	UnitsOperational		Y N		Y N
	Nameplate is ***present*** and readable	NameplateReadable		Y N		Y N
	Distribution System Type: *See HVAC-CODES form Describe "OT" systems in comments*	DistSysType				
	Quantity of units of this type	NumUnits				
	Recent Retrofit/Replacement or Newly Added equipment?	RetrofitNew		RR N		RR N
	Condition of Units (**N**ew, **G**ood, **F**air, **P**oor)	ConditionOfUnits		N G F P		N G F P
	Year Manufactured (*nameplate*) **OR** Year Installed (*site contact*)	YearManuf				
		YearInstalled				
	Temperature control type:	TempCtrlType		M A T E P		M A T E P
	Fan Control: A = Always on/continuous **C** = Cycles w/HeatCool **M** = Manual/as-needed **N** = Night Cycling **O** = Off/NotUsed	FanCtrl		A C M N O		A C M N O
	-- Variable Speed (VSD/VAV) fan/drive?	VSD		Y N		Y N
	Optimal start/stop?	OptimalStartStop		Y N		Y N
	Outside Air/Econ. Config: N = No OutsideAir intake **F** = Fixed damper **E** = Economizer **OT** = Other (describe)	OutsideAirConfig OutsideAirConfigOthrDescr		N F SE DE O		N F SE DE O
	% Outside Air (specify minimum if variable)	PctOutsideAir				
	If economizer present, appears functional?	EconFunctional		Y N UNK		Y N UNK
Cooling Equipment	**Cooling Equipment Type**	CoolEquipType		**N DX DC C E P UNK**		**N DX DC C E P UNK**
	If cooling type **DX**, and NOT air-cooled: **W** = Water **E** = Evap cooled?	CoolDXType		W E		W E
	If cooling type **E** and NOT direct: **ID** = Indirect/Direct **I** = Indirect Only	CoolEType		ID I		ID I
	Refrigerant Type:	RefrigerantType		R-22 R-410a OT		R-22 R-410a OT
	# of Compressors	NumCompressors				
	Capacity Output T=Tons k=kBtuh (circle one)	CapacityOutput	CapacityOutputUnits		**T k**		**T k**
	Equipment Manufacturer Brand	CoolEquipManuf				
	=> Model Number for unitary/split-system outdoor unit	CoolEquipModelNumUnitary				
	=> Model number for split-system coil	CoolEquipModelNumSplitCoil				
	Efficiency: **EER** **OR** **SEER**	CoolEffEER				
		CoolEffSEER				
Equipm	**Heating Equipment Type**	HeatEquipType		**N F HP B ER RH BB P OT**		**N F HP B ER RH BB P OT**
	Fuel Type	HeatFuelType		**E G F L W**		**E G F L**

			W
Input Rating/Heating Capacity	HeatInputRating		
Units of Input Rating (kW / kBtuh)	HeatInputRatingUnits	kW kBtuh	kW kBtuh
Equipment Manufacturer	HeatEquipManuf		
=> Model Number	HeatEquipModelNum		
Efficiency: (*enter as % for AFUE and* η)	HeatEff		
=> Efficiency Units: **A**=AFUE **T**=Thermal η **H**=HSPF **C**=COP	HeatEffUnits	A T H C	A T H C
Zonal Reheat Type (if applicable) **H** = Hot Water **E** = ElecResistance **O** = Other (describe)	HeatZonalReheatType HeatZonalReheatType	H E O	H E O
HP only: Supplemental Heating Capacity (kW)	HeatSuppCap		

Comments: OS_HVAC_Comments _____

_____

__Please note that tbl_OS_SiteInfo has only 3 fields which are HVAC not surveyed. No HVAC onsite, and the comments. _____

_____

HVAC Quality/Maintenance tbl_OS_HVAC_Maintenance

The site contact should be asked these questions. If he/she cannot answer because the HVAC system is maintained by an outside contractor, then obtain the contractor's contact information and ask them these questions. Also, if customer <u>does</u> have any type of service agreement, attempt to get copies of any documents that show the terms and list of services provided.

Q1: How often is maintenance/tune-up service performed on your HVAC equipment?

OS_HVACMaintServiceQty **months / years** *(circle one)* OS_HVACMaintServicePeriod **NV** = Never **P**= When a problem is reported OS_HVACMaintServiceDK **DK**=Don't know *(circle one)*

Comments: OS_HVACMaintServiceDescr_____

_____

<u>If NV (never) above, skip all the questions below:</u>

Q2: When was the last time your organization had maintenance performed on your cooling equipment. By maintenance, I mean servicing to improve performance, not repair of a broken or malfunctioning unit?

OS_HVACMaintLastServiceQty____ **months / years** *(circle one)* OS_HVACMaintLastServicePeriod **NV** = Never OS_HVACMaintLastServiceDK **DK**=Don't know *(circle one)*

Comments: OS_HVACMaintLastServiceDescr_____

_____

<u>If Q2 is within the last 6 months:</u>

Q3: What did this maintenance consist of – that is, what diagnostics and adjustments were performed on your cooling equipment?

Comments: OS_HVACMaintServiceTypeDescr_____

_____

Q4: Is maintenance/tune-up service performed on a continual, on-going basis? OS_HVACMaintRegularService **Y N DK** *(circle one)*

Comments: OS_HVACMaintRegularServiceDescr_____

_____

Q5: Who handles your HVAC system maintenance/tune-up?

OS_HVACMaintWho **IH**= In-house staff **HC**=HVAC Contractor **NA**= No one OS_HVACMaintWhoOthrDescr **OT**=Other (describe) **DK**=Don't know *(circle one)*

Comments: OS_HVACMaintWhoOthrDescr_____

_____

Q6: Do you currently have, or in the past have you had, an HVAC system maintenance agreement with an HVAC contractor? OS_HVACMaintAgreement **Y N** *(circle one)*

If "Yes, please provide HVAC Contractor contact info: OS_HVACMaintAgreementDescr_____

_____

_____

Q7: Is your HVAC service contract part of a utility-sponsored quality maintenance program? OS_HVACMaintUtilSponsored **Y N** *(circle one)*

Comments/Description: OS_HVACMaintUtilSponsoredDescr_____

_____

_____

Q8: Do you have a long-term energy management plan or just a standing maintenance agreement? *(circle one)*

LP = Long-term mgmt plan **SM**=Standing maintenance agreement **OT**=Other **DK**=Don't know **NA**=Not Applicable

OS_HVACMaintMgmtPlan

Comments/Description: OS_HVACMaintMgmtPlanDescr_____

General Lighting Inventory Survey Form

tbl_OS_LightingInventory

Item #			Item					
Area ID#			AreaID					
Typical Schedule #			TypicalSchd					
Seasonal Schedule #(2 | 3)			SeasonalSchd1 / SeasonalSchd2					
Indoor or Outdoor Lighting			LightLocation	I O		I O		I O
Lighting Application Type Code			LightAppType					
Lamps/fixtures are accessible			Accessible	Y N		Y N		Y N
Lighting System Age: Year of Installation			LightSysAge					
Condition of Fixtures (New, Good, Fair, Poor)			ConditionOfFixtures	N G F P		N G F P		N G F P
Counted All [C] or Estimated Qty [E] *(explain)*			Est_Counted	C E		C E		C E
Total Quantity	**Total # of Fixtures (all inclusive)**		TotalNumFixt					
	# of 24/7 Battery-Backup Fixtures		Total Num247					
	# of Inoperable **Fixtures**		TotalNumInoper					
	# of **Lamps** burnt out in part lit fixts		TotalNumBurntOut					
Control Type	Control Type **Code**		CtrlTypeCode					
	Multilevel: Fixture or Lamp switched?		CtrlMultilevel	ML-F ML-L NA		ML-F ML-L NA		ML-F ML-L NA
	DR Controlled?		CtrlDR	Y N UNK		Y N UNK		Y N UNK
	OccSens	# Occ Sensors	CtrlNumOccSensors					
		# of sensors working?	CtrlNumOccSensorsWorking					
		Manual override on?	CtrlManualOverrideOn	Y N UNK		Y N UNK		Y N UNK
Fixture Details	Inside Fixtures: Height from floor, ft		FixtHeightFromFloor					
	Fixture Mounting Type **Code**		FixtMountType					
	# of Lamps per Fixture?		FixtNumLamps					
	Hardwired, Plug-in, Battery, Solar?		FixtType	H P B S		H P B S		H P B S
De-lamping	LF	Tandem Fixture?	FixtTandem	Y N		Y N		Y N
		Shiny/polished reflector?	FixtReflectorType1	Y N		Y N		Y N
		EE Delamping observed?	DelampObserved	Y N Inc		Y N Inc		Y N Inc
		Lamps Removed per fixture?	DelampLampsRemoved					
Lamp Details	Lamp Type **Code**		Lamptype					
	LF	Lamp/Tube Length, ft	LampLength	2 3 4 8 ___ft		2 3 4 8 ___ft		2 3 4 8 ___ft
		Lamp/Tube Diameter	LampDiameter	T5 T8 T12 T__		T5 T8 T12 T__		T5 T8 T12 T__
	I C L	Lamp Shape/Features **Code**	LampShape					
		Lamp Base Type **Code**	LampBase					
		Dimmable or 3-Way?	LampDimmable3way	D 3		D 3		D 3
		Energy Star Observed?	LampEStar	Y N		Y N		Y N
		Other Lamp Types in Fixt?	LampOtherType	Y N		Y N		Y N
	LED Fix	Dimension / Length Desc.	LampLEDDimLen					
	Lamp & LED Fix.	Manufacturer	LampManuf					
		Model Number	LampModel					
		Watts (3W = W-W-W)	LampWatts					
Ballast Details	LF / HID	Ballast: Elec or Mag?	BlstType	E M UNK		E M UNK		E M UNK
		Ballast Item # (Form BAL)	BlstItemNum					
		# of Ballasts per Fixture	BlstNumPerFixt					
	Recent Retrofit **[RR]** or New **[N]**		RetrofitNew	**RR N**		**RR N**		**RR N**

Recent Retrofit	Pre-Retrofit Lamp-Fixture Description	RetrofitPreDescr			
	Approximate Year of Retrofit	RetrofitYear			
Comment / Notes *(or General Comment #)*		Notes			

Ballast Description Form tbl_OS_Ballast

Record each unique ballast here and reference the Ballast Item # on the Lighting Inventory pages.

Ballast Item #	Ballast Type Code	Ballast Manufacturer	Ballast Model #
Item	BlstType	BlstManuf	BlstModelNum
2			
3			
4			
5			
6			
7			
8			
9			
10			

Storage Lighting Inventory Form tbl_OS_LightingStorage

N/A

OS_NA_StorageLighting

Inventory and linear fluorescent and incandescent, CFL, or LED (ICL) lamps found on-site in storage.

Storage Item #	Lamp Type Code	LF		CFL					Make	Model # *(or UPC if Model # unavailable)*	Watts	Quantity
		Lamp Length	Lamp Diameter	Lamp Shape Code	Lamp Base Code	Dimmable or 3-Way	Energy Star	IOU Rebate Sticker				
Item	LampType	LampLength	LampDiameter	LampShape	LampBase	LampDimmable3way	LampEStar	LampRebateSticker	LampMake	LampModel	LampWatts	LampQty
2						D 3	Y N	PGE SCE SDGE				
3						D 3	Y N	PGE SCE SDGE				
4						D 3	Y N	PGE SCE SDGE				
5						D 3	Y N	PGE SCE SDGE				
6						D 3	Y N	PGE SCE SDGE				
7						D 3	Y N	PGE SCE SDGE				
8						D 3	Y N	PGE SCE SDGE				
9						D 3	Y N	PGE SCE SDGE				
10						D 3	Y N	PGE SCE SDGE				

Exit Sign and Advertising Lighting Survey Form

tbl_OS_LightingInventory

☐ **N/A**

OS_NA_Exit_Ad

			Item	10__	10__	10__
Item # *(starting at 101)*			Item			
Area ID#			AreaID			
Exit Sign or Advertising Lighting			LightAppType	**X AD**	**X AD**	**X AD**
Indoor or Outdoor Lighting			LightLocation	**I O**	**I O**	**I O**
Schedule Set #			TypicalSchd			
Control Type Code			CtrlTypeCode			
Lamps/fixtures are accessible (explain)			Accessible	Y N	Y N	Y N
Lighting System Age: Year of Installation			LightSysAge			
Condition of Fixtures (**New**, **Good**, **Fair**, **Poor**)			ConditionOfFixtures	N G F P	N G F P	N G F P
EXIT SIGNS (*DO NOT LEAVE BLANK!! If there are no exit signs, explain why in comments*)						
	Qty of Identical Display/Ad Fixtures		AdDisplayQuantity			
Exit Signs	Exit Sign Lamp Type		ExitLampType	INC LED CFL XS RF	INC LED CFL XS RF	INC LED CFL XS RF
	Make		ExitMake			
	Model #		ExitModel			
	Total Fixture Watts		ExitFixtWatts			
	Quantity		ExitQuantity			
ADVERTISING AND DISPLAY LIGHTING						
Fixture Details and Quantity	Display or Advertising Sign Description		AddFixtDescr			
	Sign Type **Code**		AddFixtSignType			
	Mounting Type **Code**		FixtMountType			
	Hardwired, Plug-in, Battery, Solar?		FixtType	**H P B S**	**H P B S**	**H P B S**
	Total # of Lamps in Sign		FixtNumLamps			
	# of Lamps Burnt Out		AddFixtNumBurntOut			
	Channel Signs: # of Letters		AddFixtNumLetters			
	Sign Width (ft)		AddFixtWidth			
	Sign Length (ft)		AddFixtLength			
Lamp Details	Lamp Type **Code**		Lamptype			
	LF	Linear Fluorescent Length	LampLength	2 3 4 8 __ ft	2 3 4 8 __ ft	2 3 4 8 __ ft
	LF	Linear Fluorescent Diameter	LampDiameter	T5 T8 T12 T__	T5 T8 T12 T__	T5 T8 T12 T__
	ICL	Lamp Shape/Features **Code**	LampShape			
	ICL	Lamp Base Type **Code**	LampBase			
	ICL	Energy Star Observed?	LampEStar	Y N	Y N	Y N
	Lamp Manufacturer		LampManuf			
	Lamp Model Number		LampModel			
	Watts per Lamp (10 if **NEON**)		LampWatts			
	If **NEON**, Total **Length**		AddNEONLength			
Ballast Details	LF/HID	Ballast: Elec or Mag?	BlstType	E M UNK	E M UNK	E M UNK
	LF/HID	Ballast Item # (Form BAL)	BlstItemNum			
	LF/HID	# of Ballasts per Fixture	BlstNumPerFixt			
Recent Retrofit	Recent Retrofit [**RR**] or New [**N**]		RetrofitNew	**RR N**	**RR N**	**RR N**
	Pre-Retrofit Lamp-Fixture Description		RetrofitPreDescr			
	Approximate Year of Retrofit		RetrofitYear			
Comment / Notes / Counts			Notes			

TV and Connected Devices Inventory Survey Form

tbl_OS_TV

☐ N/A

OS_NA_TV

Televisions

*** TV Type: LCD**=Liquid Crystal Display, **CRT**=Cathode Ray Tube, **PDP**=Plasma, **LED**=LED-LCD, **DLP**=Projection TV, **OLED**=Organic LED, **OT**=Other

	Item #	Item				
	Area ID	AreaID				
	TV Usage Description	TVUsageDescr				
	Self Report TV Purchase Date	TVPurchDateSRpt				
	Control Type***	TVCtrlType				
TV Details	* TV Type	TVType				
	Nameplate Accessible (if no, explain)	NameplateReadable	Y N	Y N	Y N	Y N
	Manufacturer	Manuf				
	Model Name / Number	Model				
	Diagonal Screen Size (inches)	ScreenSize				
	Rated Capacity | Units (Watts/Amps)	ConnectedLoad | ConnectedLoadUnits	W A	W A	W A	W A
	Year of Manufacture	ManufDate				
	Total Qty (of same type)	TotalQty				
TV Features	LED: Edge-lit or Back-lit	LEDLightSource	E B	E B	E B	E B
	External Power Supply	ExternalPower	Y N	Y N	Y N	Y N
	Web-Capable, 3D, E-Star (*circle all*)	Feature_Web Feature_3D Feature_EStar	WC 3D ES	WC 3D ES	WC 3D ES	WC 3D ES
	HDTV Resolution	Resolution	720p 1080i 1080p	720p 1080i 1080p	720p 1080i 1080p	720p 1080i 1080p
TV Usage	Schedule # (if none, Hrs per Week)	TypicalSchd | HoursPerWeek	___ hrs	___ hrs	___ hrs	___ hrs
	TV Position (Fixed / Portable)	TVPosition	F P	F P	F P	F P
	Primarily used as Monitor?	UsedAsMonitor	Y N	Y N	Y N	Y N
Recent Retrofit	Additional TV [A] or Replaced TV [R]	RetrofitNew	A R	A R	A R	A R
	* Prior TV Type	PriorTVType				
	Prior Diagonal Screen Size (in)	PriorScreenSize				
Connected Devices	ID #	ConnectedDeviceID1				
	ID #	ConnectedDeviceID2				
	ID #	ConnectedDeviceID3				

Connected Devices

tbl_OS_TV_ConnectedDevices

**** Connected Type: VGC**=Video-game Console, **VCR**=Videocassette Recorder, **DVD**=DVD Player, **BR**=Blue-Ray Player, **CB**=Cable/Satellite Box, **DTV**=Digital TV Converter, **DVR**=DVR/TIVO (Stand-alone), **MF**=CB Multifunction DVR, **PC**=Media PC, **DMR**=Digital Media Reciever, **VGDMR**=Video Game Console + Digital Media Reciever, **HAS**=Home Audio System **MFDMR**=Multifunction CB & DMR

Cable or Satellite	OS_TV_CableSatellite
Cable/Satellite Provider	OS_TV_CSProvider
HD Device?	OS_TV_HDDevice

***** Control Type: S**=Manual / IR Remote, **SS**=TV Smart Strip, **C**=Continuous/Always On, **T**=Timer, **SSO**=SmartStrip OS

ID #	**Connected Type	Manufacturer	Model Name / Number	Watts / Amps	***Control Type		Same hours as TV or Hrs/Week?	Qty	Comments
ConnectedDeviceID	ConnectedType	Manuf	Model	ConnectedLoad	ConnectedLoadUnits	CtrlType	SchdSameAsTV	Qty	Comments
					W A		☐ ___ hrs		
					W A		☐ ___ hrs		
					W A		☐ ___ hrs		

					W A		☐ __hrs		
					W A		☐ __hrs		
					W A		☐ __hrs		
					W A		☐ __hrs		
					W A		☐ __hrs		
					W A		☐ __hrs		

General Comments: ___OS_TV_Comments_____

Office Equipment Inventory   tbl_OS_OfficeEquipment

* Item #	Area ID	**Office Equip **Code**	If Office Equip Code = **"OT"**: Equipment Description	# of Units	Usage: (Personal or Shared)	In Use (plugged in)	Smart Strip	E-Star	Turned OFF or Standby at Night?	Sub-Sampled
Item	AreaID	EquipCode	EquipDescr	Qty	Usage	InUse	SmartStrip	EStar	TurnedOfforStandby	Subsampled
					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N
__					P S	Y N	Y N	Y N	Y N	Y N

[1] "*hours per week*" must be completed only if equipment operation differs drastically from the Buisness Hours. If this is not filled out, it is assumed the hours per week match the Buisness Hours.

**** Office Equipment Codes**

						Data Center Equipment	
CP	Copier	SC	Scanner	HOLE	Hole Punch		
FAX	Fax Machine	POS	Point-of-Sale Terminal	SHRD	Shredder	UPS	Uniterupptible Power Supply
MON	Monitor/Terminal	REG	Cash Registers	OT	Other (describe)	MAIN	Computer – Mainframe
CD	Computer – Desktop (+ monitor)	PROJ	Video Projector	BP	Blueprint Machine	VAX	Computer - Minicomputer (VAX)
CL	Computer – Laptop	OHP	Overhead Projector			RT	Routers
IC	Integrated Computers	PTEL	Personal Telephones			SWEQ	Switching Equipment
DOC	Docking Station	TEL	Telephone System			BSER	Blade Server
PRI	Printer – Ink Jet	DOT	Printer – Dot Matrix			TSER	Tower Server
PRL	Printer - Laser	NET	Netbooks			RSER	Rack Server
AI	All-in-One Multi-function	TAB	Tablets			OTDC	Other Data Center Equip (Describe)
AIC	All-in-One Multi-function Copier (*large / network*)	HAS	Home Audio System				

Office Equipment Inventory (Spot-Check Detail Form)

tbl_OS_OfficeEquipment

Spot-Check Form (<u>Shared</u> Equipment & <u>New</u> Computers Only)

This form is to be used as a spot-check of **<u>shared</u> office equipment** & **<u>new</u> computers** rather than getting full details for every piece of equipment. The Item # and Office Equipment Code will match up with the corresponding items on the previous page. <u>At least one of each shared equipment type</u> in the list of *Detailed Office Equipment Codes* below should be inspected if available, as well as any **new computers** purchased since *January 2009*. The surveyor should compare the number of new computers found on-site, to the number reported on the phone survey (listed below), and record in comments the reasons for any discrepencies.

Have there been any new computers purchased since 2009 (*phone survey*)?	tbl_PS_SiteInfo	If yes, How many (*phone survey*)?	tbl_PS_SiteInfo	Rvs'd	OS_OffEq_HowManyRvsd

*Item # (matches to Item # on "Full Inventory" form above)		Item				
**Office Equip Code		EquipCode				
<u>Detailed</u> Shared Office Equipment Only	Manufacturer	Manuf				
	Model Name/Number	ModelName				
	If **<u>E-STAR</u>**, Year of Manufacture	EStarDate				
	Rated Capacity | Units(Watts/Amps)	Nameplate | NameplateUnits	W A	W A	W A	W A
	# of similar units	QtySimilarUnits				
Printers / Copiers / Fax Machines / All-in-Ones						
Printers / Copiers / Fax Machines / All-in-Ones	Color or Monochrome	PrintColor	C M	C M	C M	C M
	Ink Jet or Laser	PrintType	I L	I L	I L	I L
	Options (Print, Copy, Scan, Fax)	PrintOptions_P PrintOptions_C PrintOptions_S PrintOptions_F	P C S F	P C S F	P C S F	P C S F
Monitors and Displays						
Monitors / Displays	Avg Size Range	MonitorSize	sm md lg	sm md lg	sm md lg	sm md lg
	CRT, LCD, or LED	MonitorType	C L LL	C L LL	C L LL	C L LL

** <u>Detailed</u> Office Equipment Codes			
CP	Copier		**Data Center Equipment**
FAX	Fax Machine	UPS	Uniterupptible Power Supply
PRI	Printer – Ink Jet	MAIN	Computer – Mainframe
PRL	Printer – Laser	VAX	Computer - Minicomputer (VAX)
AI	All-in-One Multi-function (*personal*)	RT	Routers
AIC	All-in-One Multi-function Copier (*large / network*)	SWEQ	Switching Equipment
MON	Monitor/Terminal	BSER	Blade Server
CD	Computer – Desktop	TSER	Tower Server
CL	Computer – Laptop	RSER	Rack Server
IC	Integrated Computers	TC	Thin-Client
		OTDC	Other Data Center (Describe)

GENERAL QUESTIONS:		
Average Number of Monitors per Personal Workstation (does not include laptop screens)? (*circle one*)	OS_OffEq_NumMonPerStation	
Are any of the desktop computers controlled by a Network Power Management System?	OS_OffEq_CtrldByNPMS	OS_OffEq_CtrldByNPMSQty

Data Center	Does the data center have any virtual servers installed in place of physical servers?	OS_OffEq_VMS	**# of Physical Servers Replaced** OS_OffEq_VMSReplaces

GENERAL COMMENTS: OS_OffEq_Comments_____

Supplemental Refrigeration System Information

This form is used to obtain supplemental information that could not be physically observed and collected on site, or that is best obtained from the contact most familiar with the refrigeration system. Contact information for the refrigeration maintenance staff should be available in the mechanical room from a posted sticker or equipment maintenance log, from the store manager, or from the primary site contact.

Refrigeration Maintenance Company Contact Information:

Does the premise have a refrigeration contractor that maintains, repairs, and/or installs new refrigeration equipment? (*Must be answered*).	HaveContractor

Maintenance Company Name	Company Phone Number	Contact Name(s)	Contact Phone #s	Contact Email
CompanyName1	CompanyPhone1	ContactName1	ContactPhone1	ContactEMail1
CompanyName2	CompanyPhone2	ContactName2	ContactPhone2	ContactEMail2

Interview/Supplemental Information Questions:

1) If night covers are present, what hours are they deployed (24 hr military time)? NiteCvrStartto NiteCvrEnd

2) Are high-efficiency evaporator fans used on any of the cases or walk-ins, and if so what type?
High-efficiency = Electronically Commutated Motors (ECM) or Permanent split capacitor (PSC) motors

ECM PSC NO UNK EcmPscInstalled_ItemList

3) Were high-efficiency evap. fans recently retrofit on any of the cases or walk-ins? HEffFansRetrofit

   a. What year was the retrofit performed? EcmPsc_YearRetrofit EcmPsc_YearRetrofit

4) *If T10/T12s used in cases/walk-ins:* Are there any magnetic ballasts (use spinners)? HaveMagBallast

5) Has LED lighting been recently retrofit in any display cases? LEDRetrofit

   a. What type of lighting did the LEDs replace? (use Lighting Type Codes): LEDReplaced

6) General anti-sweat heater control type used on display cases: ASHeaterControlType

Anti-Sweat Heater Control: A=Always On C=Cycling w/Humidistat U=Unknown N=None

7) *Self-Contained/Unitary only:* What year was the majority of the equipment installed? YearMostEquipInstalled

8) *RemoteRefrig only:* Is floating head pressure control used? FloatHeadPressureUsed

9) *Remote Refrig only:* Are external liquid suction heat exchangers used on any display cases? SuctionHeatExchangerUsed

10) *Remote Refrig, Multiplex System only:* Is condenser a high-efficiency design? CondenserHEff

11) Were any other recent (on or after Jan 2009) equipment retrofits performed on the refrigeration equipment? If so, please list and describe: OthrRetrofits

   a. Other Measure 1 OtherMeasureRetrofit1 Year of retrofit: OtherMeasureRetrofit1Year

   b. Other Measure 2 OtherMeasureRetrofit2 Year of retrofit: OtherMeasureRetrofit2Year

Comments: GenRefComments

Self-Contained/Unitary Refrigeration Equipment

Residential-Type Units: Are there any Residential type refrigerators/freezers here?	OS_Ref_ResTypeUnits

Commercial Ice Makers tbl_OS_RefIceMakers

Machine Type Codes: **IM** = Ice Making Head only **RC**=Remote Condensing Unit **SC**=Self-contained (ice+storage)

Ice Type Codes: C=Cubes F=Flake N=Nugget

Item #	Area ID	Machine Type	Ice Type	Energy Star	Make / Brand	Model Number (N/O = Nameplate Not Observable)	Total Qty	Year Manuf.	Condition Of Unit
Item	AreaID	MachineType	IceType	ESta	Make	Model	TotalQty	YearMfgr	Condition
		IM RC SC	C F N	Y N					N G F P
		IM RC SC	C F N	Y N					N G F P

Commercial Self-Contained/Unitary Refrigerated Cases & Other Equipment tbl_OS_RefSCCases_OtherEquip

Case Style Type Codes: **RI**= Reach-In **RO**=Roll-in **WT**=Worktop table **PA**=Pass-through **UC**=Undercounter **OT**=Other

Refg Ltg. Type: **T12, T8, T5** = Lin. Fluorescent **INC**=Incandescent **CFL**=CFL **LED**=LED strip, etc. **N**=None **OT**=Other

Temp Service Type: **R**= Refrigerator **F**=Freezer **Condition of Unit:** **N**= New **G**=Good **F**=Fair **P**=Poor

Item #	Area ID	Equip Code	Temp. Service Type	Case Style Type	Length (ft)	# of Doors	Make/ Brand	Model Number (N/O = Nameplate Not Observable)	Vol ft^3	Total Qty	Year Manf.	Refg Ltg Type	Total lamp Qty*	lamp Watts**	RCU?	Cond Of Unit
Item	AreaID	EquipmentCode	ServiceType	CaseType	Length	NumDoors	Make	Model	Volume	TotalQty	YearMfgr	LightType	TotalLampQty	TotalLampWatts	RCU	Condition

* Total Lamp Qty is across all of the refrigerated cases listed by each Item #. It is not on a per-case basis.

** Lamp Watts is the individual per-lamp wattage.

Equip Code	Equipment Description
SD	Solid door upright or worktop table refrigerator/freezer case, one to three doors
GD	Glass door upright refrig/freezer cases from one to three doors
GW	Glass door cases associated with self-contained/unitary walk-in coolers/freezers
BV	Glass door **beverage** merchandiser (e.g. vendor supplied) from 1 to 4 doors
BVM	Glass door **beverage** merchandiser ***with vending miser type*** control device
OD	Open upright display case (**pizza, juice, etc.**) usually 4, 5, 6 ft lengths
OI	Open Island case (**cheese, sometimes produce or juice**) from 8 to 16 ft long
CF	Coffin type glass top freezer cases (**usually ice cream**) typically 6 or 8 ft
SC	Service case (**bakery, sometimes deli**) from 4 to 8 ft long
IM	**Ice** merchandisers (storage boxes)
OT	Other self-contained refrigerated cases not listed above (describe in comments)

Revised: 10/25/12

Walk-Ins and Preparation Areas (Self-Contained & Remote)

☐ N/A

.bl_OS_RefWalkins

OS_NA_RefWalkins

This form should be used for <u>both</u> self-contained and remote walk-in coolers and freezers.

Evaporator Fan Motor Codes [A]:	**SP** = Shaded-pole **ECM** = Electronically-commutated motor **PSC** = Permanent split-capacitor motor **EFF** = If only know they are HiEff **UNK** = Unknown							
Refg Ltg Type [B]:	**T12, T8, T5** = Lin. Fluorescent **INC** = Incandescent **CFL** = CFL **LED** = LED strip, etc. **N** = None **OT** = Other							
Small Pre-fab. (SP) unit or Large Built-Up (LB)?		FixtRefID						
Walk-In Item #		Item						
Area ID		AreaID						
Served by Rack/Suction Group Item # *(For Remote/Rack Systems Only)*		RackItem						
Approx. Year of Installation		YrInstalled						
Walk-In Type: SCP=Self-contained package unit **RR**=Remote/Rack System (link to Rack Item #) **RCU**=Dedicated system w/remote cond.-comp. unit		WalkinType						
Self-Contained / Unitary Units Only	Make / Brand	WalkinMake						
	Model Number	WalkinModel						
Suction Temp. Range: F=Freezer (LowTemp) C=Cooler (MedTemp) P=Prep Area (HighTemp)		SuctionTmpRange						
Floor Area (ft^2)		FloorArea						
Ceiling Height (ft)		CeilingHeight						
Defrost Control Type: E=Electric **G**=Hot Gas **T**=Timed off **N**=None **OT**=Other *(describe)*		DefrostCtrlType						
Door Type: H=Hinged or S=Sliding?		DoorType						
Auto-closer on door?		AutoCloser						
Insulation thickness, inches		InsulationThickness						
Strip Curtains or Swinging Doors present?		StripCurtains						
Lighting	Refg Ltg Type 1 [B]	Lgt_LightType1						
	Type1 Occupancy Sensors?	Lgt_OccSensor1						
	Type1: Number of Fixtures	Lgt_NumFixt1						
	Type 1: Lamps per Fixture	Lgt_LampPerFixt1						
	Refg Ltg Type 2 [B]	Lgt_LightType2						
	Type2: Number of Fixtures	Lgt_NumFixt2						
	Type 2: Lamps per Fixture	Lgt_LampPerFixt2						
Evaporator Fan	Evaporator Fan Controller present?	EvapFanCtlrPresent						
	Evaporator Fan Motor Type [A]	Evap_FanType						
	Evap. Fan Unit Make/Manufacturer	Evap_FanMake						
	Evaporator Fan Unit Model #	Evap_FanModel						
	# of Evaporator Fans	Evap_QtyFan						
	Motor Size, fractional hp *(i.e. 1/47, 1/3)*	Evap_FanHP						
	Amps Per Fan | Volts	Evap_Fan Amps | Evap_Fan Volts						
Display Case Type: N=None, storage only Glass Doors: **G**=Reach-in **R**=Rear-load Roll-in		DisplayCaseType						
-- For **G** or **R** types: **Display Case** Item #		CaseItem						
Or **Self-Contained Refrig** Item #		SCRefrigItemNum						

Comments: _____WalkinPrepAreasComments_____ REVISED 10-25-12

Remote Refrigeration: Display Cases tbl_OS_RefDisplayCases ☐ N/A

OS_NA_RefDisplayCases

Evaporator Fan Motor Codes [C]:	**SP** = Shaded-pole **ECM** = Electronically-commutated motor **PSC** = Permanent split-capacitor motor **EFF** = If only know they are HiEff **UNK** = Unknown					
Refg Ltg Type [D]:	**T10, T12, T8, T5** = Lin. Fluorescent **INC** = Incandescent **CFL** = CFL **LED** = LED strip, etc. **N** = None **OT** = Other					
Refrig. Sched Fixture ID *(Optional - Ref Only)*		FixtRefID				
Display Case Item #		Item	D__	D__	D__	D__
Area ID		AreaID				
Served by Rack/Suction Group Item #		RackItem				
Approx. Year of Installation		YrInstalled				
Type / Suction Temperature	**IC** = Ice Cream / Frozen Juices (LT)	SuctionGrpTmpType	IC	IC	IC	IC
	FF = Frozen Food / Meat / Bakery (LT)	SuctionGrpTmpType	FF	FF	FF	FF
	MD = Fresh Meat / Deli Meat (MT)	SuctionGrpTmpType	MD	MD	MD	MD
	DP = Dairy / Produce / Beverage (MT-HT)	SuctionGrpTmpType	DP	DP	DP	DP
Anti-Sweat Heater Control: A=Always On C=Cycling w/Humidistat U=Unknown N=None		AS_HeatControl	A C U N	A C U N	A C U N	A C U N
Suction lines insulated?		LinsInsulated	Y N UNK	Y N UNK	Y N UNK	Y N UNK
Predominant* evaporator fan motor type[C]: * May be mixed, choose most common		EvapFanMtrType	SP ECM PSC EFF UNK	SP ECM PSC EFF UNK	SP ECM PSC EFF UNK	SP ECM PSC EFF UNK
Display Case Types & Characteristics						
Single-Deck Display Cases	Open single-deck Lin. ft.	SD_OpnSnglDeck_LFt				
	Closed service case Lin. ft.	SD_ClosedCase_LFt				
	Island coffin/tub (shop around) Lin. ft.	SD_CoffinAllSides_LFt				
	Coffin/tub (one-side shopping) Lin. ft.	SD_CoffinOneSide_LFt				
Multi-Deck (Vertical) Display Cases: Open/reach-in multi-deck Lin. ft		MD_OpnReachin				
For Open cases: Are Night Covers present?		NightCovers	Y N	Y N	Y N	Y N
Glass-Door Cases	Number of Doors	GD_QtyDoors				
	Door heater sticker present?	GD_HeatSticker	Y N	Y N	Y N	Y N
	Sticker amps (per door): Enter **0** if no ASH	GD_Amps				
	Sticker Volts	GD_Volts				
Lighting	Refg Ltg Type[D]	Lgt_LightType				
	# of rows (shelves) of lighting	Lgt_NumRows				
	# of lamps per row	Lgt_NumLampsPerRow				
	Total # of lamps	Lgt_TotalLamps				
	Lamp Watts	Lgt_LampWatts				
	Lighting Control Type **Code**	Lgt_ControlType				

Comments: DisplayCaseComments_____

Remote Refrigeration: Compressor/Rack Systems tbl_OS_RefCompRackSys ☐ N/A OS_NA_RefCompRackSys

Compressor Head Cooling Fan Motor Type (E):	**SP** = Shaded-pole **ECM** = Electronically-commutated motor **PSC** = Permanent split-capacitor motor **EFF** = If only know they are HiEff **UNK** = Unknown				
Refrig. Sched Fixture ID *(Optional - Ref Only)*	FixtRefID				
Rack/Suction Group Item #	Item				
Area ID	AreaID				
Controlled by Controller Item #	CtrlItem				
Served by Condenser Item #	CondItem				
Approx. year this rack was installed?	YrInstalled				
Suction Group Temperature Type: **LT** = Low (Ice Cream /Frozen Foods/Freezer) **MT** = Medium (Fresh Meat / Dairy/Cooler) **HT** = High (Produce/Prep Areas) **OT** = Other (describe)	SuctionGrpTmpType SuctionGrpTmpTypeOthr	LT MT HT OT: _____	LT MT HT OT: _____	LT MT HT OT: _____	LT MT HT OT: _____
System Type: **C**=Conventional (single-compressor) **S**=2-Stage Multiplex **T**=Twins **M** = Multiplex **D**= Distributed **OT**=Other (desc.)	SystemType SystemTypeOthr	C S T M D OT:_____	C S T M D OT:_____	C S T M D OT:_____	C S T M D OT:_____
Secondary glycol loop and heat exchanger?	GlycolLoopHeatExchr	Y N	Y N	Y N	Y N
Compressor Type: **OR**= Open Reciprocating **SCW**=Screw **SCL**=Scroll (hermetic) **SHR** = Semi-hermetic Recip. **OT**=Other (desc.)	CompType CompTypeOthr	OR SCW SCL SHR OT:_____	OR SCW SCL SHR OT:_____	OR SCW SCL SHR OT:_____	OR SCW SCL SHR OT:_____
Compressor head cooling fan motor type (E) *(only on low temp compressors)*	CompHtCFanType	SP EFF ECM PSC UNK	SP EFF ECM PSC UNK	SP EFF ECM PSC UNK	SP EFF ECM PSC UNK
Number of compressors in rack-system line up?	CompQty				
Suction lines insulated?	SuctionLinesInsulated	Y N	Y N	Y N	Y N
Control Type: **C**=Conventional (mech. pressure switch) **E**=Electronic **O**=Other (desc.)	ControlType	C E O:_____	C E O:_____	C E O:_____	C E O:_____
Rack Features: **DU**=Digital/Discus™ Unloader **MU**=Mechanical Unloader **V**=VSD **N**=None **UNK**=Unknown **OT**=Other	RackType RackTypeOth	DU MU VSD N UNK OT:_____	DU MU VSD N UNK OT:_____	DU MU VSD N UNK OT:_____	DU MU VSD N UNK OT:_____
Compressor Refrigerant Type (R-22, R-502, etc)	CompRefrigType				
Hot gas defrost?	HotGasDefrost	Y N	Y N	Y N	Y N
Subcool Type: **A**=Ambient **M**=Mechanical **N**=None	SubCoolType	A M N	A M N	A M N	A M N
Heat Recovery Type: **N**=None **S**=Space Heating/Reheat **W**=Water heating **OT**=Other (desc.)	HtRcvrType HtRcvrTypeOthr	N S W OT:_____	N S W OT:_____	N S W OT:_____	N S W OT:_____
Total Qty of Systems of this Type	QtySystems				

Comments: _CompressorComments _____

Remote Refrigeration Equipment: Condensers ☐ N/A

tbl_OS_RefCondeners OS_NA_RefCondensers

Condenser Item #	Item				
Area ID	AreaID				
Approx. Year of Installation	YrInstalled				
Condenser Type: **A**=Air-Cooled **E**=Evap-Cooled **P**=Air-Cooled w/ pre-cooler **UNK**=Unknown	Type	A E P UNK	A E P UNK	A E P UNK	A E P UNK
Condenser Make	Make				
Condenser Model #	Model				
AIR-COOLED CONDENSER					
Quantity of Fans	AC_QtyFans				
Motor HP per fan (record fraction if needed)	AC_MotorHP				
Motor nameplate is accessible?	AC_MotorNPAcc	Y N	Y N	Y N	Y N
Motor Eff.: Nom % or **NA**=Not available	AC_MotorEff				
Fan Control: **M**=Modulated speed **S**=Staged pairs **N**=None **UNK**=Unknown	AC_FanControl	M S N UNK	M S N UNK	M S N UNK	M S N UNK
EVAP-COOLED CONDENSER					
Total Quantity of Fan Motors	EC_QtyFans				
Primary Fan Motor HP (record fraction if needed)	EC_PrimMotorHP				
Quantity of motors?	EC_PrimMotorQty				
Motor nameplate is accessible?	EC_PrimMotorNPAcc	Y N	Y N	Y N	Y N
Motor Eff.: Nom % or **NA**=Not available	EC_PrimeMotorEff				
Secondary Fan Motor HP	EC_SecdMotorHP				
Quantity of motors?	EC_SecdMotorQty				
Motor nameplate is accessible?	EC_SecdMotorNPAcc	Y N	Y N	Y N	Y N
Motor Eff.: Nom % or **NA**=Not available	EC_SecdMotorEff				
Fan Control: **TS**=Two-speed **VSD**=Variable speed **N**=None **UNK**=Unknown	EC_SecdFanControl	TS VSD N UNK	TS VSD N UNK	TS VSD N UNK	TS VSD N UNK
Pump Motor HP	P_MotorHP				
Motor nameplate is accessible?	P_MotorNPAcc	Y N	Y N	Y N	Y N
Motor Eff.: Nom % or **NA**=Not available	P_MotorEff				

Comments: __CondenserComments_____

Remote Refrigeration: Rack Controllers

OS_NA_RefRackControllers ☐ N/A

tbl_OS_RefRackController

These parameters would be read directly from the refrigeration control system. An environmental controller is different than the refrigeration controller. Anti-sweat heaters would typically be on the environmental controller (though they could be the same). There is usually one controller per rack.

Controller Item #	Item	____	____	____	____
Area ID	AreaID				
Controller Description/Brand	CtrlrDesc				
Compressor Refrigerant Type	RefrigerantType				
Controller is accessible locally? *(N=blind controller, no human interface)*	CtrlrAcc	Y N	Y N	Y N	Y N
Controller Condition: N=New G=Good F=Fair P=Poor X=Non-Functional	ControllerCondition	N G F P X	N G F P X	N G F P X	N G F P X
Approx. Year of Installation	ApproxYearInstallation				
Approx. Year of Last System Update	ApproxYearLastUpdate				
Suction Group Temperature Type: **LT**=Low (Ice Cream /Frozen Foods/Freezer) **MT**=Medium (Fresh Meat / Dairy/Cooler) **HT**=High (Produce/Prep Areas) **OT**=Other (describe)	SuctionGrpType SuctionGrpTypeOthr	LT MT HT OT:_____	LT MT HT OT:_____	LT MT HT OT:_____	LT MT HT OT:_____
Defrost Control Type: E=Electric G=Hot Gas T=Timed off N=None U=Unknown	DefrostControlType	E G T N U	E G T N U	E G T N U	E G T N U
Condensing Temperature Parameters					
Minimum SCT (Floating Head Pressure)	CondTmp_MinSCT				
TD for Floating Head Pressure	CondTmp_TD_FHP				
Fixed Head Pressure: Temperature or PSI value	CondTmp_PSI				
Units: T=Temperature P = PSI	CondTmp_Units	T P	T P	T P	T P
Floating Suction Pressure Parameters					
Degrees of Float Allowed (NA if not used/allowed)	DegreesFloat_Allowed				
Subcooling Parameters					
Subcooled Liquid Temperature	Subcool_Tmp				
Which rack/suction group # provides subcooling?	Subcool_RackItem				
Anti-Sweat Heater Control Scheme					
- Minimum % humidity setpoint (ASH OFF)	AS_MinSetPoint				
- Maximum % humidity setpoint (ASH 100% ON)	AS_MaxSetPoint				
Additional Controller Data *(only if applicable and observed)*					
Display Case Lighting Schedule #	LightingSchd				
Heat Recovery Holdback Temperature	HtRcvrHoldBackTmp				

Comments: ___ControllerComments_____

General Comments tbl_OS_GeneralComments

Item #	Form Name	Comments
Item	FormName	Comment

Site Photo Log (01/09/2012) tbl_OS_PhotoLog

Record site photo information here including the PhotoID (i.e. digital file name) and a brief description of the photo where needed. Site Photos should include the site entrance and entire building, rebated measures, and close-up photos of nameplates, lamp codes, and other make/model identification. Refer to the training manual for more on what photos to take. Photo/file naming conventions is SiteID_Item# (e.g. PGE056789_1.jpg). Include the form name and Item # in the description/comments (if applicable). The ***Identifier*** *column is used to record a standard description of the photo type. See below for descriptions:*

Identifier: **CF**=CFL **LF**=LinearFluorescent **OL**=OtherLighting **H**=HVAC **TV**=TVs **Ref**=Refrigeration
OBldg=Outside Building/Site **IBldg**=Inside Building/Site **M**=Elec/Gas Meter **EMS**=EMS **OT**=Other (describe)

#	Identifier	Description/Comments/Measure Code *(do not data enter)*
Item	Identifier	
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

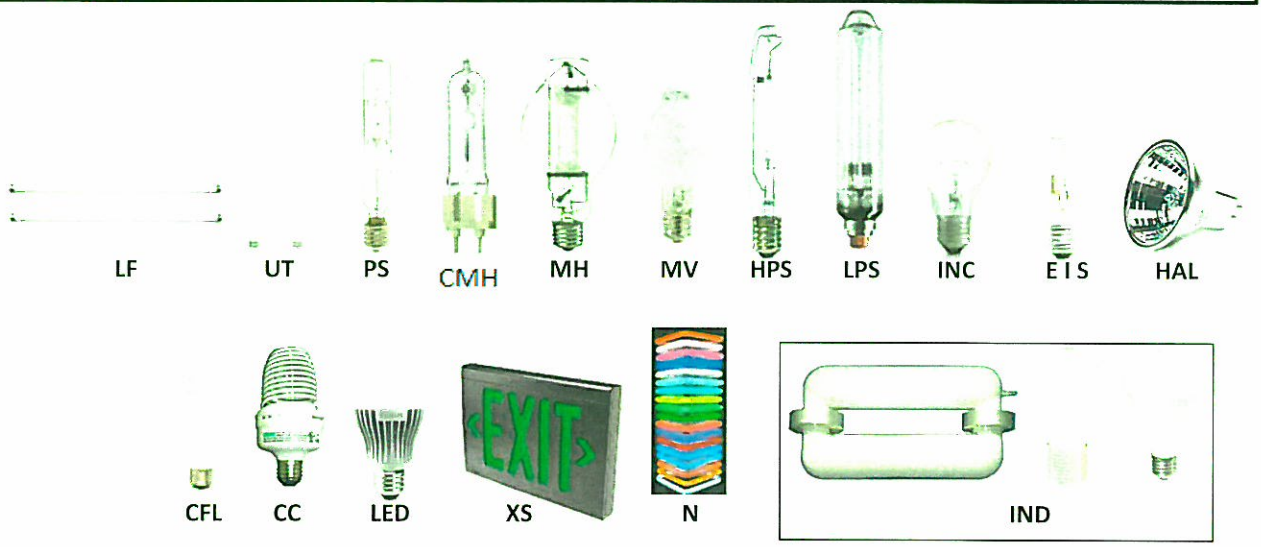
Incentive Payment tbl_OS_SiteInfo

My signature acknowledges that I received a participation incentive in the form of a $OS_IncPmtGiftCardAmt gift card for the survey effort regarding the California Saturation Survey / California Market Share Tracking effort.

Print Name	OS_IncPmtName	**Date Received**	OS_IncPmtDate
Gift Card Company	OS_IncPmtCardCo	**Gift Card Serial #**	OS_IncPmtCardSerialNum
Signature	OS_IncPmtSigned		

Lamp Type Codes

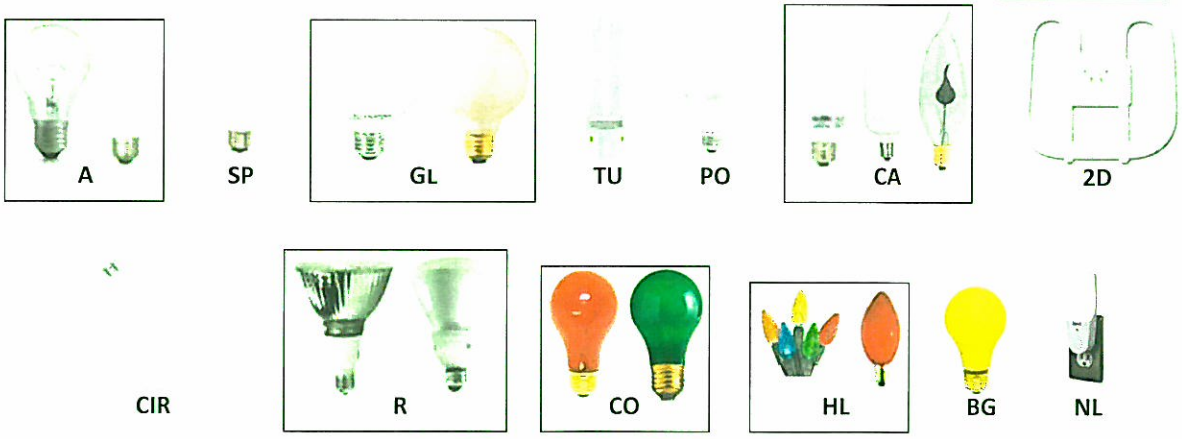
LF = Linear Fluorescent	**HPS** = High-Pressure Sodium	**LED** = LED
UT = Fluorescent U-tube	**LPS** = Low-Pressure Sodium	**XS** = Self/battery powered exit signs
MH= Std Metal Halide	**INC** = Std Incandescent	**N** = Neon
PS = Pulse-Start Metal Halide	**EIS** = EISA-Compliant Halogen/Incand	**IND** = Induction/Electrodeless
CMH= Ceramic Metal Halide	**HAL** = Halogen/Quartz-Halogen	**OT** = Other Lighting (describe in comments)
MV = Mercury Vapor	**CFL** = Compact Fluorescent	**RF** =Reflective/Paper Exit Signs (non-illuminated)
	CC = Cold Cathode Fluorescent	



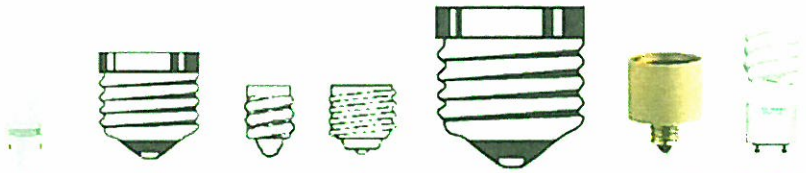
NOTE: INC-HAL-CFL-CC-LED: These lamps come in many other shapes and sizes than those shown here.

I-C-L Lamp Shape/Features Codes

A = A-shape	**R** = Reflector/Flood/PAR	**Integral-LED Fixtures**
SP = Bare Spiral/Twist	**CO** = Colored	**LP** = LED Panel/Head
GL = Globe	**HL** = Holiday Lights	**LB** = LED Bar/Strip
TU = Bare Tube	**BG** = Bug Light	**LS** = LED String or Tape
PO = Post/Capsule	**NL** = Night Light	**LF** = LED Flood lamp (not screw-in)
CA = Bullet/Torpedo/Candle/Flame	**OT** = Other (describe in comments)	**LC** = LED Custom/Specialty (describe)
2D = 2D (Double-D)		**LL** = Linear fluorescent tube replacement
CIR = Circline		



I-C-L Lamp Base Type Codes	
P = Pin	**MO** = Mogul
M = Medium/Edison	**ADP** = Candelabra-to-medium adapter
C = Candelabra	**GU24** = GU-24
I = Intermediate	**GUO** = GU-Other (GU10, GU6.5…typically Halogens)
HW = Hard-wired (use ONLY for LED Fixtures)	**OT** = Other (describe in comments)



Advertising/Display Sign Type Codes	
EMC = Electronic Message Center	**EI** = Externally Illuminated
CA = Cabinet signs	**UE** = Unenclosed\Bare Lights
CL = Channel Letter signs	**OT** = Other (describe in comments)

Ballast Type Codes	
ELECTRONIC:	**MAGNETIC:**
IS = Instant Start	**S** = Standard
RS = Rapid Start	**MRS** = Magnetic Rapid Start
PS = Programmed Start	**MD** = Magnetic Dimming
SD = Step Dimming	**ES** = Energy-Saving
CD = Continuous Dimming	**LPF** = Low Power Factor

Lighting Field Codes

Lighting Application Type Codes		
A = Area	**B** = Bathroom Bar/Vanity	**Outdoor Lighting:**
T = Task	**TH** = Theater/Performance lighting	**P** = Parking Lot
X = Exit	**SP** = Spot Light	**G** = Parking Garage
TR = Track	**OR** = Ornamental/Decorative	**F** = Bldg façade
S = Security	**AR** = Architectural/wall wash	**L** = Landscape
D = Display (cases, windows, etc.)	**AC** = Accent lighting	**C** = Service Canopies (service station, etc.)
	M = Medical equipment	**ST** = Stadium / Athletic Field Lighting
AD = Advertising	**OT** = Other/Specialty (describe in comments)	
R = Refrigerated cases		

Control Type Codes		
C = Continuous/24 hour	**PT** = Photocell/Timelock	**DL** = Daylighting Controls
S = Manual on/off	**E** = EMS (energy mgmt system)	**MSW** = Motion Sensor – Wall Mounted
BI = Bi-level or Multi-level Switched	**DM** = Dimmer switch	**MSC** = Motion Sensor – Ceiling Mounted
TC = Timeclock	**TW** = Twist-timer	**MSI** = Motion Sensor – Fixture Integrated
PC = Photocell		
PMSW = Photocell / Motion Sensor - Wall Mounted		**OT** = Other (describe in comments)
PMSC = Photocell / Motion Sensor - Ceiling Mounted		**EP** = Electrical Panel/Breaker
PMSI = Photocell / Motion Sensor - Fixture Integrated		**LC** = Lighting Contactors

MSW MSC MSI

Fixture Mounting Type Codes	
RC = Recessed can/downlights	**TL** = Table Lamp
RO = Recessed (any other)	**FL** = Floor Lamp
H = Hanging/ Suspended/Pendant	**A** = Attached to bldg exterior
CM = Ceiling Surface-Mount	**P** = Pole
WM = Wall Surface-Mount	**OT** = Other (describe in comments)
CF = Ceiling Fan	

Activity Area Codes

AA Code	Activity Area Type Description	AA Code	Activity Area Type Description	AA Code	Activity Area Type Description
1	Auditorium/Gym	22	Hallways / Corridors / Stairways	46	Smoking Lounge
2	Auto Repair Workshop	23	Kitchen/Break room & Food Prep.	47	Stairwells (*not stairways/hallways*)*
3	Bank/Financial	24	Laboratory	48	Storage (Conditioned)
4	Bar Cocktail Lounge	25	Laundry	49	Storage (Unconditioned)
5	Barber/Beauty Shop	26	Library	50	Storage (Refrigerated/Freezer), Walk-in
6	Casino/Gaming	27	Loading Dock	51	Storage (Refrigerated/Freezer), Building
7.1	Classroom/Lecture	28	Lobby (Hotel)	52	Surgery Rooms
7.2	Classroom (Portable)	29	Lobby (Main Entry and Assembly)	53	Theater (Motion Picture)
8	Clean Room	30	Lobby (Office Reception/Waiting)	54	Theater (Performance)
9.1	Computer Room	31	Locker and Dressing Room	55	Unknown
9.2	Computer (Network Room / Server Room)	32	Mall Arcade and Atrium	56	Vacant (Conditioned)
9.3	Computer (Data Center)	33	Mechanical/Electrical Room	57	Vacant (Unconditioned)
10	Comm/Ind Work (General High Bay)	34	Medical Offices and Exam Rooms		
11	Comm/Ind Work (General Low Bay)	35	Office (Executive/Private)	**97**	**Elevators**
12	Comm/Ind Work (Precision)	36	Office (General)	**98**	**Non-Rebated Area [WO29 ONLY]**
13	Conference Room	37	Office (Open Plan)	**99**	**Other Unlisted Activity Types**
14	Convention and Meeting Center	38	Patient Rooms		
15	Copy Room	39	Patio Area	0	Outside/Outdoor Area
16	Courtrooms	40	Pool/Spa Area	101	Parking Garage
17	Dining Area	41	Police/Fire Station		
18	Dry Cleaning	42	Religious Worship	999	Non –Surveyed Suite (Master-Metered Multi-Tenant Suites Only)
19	Exercise Centers/Gymnasium	43	Residential		
20	Exhibit Display Area / Museum	44	Restrooms		
21	Guest Rooms (Hotel/Motel)	45	Retail Sales/Showroom		

If an area is vacant, but the surveyor can still identify what kind of activity is performed in the area, then the surveyor should still define the area according to its activity, but also add the identifier "V" to the end of the Activity Area Code.

Business Type Codes

Business Type	Code	Business Type	Code	Business Type	Code
Offices (Non-Medical):		**Retail Store:**		**Public Assembly:**	
Administration and Management	010	Department / Variety Store	051	Religious Assembly (worship only)	111
Financial / Legal	011	Retail Warehouse / Clubs	052	Religious Assembly (mixed use)	112
Insurance / Real Estate	012	Small Retail	053	Health/Fitness Center	113
Data Processing / Computer Center	013	Discount Store	054	Movie Theaters	114
Mixed-Use / Multi-Tenant Office	014	Auto Sales	055	Theater / Performing Arts	115
BioTech R&D Lab	015	Other Retail Store	056	Library / Museum	116
Lab/R&D Facility	016	**Warehouse:**		Conference/Convention Center	117
Software Development	017	Refrigerated Warehouse	061	Community Center	118
Bank	018	Unconditioned Warehouse, High Bay	062	Other Recreational/Public Assembly	119
Other Office	019	Unconditioned Warehouse, Low Bay	063	**Services:**	
Restaurant / Food Service:		Conditioned Warehouse, High Bay	064	Gas Station / Auto Repair	121
Fast Food or Self Service	021	Conditioned Warehouse, Low Bay	065	Gas Station w/Convenience Store*	122
Specialty/Novelty Food Service	022	Public Storage / Storage Units - Conditioned	066	Repair (Non-Auto)	123
Table Service	023	Public Storage / Storage Units - Unconditioned	067	Other Service Shop	124
Bar/Tavern/Nightclub/Other	024	**Health Care:**		Nail Salon	125
Other Food Service	025	Hospital	071	Hair Salon	126
Food Stores:		Nursing Home / Rehab Center (live-in)	072	Massage Spa	127
Supermarkets	031	Medical / Dental Office	073	Day Spa	128
Small General Grocery	032	Clinic/Outpatient Care	074	**Industrial:**	
Specialty/Ethnic Grocery	033	Medical/Dental Lab	075	Assembly/Light Manufacturing	131
Convenience Store**	034	**Education:**		Food Processing	132
Liquor Store	035	Daycare or Preschool	081	Other Industrial	133
Other Food Store	036	Elementary School	082	**Public Service:**	
Condo Association:		Middle / Secondary School	083	Police / Fire Station	141
Garden Style	041	College or University	084	Post Office	142
Mobile Home	042	Vocational or Trade School	085	Military	143
High-Rise	043	**Laundry:**		Court house	144
Townhouse	044	Coin-Op	091	**Miscellaneous:**	
Multi-Family Common Area	045	Commercial Laundry	092	**Other** *Describe on Form 3a*	150
		Dry Cleaning	093	**Vacant (Unoccupied Space)**	151
		Lodging:		**Mixed-Use Multi-Tenant****	152
		Hotel	101	**Agriculture**	
		Motel	102	Commercial Greenhouse	200
		Resort	103	Commercial Farm	201
		Other Lodging	104	**Other Ag.** (describe)	202

* *Convenience stores that do not sell gasoline should be coded as 034; convenience stores that do sell gasoline should be coded as 122.*

** *This code is different from the "Mixed Use/Multi-Tenant Office" Code, as this is for areas like strip malls/malls or other multi-tenant areas that cannot be classified as offices.*

Building Activity Type Codes (*for single-building premises only)*

For Single Building Premises*	Code
In a Building	ZA
In an Enclosed Mall	ZB
In a Strip Mall	ZC
Stand Alone Buildings	ZD
Portable Building	ZE

Building Activity Type Codes (*for multiple-building premises only)*

Building Activity Type	Code	Building Activity Type	Code	Building Activity Type	Code
Auditorium	AA	Exhibit Display / Museum	EA	Storage (Conditioned)	SA
Auto Repair Workshop	AB	Gymnasium	GA	Storage (Unconditioned)	SB
Auto Sales	AC	Health / Fitness Center	HA	Storage (Refrigerated/Freezer)	SC
Bank/Financial	BA	Hospital	HB	Supermarket	SD
Bar / Cocktail Lounge	BB	Hotel / Motel	HC	Theater (Motion Picture)	TA
Barber / Beauty Shop / Salon / Spa	BC	Kitchen	KA	Theater (Performance)	TB
Cafeteria / Dining	CA	Laboratory	LA	**Vacant**	YY
Casino/Gaming	CB	Laundry	LB	**Other Unlisted Building Activity Types** ***(describe in comments)***	XX
Central Plant / Processing Center	CC	Library	LC		
Classroom/Lecture	CD	Locker Room	LD		
Classroom (Portable)	CE	Medical Offices	MA		
Clean Room	CF	Medical / Dental Lab	MB		
Computer Lab	CG	Mixed-Use Building	MC		
Computer (Data Center)	CH	Multi-Family Common Area (Interior)	MD		
Comm/Ind Work (General High Bay)	CI	Multi-Family Common Area (Exterior)	ME		
Comm/Ind Work (General Low Bay)	CJ	Nursing Home / Rehabilitation Center	NA		
Comm/Ind Work (Precision)	CK	Office	OA		
Convenience Store	CL	Pool	PA		
Convention Center	CM	Police/Fire Station	PB		
Courthouse	CN	Post Office	PC		
Dormitory / Residence Hall	DA	Religious Worship	RA		
Dry Cleaning	DB	Restaurant	RB		
		Retail	RC		

NOTE: These building types are to be used specifically for multiple-building premises, account for the different activities at a premise. (ex. A school campus will have offices, gym, classrooms, but the business type is still a school).

**For single-building premises, the business type code should also describe the building activity code. In this case, the building type code will describe the location of the business.*

HVAC – Code Descriptions

Distribution System Types	Temperature Control	Heating Equipment
PSZ = Package Single Zone (Unitary) SSZ = Split-System Single Zone PTU = Package Term. Unit MINI = Ductless, mini-split units WLHP = Water Loop/Source Heat Pump GSHP = Ground Source Heat Pump UV = Unit Ventilator or Heater PMZ = Package Multizone PVAV = Package VAV SZ = Single Zone (built-up) 2PFC = 2-Pipe Fan Coil 4PFC = 4-Pipe Fan Coil BR = Baseboard or Radiant Heater BMZ = Built-up Multizone BVAV = Built-up MZ VAV PH = Portable Space Heater SC = Spot Cooler OT = Other (describe) UNK = Unknown (must have a photo)	M = Manual (heat/cool On only as needed) A = Always on, constant temperature T = Time Clock E = EMS P = Programmable Thermostat	N = None F = Furnace *HP = Heat Pump** B = Boiler (fan coil) ER = Electric Resistance RH = Radiant Heater BB = Baseboard Heater P = Purchased Steam OT = Other BX = Boiler (radiant/baseboard) UNK = Unknown (must have a photo) **NOTE:** A package heat pump would be recorded as a PSZ/DX-HP system (DistSystem/CoolType-HeatType). Other DistSystem types would follow the same approach.

Cooling Equipment Types	Fuel Type	
N = None DX = Direct Expansion DC = Dedicated Compressor C = Chiller/Chilled Water E = Evaporative Cooler P = Purchased Chilled Water UNK = Unknown (must have a photo)	E = Electricity G = Natural Gas F = Fuel Oil L = LPG HW = Hot Water W = Wood C = Coal/Coke WO = Waste Oil	D = Diesel Fuel GA = Gasoline ST = Steam SO = Solar SG = Solar w/gas backup HR = Heat Recovery O = Other

Outside Air/Economizer Configurations
N = No outside air intake F = Fixed damper (indicate approx % OA) E = Economizer OT = Other (describe in comments)

Appendix D

CSS On-Site Surveyor Handbook

This appendix contains the CSS on-site survey handbook. The procedures in this document were developed to standardize data collection and reporting for the on-site survey. This was a working/living document during the course of the survey, meaning that the handbook was continually updated as needed during the on-site survey effort to reflect any unanticipated issues and lessons learned in the field. Prior to going on-site, the surveyors were provided with intensive training and this surveyor handbook to ensure that the survey was implemented with the highest efficiency and quality. The handbook provides general information on the project and the on-site survey process and protocols. The handbook provides the surveyors with specific information about implementing the survey including preparing for the on-site, taking notes on-site, and survey form completion. The handbook also serves as reference for filling out each of the individual survey forms, and explains every field on each form.

1

General Project Information

The purpose of this manual is to provide program background information and instructions for conducting the on-site survey work for the Commercial Saturation Survey / Commercial Market Share Tracking (CSS-CMST) study. The CSS-CMST study was conducted for the California Public Utilities Commission (PUC) as part of the 2010-2012 evaluations. The procedures in this document were developed to standardize data collection and reporting for the on-site survey. This is a working/living document, and will be continually updated as needed during the on-site survey effort to reflect any unanticipated issues, and lessons learned in the field.

Section 1 presents an introduction and overview of the project and on-site survey objectives. Section 2 describes the general on-site survey process and protocols. Sections 3 and 4 provide specific and specialized procedures for conducting the on-site survey. Section 5 contains detailed instructions and references for filling out the on-site survey forms.

1.1 Introduction

The CSS and CMST efforts are being conducted to gather basic market information about commercial equipment including lighting, TVs, office equipment, small package HVAC, and refrigeration equipment. The two studies will be used together to determine the market saturation of high-efficiency equipment in the commercial/nonresidential market for key end uses and technologies. The CSS study involves preforming a *complete inventory* of the targeted end-uses or technologies, whereas the CMST is focused only on recent purchases of specific technologies, with "recent" being defined as on or after January 1, 2009. Incentives (gift cards) will be offered when needed to encourage customer participation.

This equipment saturation information can be used for energy efficiency potential studies, program planning, and setting technology baselines for evaluation studies. A total of 1,500 on-sites are targeted for the CSS effort and will consist of a combination of CSS only, CMST only and CSS/ CMST sites. A brief explanation of these categories is provided below:

- **CSS-Only sites** are those sites where there were *no purchases* of CMST-targeted equipment. For these sites, detailed firmographics information, as well as a complete inventory of all of the CSS-targeted end uses/equipment, will be obtained.

- **CSS/CMST sites** are like the CSS-Only sites in that a detailed and extensive inventory will be conducted, but in addition, there were also purchases of CMST-targeted equipment. For these sites, both the CSS *and* the CMST procedures will be followed, and the CMST equipment will be identified amongst the CSS inventory. On-site survey time should be on par with the CSS-Only sites, though identifying the CMST equipment may take a bit more time.

- **CMST-Only sites** are those sites where minimal firmographic information will be collected, and only the purchased CMST-targeted equipment will be inventoried. These are expected to take the shortest amount of on-site survey time.

1.2 Goals and Objectives

As previously mentioned, the on-site survey effort will be focused on lighting, TVs, office, small package HVAC, and refrigeration equipment. For CSS sites, a significant amount of general information about the site will also be collected, including information about the meters and accounts. Each of the end uses for which information will be collected is described briefly below:

- **General Site Information.** The CSS study collects information on building types, floor area, conditioned floor area and meters/accounts (used to develop consumption which can be used with floor area for benchmarking and whole-building energy intensities, etc.).
- **Lighting.** For the CSS study, a complete inventory of indoor and outdoor lighting will be collected, while the CMST focuses exclusively on indoor linear fluorescent lighting. This includes all linear fluorescents, not only the recently purchased lighting.
- **TVs.** For the CSS study, a complete inventory of televisions will be collected, along with all connect devices (cable boxes, DVD players, video game consoles, etc.). The CMST study focuses exclusively on newly purchased TV's.
- **Office Equipment.** For the CSS study, a complete inventory of all office equipment will be collected. This includes printers, computers, and data center equipment. However, in-depth information like make/model number was only collected for shared equipment (equipment in common areas) and all new computers (purchased since January 2009).
- **Small package HVAC equipment.** For the CSS study, an inventory of all small packaged HVAC equipment will be collected, including make, model, and serial number, with the intent of using the make/model numbers to lookup equipment characteristics such as size and efficiency. For the CMST study, information will only be gathered for the recently purchased equipment. Minimal information will also be collected for larger, built-up systems.

- **Refrigeration Equipment.** For the CSS study, an inventory of all self-contained refrigeration equipment will be collected. Information will also be collected on all

built-up rack type remote refrigeration systems, including information on the compressors, condensers and cases. All refrigerated walk-ins spaces will also be surveyed. Data for the refrigeration lighting systems was also collected.

1.3 Project Management and Contact Information

The PUC Energy Division (ED) project management for this survey effort will be handled by several different staff over the course of the study. Itron is the prime contractor for this study. Jean Shelton and Rachel Harcharik are the project managers/directors. Bob Ramirez and Ben Cheah are leading the engineering and on-site survey effort. Tom Mayer is developing the data entry and tracking system into which the verification data will be deposited. Itron will also be supported by subcontractors including Robert Thomas Brown, ASW, GC Green and KEMA.

Contact information for lead project staff, as well as field staff, is be provided in the *SurveyTeam_ContactInfo.xlsx* spreadsheet, and will be continuously updated as necessary. Engineering team members can refer to the study Research Plan for more information on other tasks and overall project objectives. Subcontractors should contact Itron staff on project-related issues, and should not contact the CPUC ED or IOUs directly, unless specifically instructed to do so.

1.4 Useful Terms and Definitions

Primary terms and definitions that are used in these protocols are provided in this section.

- **CPUC and ED.** California Public Utilities Commission. ED is the Energy Division of the CPUC.
- **IOU.** Investor owned utilities, which are Pacific Gas & Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E) and Southern California Gas (SCG). Sempra is the parent corporation for SDG&E and SCG.
- **Firmographics.** In the context of this study, it refers to the general information (site floor area, HVAC type, age of building, business hours, utility meter numbers. etc.) that is used to characterize a customer and/or market segment. Nonresidential sector building type (Office, Health, etc.) is one of the primary characteristics.
- **Saturation.** Typically refers to "equipment saturations", and is used to indicate the share of the market that a given characteristic has captured. For example, the HVAC equipment market might have a 20% *saturation* of high-efficiency equipment, with the remainder being standard efficiency equipment. The implication is that knowledge about the entire market is known.
- **Commercial Saturation Survey (CSS) Study**. This is a *baseline* study used to collect *detailed and extensive* firmographic data and establish existing saturations of equipment configurations, efficiency levels, size, age, vintages, and other

characteristics, at the building type, end-use and/or technology level. The CSS study is essentially an *inventory* of all relevant, targeted (end-use or technology) equipment found on-site. The data will be used for IOU program evaluation, as well as for energy efficiency potential studies, program planning, and updates to DEER

- **Commercial Market Share Tracking (CMST) Study**. The CMST study will collect information on *recent purchases*, which for this study are defined as those made since *January 2009*. The recent purchase data will be used to describe the current marketplace for select high priority energy efficiency measures. Information on recent purchases of both standard and high efficiency measures will be collected, in order to develop information on base and high efficiency market shares. In addition, information from the 2010-2012 IOU energy efficiency program tracking databases will be used to help determine the share of high efficiency purchases receiving an IOU rebate.
- **End Use.** A high-level categorization of measures related to the end-use function or service the measure provides, such as Indoor Lighting, Space Cooling, Office Equipment, etc. An end use can be defined in many ways and at different levels of aggregation.
- **Site or Premise.** A "*site***"** or "*premise*" is a unique, contiguous business or corporation who purchases energy from one of the California IOUs. Premise is sometimes used instead of site to differentiate between a single building and a possible multiple building campus, however for this study, site and premise may be used interchangeably.
- **Multi-Site Customer.** A corporation that is part of a multiple site chain, franchise, property management group, school district, etc. The corporate name may or may not be the same as the actual business name.
- **IOU Tracking Database.** This database contains information about all of the energy efficiency program accomplishments for the IOUs. The data used for this survey is the customer contact information, and the types and quantities of measures implemented on-site. For this study, only lighting, HVAC, and refrigeration measure information will be extracted and printed to the on-site survey form
- **IOU Customer Information System (CIS).** The CIS contains all of the utility customer information and is used for sample design as well as customer contact and recruitment and meter/account information.

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2

On-Site Survey Process and Protocols

This section describes the field procedures that will be followed in taking inventory of the items found at a sampled site.

2.1 On-Site Inventory Process Overview

The process that will be used for the CSS/CMST on-site inventory survey effort is as follows:

- A phone survey (conducted by Itron's CATI center) will be used to identify customers who agree to allow on-site inventory. They also obtain a primary and (if needed) a back-up contact for the on-site survey.
- Phone survey, CIS data, and IOU tracking data are extracted and used to produce hardcopy survey forms populated with site, contact, and measure data.
- Survey forms are assigned to a survey team (Itron, KEMA, RTB, or ASW) and distributed to surveyors.
- Surveyors review the forms, note any special details about the site, and perform a background review (e.g. internet search, loopnet.com, electric meter checks) on the site prior to scheduling an on-site visit. This may include reviewing CMST-measure data or looking up business information and building information online to determine what sort of questions may need to be asked during the scheduling call.
- Surveyors use the contact information to call and schedule the on-site visit.
  - Scheduling procedures, listed below in the section, 2.2 *On-site Inventory Procedures and Protocols* are provided to the surveyor for them to use prior to scheduling the site. These procedures cover things like questions to ask the site contact, number of attempts, responses to questions the contact may ask, among other things.
- The on-site survey visit is conducted.
- The hardcopy survey form is filled out and returned to the data entry team to be recorded in the survey tracking sheet. Expenses (and CPUC forms if applicable) should also be completed and turned in at the same time. This process is highlighted in the section, *Survey Form Completion and Quality Control*. This process is slightly

different for Itron staff working from the office, Itron staff working externally, and subcontractors due to the confidentiality requirements of the project.

- The forms are sent to the lead engineers at Itron for Quality Control. If issues are found that the surveyor needs to address, the form is returned to the surveyor for correction, and the form status is updated in the tracking sheet.
- Once all issues have been sorted out, and the final Quality Control has been completed, forms are sent to be data entered, and the form status is updated in the tracking system.
- Daily status reports for surveyors will be required from all surveyors in order to track the progress of the on-site verification effort towards meeting sample quotas. Reports being sent in, should be in the following format:

Figure 2-1: Daily Status Report

DAILY PROGRESS SUMMARY (For the week) - Only add daily comments for work you did that WILL NOT BE INCLUDED in the SUMMARY tables below

Day	Date	Comments
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

WEEKLY *SITE STATUS* – SUMMARY

- New Daily Updates (Red text), previous Daily Updates (Black text)
- Add sites to the list as you go, older sites nearer to the top

					WO029 ONLY					
Date Site Visit Completed	City	Work Order	SiteID	Site Status (Completed, Lost, or Extracted)	"Logger" or "Verify Only"	# DENT (LL or LC) Loggers	# DENT (CT) Loggers	# HOBO Loggers	# HOBO CT's	Comments

WEEKLY Paperworks *TURNED IN* or *SCANNED TO NETWORK* – SUMMARY

- Make new Daily Updates (Red text), previous Daily Updates (Black text)
- Add sites to the list as you go, older sites near top

Date Turned in to Sue	Date Scanned to Network	Work Order	SiteID	Original or QC Revisions	Comments

WEEKLY Sites *SCHEDULED* - SUMMARY

- Make new Daily Updates (Red text), previous Daily Updates (Black text)
- Add sites to the list as you go, older sites near top

						WO29 Only	
Today's Date	Work Order	City	SiteID	Date Scheduled	Time Scheduled	Logger, or Verify Only, or Extraction, Site	Comments

This process makes the best use of engineering expertise by allowing engineers to focus on doing the on-site inventory surveys. Doing the data entry at a single, central location will also assist in the QC process by catching errors and issues, which can be reported back to the surveyors. Evaluation of the data will be conducted on the complete dataset using the Access database into which the data will be data entered, so that specific measures can be analyzed consistently.

2.2 On-site Inventory Procedures and Protocols

This section describes the general protocols and procedures to be used for conducting the inventory survey.

2.2.1 Review the On-site Verification Survey Form

The on-site inventory survey forms will be printed and/or made available electronically. The contact and site information should be reviewed to assess the extent and magnitude of the on-site survey. This includes a review of the phone survey data reported on the form, to evaluate the size of the site, number of buildings onsite, the type of site (CSS or type of CMST site) and the quantity of measures reported, to gauge the amount of time that should be set aside for this site.

2.2.2 "Scheduling" the On-Site Survey

Smaller site visits for the CSS/CMST field efforts will be done without scheduling ("cold call" or "soft scheduled"). However, formal appointment scheduling will typically be needed for churches, schools, large/multi-tenant office buildings, restaurants (to avoid busy meal service times) and larger sites.[1] *Scheduling on-site visit appointments will be the responsibility of the surveyor*.

Every program participant (site/customer) will receive a phone survey from Itron's CATI center. As part of the phone survey, CATI will ask the customers for permission to do an on-site inventory. They also obtain up to two sites contacts - a primary and a back-up - who can best facilitate the on-site survey. This information will be pre-printed on the on-site form for use in scheduling the on-site visit, and an example is shown in Figure 2-2. Email addresses are not obtained during the phone survey, but they can be quite useful for confirming site visits ahead of time, and should be obtained if a pre-visit call is made to the customer.

Figure 2-2: Site Contact Information from the CATI Phone Survey

Site Contact Information

PS Completion Date:	08APR2008	Length (min)	11	Respondent:	John

	Contacted	Contact Name	Phone Number	Alternate Phone	Email Address
OS Primary	☐	*John Smith*	*619.867.5309*		
OS Back-up	☐	*Jenny Smith*	*619.867.5309*		
OS Other	☐				

Note: Use the "Contacted" check box to indicate the actual contact(s) for the site visit.

Contact Information Reliability and Customer Refusals On-site. The site contact information should be very reliable, but if any difficulties are encountered contacting the customer or once you arrive on-site and they refuse the survey, Itron should be informed and will provide assistance. If the customer changes their mind after you arrive on-site, you should offer

[1] Different surveyors may show higher success with one method versus another method. If the surveyor determines that they are more effective cold-calling sites rather than hard-scheduling them, they should use that approach, and only hard schedule certain sites like schools and large hospitals or other similar facilities.

to reschedule for a later time or another day if your schedule permits. If the customer requests a much later date, then Itron will have to reschedule after you report back on the status. For this study, there is one other option available: You may be able to offer a gift card incentive, if one has not already been offered (this will be noted on the survey form). You should always make your best effort to not lose a viable site, as much time and effort has been invested in recruiting the customer and getting you there. However, if a customer is being difficult and not allowing access to a site, this site should just be tagged as a lost site and the disposition recorded as a customer refusal.

Whatever the approach (soft or hard scheduling), when contacting the customer you must always identify yourself as a consultant acting on behalf of the CPUC, ask for the site contact by name, mention that you are following up on the phone survey call they received from Itron, and inform them that you would like to schedule a site visit. A sample script is presented below:

Hello, my name is _____ and I am part of a team of energy engineers at Itron, performing energy studies on behalf of the California Public Utilities Commission (CPUC). I am following up on a phone interview we conducted with *(name on cover page)* on *(phone survey date on cover page)* regarding an on-site survey of your business, and I am trying to schedule a good time to visit the site to perform this survey.

Do you recall this previous phone interview?

The purpose of the onsite is to gather information on different energy uses throughout your facility. This equipment information we are trying to gather may include data on lighting, HVAC, and Office Equipment, and Televisions. We also collect building and schedule information. The data we collect allows us to analyze how energy is being consumed in commercial buildings, and where potential for energy savings lies.

- When would be the best time for me to schedule a visit?
- Are there any special instructions I should follow when I arrive at your facility? Is there anywhere special I should park, or any locked gates I should be aware of?
- Will I have access to the electrical and gas meters, or are they behind a locked gate? Or,
  - Can you provide me a copy of the electric and gas bills so I can verify the account and meter numbers?
- Do you have ceilings over 10 ft. where I would need a larger ladder to reach the lighting?
- Do you have roof access available, and if not, can you approximate how tall of ladder I would need to reach the roof?

- The number of buildings reported during the phone survey was *"enter number here"*. Is this correct?
- *For Multi-Tenant Facilities:*
  - Can you request access for me to survey several of the tenant spaces? *(try to gain access to 30% of the tenant spaces)*
  - Do you have a site map that you can email over to me so I can review the layout and minimize my time required onsite?
- *For Large Sites or Multi-building Campuses:*
  - Do you have a site map that you can email over to me so I can review the layout and minimize my time required onsite?
- *For any CMST site:*
  - Can you provide me with any invoices from the newly purchased measures?

Thank you very much for your time. I will be at your facility at *(specify date and time agreed upon).*

FAQ's:

"What do I gain from this?"

The information gained from this study will be used by the CPUC and the California electric utilities to improve and better target their energy efficiency programs for commercial businesses like yours.

Other issues related to contacting the site are:

- **Directions/Special Instructions.** This is additional information that would be gathered from the scheduling call. The special instructions could include directions on where to meet or park, how to gain access to the site, or how to get a hold of the site contact when you arrive. Be sure to ask questions about the site access (dogs, locked gates, guarded entrances, etc.).
- **Specific Roof/Site Access Requirements.** During the scheduling call, the surveyor should request access needed to physically inspect the electric meters and any other equipment noted on the pre-populated form. For example, if the measure is high-bay lighting then ask if they have a ladder or lift available for your use, or if a rooftop package unit, then ensure that someone with a key to unlock the roof access hatch will be present. Access to the electric meters and gas meters will be needed for CSS sites. If you

anticipate a semi-intrusive investigation (flipping circuit breakers or switches on/off), or the measure involves operation after the business is closed, the surveyor might consider meeting after hours or at slightly before or after normal business hours. This may be especially true for sites like restaurants, which have specific times of the day when they are busy.

- **"Hard" vs. "soft" scheduled sites.** Some sites may require strict scheduling of appointments with a "reminder call" to be made the day before the visit. This is especially true for *professional offices* (lawyers, doctors, real estate, etc.), and is also true for *schools* and *hospitals* which may have areas that are not open to the general public.
- **How many times to call for a "hard scheduled" site.** The contact should not be called or emailed more than 5 times and the times should be varied (morning, afternoon, evening). Leave a message for the first 3 calls, but do not leave a message for the last 2. If the site contact cannot be reached, the surveyor should notify Itron (Anastacia Bronner) to confirm that the phone number provided on the survey form is correct, or check if there is an additional phone number that can be provided. Once the phone number is confirmed, the surveyor should try a single cold-call attempt, if the site is nearby. If the surveyor is still unsuccessful, the site should be considered a lost site.

2.2.3 CPUC Letter of Introduction

A laminated letter of introduction printed on CPUC letterhead, and a photo ID (either Itron badge or official PUC on-site badge) must be carried at all times by all personnel conducting on-site visits. The letter of introduction in Figure 2-3 states that Itron and its subcontractors are authorized to conduct the impact evaluation. The letter provides a web-link (http://www.cpuc.ca.gov/eevalidation) that the customer can use to further validate the study, as well as the CPUC ED contract manager's name and phone number. The surveyor should also keep several non-laminated copies of this letter available, and should always leave one with the customer.

Figure 2-3: CPUC Letter of Introduction

STATE OF CALIFORNIA — Edmund G. Brown Jr., Governor

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

October 19th, 2012

Dear Commercial Survey Participant:

The California Public Utilities Commission (CPUC) is currently employing independent program evaluators for two statewide, commercial on-site surveys. These surveys will collect information on recent purchases of commercial measures and inventory energy using equipment in your business. These surveys are undertaken in coordination with California's investor-owned utilities: PG&E, SCE, SoCalGas, and SDG&E.

The CPUC's Energy Division requests your cooperation for these data gathering efforts. The CPUC has retained Itron, Inc as the primary contractor for this work. This letter serves to authenticate their request for information. For additional confirmation, please go to the CPUC web link:

www.cpuc.ca.gov/eevalidation

Please do not hesitate to contact me at the phone number or email address shown below if you have further questions regarding the evaluation process.

Thank you for agreeing to participate in the research effort by providing useful information about recent purchases and energy using equipment at your business. Your participation will help both the electric utilities and the CPUC better understand the way energy is used in businesses in California, helping them plan for future energy needs and energy efficiency programs.

Sincerely,

Lisa Paulo
Energy Division
California Public Utilities Commission
415-355-5495
LP1@cpuc.ca.gov

2.2.4 Large Sites

"Large" can refer to either floor area or quantity of equipment. The procedure for large sites is as follows:

- **Consider using two field staff.** For especially large sites, if other surveyors are close to where you are working and available, you can consider using two people for the survey.
- **Consider hard scheduling.** Consider hard scheduling, especially for a remote site or a school, large chain hotel, sports arena, campus, etc.
- **Requirements for multiple building sites.** If there are multiple buildings, be sure to:
  - Obtain a site plan or sketch one up, or use Google Earth/Maps satellite view.
  - Identify on the site plan which buildings were surveyed
  - Capture the total floor area and # of buildings for the site, as well as the buildings surveyed. Cooled/Heated and Total floor areas should reflect the actual buildings surveyed. Total floor area and number of buildings for the entire site should also be recorded on survey forms, as well as in comments, as needed.
- **Try to walk all areas and do a visual count of all CSS-CMST targeted equipment.** If there is a diversity of building configurations/space types, try to do a visual count of all targeted equipment (for example count all of the lighting fixtures) and observe the different spaces and equipment operation schedules. If this is not possible and the site needs to be sampled or some spaces are not accessible, then fill out the survey forms completely, but clearly explain in comments the actual situation, and any shortcomings with the approach that you had to use.
- **Use sub-sampling if required and document your approach.** Use sub-sampling if needed. Sub-sampling means to physically count and verify measures in only a portion of the treated/rebated areas, and use what you find there to estimate/make your best judgment as to whether or not the equipment is installed in all of the other areas.
  - If sub-sampling is used, you must document what you actually saw and what you estimated. You should document the approach in comments.
  - Your sub-sample should ideally represent all of the activity area types and equipment operation where targeted equipment can be found; so you will have to determine activity areas and operation.
- **Attach original notes and/or supplemental documentation to the back of the form.** If you assemble any notes or sketches besides what you record on the survey form, please be sure to include those additional documents/sketches/etc. with the survey form (attach to the back). It is better for us to hold on to those than you, and these can often be very useful in troubleshooting/quality checking (QC) the on-site survey data.

3

Conducting the On-Site Survey

In this section of the training manual, the steps in the on-site survey process and the protocols related to the general approach to use when surveying a premise are described.

3.1 Pre- and Post-Onsite Survey Procedures

A brief overview of the on-site survey process is provided. The procedures are discussed in this order:

- On-Site Survey Notes and Issues,
- Pre-visit Preparation,
- Introduction, Self-Report Questions, and Walk-Through, and
- Survey Form Completion and Quality Control.

3.1.1 On-Site Survey Notes and Issues

There are a handful of issues that should be uppermost in a surveyor's mind when they are performing the on-site:

- Identify all the specified equipment that is targeted by this study, and any CMST equipment that was reported on the phone survey.
- The survey form does not capture all situations, but all required fields must be completed. When a situation is encountered that does not fit the survey structure, fill out the fields but then explain the situation in comments. As soon as on site visit is complete, the surveyor should report and discuss the situation with the QC team.
- Understand the technologies that are being surveyed. This includes configuration and technical specifications. In cases where the survey form is deficient for a unique configuration or situation, be able to recognize and gather the data required to fully characterize the equipment (consistent with the previous item).

3.1.2 Pre-Visit Preparation: Site/Measure Assessment, Expenses, and Equipment

When going on-site, it is important to be fully prepared so that callbacks and follow-up calls are kept to a minimum. There are several things one can do to help with this process. The CIS

tracking database and pre-populated items in forms can be useful in preparing equipment for site visits. Surveyors should bring ladders with them to all on-site visits. Since some of the commercial buildings are manufacturing or assembly environments, they might not allow open toed shoes, loose garments or jewelry, so it is important to always dress appropriately.

Site/Measure Assessment before the On-site Visit. Reviewing the populated, site-specific survey form well in advance of the site visit is the single most important thing to do before visiting a site. The survey form provides general information about the site, such as business type, size, and number of buildings, and the Business Type. The *surveyor must do a detailed review of this information, especially the type of site, and ask the field-supervisor for guidance if they are unsure about the pre-populated information from the phone survey.* The information about the size of the facility and the number of CMST or IOU program measures can be used to estimate the time needed to conduct the on-site survey. The Business Type might also be used to decide whether a scheduled appointment is required (such as for schools or lodging sites). This information can also be used to prepare for sub-sampling situations. For example, for a school there might be different sizes/types of classrooms, administrative buildings, a cafeteria, a gym or other public assembly area, etc. For a large, multi-story office building, sub-sampling of different activity areas (open office, private office, etc.) and multiple floors could be expected.

Tracking Time and Expenses. CPUC travel expense requirements are very strict and limited. As such, before doing any field work, surveyors need to thoroughly review the CPUC travel expense requirements and their own relevant travel policies[2]; then clarify specific requirements with their field-supervisor. Generally though, expenses will end up being split between the CPUC contract and internal overhead. Some general tips and guidelines are listed below:

- **Bill to the correct task.** There are two separate surveys being conducted here, CSS and CMST, each with separate budgets and it important to accurately track and bill your time accordingly.
- **Maintain a survey tracking sheet.** For each site visited, record the Site ID, date and time of the visit, mileage traveled, task to bill to, and whether the on-site was successful. A tracking sheet is not required, but it will make expensing much easier.
- **Complete Expenses in a timely manner.** Expenses should be completed within two weeks on the actual site visit.
- **Mileage can almost always be billed to the CPUC contract.** Mileage for driving your personal vehicle to and from a site can usually be billed to the CPUC contract.
- **All expenses billed to the CPUC project must have a receipt!** If you do not have a receipt, then it cannot be billed to the CPUC project, though it may still be covered as overhead by your company.

[2] Public Utilities Commission "*Contractors Travel Expense Reimbursement*" flyer.

- **Meals billed to CPUC project require an overnight stay.** You cannot bill any meals to the CPUC project unless you have an overnight stay, or travel more than 50 miles from home base. In addition, in order to bill meals to the CPUC project, you need to have receipts and you need to stick to the CPUC meal amounts: Breakfast is $8.00 max, Lunch is $12.00 max, Dinner is $20.00. If you exceed the CPUC meal amounts, with approval of project manager or field work supervisor, you may be able to bill excess amounts to an indirect/overhead project/task.
- **Meals without an overnight stay.** If a trip lasts less than 24 hours, and therefore no overnight stay is required, a surveyor can claim breakfast if their trip begins at or before 6 am and ends after 9 am. Reimbursement for meals can only be claimed for trips outside of a 50 mile radius of home base or headquarters.

Once again, before conducting any on-site surveys, the surveyor should make sure they clearly understand the travel expense procedures and tracking/reporting requirements.

Survey Tools and Materials Checklist. The following items should be taken to all verification site visits:

- Water or other beverages to stay hydrated!
- ID Badge
- Letter of Introduction on CPUC letterhead (1 laminated, several loose copies to hand out if customer wants one)
- Gift cards (for customer participation incentives). These are Visa gift cards, and incentives are $50, but they are not paid to all customers.
- The pre-populated survey forms with site-specific information.
- *Extra copies of blank survey form pages*, especially the activity area, building type and equipment inventory forms, especially for large and/or multi-building sites.
- Cell phone programmed with phone numbers of all project/field-work leads (to answer questions from the field, respond to emergencies, if needed)
- Lighting flicker checker[3]
- Digital camera (know how to use the close-up feature to get clear nameplate photos and zoom to get clear lamp code photos)
- Compass
- Calculator

[3] Call Motorola (1-800-453-1506) or Sylvania (1-609-981-4887) to order, and to learn more about them here: http://www.earthteam.net/projects/earth_team_projects/mkhc/LCFlickerChecker.pdf

- Telescoping inspection mirror w/LED light (for access/viewing equipment/nameplates in hard-to-reach places)
- Flashlight
- 6-in1 screwdriver tool
- ETEKT AE1601 Low-E window film detector (http://www.edtm.com/spec_ae1601.htm)
- Utility knife or box cutter
- Laser tape measure with 50-100 ft capability
- Mechanical tape measure (to measure size of television screens and monitors)
- Portable ladder (minimum of 4 ft. tall)
- Small dusting brush (use to clean nameplates etc., a paintbrush will work)
- Training manual/handbook (as a reference for completing the forms)

3.1.3 Introduction, Self-Report Questions, and Walk-Through

The on-site visit is expected to proceed as follows:

Arrival at the Site. Upon arrival at the site, photograph the site from the front (main entrance). Take note of the building/site configuration and try to anticipate the extent of the survey based on the size and layout, and the quantities of rebated measures installed.

Site Contact Introduction. Upon arrival at the site, present your identification badge and the laminated CPUC letter of introduction. If the site contact requests a copy of the letter, make sure that you have one available. If the site contact has any doubts about the legitimacy of the surveyor or the survey, he/she should be encouraged to check the website or call the CPUC project manager for verification.

Interview. After all identification issues have been handled, the surveyor will interview the site contact about general site operations and characteristics, as required for the first few forms in the verification survey instrument. Surveyors must be sensitive to the site contacts time constraints. If the site contact has limited availability, the most critical questions should be asked first, such as the location of rebated equipment, accessibility, and operation.

In the case of a CMST site, the most important thing to do when talking with the contact is to identify the targeted equipment that are listed on the CMST form and were identified in the phone survey. The surveyor should use the technology description, the quantities, and the year of installation to assist the site contact in identifying where this equipment has been installed. He or she should also ask for access to rooms, roofs, and other areas where additional equipment may be located.

If the site contact will not be accompanying you, inform him/her that you will check with him/her before you leave. If you have questions about what you see during your walk-through, you can obtain the answers when you check out with your contact.

In some cases, the site contact may only be available after the walk-through has been completed. If this occurs, questions should be organized after the walk-through.

Walk-Through. Upon completion of the interview, the surveyor will walk through the facility and try to identify the targeted equipment. For lighting equipment, it will be especially important to think about the areas and control types for the lighting systems. Depending on the wishes of the site contact, the surveyors can proceed by themselves, or the site contact or other representative may accompany the surveyor through the facility. Additional issues/concerns include:

- For larger sites, it is advisable, if possible, to talk with the building technical staff or maintenance people before proceeding to walk through the facility.
- For lighting, the surveyor should be sure to check the storage rooms and ask the site contact about spares.
- Physical inspections of the targeted equipment must be performed to collect technical specifications.
- At least two photos should be taken of each measure; one to show an example installation and the other to show model, label or nameplate data.
- For CMST sites, the surveyor should attempt to identify the newly purchased equipment (since January 2009), that has been installed onsite, and compare this to the quantity reported in the phone survey.

In addition to the interview and the walk through, data may be obtained from structural and architectural drawings, or mechanical/electrical/plumbing plans, and for larger facilities, this information should be asked for as it may make the surveyor's job much easier.

Subsampling may be employed at large facilities and/or where numerous measures are installed. Subsampling plans will be developed and documented by the assigned engineer after an initial site assessment. However in some situations, Itron may need to be consulted on subsampling plans; the assigned engineer will attempt to contact the Itron point-of-contact (POC) to discuss on-site sampling strategies prior to implementing the plan.

If available, use a lighting flicker checker to confirm if electronic ballasts are used for installed lighting. The flicker checker is a top-like device that can be used to test for standard magnetic or high-efficiency electronic ballasts. The flicker checker has a pattern printed on the top of it. When spun like a top under low-frequency (60 Hz) magnetic ballasted lamps the

pattern is visible due to a strobe effect. When spun under high-frequency electronic ballasted lamps, the pattern is not visible. Flicker checkers can be obtained by calling Osram Sylvania at 1-800-654-0089.

For most sites, several photos of the building exterior, meter numbers, and two of each measure should be sufficient. For measures installed in multi-building sites, several exterior photos of each treated building should be taken. As previously mentioned, for each measure there should be one photo of each unique installed equipment, one photo of each unique rebated measure configuration (i.e. 2-lamp, 3-lamp, delamped, etc.) and one photo of a label or nameplate, or in the case of CFLs found in a storage room, a photo of the package, especially if it features a utility rebate label. Any unique scenarios should also be recorded, whether it is new technologies or unusual situations encountered. Also, if a surveyor is unsure of something onsite, photos should be taken as documentation, and can be reviewed back in the office.

Photos should be identified and described on the Photo Log sheet of the survey form and a brief description entered and will be delivered in digital format. Digital photo file names should use the following naming convention: S**iteID#_Item#.** For example, **PGE0122033005_1.jpg** would be the first photo on the photo log for Site ID PGE0122033005. An additional field has been added here, to identify what photos have been taken at a site. These identifiers the surveyor can choose from include the following:

- LF – Linear Fluorescent
- CF – CFL
- LED – LED Fixtures
- OL – Other Lighting
- H – HVAC
- TV – TVs
- Ref – Refrigeration
- OBldg – Outside Building/Site
- IBldg – Inside Building/Site
- M – Elec/Gas Meter
- EMS – EMS
- OT – Other (describe)

This information will be used for future training or future projects. This will help those designing training materials to easily identify where photos can be found for different types of technologies.

3.1.4 Survey Form Completion and Quality Control

The following procedures highlight the process to be used once the on-site survey has been completed. This will help streamline the process that takes place after the on-site has been performed, and ensure that the survey forms get from the surveyor to San Diego to be QCed and data entered as quickly and as efficiently as possible.

- **Daily Status Reports.** Surveyor will send in daily updates to Ben Cheah (*ben.cheah@itron.com*), with Cc to Bob Ramirez (*bob.ramirez@itron.com*) and Sue Burrus (*sue.burrus@itron.com*). These updates will include a list of all Site ID's attempted in a given day, along with the site disposition or any site notes that may accompany the disposition. Status reports can be phoned in when email is not available (use the 800 # if cell service is not available => 1-800-755-9585).
- **Update the Site Tracker.** The daily *site status reports* from field staff, along with the disposition and any relevant notes, will be entered into the Site Tracker (i.e. the on-site tracking excel spreadsheet) by Ben Cheah on a daily basis. Overall project and by-person progress/stats will be shared with field staff at the weekly check-in meetings and via email.
  - **Limit on Completed On-Sites versus Submitted Paperwork.** Field staff with more than 5 completed on-site visits where the completed hardcopy survey form has not been submitted to San Diego *will not be assigned any additional sites* until they have caught up. QCed survey forms that are waiting for responses from the surveyor will also be considered in limiting the assignment of additional sites.
- **Completed survey forms.** Field staff located in San Diego will hand all completed survey forms to Sue Burrus (*sue.burrus@itron.com*) , and either copy the photos to the appropriate Site ID directory (P:\CPUC1012\P12810_CSS_CMST\OnSiteSurveys \CompletedSites) or hand Sue a flash drive containing the photos. Note that the file names must be correct per the photo procedure and they must be in a Site ID directory.
  - **For field staff located outside of San Diego**. The field staff will be provided with portable scanners. These scanners will allow the surveyors out in the field to be able to still send in forms on a daily or bi-daily basis. The surveyor will scan the completed survey form. The document should be saved as *SiteID.PDF*.
    - ***For ITRON Staff***. Once the forms have been scanned, the Itron field staff will save the file along with site photos to the appropriate Site ID directory (*P:\CPUC1012\P12810_CSS_CMST\OnSiteSurveys\CompletedSites*). The surveyor will then send an email to Sue Burrus, to let her know that the survey form has been uploaded to the drive. No site forms or photos should ever be transferred via email due to security. The only methods of remote transaction include direct VPN uploads to Itron networks and Itron secured SharePoint sites.

- ***For Contractor Staff (ASW, RTB, KEMA)***. Once the forms have been scanned, the contractor field staff will upload the file and site photos to Itron's SharePoint site, per the *SharePoint instructions (SharePointSecureFileTransfer.docx)*. The surveyor will then send an email to Ben Cheah and Sue Burrus, to let her know that the survey form has been uploaded to the drive.

– Per the non-disclosure agreement (NDA) Itron signed with the CPUC, no site information can be emailed, even within Itron. This includes contact information, addresses, and no survey forms. Survey forms must be uploaded to the server or to the SharePoint site. In addition to these requirements, Itron requires that any document with customer information that is uploaded to the SharePoint site must be 128-bit encrypted and password protected. Each company will have their own password that they should use to protect the documents uploaded to the site.

– The completed hardcopy survey forms and photos will be sent into the San Diego office (via FedEx or other envelopes provided by Itron) on a weekly basis. The forms should be sent to: Attn: Sue Burrus, 11236 El Camino Real, San Diego, CA 92130.

– If a site is considered "LOST", a brief site disposition needs to accompany the daily status update email. The disposition should be detailed enough for whoever is marking the site as lost, to assign it to one of the standard lost site dispositions.

- **Receipt/Intake of completed survey forms.** Once the survey forms have been received in San Diego, Sue Burrus will update the Site Tracker excel spreadsheet to reflect that the survey forms and photos have arrived in San Diego, to set gift card status, and mark that the submitted forms are ready for QC. She will also scan the survey forms onto the drive, file away the original copies, and follow-up with field staff who did not provide photos. If a reason for not taking photos is provided, then an empty "NoPhotos.txt" file will be added to the directory.

- **Engineering survey form QC.** The QC team will then be able to filter on the sites that are "ReadyForQC", choose the site to be QCed and change the cell value to reflect the name of the QCer. A copy of the form will be printed and "QC Copy" will be written across the top of the form in large, bold red letters. QCers will review the form and make as many corrections/completions as possible, but follow up with field staff as needed to resolve more complex issues and questions.

  – **Pilot Test Surveyor Evaluation Phase.** Until the field staff person has been certified, every QCed survey form will be reviewed with that person in detail, and not just the unresolved issues. This is part of evaluating the field staff's capabilities, and correcting any issues before they can start surveying on their own/full-scale.

  – **Major survey form QC Issues.** If the QC process identifies issues that need a surveyor's response, the original surveyor will be notified via email or phone call, to

resolve the issues as quickly as possible and keep the QC process moving. However, if additional/extensive effort from the surveyor is needed, an email with issues will be sent to the surveyor, and the Site Tracker will be updated to reflect the fact that the paperwork has been sent back to the surveyor for QC changes. The QC form will remain with the QCer.

- **Correction of major QC issues.** When the surveyor fixes any issues found by the QC team, and returns the corrections to the original QCer, one more round of QC will happen. If issues are still found, the forms will be returned to surveyor one last time.

- **Engineering QC complete.** Once all issues have been resolved and cleaned up, the forms will be passed on by the QCer to Sue Burrus, who will update the Site Tracker to show that the forms have been QCed and are ready for data entry. San Diego QCers will give Sue the hardcopy, which will be scanned, saved to the hard drive, and used directly for data entry. Oakland QCers will scan the QCed form themselves (save as SiteID_QC.pdf), save to the drive, update the tracking sheet to reflect that the survey form has been QCed and is ready for data entry, and then email Sue with a list of those sites (Sue will print out the final form and pass along to data entry, and it will also be filed in the site folder after data entry). Regardless of QCer location, all other scanned copies of the survey form should be moved to the "archive" subdirectory (create one if one is not present), so that only the final version remains in the main directory.
- **Data entry of survey forms.** Data entry will be completed by Sue Burrus and the data entry team, who will file away the QC Copy of the survey form along with the original once the data entry has been completed. The data entry team will attempt to fix any issues that may be identified, that slipped past engineering QC. If they are unable to do so, Sue will follow-up with the original surveyor, the engineering QC person, and possibly the data entry system creator as well.
- **Site-level Data QC/Analytics-metrics-reviews.** Once data entry is completed for a site, the QC process continues. The engineering leads, with support from analyst staff, will need to review a set of site, building, and activity area level metrics (LPDs, conditioned floor areas, whole building energy intensities, etc.) calculated from the data, and generated either by Access queries/reports or SAS. Any issues found with the data at this level will need to be corrected in the data, but may also require additional follow-up with the surveyor.

4

Specialized Scenarios

This section describes specialized scenarios where alternative on-site methods may be required. These scenarios include the following:

- Sampling Procedures for Large Sites
- Multi-family Common Area Protocols
- Master-Metered Multi-Tenant (MMMT) Sites

4.1 Sampling Procedures for Large Sites

The following procedures explain the sampling techniques a surveyor should use when surveying a large premise, or one where access to some areas is limited. A large premise is defined as one where the total premise floor area is greater than 25,000 ft^2. This facility may consist of multiple buildings or floors. The following procedures are highlighted in this subsection:

- General Sampling Overview
- Building-Specific Scenarios

4.1.1 General Sampling Overview

Sampling is defined as surveying a portion of a space, floor, building, or premise to represent that entire area. These sampling procedures are to be used when portions of the premise or homogeneous (similar) space is greater than 25,000 ft^2. The surveyor should consider (but not limit themselves to) the following items to determine whether a space could be deemed homogeneous:

- Are these spaces all the same activity area?
- Are the areas a similar configuration[4]?
- Do the areas have a similar lighting load?
- Are the areas served by the same type of HVAC system?
- Do the areas follow the same schedules?

[4] Similar configuration would include a similar square footage and similar layout.

If there are any doubts whether the sampling approach is appropriate for a specific space, the surveyor should proceed to survey the entire area instead. If the area is in fact too large to efficiently survey, the surveyor should contact Ben Cheah or Bob Ramirez for further instruction.

The surveyor must sample at least 1/3 of the entire facility. Using this approach, the surveyor would record on the survey form only the counts of equipment that they physically surveyed. These counts would then be scaled up using the *Activity Areas Definitions* form (Section 5), which allows the surveyor to record the number of rooms of each Area ID actually surveyed, and the total represented number of rooms of each Area ID in the facility, see below:

Area ID#	Building ID #	Activity Area Code (AA Code)	Surveyor's Description of Area	% of Total Represented Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Actually Surveyed	Total Represented Qty of this Area Type On-site	End-Uses NOT Surveyed (all that apply - Explain)	Similar to these Area ID groups (MM-MT Only)
1					W S				LT OF TV	
2					W S				LT OF TV	
3					W S				LT OF TV	
4					W S				LT OF TV	

Rather than scaling up the quantity of measures on the individual inventory forms, all different measures can be scaled up at the same time, including TVs, Lighting, and Office Equipment. This relieves the surveyor of having to manually scale up on the inventory-specific pages, for each measure individually. Scaling of the equipment quantities would all be done during the data analysis phase. An example of how this would work is shown below:

- A site with 10 total offices, where the surveyor sampled 4 of them. Each office sampled had 5 LF fixtures, 1 computer and monitor, 1 telephone, and 1 printer.
  - The surveyor would record on the ACTAREA form, that they surveyed 4 out of 10 offices. On the general lighting inventory form, they would record that they counted 20 LF fixtures. On the office equipment form, they would record 4 computers and monitors, 4 printers, and 4 telephones. When the analysis is done, this would be scaled up, based on the "Total Represented Qty of this Area Type On-site".

Sampling 1/3 of the facility can be accomplished in several different ways:

- **Sample of floors in a high-rise building:** If a 10-story high rise building is surveyed, the surveyor may sample 1/3 of the unique floor types in the facility. However, sampling should not be performed blindly. If the bottom floor is a large lobby with a restaurant and floors 2 through 10 are all similar office suites, the bottom floor must be surveyed,

while the floors 2 through 10 should be sampled. Based on this 1/3 rule, the surveyor should survey a minimum of 3 floors (in addition to the first floor), but not more than 6.

- **Sample of guest rooms in a hotel/motel:** A hotel or motel will generally have different types of rooms, ranging from standard rooms, deluxe rooms, one-room suites, two-room suites, and others. Each of these unique room types should be sampled using the same 1/3 rule. The surveyor should survey a minimum of 3 of these similar spaces, but not more than 6[5]. The surveyor will also need to note down the total number of rooms of the same type, and record them in the Activity Area Definitions page. Other areas of a hotel that would be surveyed, but not necessarily sampled, may include kitchens, employee break rooms, common lounges, and common restrooms.
- **Sample a homogeneous space:** Any large facility will often include other types of homogeneous spaces. These spaces may include similar offices, similar floors, similar hallways, similar buildings, or other spaces. The onsite surveyor should use the same 1/3 rule that applies to floors and hotel guest rooms, surveying 1/3, with a minimum of 3 of them, but not more than 6.

4.1.2 Building-Specific Scenarios

These procedures address the following situations:

- **School campuses:** A school campus will consist of multiple types of buildings, including but not limited to classrooms, gyms, cafeterias, laboratories, locker rooms and offices..
- **Hospitals:** Hospitals can consist of single or multiple building facilities with multiple wings or additions.
- **Large Office Buildings:** Office buildings may have multiple floors with different configurations and spaces that will be inaccessible.
- **Restricted Access Sites:** These may include military complexes, or defense contractors which have sensitive and confidential material.
- **Large Campuses:** These campuses reflect areas that are far too large to enter every single building. These would include large hospital campuses, office campuses (think of the Google Campus) or university campuses.

These procedures to be followed for these facilities are described in detail below. This list is not comprehensive of the different unique situations a surveyor may come across, but if possible, the techniques listed here should be used by the surveyors to handle other situations they encounter.

[5] In a large hotel, it is likely that the 1/3 rule would not apply, and the surveyor would end up sampling a quantity of 6 of each unique room type.

School Campuses

The first step for the surveyor when they arrive at a school would be to ask for a copy of a site map, like one shown in Figure 4-1. A school map allows the surveyor to easily determine a sampling approach to take. Each unique area needs to be surveyed. For these large school campuses it is not always possible to survey every building. In cases where it is not possible surveyed buildings can be used to represent the non-surveyed building if they have similar activity areas, schedules and loads. The approach for each of the different areas in the site map is highlighted here:

- **Classrooms:** A quick look at the site map indicates that there are approximately forty-one classrooms across 13 buildings. As it is not possible to actually enter all classrooms, a sampling procedure needs to be determined. For the buildings that hold only classrooms, the surveyor should enter all of the buildings in order to verify that they all have similar equipment and loads. While all of these buildings should be quickly walked through on the survey form buildings with primarily classrooms and built at similar times can be grouped together into one activity area. Within these buildings, the surveyor should attempt to survey 1/3 of the classrooms, no less than 3 and no more than 6.
- **Portable Classrooms:** Portable classrooms should be surveyed like a single building. Based on the site map, 7 portable classrooms can be found onsite. Assuming that all 25 of these portable classrooms are of the same configuration, 1/3 of these should be surveyed, which equals 6 portable classrooms being surveyed.
- **Theater:** The Theater is a unique building and should be surveyed.
- **Gym:** The gyms are unique, and should both be surveyed.
- **Cafeteria:** The cafeteria is a unique area, it should be surveyed.
- **Kitchen:** The kitchen is a unique area, it should be surveyed.
- **Locker Rooms:** The locker rooms are unique areas, they should be surveyed.
- **Library:** The library is a unique area and should be surveyed.
- **Administration Offices:** The administration offices are unique buildings. As there are many offices in the building, 1/3 of the offices should be surveyed, no less than 3 and no more than 6.
- **Laboratories:** The site map only shows a single laboratory, so it should be surveyed.

Figure 4-1: Sample School Map

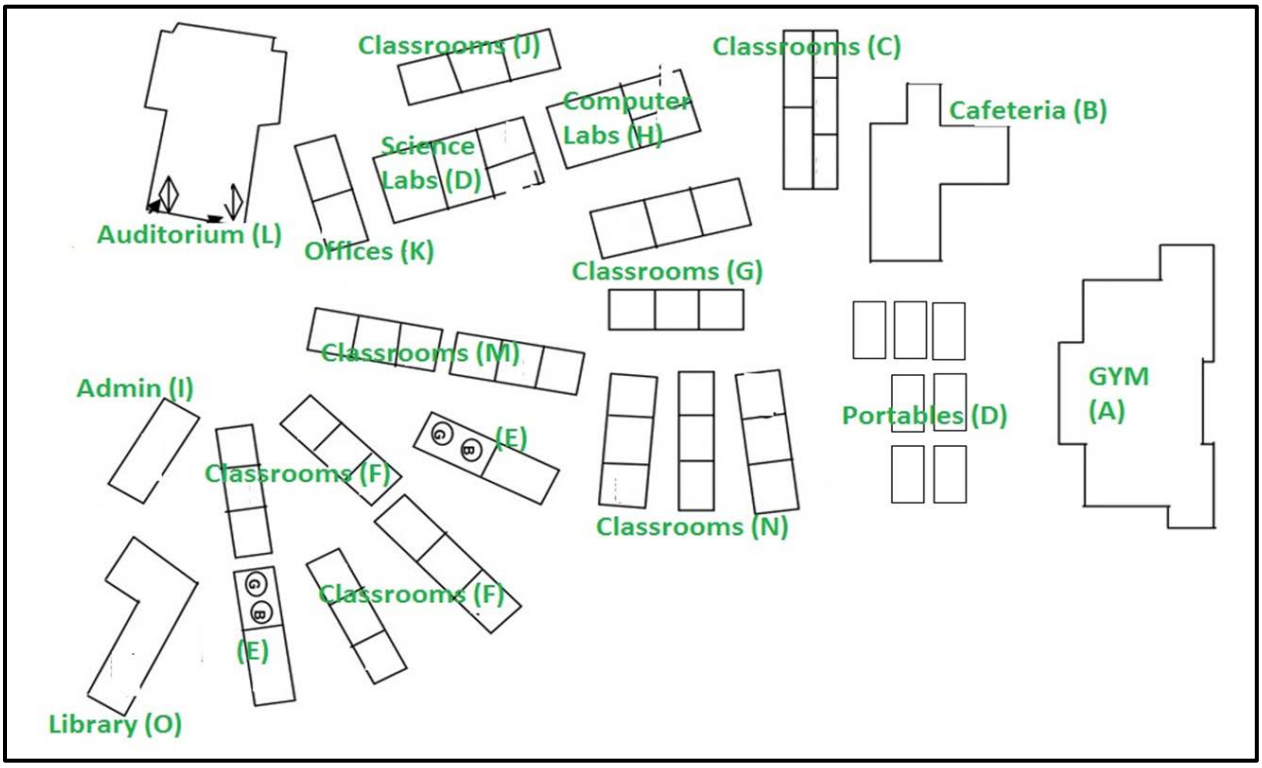

Figure 4-2: Activity Area Definition Sheet

Area ID#	Building ID #	Activity Area Code (*AA Code*)	Surveyor's Description of Area	% of Total Represented Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Actually Surveyed	Total Represented Qty of this Area Type On-site	End-Uses *NOT* Surveyed (*all that apply - Explain*)	Similar to these Area ID groups (*MM-MT Only*)
1	F	7.1	Building F	80	W S	CH	4	12	LT OF TV	--
2	F	44	Building F – Restrooms	20	W S	UN	1	4	LT OF TV	--
3	M	999	Building M	100	W S	CH	0	2	LT OF TV	1-2
4	J	999	Building J	100	W S	CH	0	1	LT OF TV	1-2
5	C	999	Building C	100	W S	CH	0	1	LT OF TV	--

Hospitals (CMST-only)

Hospitals are tricky sites as they are very large, and can include multiple buildings or multiple wings. However, the fact that they are CMST-only sites offers some relief. The activity areas that should be surveyed include, but are not limited to, offices, exam or surgery rooms, patient-care rooms, laboratories, storage rooms, cafeteria and break rooms, kitchens, hallways, lobbies and waiting rooms, restrooms, and many more. In order to survey the facility as efficiently as possible, the surveyor should take the following steps:

- **Obtain a site map from the site contact:** Similar to schools, a hospital should have a site map that they can provide, which shows at the very least, the different buildings and different wings at the facility.
- **Identify from the site contact where the CMST-measures are located:** As hospital facilities will be CMST-only sites, the site contact should be able to specify which areas on the site map have the installed CMST-measures.
- **Plan a sampling approach:** Based on the site layout and where the CMST-measures are located, sampling of the site will likely have to be performed. In the most complicated scenario, where new linear fluorescent lighting is installed throughout the facility, an approach similar to the one described for schools would have to be taken. Every unique area ID with CMST-measures should be surveyed, and the 1/3 rule should be taken for any similar floors and similar areas, surveying 1/3 of the similar areas, no less than 3, and no more than 6.

Large Office Buildings

Large office buildings with multiple suites, offices, and floors, will need to be sampled. There are two different scenarios where different approaches will need to be taken.

Single-Business Offices: These office buildings will generally have just a single, or possibly a few different electrical meters for the site, but they will all be paid for by the same company. In this scenario the entire office should be surveyed. Depending on the size of the office, it may have to be sampled, using the same 1/3 approach taken for hospitals and campuses. One third of the floors should be sampled, no less than 3 and no more than 6. In the same manner, 1/3 of the offices on each of those floors should be surveyed. Other unique areas should be surveyed, like restrooms, break rooms, hallways, and storage and copy rooms, to name a few.

Multi-Tenant Offices: A multi-tenant building will work much the same as a multi-family or a lodging facility does, depending on whether the meters onsite serve the facility as a whole, or if there are individual meters for each suite.

- **Master Metered Offices:** A master metered office, regardless of whether it is a multi-tenant facility or not, should be surveyed in the same manner that a Single-Business Office is. As the property managing company pays the electrical bills for the entire facility, the entire facility should be surveyed. This will require the surveyor to get permission ahead of time to enter the leased suites.
- **Individual Meters for each Suite:** An office building with multiple tenants, who are all on individual electric meters would be surveyed in much the same way as a multi-family facility would be. The common areas of the facility would be surveyed, which may include hallways, restrooms, lobbies, and outside lighting. If the facility is a high-rise

office building, the floors should be sampled following the same procedures; 1/3 of the floors, no less than 3 and no more than 6. However, like everything else, all unique areas should be captured.

Restricted Access Sites

Some premises (offices with DoD contracts, or certain military sites) may not be open to public gain. These premises will simply not be able to be included in the final sample. Other premises may be open to surveyors, but have specific areas with restricted access. This is typically true in research sites, where labs may be off-limits. There are few good options available for the treatment of areas with restricted access. Surveyors will be trained to probe to the extent possible for information about the types of activities conducted in the restricted area and for rough estimates of connected loads and operating schedules. Moreover, surveyors will request site layouts in order to ascertain square footage, lighting connected loads, and other structural characteristics of the restricted areas. However, if more than 10% of conditioned space is inaccessible and a good estimate for the equipment in this space cannot be obtained, the site should not be surveyed.

Large University/Office/Hospital Campuses

Areas like large hospital campuses, or university campuses, that have far too many buildings associated with the premise to enter them all, will have to have a sampling plan created. In these cases, the surveyor assigned the site should notify Ben Cheah, Bob Ramirez, and Jean Shelton ahead of time. The site contact will need to be notified, and a copy of a campus map, blueprints, and other additional information[6] will need to be reviewed. This may require a visit by the surveyor to pick up any material. The material will be reviewed back in the office, and a sampling plan will be created for the surveyor. This plan will be based on the number and type[6] of buildings in the campus. The surveyor will schedule a second visit and inform the site contact of the sampling plan that has been drawn up. Within each building visited, the surveyor will probably have to take a sampling approach, and should follow the instructions in the rest of this document on how to sample the buildings.

4.2 Multifamily Common Area Procedures

A multifamily site consists of two primary space use types: public or common areas and residential areas. The distinguishing feature of a multifamily site versus a commercial lodging type site is that the common areas are typically treated and billed at commercial rates and the

[6] Basic information needed includes, but is not limited to, building activity, size of the building, and vintage.

residential units are separately metered and billed under residential rates.[7] As the focus of this survey is on commercial customers, the CSS-CMST survey will focus on the commercial (common area) space that is served by the commercial rate meters. Area types that will typically be surveyed as part of the site visit will include, but are not limited to, offices, walkways, parking lots[8], laundry rooms, gyms, hallways, pools, maintenance/storage areas, and recreation areas. The following procedures highlight the approach to take when a surveyor is assigned a multifamily site. In this section, the following topics are discussed:

- Multifamily versus Lodging (hotel/resort) site;
- CSS-CMST[9] versus CMST-only site approaches;
- Scheduling of the site (what questions to ask before going on site); and
- On site issues, survey techniques, and filling out the form for:
  - Survey Area,
  - General Premise Info,
  - Electric and Gas Meters,
  - Building-Specific Information,
  - Activity Areas,
  - Building Shell Construction and Windows, and
  - Central HVAC System.

4.2.1 Multifamily versus Lodging (Hotel/Resort) Site

In some, resort-style sites, it will be difficult to tell whether a site is a multifamily facility or a hotel/resort. The differences are as follows:

- **Multifamily Site:** This entire site will either have individual tenants who occupy the residential units or the complex could be an apartment complex, occupied by renters, or it could be a condo association, occupied by individual unit owners. The distinguishing feature in either case is that each residential unit has its own electric meter, and the common areas are on their own meter(s).

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7 Master metered sites (common area & residential units served by the same meters) are a mixed bag: Some utilities treat these as residential, some treat them as commercial.

8 Parking Lots are different than individual parking garages. In some multi-family facilities, each unit has its own parking garage, which may be open, but possibly include locked storage. These specific parking spaces will be considered "residential spaces" and should not be surveyed.

9 Any reference to a CSS-CMST site in this document will refer to either a CSS-only site or a combined CSS and CMST site.

- **Lodging (Hotel / Resort) Site:** This site will not have individual owners or tenants of their rooms. The separate units will be rented on a nightly or possibly a weekly basis, but will not have long-term occupants. These sites may also have time shares that are shared by multiple occupants throughout the year. These sites may have either a single, or just a few electric meters onsite, but will not have a separate electric meter for each unit.
- **Multifamily Master-metered Site:** In some situations, a surveyor may come across a site, like a nursing home or rehab center, where the entire facility is on one of several commercial meters, yet there are living quarters that hold semi-long to long-term residents. These sites may need to be treated on a case-by-case basis, and if identified early enough, should be clarified with the site contact during the scheduling process. If the onsite surveyor cannot determine whether it should be considered a lodging site or a multi-family site, they should immediately call Ben Cheah or Bob Ramirez for clarification.

In the multifamily scenario, the surveyor will not survey any portion of facility that is part of a residential unit. This means that the surveyors will not enter any residential units, or survey any outside lighting that is controlled by the occupant of the residential unit, like the lights on the balcony or porch. In a hotel/resort scenario, the surveyors will survey the entire facility, including the individual rooms (sampling approach used for the hotel rooms). Everything served by the common area electrical meters at the site should be surveyed.

4.2.2 CSS-CMST versus CMST-Only Approaches

When it comes to multifamily areas, before the site is even called, it is necessary for the surveyor to determine whether the site is a CSS-CMST site or a CMST-only site. If the site is a CSS-CMST site, then the surveyor will still have to survey everything in the common areas, including lighting, HVAC, office equipment, televisions, and commercial refrigeration equipment. *If the site is a CMST-only site*, only the targeted end-uses (TV, HVAC, and/or LF) will be surveyed. For example, if a site is a CMST-TV site, only the TVs in the common area will be inventoried. Likewise, if a site is a CMST-HVAC site, only the HVAC units supplying the common areas will be inventoried. For a CMST-only site, the surveyor will need to check with the site contact while scheduling the on-site visit, to make sure that the CMST measures are in fact serving common areas, and not serving residential units.

4.2.3 Scheduling of the On-Site Visit

These on-site visits should be scheduled ahead of time, as often the multifamily facilities may not have an on-site office, or the office may hold odd business hours. There will also need to be someone knowledgeable at the site that will be able to grant the surveyor access to locked storage rooms or common areas that might require a key or a code to enter. The following questions should be asked by the surveyor while scheduling the on-site visit:

- **If CMST-only site:** Are any of the CMST measures in residential units, or are they all located in common areas? For example, the surveyor might ask: "The information I have indicates that you recently purchased 100 TVs. Are any of those located in the residential units, or are they all located in common areas?"
- Will there be access on site to all common areas?
- **If CSS-CMST site or CMST-HVAC site:** Where are the HVAC systems located? If they are rooftop units, is there rooftop access?

4.2.4 On-Site Issues, Surveying Techniques, and Filling Out the Form

This final section discusses on-site issues and questions that will come up when surveying this type of facility. This covers what to survey, how to fill out the survey form on certain areas, and different scenarios that might arise that will need clarification. As always, if something comes up onsite that is not covered in this document, or needs clarification, *the surveyor should call Ben Cheah, Bob Ramirez, or Jean Shelton immediately.*

Survey Area

As mentioned in the beginning, the multifamily common area consists of the management office, interior hallways and walkways, stairwells, gyms and game rooms, pool houses, laundry rooms, and any other area that is able to be accessed by the management and/or all tenants. All exterior lighting would also be included with the common area, with the exception of the lighting located on the porches of the individual units if they are controlled by the occupant (and hence on the residential meter). For CSS-CMST sites, the detailed building type and activity area information will only reflect that for the common area spaces. The addresses and meters serving the common area

General Premise Information

The general premise information form asks for information regarding the facility as a whole. This includes information on square footage, percentage of heated and cooled floor area, number of buildings, and parking garage information. Most multifamily sites usually have a site plan or map, and those should be used as much as possible, and can even be used instead of a hand-drawn sketch, as long as they are labeled with survey notes.[10] Although the surveyed area of the site is supposed to only include common areas, there is still some general information that must be recorded for the site as a whole:

[10] See site plan examples here:
W:\CPUC1012\P12810_CSS_CMST\OnSiteSurvey\Procedures&Handbook\MultifamilySitePlanExamples

- **What is the total occupied floor area of this facility?** The floor area of the entire premise, not just the common areas, should be entered[11]. This includes the area of the residential units also. Notes about how these values were determined should be entered in the General Comments section of the form.
- **What percentage of the total floor area is heated/cooled?** This question also applies to the entire facility, not just the heated/cooled floor area of the surveyed common areas.
- **How many buildings are part of this premise?** This question also applies to the entire premise, not just the buildings that have common areas.

Electric and Gas Meters

As mentioned above, the electric and gas meters listed for the facility should only be the meters associated with the common areas. This will likely be impossible to determine without the help of the site contact, unless the meters have addresses or other notes written on them. As with any site, the surveyor should be resourceful when trying to obtain this information, and if the meters are not accessible, ask the site contact for access and/or obtain a copy of the electric and gas bills, and check the meter numbers on the bill.

Building-Specific General Information

The *Building-Specific General Information Form* should only be filled out for buildings common areas associated with that building (inside or outside). If a building consists only of residential units, with no common hallways where lighting is possibly, or indoor conditioned common areas, then no *Building-Specific General Information Form* needs to be filled out for the building.

However, if a building does have common areas associated with it, the field "*Total **surveyed** floor area"* should be filled out for only those common areas. If the building only has a common laundry room, with an area of 200 ft^2, then the "*Total **surveyed** floor area*" for that building should be 200 ft^2.

Activity Areas

The surveyor should list all unique types of common activity areas at the facility. This should include areas like hallways, stairwells, exterior lighting, parking lot lighting, laundry rooms, and others. On the *Building-Specific General Information Form*, the field "*% of total building floor area*" should also be filled out, but in the case of a multi-family common area site, this number should include just the surveyed floor area. These percentages should add up, by building, to

[11] For CMST-TV sites, this should just be a quick estimate from the site contact or from Google Maps, but for all other sites, this information should be measured by the surveyor.

100%. The point of this field is to capture the square footage of each of the different activity areas, so the total value used should be that of the surveyed common areas.

The following three figures provide an example. If a facility has a single multi-family building, with a total area of 4,000 ft^2, then the *Premise-Level General Information Form* would be filled out to reflect that, as seen in Figure 4-3.

Figure 4-3: Premise-Level General Information Form

What is the total occupied floor area of this premise?	*CC2a / CC2b* ft^2	Revised	4,000 ft^2
-- If the premise has an enclosed parking garage, what is the floor area? (exclude from above ft^2)			ft^2
What percent of the total floor area is heated or cooled?	*CC2c / CC2d* %	Revised	90% %
How many buildings are part of this premise?	*CC1a*	Revised	1

However, the building consists of only residential units, and a single laundry room and two storage rooms. The surveyor would survey all three rooms, and record the area of these three rooms on the *Building-Specific General Information Form*. In this example, the laundry room is 200 ft^2, and the storage rooms are 100ft^2 each; see Figure 4-4.

Figure 4-4: Building-Specific General Information Form

Building Type: **B** = 1 building, single footprint **MB**=Multiple Buildings **P** = Part of a building **OT** = Other	(B) MB P OT
Total **surveyed** floor area	400 ft^2
Total number of floors	2
Is there a parking garage below the bottom floor?	Y (N)

Finally, the *Activity Area Definitions Form* is to be filled out. The two common area activity areas are recorded. The field "*% of Total Building Floor Area*" in the multi-family common area scenario, is actually % of total surveyed floor area. As shown below, the Laundry Room is 50% of the total surveyed floor area, and the Storage Rooms (combined area) is equal to the other 50% of the total surveyed floor area.

Figure 4-5: Activity Area Definitions Form

Area ID#	Building ID #	Activity Area Code (AA Code)	Surveyor's Description of Area	% of Total Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Type On-site
1	A	25	Laundry Room	50	W S	UN	1
2	A	49	Storage	50	W S	UN	2

Building Shell Construction and Windows[12]

The *Building Shell Construction and Windows Form* will only be filled out for surveyed buildings where the floor area of the common areas is larger than the floor area of the residential areas. In the case where the entire building consists of residential units, and a single laundry room, the *Building Shell Construction and Windows Form* should not be filled out, and a comment should be made in the *General Comments Form* as to why the form was not filled out. However, if a surveyor arrives at a two –building facility and finds out that Building A is mostly a residential building, but Building B consists only of a gym and a recreational room, then the *Building Shell Construction and Windows Form* should be filled out only in regards to Building B, and a comment should be made in the *General Comments Form* as to why only the form was only filled out for Building B.

[12] The Building Shell and Windows form is only filled out for CSS-CMST sites. CMST-only sites are not required to collect this information.

Figure 4-6: Site Map Example

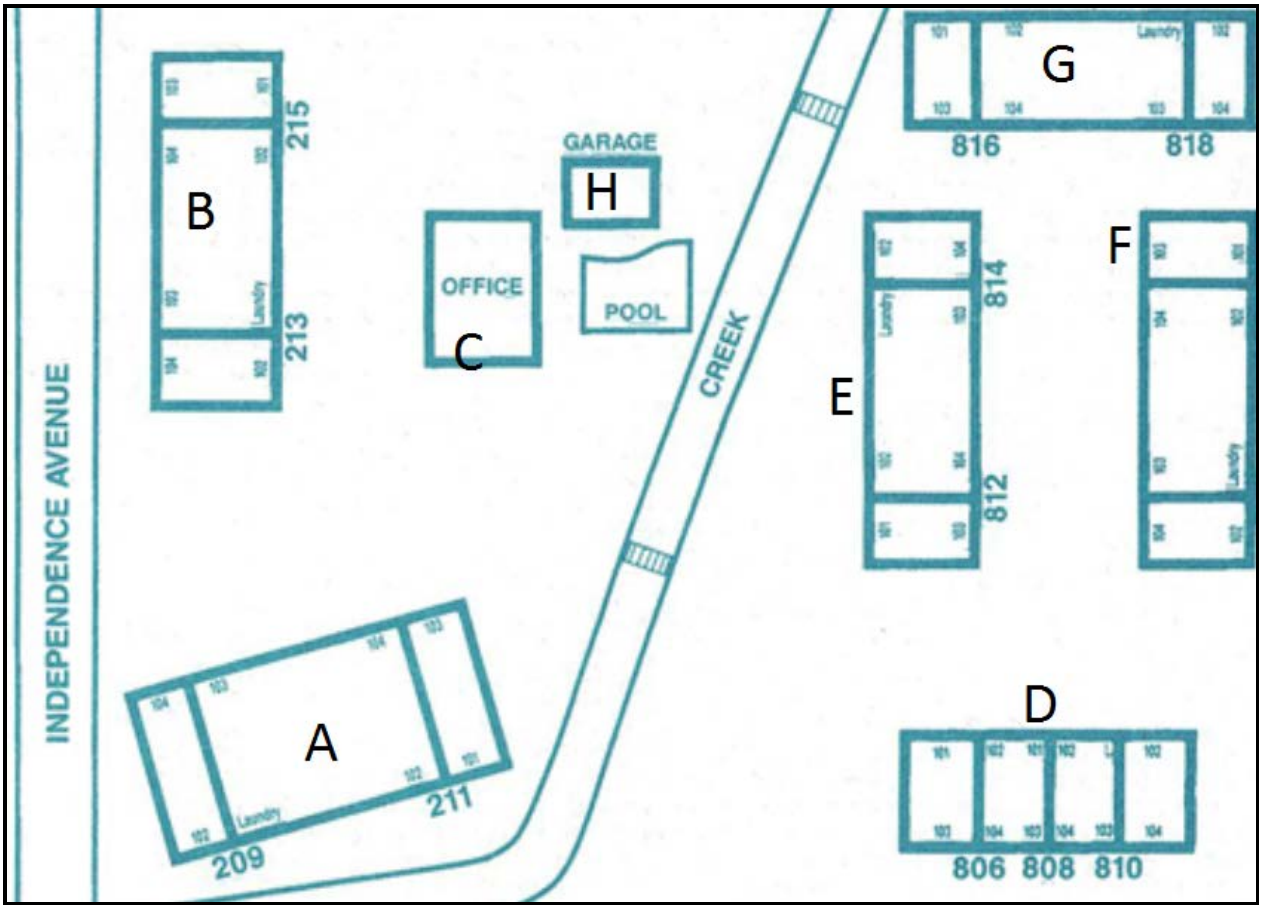


Figure 4-6 above shows an example of a Multi-family site with multiple buildings. All buildings except for buildings C and H are considered mostly residential units. As Building H is a parking garage, and not considered part of the premise total floor area, the *Building Shell Construction and Windows Form* does not need to be filled out for it. Therefore the only building that needs this window and shell information recorded for is Building C, as shown below in Figure 4-7.

Figure 4-7: Building Shell Construction and Windows Form

Windows / Fenestration		BldgID	C
(record glass doors here too)		Item	#1
Operable Window?			(Y) N
# of Panes (1, 2, 3)			2
Film/Glazing Type	C=Clear T=Tinted R=Reflective O = Opaque L = LowE		C
Window Frame Type	M=Metal W=Wood V=Vinyl O=Other		W
Interior shading type	F=Fixed M=Moveable N=None		N
% of Window to Wall Installed on:	-- Front Wall		10
	-- Left Wall		15
	-- Back Wall		25
	-- Right Wall		20

HVAC Issues

Some facilities might have a central HVAC system that serves both the common areas and the residential areas. If this is the case, any system that serves the common areas should be inventoried. However, a note should be made to state that the system also serves the residential units too. If possible, the surveyor should also record how many residential units the system serves.

4.3 Master-Metered Multi-Tenant Survey Procedures

For large premises, it is often difficult to determine how to proceed. This section provides general guidance and examples to address one of these situations, the Master-Metered Multi-Tenant site (MMMT). If not specifically stated otherwise, these protocols apply to any and all CSS-CMST sites. If the protocol is different for a CMST-Only site, the difference will be noted. When surveying these larger, more difficult sites, it is important to keep in mind the overall survey objective, which is explained below.

4.3.1 Site-Level Survey Objectives

The primary objective of these on-site surveys is to capture site characteristics and to get the best representation of the CSS-CMST targeted equipment for the entire site.[13] The "best" representation as determined for this project means the survey should meet the following objectives (presented in their order of importance):

13 A site is ideally everything on the meters associated with the SiteID as created by Itron's site aggregation approach. The meter numbers found on site need to be recorded and checked, however, because off-site meter aggregation may form an incomplete or inaccurate aggregation. Meter numbers are also subject to change.

- Capture the targeted equipment characteristics which will be used to develop equipment saturations.
- Characterize the primary activity area and business types that are found on site.
- Accomplish this within the constraints of the project, which for larger sites means the judicious use of sub-sampling of survey areas and equipment.

It is important to remember that each of the 1,800 CSS sites is a sample point, and it will be weighted up to represent a much larger number (1000's) of other similar sites within the IOU service areas. As such, it is critical that every site be surveyed to provide an accurate representation of the site and the equipment at the site.

4.3.2 Master-Metered, Multi-Tenant (MMMT) Site Description and Issues

Master Metered Multi-Tenant (MMT) sites are typically commercial businesses that have a single electric meter that serves a single building that is occupied by multiple tenants who lease space from a property management company.[14] The utility bill is paid by the building/property manager, and typically, the property management company also occupies at least one of the suites in the site. The primary issue with these sites is that the equipment in the tenant spaces needs to be characterized, but it is difficult to gain access to these spaces because the property manager is the only contact available from the phone survey. Furthermore, in order to access the tenant spaces, the property manager is almost always required to give the tenant's prior notice – typically 24 to 48 hours, but sometimes as long as a week! Ideally, all the tenant spaces would be accessed and surveyed. However, for most MMMT sites, sub-sampling will have to be used due to time and accessibility limitations. Sub-sampling is further complicated when the tenants are significantly varied in their business type, the density of targeted CSS-CMST equipment types, the floor area/size of the suites, or their business hours. The more varied the tenants are in any of these parameters, the less effective sampling becomes, and the more difficult it is to get the "best" representation of the site. Guidelines for surveying this type of site are discussed in detail in the next sections.

4.3.3 Pre-Visit Identification of an MMMT Site

Unfortunately, these types of sites are often difficult to identify from just the utility CIS frames and even the phone survey process. However, it is important to try to identify these sites before visiting the site, since it is critical that tenant's spaces be accessed.

[14] This is a key distinction because individual businesses (tenants) who have their own utility/IOU meters would show up in the utility CIS frame as separate sample points and have their own unique SiteID.

The steps that can be taken above and beyond the normal pre-visit steps (like checking the business on Google Maps) are:

1) **Check Premise-Level General Information.** If the phone survey business type shows "Mixed-Use / Multi-Tenant", this is probably an MMMT site. Sites that are identified as malls or strip malls are also likely to be MMMT sites. To confirm, review the meters and do an EI check as explained further on.
2) **Meters and Annual Energy Intensity (EI) check.** This is the best way to identify a MMMT site. Typically, only a single electric meter and a single gas meter will be listed, consumption will be very large, and there will not be any suite numbers in the meter service address or the suite number may be a house meter (HM) or management suite (which can be seen on the CIS-Info page). The EI is just the annual electric energy use divided by the total floor area associated with that meter(s). For this initial check, use the total occupied floor area as pre-populated on the Premise-Level General Information form (if a range, use the midpoint).
    a. A typical range for offices is 12-15 kWh/ft^2, but it may be as low as 8 or as high as 20+ kWh/ft^2 for low or high-intensity offices, respectively.
    b. If the calculated value is off by an order of magnitude, for example 120 to 150 instead of 12-15, then chances are that this is an MMMT site and the property manager only provided the floor area for the suite that they occupy, and not the total floor area for the building that is served by the master meter(s). If the site has a very high EI, please contact Ben, Bob, or Jean. They will review the site aggregation to ensure it is as accurate as possible.
3) **Cover Sheet, Service Address vs CIS-INFO sheet.** If the service address and/or suite #s on these two forms are different or conflicting, this is already an issue that needs to be investigated. Typically for MMMT sites, the cover sheet will show specific suite numbers but the service addresses on the CIS-INFO sheet will not contain any suite numbers. If you are concerned by the addresses, please contact Ben, Bob, or Jean with your questions.
4) **Cover Sheet, Business Name.** If the business name contains the building address, or the words "management" or "property", etc., that may be an indication that this is an MMMT site.
5) **Check www.loopnet.com[15], Property Records\Tenant.** If additional confirmation is needed or none of the other checks confirm an MMMT site, you can use www.loopnet.com to confirm this. The Property Records, Tenant tab will show a list of the current and past tenants. If multiple tenants are shown, the loopnet.com building floor area is close to that reported on the survey form, there is only a single meter, and the

[15] Itron has a log in that can used to access the site. Contact Ben or Bob for the login.

EI is within the expected range, then this is likely a multi-tenant building. Note that vacant space will not show up, though sometimes old tenants will be displayed.[16]

This preliminary research will help the surveyor determine the number and type of tenants that should ideally be surveyed in order to get the best representation of the site and it's equipment, as well as any other questions they should ask on the phone when they call to schedule the site.

4.3.4 Pre-Visit Scheduling Procedures and Information Requests

For a master-metered multi-tenant site, much more information is needed than for a single customer site, and the majority of this is needed to characterize the tenant spaces and decide on a sampling approach. As described in the Scheduling Procedures document, prior to arriving on site, the surveyor must attempt to make initial contact with the site contact. It is *especially* critical for these sites due to the tenant access issue mentioned previously. If the hard scheduling procedures have been followed without success, then a cold call may be used as a last resort for these sites. This is only a last resort because it will typically require two site visits to complete the survey. The first visit would be used to gather the data needed to design a sampling approach, collect common area information, and to request tenant access. The second visit would be to survey the tenant spaces at a future date.

In addition to the normal pre-visit requests like roof access, the information requests needed for a MMMT building are:

Confirm that the Tenant Suites are not Individually Metered: If the tenant suites *are* all individually metered *by a utility/IOU meter* (not a private sub-meter), then this *not* an MMMT site. This can also be confirmed by checking with Itron's CIS billing frame analyst. If the tenants are individually metered please call Ben, Bob, or Jean.

Determine the Number of Suites, Size of Suites, and Tenant Business Types: Get the total number of suites and determine the range of sizes, the general business types, and general hours of operation. The objective is to be able to group similar businesses together for sampling. This will help the surveyor assess how many different tenant spaces will need to be surveyed to effectively represent the entire premise, and possibly how long the site will take to complete. Ask if they have an electronic listing of the building directory.

Request Access to Tenant Spaces: As previously discussed, access into at least some of the tenant spaces is required. Without the inclusion of the tenant spaces, a large portion of the site's equipment would not be represented. Ideally, the surveyor should try to get into at least 3 tenant spaces, and assuming the space are not substantially dissimilar, no more than 6 tenant spaces. If

[16] It is important to note that loopnet.com may not have information on every building, so the surveyor should be prepared to collect this information on site.

the tenant space are very different from each other, it may be optimal to visit more than 6 tenant spaces. The actual number of tenant areas that need to be surveyed will be determined from the tenant business type groups, and floor areas that they occupy. However, tenant access will typically be limited to less than the ideal by the property manager. For this situation, a good representation of the entire building may not be possible, and the non-surveyed areas will be recorded as such on the survey form.

Ask for Building Site Plans: This is especially important for larger facilities, and can save quite a lot of survey time if they are available. A building plan will help the surveyors to identify which areas they should request access to, in order to sufficiently sample the entire building.

4.3.5 Characterizing the Site for the Sampling Approach

Based on the information determined from the preliminary research of the site, and the information extracted from the site contact, the tenants and site should be characterized in order to determine the best sampling approach that would represent the site. The ideal approach to sampling is this: Physically survey all common areas and vacant areas[17] (as they should be readily accessible), survey all unique tenants that represent significant %s of the site floor area, but do a sample of each "tenant group", where a tenant group is just tenants who have similar business types, equipment densities, and business hours.[18] The following parameters should be considered when characterizing the tenants:

Business Type of Tenants: Is the entire building all office spaces, with a similar business activity type, equipment densities, and similar hours of operation? Or are there some retail tenants, some medical office tenants, some legal and/or financial office tenants, and some restaurants, all of which would have to be sampled individually?

Equipment Densities and Activity Area Configurations. This might be mostly already characterized by the business type, but one example would be an office that is mostly medical records storage, which would have very different Activity Area types and percentages than the typical office filled with people.

Tenant Business Hours & Equipment Schedules: If the tenants have drastically different business hours, they should not be sampled together, however, if their schedules are generally the same, then the schedules do not need to be taken into consideration when deciding which tenants to sample.

[17] Vacant areas can also be considered a "tenant group" and should be sampled if there are several vacant suites.

[18] Technically, if business hours are the only difference, this could be handled by using different schedules for the equipment in each area, but it may be easier for surveyors to use this as a grouping characteristic.

Tenants Suite #s and Floor Areas: Ideally, in a multiple floor building, you would want to sample from different floors and you would also want to sample the largest tenants from within each tenant group. If there are whole-floor tenants and partial-floor tenants, that could also be used as a sampling criteria.

All of these criteria should be used to create a sampling plan and decide which tenants should be sampled to get the best representation of the equipment in the building. Once on-site, you should also obtain or sketch floor plan layouts, and take a photo of the business directories on every floor. This information will also be used to support the survey approach, and filling out the form. Even with all of this planning, the tenants that are made available may typically be limited and chosen by the site contact. However, you will still need to record and characterize what you could and could not survey. An Excel worksheet is provided to facilitate this task.

4.3.6 Master-Meter Multi-Tenant Worksheet

A worksheet has been included as part of the survey form. This worksheet will not be data entered, but will assist the surveyor with filling out the survey form and deciding which suites to survey to represent the entire building onsite. Similarly, it will ensure that the QC team understands the layout of the site, the different tenants and their business types, the square footage of the different tenant units, which areas were surveyed and which were not, and which non-surveyed areas can be represented by the surveyed areas. The worksheet will be submitted electronically with the survey form and photos for each site.

The worksheet consists of two parts. The first table, as shown below in Figure 4-8, is designed to capture information on all tenants at the site. This includes the floor they are located on, the suite #, the suite floor area, whether the suite was surveyed or not, the tenant name, and the tenant business description. The majority of this information should be accessible from a directory. The rest of the information should be confirmed by the site contact. If the site contact does not have records on the suite floor area of the facility, then the surveyor should use resources like http://www.loopnet.com to try to get information on the tenants.[19] If http://www.loopnet.com does not have property records on the facility, and the site contact does not have the information, then the surveyor should take actual measurements of the floor areas of the surveyed tenants. The floor area of the non-surveyed tenants should be estimated based on the total floor area of the building, the measured floor area of the surveyed tenants, and the building plans (or sketches) created onsite. The tenant business description should be used as a guide for the surveyor to determine whether the business description of non-surveyed suites match closely enough to the business description of the surveyed suites. This should assist the

[19] As described above in the section "Researching the Site", the site http://www.loopnet.com should be visited prior to performing the onsite visit. It should be known to the surveyor prior to going onsite whether http://www.loopnet.com can be used as a resource to verify information on the tenant suites that were not surveyed.

surveyor in deciding whether the surveyed suites can be used to represent the end-uses in the non-surveyed suites.

Finally, the bottom section of this table asks the surveyor to fill in the total tenant floor area the total common area floor area. The sum of these two areas will be the total site floor area, listed on the BLDGINFO form.

Figure 4-8: Tenant Overview Table

Item #	Floor #	Suite #	Suite Floor Area	Surveyed (Y/N)	Tenant Name	Tenant Business Description
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Total:			(A)	← This should equal the total leasable floor area within each building (sum floor area of all suites)		
			(B)	← This value should be the total floor area of the common areas within each building		
				← (A) + (B) This should equal the total represented floor area on the BLDG_INFO form.		

The second table on this form is the Suite Activity Area table, Figure 4-9, and is a worksheet similar, and slightly repetitive, to the ACTAREA form. This form enables the surveyor to break out the separate activity areas within a tenant's suite, and estimate the % of floor area of that tenant suite. This table has been included, as it is much easier and more accurate for the surveyor to estimate the % of floor area of a room like a conference room when it is taking the % of the suite, rather than % of the building. There are fields added, like "Surveyor's Description of Area" which do not necessarily have to be filled out, but are provided for reference incase the surveyor decides it is easier for them to use the description rather than just the Area ID. The fields "Suite #" and "Suite Floor Area" should be pulled from Figure 4-9

Figure 4-9: Suite Activity Area Table

From ACTAREA		Suite #	Suite Floor Area	% of Suite	From Form ACTAREA		Suite #	Suite Floor Area	% of Suite
Area ID#	Surveyor's Description of Area				Area ID#	Surveyor's Description of Area			
1					16				
2					17				
3					18				
4					19				
5					20				
6					21				
7					22				
8					23				
9					24				
10					25				
11					26				
12					27				
13					28				
14					29				
15					30				

4.3.7 Filling Out the Activity Area Form

The detail provided in the activity area form will be used for the analysis when a site has been sampled, to scale up the equipment for the sampled survey area to the entire site. In the majority of sites, this is straight-forward, however, for multi-tenant situations like office buildings, there may be a wide variety of tenants with a wide range of business hours, and a large difference in equipment densities. For example, the same building may house lawyer's offices, medical offices, retail spaces, and storage-support areas. The surveyor must use professional judgment when deciding which suites to survey, and which surveyed suites are similar enough to the non-surveyed suites that they can represent the equipment end-use densities and load. The Master-Meter Multi-Tenant Worksheet, described in the section above will assist in the majority of this, but as this page is not data entered, the information will have to be transferred over to the Activity Area form manually. To assist with this, an excel worksheet[20], shown in Figure 4-10, has been created, which include equations to calculate the "% of Total Building Floor Area" from the "% of Suite Floor Area". The table, shown below, is mostly the same as the Suite Activity Area table shown above, but has additional calculated fields. The user-inputted fields are highlighted in salmon, while the calculated fields are colored blue. The last two columns, "%

[20] The activity area workbook file name is *MMMT_Wkst.xlsx*.

of Total Represented Building Floor Area" and "Similar to these Area ID Groups", are entered on the Activity Area form.

This spreadsheet should be used when surveying master-metered multi-tenant facilities and a copy of the spreadsheet should be turned in along with the survey form.

Figure 4-10: Master-Meter Multi-Tenant Calculation Worksheet

Suite Activity Area (MMMT Worksheet)						To be pasted in ACTAREA	
From Form ACTAREA							
Area ID#	Surveyor's Description of Area	Suite #	Suite Floor Area	% of Suite	Floor Area	% of Total Represented Building Floor Area	Similar to these Area ID Groups
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

As mentioned above, the Activity Area Descriptions form (ACTAREA) is the only form that is actually data entered, and will be where all the necessary data to do the analysis comes from, which means it should be filled out as completely as possible. The form is shown in Figure 4-11 below, and an explanation of the fields in the table as they pertain to master-meter multi-tenant facilities is also provided below:

Figure 4-11: Activity Area Table

Area ID#	Building ID #	Activity Area Code (*AA Code*)	Surveyor's Description of Area	% of Total Represented Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Actually Surveyed	Total Represented Qty of this Area Type On-site	End-Uses *NOT* Surveyed (*all that apply - Explain*)	Similar to these Area ID groups (*MM-MT Only*)
1					W S				LT OF TV	
2					W S				LT OF TV	
3					W S				LT OF TV	
4					W S				LT OF TV	
5					W S				LT OF TV	
6					W S				LT OF TV	
7					W S				LT OF TV	
8					W S				LT OF TV	
9					W S				LT OF TV	
10					W S				LT OF TV	

The Activity Area Table should be filled out for every surveyed activity area, and split out between each suite individually. Each suite should be represented on the activity area table, even those that have not been surveyed. For surveyed suites, all of the Activity Areas for that suite need to be kept together sequentially. For the suites that are not surveyed, they should get their own Area ID.

- *Activity Area Code (AA Code)* for the non-surveyed suites are classified as "999".
- *Surveyor's Description of Area* should include the suite number, so the activity areas for each suite are broken up by suite.
- *% of Total Represented Building Floor Area* will be calculated from the MMMT_Wksht.xslx.
- *Total Qty of this Area Actually Surveyed* should be filled out accordingly for the activity areas within the suites surveyed, and filled out as "0" for the suites not surveyed.
- *End-Uses **NOT** surveyed (All that Apply – Explain)* should be all circled for the non-surveyed suites, and circled where appropriate for other activity areas.
- *Similar to these Area ID Groups (MM-MT Only)* is only applicable for the non-surveyed suites. This field will be filled out when the non-surveyed area is similar to one of the surveyed areas. It will be up to the surveyor onsite to determine whether or not the non-surveyed area can be represented in equipment end-use densities and load by the surveyed areas. This should be done by a combination of, but not limited to, any of the following possibilities:

- Discussion with the site contact to determine the layout of the suites. If one suite has all private offices, and the other suite has just a single large open office layout, the two suites cannot be compared.
- Comparing business types. The Tenant Overview Table Figure 4-12 is designed for this very reason, to help the surveyor compare the business types between the suites, to help them make a decision to see whether one area can be represented by another.
- Peeking through windows or open doors when allowed by the contact or the suites. A quick look around at the non-surveyed areas will allow the surveyor a quick chance to compare the different suites.

The onsite surveyor should remember, that no matter how unsure they are about whether or not they are making the right call on whether one suite represents another suite, they are the ones on site, so they will have the best idea of whether one site represents another one or not. If they determine that a non-surveyed suite can be represented by another surveyed suite, this field should be filled out with the Area ID's of the represented suite. If the non-surveyed suite cannot be represented by a surveyed suite, the field should be filled out with "NA".

Example Site

The following example shows a multi-tenant facility with 8 suites, three of them surveyed with three of the non-surveyed suites being represented by one of the other suites. The sample Tenant Overview Table is shown filled out in the MMMT_Wksht.xlsx, below:

Figure 4-12: Example Tenant Overview Table

Tenant Overview						
Item #	Floor #	Suite #	Suite Floor Area	Surveyed (Y/N)	Tenant Name	Tenant Business Description
1	1	100	5051	N	Hamilton & Assoc	Real estate brokers and agents
2	1	110	2929	N	Italian Federation	Fraternal associations
3	1	170	2108	N	Nrf Technologies	Computer related consulting services
4	1	180	2184	N	Talba North	Personal Service Agents (rehab, mental health)
5	2	200	1700	N	Healthcare Solutions	Billing and bookkeeping services
6	2	210	3471	Y	Hume Principal	Nonresidential building operators
7	2	220	2100	Y	Management Services	Management Services
8	2	240	1671	Y	Joseph & Assoc	General practice attorney, lawyer
			21,214	(A)	← This should equal the total leasable floor area within each building (sum floor area of all suites)	
			1500	(B)	← This should equal the total leasable floor area of the common area of the building.	
		Total:	22,714	← (A) + (B) This should equal the total represented floor area on the BLDG_INFO form.		

The salmon colored fields are all populated by the user, while the blue fields are calculated. Figure 4-13 below shows the calculation worksheet that goes along with this. The fields from here are populated in the Activity Area table.

Figure 4-13: Example Multi-Tenant Master-Meter Calculation Worksheet

Suite Activity Area (MMMT Worksheet)						To be pasted in ACTAREA	
From Form ACTAREA		Suite #	Suite Floor Area	% of Suite	Floor Area	% of Total Represented Building Floor Area	Similar to these Area ID Groups
Area ID#	Surveyor's Description of Area						
1	Lobby	210	3471	15%	521	2.29%	
2	Private Office	210	3471	48%	1649	7.26%	
3	Open Office	210	3471	25%	868	3.82%	
4	Hallways	210	3471	5%	174	0.76%	
5	Copy Room/Storage	210	3471	3%	87	0.38%	
6	Conference Room	210	3471	5%	174	0.76%	
7	Lobby	220	2100	5%	105	0.46%	
8	Private Office	220	2100	92%	1936	8.52%	
9	Storage/Copy Room	220	2100	3%	59	0.26%	
10	Lobby/Open Office	240	1671	3%	53	0.24%	
11	Private Office	240	1671	87%	1450	6.39%	
12	Storage	240	1671	10%	167	0.74%	
13	Common Area: Hallway/Elevator	Common	1500	85%	1275	5.61%	
14	Common Area: Restrooms	Common	1500	10%	150	0.66%	
15	Common Area: Stairwells	Common	1500	5%	75	0.33%	
16	Common Area: Outside	Common	0	0%	0	0.00%	
17	Property Management	100	5051	100%	5051	22.24%	1-6
18	Fraternal Association	110	2929	100%	2929	12.90%	1-6
19	Computer Consulting Services	170	2108	100%	2108	9.28%	NA
20	Personal Services	180	2184	100%	2184	9.62%	NA
21	Billing/Bookkeeping Services	200	1700	100%	1700	7.48%	1-6
					Total	100.00%	

As seen above, there are 6 activity areas for Suite 210, 3 for Suite 220, and 3 for Suite 240. The floor area for each suite was pulled from the Tenant Overview Table, and within each suite, a % of suite floor area was calculated. This field should add to 100% within each suite, just as it should add to 100% within each building ID on Activity Area form. It is split up by suite on this form, as it is easier for the surveyor to accurately estimate the % floor area within each suite rather than estimating it for the entire building. Once this is estimated, the floor area of each activity area within each suite, and the field *% of Total Represented Building Floor Area* are calculated, and can be used in the activity area form. Finally, the 5 non-surveyed suites were evaluated to determine whether or not they could be represented by one of the three surveyed suites. It was determined that suite 100, 110, and 200 could all be represented by suite 210. However, suite 170 and suite 180 were not similar enough to be represented by any of the suites. The activity area table, based off all the information listed above, is shown below in Figure 4-14:

Figure 4-14: Example Activity Area Table

Area ID#	Building ID #	Activity Area Code (*AA Code*)	Surveyor's Description of Area	% of Total Represented Building Floor Area	Windows or Skylights	Conditioned Space Type Code	Total Qty of this Area Actually Surveyed	Total Represented Qty of this Area Type On-site	End-Uses *NOT* Surveyed (*all that apply - Explain*)	Similar to these Area ID groups *(MM-MT Only)*
1	A	30	#210: Lobby	2.29%	W S	CH	1	1	LT OF TV	
2	A	35	#210: Private Office	7.26%	W S	CH	3	10	LT OF TV	
3	A	37	#210: Open Office	3.82%	W S	CH	1	1	LT OF TV	
4	A	22	#210: Hallways	0.76%	W S	CH	1	1	LT OF TV	
5	A	15	#210: Copy Room/Storage	0.38%	W S	UN	1	1	LT OF TV	
6	A	13	#210: Conference Room	0.76%	W S	CH	2	2	LT OF TV	
7	A	30	#220: Lobby	0.46%	W S	CH	1	1	LT OF TV	
8	A	35	#220: Private Office	8.52%	W S	CH	4	4	LT OF TV	
9	A	15	#220: Storage/Copy Room	0.26%	W S	UN	1	1	LT OF TV	
10	A	30	#240: Lobby/Open Office	0.24%	W S	CH	1	1	LT OF TV	
11	A	35	#240: Private Office	6.39%	W S	CH	4	4	LT OF TV	
12	A	49	#240: Storage	0.74%	W S	UN	1	1	LT OF TV	
13	A	22	CommonArea: Hallways/Elevator area	5.61%	W S	CH	2	2	LT OF TV	
14	A	44	CommonArea: Restrooms	0.66%	W S	CH	2	4	LT OF TV	
15	A	47	CommonArea: Stairwells	0.33%	W S	UN	2	2	LT OF TV	
16	A	0	CommonArea: Outside	0.00%	W S	OU	1	1	LT OF TV	
17	A	999	#100: Property Mgmt	22.24%	W S	CH	0	1	LT OF TV	1-6
18	A	999	#110: Fraternal Assoc	12.90%	W S	CH	0	1	LT OF TV	1-6
19	A	999	#170: Computer consulting services	9.28%	W S	CH	0	1	LT OF TV	NA
20	A	999	#180: Personal Services	9.62%	W S	CH	0	1	LT OF TV	NA
21	A	999	#200: Billing/Bookkeeping Services	7.48%	W S	CH	0	1	LT OF TV	1-6

5

Filling Out the Survey Form

This section of the on-site handbook provides general, as well as form-by-form, field-specific instructions for filling out the on-site survey form. It also provides background information about the purpose of each field, and guidelines for estimating data values, where appropriate. The headings of this section are keyed to the on-site survey layout and individual form names.

Portions of the forms will be pre-populated with data from the recruitment phone survey, the IOU 2010-12 energy efficiency program measure tracking databases, and the IOUs Customer Information System (CIS). However, the majority of the forms in the survey instrument will be filled out using a combination of: a) ***Customer interviews*** (also referred to as a "self-report") with the original site contact or other knowledgeable individuals, b) ***Direct observation*** of the survey area, c) ***Follow-up calls*** to other off-site contacts/contractors (such as HVAC maintenance or lighting contractors), and d) ***Review of on-site documents*** such as blueprints and refrigeration schedules. Judgment should be used to determine which information source will provide the best source for any specific data field.

5.1 General Instructions

General instructions, i.e. those that are not specific to a single survey form and/or address a general survey approach issue, are provided under the following topics:

- Before the Site Visit: Review the Pre-Populated Survey Form,
- Documenting the Information,
- Supplemental Information, and
- Surveyed Area Sketches.

Each of these topics is discussed in detail below.

5.1.1 Before the Site Visit: Review the Pre-Populated Survey Form!

Prior to visiting the site, the pre-printed fields on the survey form should be reviewed, and the surveyor should clearly understand the CMST recently purchased equipment descriptions and quantities. If <u>any</u> of the information on the survey form is confusing and cannot be clearly understood, the surveyor should consult with their field work manager or one of the survey team

data management staff members. Furthermore, as there are different versions of the survey form, the surveyor *must* learn to recognize these different versions, especially the relevant survey form pages, so that they can identify when a required page is missing and reprint it or alert a data management staff member. Arriving on site, and then not getting the needed information because a key survey form page was not printed could cause that site to not be used for the analysis.

5.1.2 Documenting the Information

All responses and field entries will be entered into a database. Therefore, when recording responses or data values, please use the following guidelines:

- **Please print legibly and dark** so that the data entry personnel do not have to struggle to read the data and copies can be read clearly.
- **Data fields must have a discrete value**, not comments or additional text. If a discrete value does not accurately capture the observed situation, enter your best guess for the discrete value required by the survey form, but then explain in comments what the actual situation is, and use as much detail as needed. A "black and white" response is needed, but any "gray" situations should be recorded in comments.
- **Enter data only in the units that are indicated for that field.** For example, if cooling capacity is listed on the form as "tons", but "Btu" are observed on site, the value entered on to the final, completed form must be in tons. It is not acceptable to record "50000 Btu" in the field, because the data entry person will not do a conversion, they will enter what they see and ignore the text.
- **Do not leave data fields blank.** If the field is irrelevant to a specific line item of data, then put a diagonal line through the box (or group of boxes) to show that you did not just skip or miss these fields.
- All time values should be recorded on a 24-hour basis, unless otherwise indicated. For example, 9 am will be recorded as 0900, 3 pm will be recorded as 1500 (12+3=15), 8:30 pm is 2030 (12+8=20).
- **When recording equipment model and/or serial numbers,** there are several important issues to consider. Most importantly, record the model and serial numbers just as they are observed, including any spaces, dashes, or underscores. Also, please write all zeroes with an overstrike (Ø) to differentiate them from the letter 'O', and make sure that a seven (7) can be distinguished from a Z.
  - When entering large model numbers, please do not try to cram it in the field. If you do not have enough space, use an asterisk and/or a number (*1) in the field, but record the model number in a comment block and link to the reference number.

- **Use decimals** (1.25), instead of fractions (1¼) when recording values, unless the field is a text field.
- **For decimals that are less than one, always precede the decimal point with a zero.** For example, record "0.5" not just ".5". If written without the preceding zero, the value might be interpreted by data entry as 5 instead of 0.5.
- **Check boxes** are scattered throughout the form, so be sure to use them when appropriate.
- **Do not use automatic defaults.** If you don't know a value, cross the field out and if it a key field, note in comments why you were unable to obtain the information.
- **For Operating Schedules** do not automatically put 0 for the operation outside of business hours. Make sure to ask not only the site contact, but other employees. If a value cannot be determined on site, then take your best guess based on your observations, actual switching configurations, etc. and note that in comments.

Field Codes

Many of the fields on the survey form use short-hand "codes", which are an abbreviation for the allowed values for a field. The allowable codes are either included as part of the question, in the response fields themselves, or in a separate table such as the one shown below:

Figure 5-1: Code Table Example

Conditioned Space Type Codes
CH = Cooled & Heated
CL = Only Cooled
HT = Only Heated
ECH = Evap. Cooled & Heated
ECL = Only Evap. Cool
NU = HVAC present but not used
RF = Refrigerated
UN = Unconditioned
OU = Outside
OT = Other (describe in comments)

There are three sets of field code documents. The first is includes the building, business, and activity area type codes. The second includes all the lighting-related codes (and pictures), and the last is the HVAC-related codes. These separate documents allow the field code sheets to not have to be printed every time with the survey form. The field code sheets will be printed and laminated so that they can be used continuously.

5.1.3 Supplemental Information

Many additional sources of information can supplement the interview and the walkthrough. For example, the following sources can be very useful:

- Copies of utility bills (for verifying account/meter numbers),
- Facility or campus maps (schools, office complexes, hospitals, resorts, etc.),
- School calendars,
- Energy Management System (EMS) printouts or control information,
- Refrigeration Schedules (used for built-up supermarket refrigeration systems), and
- Contact information for off-site equipment support contractors (HVAC maintenance, lighting designer, M&E (mechanical/electrical) design/maintenance contractors, etc.).

If possible, request copies of these or other materials. The SiteID number and the surveyor's initials should be written on the documents, and they should be attached to the back of the completed survey form when it is turned in.

5.1.4 Surveyed Area Sketches

The survey instrument includes two pages which can be used for sketches of the verification survey area. However, both forms do not need to be used if all the information needed to evaluate the approach used to survey the site can be done on a single page. *Surveyors should also use pre-printed floor plans and site maps, whenever they are available.* Purpose and use of the sketch forms is described in greater detail later on in this manual.

5.2 General On-Site Survey Instrument Layout and Notes

The on-site survey instrument is quite extensive and is used to gather general site information; such as, lighting, HVAC, building shell, schedules, office equipment, TVs, etc. The forms are automatically populated with information from the IOU tracking databases and recruitment phone surveys via an Access database, combined with encoded Word templates.

Furthermore, there are two basic versions of the form and corresponding survey approaches: CSS and CMST. The survey instrument is generally divided in to seven sections:

- **Site and Firmographic Information.** These forms encompass the site identifier (Itron SiteID), sample design and CSS or CMST survey type identifiers, both premise and building specific information, utility service accounts/meters, site contact information, survey tracking information, business hours, etc. The pre-populated information on these forms comes primarily from the recruitment phone survey and the CIS data.

- **CMST and IOU Tracking Data.** The data on these forms are pre-populated from either the phone survey data or the IOU tracking data. The purpose of these forms is to inform the surveyor about what equipment was installed recently and should be found onsite.
- **Activity Area definitions and Site Plan Sketches.** The Activity Area ID# is used to identify each distinct activity area in the surveyed area. The conditioning type and approximate percent of the total premise floor area are also indicated on these forms. The sketch sheets are used to illustrate the physical areas of the building, and where the targeted equipment is located. More detail is needed wherever the targeted equipment is located.
- **Hourly Equipment Operation Schedules.** The schedules are used to define equipment operation schedules and hours of use.
- **Equipment Specific Inventory Forms.** The inventory forms are used to collect the detailed equipment information including, but not limited to, Activity Area location, type, quantity, age, condition, recent retrofit, etc.
- **Miscellaneous Information.** The survey includes a form for recording general comments, and a log for the photos that are taken.
- **Field Survey Codes.** The Field Survey codes encompasses the tables of field codes that are used throughout the form including building types, activity area, and equipment codes.

Printing of Forms for Specific Type of Survey. After printing the forms the surveyor needs to check to make sure the survey contains all of the appropriate forms for the type of survey being conducted (CSS Only or CMST-Only). For CMST only sites the form will not contain the building shell or accounts pages, and will only require the inventory forms for the recently purchased end uses.

Description/Identification of Pre-Populated Fields. Some of the fields on some of the forms will be populated with data from the participant phone surveys and the IOU tracking databases. These fields are shaded in yellow on the survey form, and are noted in this document as follows:

- **Phone Survey data.** Fields that are populated with data from the phone survey will be noted by a **[PS]** preceding the description. This data is primarily site identifiers, business characteristics and contact information (much of this pulled from the IOUs CIS data).
- **IOU Tracking Data.** Fields that are populated with data from the IOU tracking databases will be noted by a **[TD]** preceding the description. This data is the measure-related information including IOU measure code, measure description, number of rebated units, and unit basis.

- **CIS Data.** Fields that are populated with CIS data will be noted by a **[CIS]** preceding the description. This data is the customer related information such as business name.

Guidelines for completing each of the forms are described in the following sections.

5.3 Site Information (Form COVER)

This form provides the key evaluation study identifiers for the site, as well as site location information, survey tracking data, and last revision/version date for the survey form. *The customer information on this form is confidential information, so it should be treated and protected in accordance with all Personally Identifiable Information (PII) procedures.*

5.3.1 General Site Information

All of these fields will be populated with data from the participant phone survey (PS). If any of this information is found to be incorrect upon visiting the site, corrections should be made in the fields provided.

Site/Survey Type Identifiers

- **Itron SiteID:** [PS] This is a unique alpha-numeric identifier created by Itron that is assigned to every customer. The first few characters typically identify the utility.
- **Sample Strata:** [PS] This is the sample strata identifier. It is a key identifier for field staff in managing site assignments and quotas. The strata numbering convention is detailed in the CSS/CMST Research Plan.
- **CSS Site:** [PS] A "Yes" in this field indicates that this is a CSS survey, and the full set of survey forms should be present. If "(With incentive)" is shown, then a participation incentive is to be paid to the customer.
- **CMST:** [PS] A "Yes" in this field identifies that this is a CMST site, and the CMST forms will be present. In addition, the type of CMST equipment at the site will also be identified as either "TV", "HVAC", or "LF. If "(With incentive)" is shown in this field, then an incentive for participating in the survey is to be paid to the customer.
- **Task:** This field provides the project task number that the work should be billed to, and is needed because the CMST and CSS sites are budgeted separately. *CMST-Only* survey sites are billed to Task 06.03, while CSS-Only and CSS-CMST sites are billed to Task 06.04.

NOTE: The two fields above - *CSS Site* and *CMST Site* - together determine the type of on-site survey to be conducted. Also, if "With incentive" appears in either of the fields, a customer participation incentive should be paid. The options are described below:

CSS-Only site. A "Yes" in the *CSS Site* field and a "No" in the *CMST* field indicates that this a CSS-Only survey, that is, the full set of forms excluding the CMST forms will be printed, and a complete inventory of all TV, office, HVAC, lighting, and refrigeration equipment is to be conducted.

CMST-Only site. A "No" in the *CSS Site* field and a "Yes" in the *CMST Site* field indicates a CMST-Only survey, that is, only a short survey of the targeted CMST equipment - TVs, HVAC, inside linear fluorescent lighting, and/or refrigeration equipment - will need to be conducted. The CMST targeted equipment will be identified in this field as well, and only those inventory forms will be printed. Note that for lighting, only indoor linear fluorescent lighting will be inventoried.

CSS-CMST site. A "Yes" in the *CSS Site* field and a "Yes" in the *CMST Site* field indicates that this is a CSS-CMST survey. This survey will include the CMST forms for any recently purchased equipment, as well as all of the CSS forms.

Business/Customer Contact Information

- **Corporate (Multi-Site) Name:** [CIS] Ideally, this field is used to identify sites that are part of a chain, franchise, property management group, etc. The corporate name may or may not be the same as the actual business name.
- **Business Name (CIS):** [CIS] This is the business name as extracted from the IOU Customer Information System (CIS). Rather than the actual business name, it might be the owner's name, a corporate name, etc.
- **Storefront Name:** [CIS] This is the business name as it appears on the signage outside the site, or could represent a dba ("doing business as") name. This is extracted from the CIS data, but it should be confirmed during the pre-visit site call or internet/Google Map/Earth search.

Correct the Business Name if different than that on the storefront. If the Business Names listed above are a person's name or appear to be a cryptic truncated version of the business name, then use the "Revised Business Name" block below to record the name that is shown on the storefront, or that is otherwise related to you by the site contact. For example, some small businesses and medical offices will be listed in a single doctor's name, but those will typically need to be revised. Another example "HBR LUTH CHURCH" should be changed to "Harbor Lutheran Church".

- **Service Address, City, Zip Code:** [PS] This is the location of the site as obtained from the IOU tracking database, and confirmed by the phone survey.

NOTE: The zip code will be used to lookup CEC Title 24 Standards climate zone which is needed for verification of weather-sensitive DEER measures.

Corrections to Site Information

The fields in this section should be used to correct any observed problems with the site information listed in the previous fields. The information above should be validated when the on-site survey is scheduled.

- **Revised Corp. (Multi-Site) Name:** Record the corrected corporate name if different than that from the IOU tracking data.
- **Revised Business Name:** If at least one of the names in the two Business Name fields above does not reflect the name observed on the signage in front of the business, record the correct business name here. If the Business Name is abbreviated, please spell it out completely in this field.
- **Revised Service Address:** Record the correct service address for the site.
- **Revised City:** Record the correct city for the site. If drastically different than the original, contact Itron immediately.
- **Revised Zip:** Record the correct zip code for the site.

NOTE: If the Service Address or City that are found by the on-site visit or pre-visit call are found to be *different* from the pre-populated values, ***please contact the site assignment manager or project manager before surveying the site***. Because the address information comes from the utility CIS, the address and city should always be correct. If it is not, this is generally an indication of a problem with the recruitment or phone survey data.

5.3.2 Site Contact Information

This information will be used to document the contacts used to gain access to the site. It will also be used in the event that follow-up information is needed, or a copy of the survey form and associated materials is requested. Data fields for both primary and back-up contact information are provided. If more than two contacts are used, record that information in others and note the function provided by each contact. PS= Phone Survey, OS=On-site Survey.

- **PS Completion Date:** [PS] This is the date the phone survey was completed. If a significant amount of time has elapsed between the initial contact and the on-site survey, then a pre-visit call is mandatory. If 6 months or more has elapsed between the initial contact date and the on-site survey assignment, then Itron will try to refresh the contact before assigning the site to a field surveyor.

- **Length (min):** [PS] This is the length of the phone survey, provided only for reference. It may or may not provide insight in to the customer's responses, and the extent of the on-site survey. This should be kept in mind when the surveyor calls to schedule the on-site visit. A customer who may have spent a long time completing the initial phone survey may not be very happy about it, so the surveyor should take that into consideration when speaking to the customer.
- **Respondent:** [PS] This is the name of the person who completed the phone survey. As part of the phone survey, this person is asked to provide up to two contacts for the on-site verification survey, and this data ends up in the OS fields below.

The table below the *Respondent* field provides contacts for the on-site survey as provided by the respondent during the phone survey. These fields are:

- **Contacted [check-box]:** Use the check boxes in this column to indicate the contact(s) that *actually assisted with* the on-site verification survey. This information would be used if follow up calls are needed to obtain additional information.
- **OS Primary, OS Back-up:** [PS] The *Contact Name* and *Phone Number* are populated from the phone survey, and are obtained when permission to perform an on-site survey is requested. The *Alternate Phone* number and *Email Address* are optional, and only need to be populated by the surveyor if they are provided by the site contact during the on-site scheduling call as preferred methods of contact. If the *OS Primary* contact is different than the *Respondent*, then when the surveyor calls to schedule the on-site it might be useful to mention that they were referred to the *OS Primary* contact by the *Respondent*.
- **OS Other:** If an additional site contact is needed for the on-site survey, record that information in this row.
- **Scheduling Notes/Special Instructions for On-site Visit:** [PS] This comment block should be used to record any special instructions related to the site visit that are obtained during the phone survey and/or from the on-site pre-visit call. An example might be "Meet contact at the North door and call him on his cell phone 888-555-1212" or "If site contact is not present at time of visit, call Joe Smith at 888-555-1212 and let him know that you need roof access and lift access to inspect the high-bay lighting".

5.3.3 Survey Tracking Information

The information in this section will be used to track the date and responsible person for each significant step in the survey process.

- **Survey Company:** The name of the field surveyor's immediate employer is recorded here (Itron, ASW etc.).

- **Assigned Surveyor's Initials:** The surveyor's initials, usually 3 letters, but sometimes only 2, are recorded here. Each surveyor must use only one, unique (by survey company) value.
- **Survey Travel Mileage:** Record the miles traveled to conduct the survey. If this is a single site in a single day, record the round-trip mileage. If multiple sites in a single day, then record the mileage from point of origin to the surveyed site.
- **Total Travel Time:** Record the total time that was spent driving to and from the site.
- **Survey Duration (24 hr clock) Start / End:** Record the start time and end time of the survey on a 24 hour clock basis (e.g. 7:25 am = hour 0725, 1:05 pm = 1305).
- **Total Onsite Time:** Record the total time that was spend onsite, from the time of arrival to the time of departure. This does not include travel time.
- **Total Time to Fill Out Survey Form:** Record the total time spent, not onsite, to fill out the survey form. Don't include the time that was spent onsite filling out the form and asking questions to the site contact. This should include only time spent back at the office or hotel finishing up the form and straightening out details that were not completed onsite.

The next set of fields is used to track the progression of the survey form at the key stages of the process. This information will be used to provide periodic progress reports to Itron.

- **Field survey completed:** Record the date the survey was conducted and the surveyor's initials.
- **Survey received from surveyor:** Record the date when the completed survey form is received from the surveyor, and the initials of the person who received it.
- **Initial QC check completed:** This field would be used by subcontractors. Record the date when the survey form is given an initial QC and the person who performed the QC review.
- **Survey sent back to surveyor (*if needed*):** Especially during the training period of these survey forms, the QC team will find issues that need addressing by the surveyors. If that is the case, the survey form will be sent back to the surveyors for clarification and correction. The data that this occurs will be recorded here.
- **Received from surveyor (*if needed*):** If the survey is sent back for corrections, this field will be used to fill in when the survey was received back by the QC team after corrections have been made.
- **Itron QC completed:** Record the date when the survey form is QCed by Itron staff, and the person who performed the QC review.

- **Data entry completed:** Record the date when the data entry is complete, and the initials of the person who entered the data.
- **Tracking Sheet Only:** CMST Revised: ☐ TVs ☐ LF ☐ HVAC
  - These check boxes are only used when the CMST equipment situation found on site is different than that identified in the "*CMST Site:"* field. There are two possible situations:
    - The first is for a **CSS site (*CSS Site:* = *Yes*)** whenever newly purchased CMST-targeted equipment (TVs, linear fluorescent lighting, or HVAC) that was not originally identified in the "*CMST Site:*" field, is found on site. *These update fields will never be used in this way for a CMST-only site*, because the surveyor will only be focused on CMST targeted measures.
    - The second situation is for any CMST site **(*CMST Site:* = *Yes*)** when CMST targeted equipment is not found on site. For this situation, a slash should be drawn through the equipment text to indicate a change.

These update fields will be filled in by the engineering QC staff as part of their review, and it must include whatever is already in the "*CMST Site:"* field. These fields will be used to update the site tracking/assignment spreadsheet (Site Tracker) fields: *OS_CMST_[EndUse]_Verif* will be set to 1 if checked or 0 if not checked or lined out. All fields need to be either checked or lined out!

For example, for a CSS-CMST site, if the *CMST Site:* field only showed TVs, but the surveyor also found new LF lighting equipment, then both the TV and LF would be checked, and HVAC would be unchecked. In the Site Tracker, a value of 1 would be entered for *OS_CMST_TV_Verif* and *OS_CMST_Lin_Verif*, and a value of 0 would be entered for *OS_CMST_HVAC_Verif.* If on the other hand, the new TVs were not found on-site, then a slash would be drawn through all of the individual checkboxes.

5.4 IOU EE Measures and CMST HVAC Data (Form CMST-HVAC)

This form provides a summary of the HVAC-specific data that is useful for the on-site survey. It includes information from the IOU tracking data for any HVAC-related High Impact Measure (HIM), as well as the information on recently purchased HVAC equipment that from the CMST phone survey. CSMT-eligible HVAC measures are those described by the following:

- Distribution System Type: Packaged-Single zone (PSZ), Split-System Single Zone (SSZ), and Ground Source Heat Pumps (GSHP).
- Size requirements: Under 5 tons (or <65,000 Btuh)
- Cooling Type: DX or E

The two subsections that can appear on this form are described below.

5.4.1 IOU EE Measure Summary – HVAC Tracking Data Table

The measures received from participation in any IOU energy efficiency programs since 2009 are listed in this table.

- **Item #:** This is a unique identifier, which will represent the number of HVAC entries from the IOU tracking data.
- **Program Year:** Program year represents the year in which the measure was rebated by the IOU.
- **Program Type:** Identifies the program type as prescriptive, custom, upstream, etc.
- **High Impact Measure Category:** These are the general, standardized categories that are created to group like measures for all CPUC evaluation efforts.
- **IOU Measure Description:** This is the measure description provided in the IOU tracking data, and might look something like "*Central Natural Gas Furnace 94%-95.9% AFUE with built in VSM CA restrictions apply*"
- **Quantity of Units:** This value relates the number of units rebated and installed through the program.
- **Unit Basis:** Unit basis will be "per unit" for HVAC systems.

5.4.2 Self-Reported Recently Purchased CMST Measures Summary – HVAC

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will be reported from the phone survey, and should be confirmed and dispositioned on site using the CMST verification form.

Recently Purchased Package HVAC Units Summary Table

- **Item #:** This is a unique identifier, which will represent the number of HVAC entries from the phone survey.
- **Year Installed:** A self-report value from the site contact.
- **Cooling Type:** Responses here can include '*split system air conditioners*', '*packaged air conditioners*', '*cooling tower*', '*window/wall air-conditioning units*', just to name a few. These responses come from the phone survey.
- **Efficiency Rating:** Efficiency of the unit, as specified in the phone survey.
- **Efficiency Rating Basis:** Units of efficiency, as specified in the phone survey.
- **Age of Replaced Units:** Reported age of the replaced units, in increments of 5 years, as specified in the phone survey.
- **Quantity of Units Purchased:** Total number of units purchased and installed.

HVAC On-Site CMST Measure Confirmation table

This table is used by the on-site surveyors to comment on the number of newly purchased HVAC systems that were actually found on site.

- **Total # of HVAC systems purchased since January 2009 found onsite.** As stated, this field represents the new HVAC systems that the surveyor found. The number to compare it to is the "Quantity of Units Purchased" in the table above, but the two numbers don't necessarily have to line up.
- **I certify that I have double checked with the site contact that I have captured all recently purchased HVAC systems.** The surveyor should confirm with the site contact that the number of HVAC systems they found onsite (purchased since January 2009) is what the site contact believes to have onsite.

A comment section is also provided to allow the surveyor a change to explain any discrepancies between the number of HVAC units found onsite, and the number reported by the phone survey or tracking data.

5.5 IOU EE/DR/DG Program Participation and CSS Measures Summary Sheet (Form DRDG)

This form provides information from the IOU tracking databases and the phone survey that is used for the on-site survey effort. The phone survey information includes questions that a surveyor would typically need to ask as part of the on-site verification. Rather than bother the customer again with the same questions, the answers are reproduced on this form, although a surveyor can and should always further investigate fuzzy answers.

5.5.1 IOU DR/DG Program Participation Summary Table

The data in this table pertains to any IOU demand response (DR) or direct generation (DG) program participation for the 2010-2012 program years. However, this table may not be all inclusive, so even if the field is empty, the field surveyor should ask the site contact if they are aware of any IOU DR or DG program participation. The year of participation and any additional information about the end use, type, and location of equipment should be noted in comments. There are only three fields on this table:

- **Source:** This field indicates the data source and especially the vintage of the data.
- **DR/DG:** A flag to indicate whether the item is from a DR or DG program.
- **Various Field to be filled out based on data available:** The type of information available varied based on the type of program, so a single field is used for flexibility.

5.5.2 IOU EE Measure Summary – Tracking Data Table

If the site had participated in IOU energy efficiency programs since 2009, all of the measures received for those programs will be listed in this table. If the table is blank, it does not necessarily mean that the site did not participate in an IOU program. By the time the CSS/CMST on-site survey data is analyzed, the tracking data extracts will be available and will be used to identify program participants. The table is shown below.

Item #	Program Year	Program Type	High Impact Measure Category	IOU Measure Description	Quantity of Units	Unit Basis

5.6 IOU EE Measure Summary and Linear Fluorescent Tracking Data (Form CMST-LF)

This form provides information on linear fluorescent lamps from the IOU tracking data and the CMST phone survey. There are two tables and a comment block on this form, as explained below.

5.6.1 IOU EE Measure Summary – Linear Fluorescent Tracking Data

If this site participated in IOU energy efficiency programs since 2006, the measures received for those programs are listed in this table.

- **Item #:** This is a unique identifier, which will represent the number of Linear Fluorescent entries from the IOU tracking data.
- **Program Year:** Program year represents the year in which the measure was rebated by the **IOU.**
- **Program Type:** Identifies the program type as prescriptive, custom, upstream, etc.
- **High Impact Measure Category:** HIM categories give what type of measure is represented.
- **IOU Measure Description:** Measure description is provided by the IOU tracking data, and might look something like "*T8 to 4-ft 28 Watt system*"
- **Quantity of Units:** This value relates the number of units rebated and installed through the program.
- **Unit Basis:** Unit basis can be lamp, fixture, or lamp removed.

5.6.2 Self-Reported Recently Purchased CMST Measures Summary – Linear Fluorescents

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will need to be verified and disposition on site using the CMST verification form.

Recently Upgraded Linear Fluorescent Lighting Summary table

- **Item #:** This is a unique identifier, which will represent the number of Linear Fluorescents from the phone survey.
- **Year Installed:** A self-report value from the site contact.
- **Lighting Type:** Responses here can include '*High performance T8 fluorescent fixtures (1" diameter bulbs)', 'T12 Fixtures (1.5" diameter bulbs)', 'Fat/Thick Tubes', 'Skinny/Thin Tubes',* just to name a few. These responses come from the phone survey.

- **Age of Replaced Units:** Reported age of the replaced units, in increments of 5 years, as specified in the phone survey.
- **Quantity of Units Purchased:** Total number of units installed.
- **Unit Basis (fixtures or lamps):** This field is for the surveyors to fill in, to determine how the counts were calculated, based on lamps or fixtures.

Linear Fluorescent On-Site CMST Measure Confirmation Table

This table is used by the on-site surveyors to comment on the number of newly purchased linear fluorescent fixtures that were actually found on site.

- **Number of Linear Fluorescent fixtures purchased since January 2009 found onsite.** As stated, this field represents the new linear fluorescent fixtures that the surveyor found. The number to compare it to is the "Quantity of Units Purchased" in the table above, but the two numbers don't necessarily have to line up.
- **I certify that I have double checked with the site contact that I have captured all recently purchased Linear Fluorescents.** The surveyor should confirm with the site contact that the number of Linear Fluorescent fixtures (or lamps, depending on the unit basis from above) they found (purchased since January 2009) is what the site contact believes to have onsite.

A comment section is also provided to allow the surveyor a change to explain any discrepancies between the number of Linear Fluorescent units found onsite, and the number reported by the phone survey or tracking data.

5.7 Recently Purchased CMST Measures Summary – Televisions (Form CMST –TV)

These are the targeted, recently purchased (since January 2009) measures needed for the CMST effort, as identified by the phone survey. These measures will need to be verified and the disposition will be provided using the CMST verification form.

5.7.1 Recently Purchased TVs Summary

- **Item #:** This is a unique identifier, which will represent the number of TV's from the phone survey.
- **Television Type:** Responses here can include *'LCD – Liquid Crystal Display', 'CRT – Cathode Ray Tube', 'LED – LED backlit LCD display'* just to name a few. These responses come from the phone survey.
- **Size:** Reported size of the television purchased (diagonal screen size).

- **Quantity of TVs Purchased:** Total number of units purchased.
- **Year Purchased:** Year of purchase, reported by the phone survey.

5.7.2 TV On-Site CMST Measure Confirmation

- **Number of TVs purchased since January 2009 (*from Phone Survey*) (A).** This field should match the Qty field from the table above – "Recently Purchased TVs Summary".
- **Number of TVs purchased since January 2009 found installed onsite (B).** As stated, this field represents the new TVs that the surveyor found. The number to compare it to is the field directly above, (A), but the two numbers don't necessarily have to line up.
- **Are (A) and (B) significantly different? (over 25% difference).** This field is added as an additional verification, so that if the two fields are significantly different, the surveyors should double check again and write comments.
- **I certify that I have double checked with the site contact that I have captured all recently purchased TVs.** The surveyor should confirm with the site contact that the number of TVs they found (purchased since January 2009) is what the site contact believes to have onsite.

A comment section is also provided to allow the surveyor a change to explain any discrepancies between the number of TVs found onsite, and the number reported by the phone survey or tracking data.

5.8 Premise-Level General Information (Form PREMISEINFO)

The purpose of the fields under this heading is to get a general idea about the facility and information about the site contact or multiple contacts in many cases. These fields provide basic information about the business type, building type, and size of the building. Many of the fields are pre-populated with information from the phone survey, but some information will need to be obtained on site, and all information should be verified while on site.

5.8.1 Primary Business Type Code

This field is NOT populated from the phone survey, and it one of the most critical fields, so do not leave it blank! Record the three-digit code from the *Business Type Codes Table* that best describes the primary business/building type of the site. If the site is a multi-tenant site, select the code that best describes the primary tenant (the one that occupies the most floor space). Code 150 (Other – Describe) should only be selected when no other category adequately describes the primary business.

Phone Survey

- **Phone Survey Business Type:** [PS] This information is obtained from the phone survey. Phone survey building types are provided for reference in the survey field codes section of the form. Building types and other possible responses are listed in Table 5-1 below. Note that if the response is "Other", then the full open-ended response will be printed in this block rather than a building type.

Table 5-1: Phone Survey Building Types

Building Types	
Offices (Non-Medical)	Restaurant / Food Services
Food Stores	Condo Association
Retail Store	Warehouse
Health Care	Education
Laundry	Lodging
Public Assembly	Services
Industrial	Public Service
Miscellaneous	Other *(Describe)*
Agriculture	Other Ag. *(Describe)*

- **Detailed Business Type: [PS]** The detailed building type is listed on the *Business Type Codes Table* under the building type. This information is obtained by the phone survey as well and allows the surveyor to compare the *Primary Business Type Code* to the *Detailed Building Type.* If there is a difference between the code the surveyor chose to use and the detailed building type, a comment should be made.

5.8.2 Premise Business Type Description

Primary Product or Service

Describe the type of work, and/or the primary product/service provided at this site. What makes this site unique? The description here provides the analysis team with an explanation of why the surveyor classified the site into the business code they did. A one-word answer, like "office" is not descriptive enough. Several examples of good descriptions are shown below:

- Multi-Tenant Office with 10 Suites – law offices and medical offices
- Restaurant, serving breakfast and lunch only
- Mixed-Use - mostly warehouse machine process with smaller office attached

Recent Survey Area Changes

Briefly describe any changes that have been made to the site since January 2009. The survey area changes described should have a significant impact on energy usage. If there have not been any significant changes the surveyor should write "none" in the box.

5.8.3 Premise General Information

The purpose of the fields under this heading is to get a general idea about the facility and information of the site contact or multiple contacts is many cases. It also holds information about the utility under which the facility falls, business type and the building type.

These fields provide basic information about the utility service provided to the site and the size and type of building. Many of the fields are pre-populated with information from the phone survey, but some information will need to be obtained on site, and all information should be verified while on site.

Data provided in this section is pre-populated by the phone survey. However, the data is sometimes estimated by the site contact and may by inaccurate. The surveyor must confirm the data with the site contact and make revisions wherever necessary.

- Is this premise owner-occupied (O) or leased/rented (L)? [PS]
- How many full-time equivalent employees work at this premise? [PS]
- What kind of premise is this?
  - **P = Part of a bldg:** Means the site is part of a larger building or one or more suites in a strip mall. This indicates that at least one exterior surface is adiabatic. An example of this configuration is a business within a strip mall that is metered separately from the other businesses.
  - **B = Single building:** Means the site is a single, stand-alone building.

- **SM = Small multi-building:** Means the site consists of more than one building but it is small enough that all buildings can be surveyed and subsampling of buildings is not needed.
- **CM = Campus (multi-bldg, subsampled bldgs):** Means the site is a large campus consisting of multiple buildings of varied activity types, and subsampling of the measures/buildings was employed for the verification effort.
- **MF = Multiple footprints:** Means that the site consists of one building with multiple floors and all of the floors do not have the same footprint.
- **OT = Other:** Use this code if the site does not fit into any of the above categories, and record a brief description of the site configuration in the space provided.

- **What is the total occupied floor area of this premise? (exclude parking garage): [PS]** This information will be obtained from the phone survey and should be pre-populated. If it is not, then ask the site contact for an estimate or record your own actual observation. If a range (for example "between 100,000 and 250,000 sqft") is given, once you are onsite try to obtain an actual floor area value and record that here instead. The value provided by the site contact on the phone survey should still be verified onsite by the surveyor.
- **If the premise has an enclosed parking garage, what is the floor area?** This is where a building will have an underground parking structure, or a number of the floors of the building are for parking.
- **How many buildings are part of this premise? [PS]** This includes all buildings that are part of the same business listed on the front cover. The buildings may have different electric and gas meters, and may have different addresses, but the addresses should not vary by more than a few digits, and all buildings listed here should be part of the same campus.
- **What year was this business established at this location? [PS]** This is the year the business began operation at this location. This field should be populated from the phone survey, but if not, obtain the info on site. Do not leave this field blank. This information can usually be obtained from the site contact or may be posted somewhere on the facility. If the business was established during the past year, describe the timing of the scale-up period and indicate whether it has reached full operation.
- **What year was the majority of the facility built? [PS]** Document the year, or if not available then the decade (e.g. 1970s, 1960s, before 1950), that the majority of the facility was constructed. This field should be populated from the phone survey, but if not, obtain the info on site. Do not leave this field blank! If the building was constructed during the past year, describe the timing of the scale-up period and indicate whether it has reached full operation. If there are multiple buildings, document the year of construction for the building(s) that account for the majority of the square footage. If unable to

determine this, document the most recent year of construction. Provide comments to explain any ambiguities.

- **Is there a pool at the facility?:** Circle Y or N

NOTE: These fields are required fields and must always be filled out. Unknown (UNK) is not an option! It is especially important to fill these out with actual estimates of floor areas, including when the previous field is *listed as a range* (for example "between 100,000 and 250,000 sqft"). In addition, large differences between these two floor area values should be explained in the Primary Product/Service block. Floor area will primarily be used to determine the correct DEER building prototype, for those building types that are based on size, for example small & large office.

5.8.4 Business – Type Specific Information

The following questions are geared towards certain business types. They are business-specified questions that help to classify these building types into certain categories, based on metrics like size, business activity function, occupancy, and energy use.

- **Lodging**
  - **Total Number of usable rooms/residential units:** This is an open ended question used to determine the size of the lodging facility.
  - **Average % of rooms occupied:** Used to estimate the average energy consumption against its potential energy consumption.
  - **Is keycard system present? (If so, circle all end-uses it controls):** Some hotels, especially outside of the US, use a keycard system which turns on the electricity in the room, to ensure that energy isn't wasted when the occupants leave the room.
- **Office**
  - **Average % of occupied (non-vacant) space**: Used to estimate the average energy consumption against its potential energy consumption.
- **Hospital**
  - **Number of beds in hospital:** Used to determine the size of the hospital.
  - **Average % of beds occupied:** Used to estimate the average energy consumption against its potential energy consumption.
- **Education**
  - **Average number of enrolled students (e.g. ADA):** Used to determine the size of the school.
- **Data Center**

- **Sq. footage of Data Center:** Used to determine the size of the data center.
- **Temperature of cooling set point:** Metrics used to classify energy usage of the data center.
- **HVAC Type:** Open ended question to determine what kind of cooling is used for the data center.

- **Restaurants**
  - **% of current cooking equipment that was purchased second-hand:** Due to the cost of cooking equipment, this equipment is often purchased second-hand, especially for smaller restaurants. This question helps to address how much of it has been purchased second-hand and has the potential for energy savings.
  - **Meals served (circle all that apply):** This question helps determine operating hours and refers to times of the day, rather than foods served.

5.9 Premise Accounts and Meters (Form ACCTS)

The purpose of this form is to identify and document the electric and gas meters associated with the survey area. The documentation of account and meter numbers for the meters found on premise is extremely important. These meter numbers are used to confirm that the correct utility bills, and hence demand and energy use, have been obtained for the survey area. Prior to the development of the *Premise Accounts* form, an attempt was made to identify all the electric and gas meters at the premise. However, the procedure used to do this is not perfect. Therefore, it is critical that every attempt be made to identify the accounts and meters during the premise visit. Because the electric and gas meter tables are identical they will be described together below.

5.9.1 Electric Accounts and Meters

Prior to the premise visit, the electric and gas account and meter numbers should be pre-populated on the *Premise Accounts* form. Once on premise, the following general procedure should be executed:

- Utility service provider should be noted
- Account/meter information on the *Premise Accounts* form should be verified
- Additional meters identified at the premise should be added.
- Accounts/meters that are not applicable should be deleted.

Utility / Provider

Circle the utility service provider (SDG&E = San Diego Gas and Electric, PG&E = Pacific Gas and Electric, SCE = Southern California Edison, SMUD = Sacramento Municipal Utility

District, LADWP = Los Angeles Department of Water and Power) of the energy used. This may not always correspond to what is on the *Premise Accounts* form.

Item #

This is an item identifier. Account and meter information should be numbered sequentially, beginning with "1".

Meter Number

Document the meter numbers provided on the *Premise Account* form. Attempt to observe the meters serving the survey area during the premise visit.

- **If additional meters serving the premise are observed**, then the meter number should be recorded here. It may not be possible to identify the account number that corresponds to the meter, so the account field may be crossed out.
- **If meters cannot be observed**, then it is not possible to verify the meter numbers provided in the *Premise Accounts* form.

Account Number

An account number will be pre-populated from the tracking data. Verify, add or delete account numbers based on utility bills provided by the premise contact.

- **If utility bills indicate additional accounts at the premise,** then these should be added as a line item. It will not be possible to identify the meter number that corresponds to the additional accounts, so the meter field should be left blank.
- **If utility bills are not available**, then it is not possible to verify the account numbers provided on the *Premise Accounts* form.

Meter Status Codes

For each meter or account number entered, indicate the ability to verify the meter or account. A table of codes is supplied on the form and is shown below. If verification differs in any way from the codes provided, explain the situation in the comments section at the bottom of the form.

Figure 5-2: Meter Status Codes

Meter Status Codes:	**V** = Verified pre-populated meter	**A** = Add meter that was found on site but not prepopulated here.
	D = Delete meter that was listed here but not found onsite	**NI** = Not verified meter – inaccessible: Explain in comments
	OT = Other Situation: Explain in comments	

5.9.2 Other Energy Service Accounts

Fuel Type

Locate each additional fuel type used at the premise and record subsequent information according to the appropriate fuel type. The fuel types are detailed below.

- **Bottled Gas (LPG):** LPG stands for liquefied petroleum gas. Common types of bottled gas include propane and butane. This type of fuel is very flammable and is supplied in pressurized steel cylinders.
- **Other:** If the fuel type is not one of the options detailed above, select other and explain in comments.

Bills Available

Obtain all available bills for alternative fuels and record the availability. If bills are available, request copies and submit them with the survey instrument.

Utility / Provider

Document the utility or the provider of each additional fuel type. The bill or premise contact will be the best source of information.

5.9.3 Shared Services and/or Electric/Gas Meters

This section covers sites that share their services or meters with other facilities.

- **The shared service is:** This question describes whether the surveyed site provides services to another site that was not part of the survey, the surveyed site receives services from another site that was not part of the survey, or other (needs a description).
- **The shared service impacts these utility services:** The surveyor should choose from Electricity, Natural Gas, Fuel Oil, LPG, or other utility services.
- Briefly describe the shared services and list the affected meters: A free-response section for the surveyor to provide a little more information about the shared services.

5.10 On-Site Power Generation (Form PWR_GEN)

Complete this section for each on-site power generating system. The survey form allows for up to two types of on-site power generation. Cogeneration, self-generation, solar cell/photovoltaic system, and emergency generators are the systems that would be recorded. Solar thermal (i.e. water heating) technologies are not recorded here because they are only electric generation systems.

Emergency / Backup

- **Is this primarily an emergency generator/backup system?:** Record if system is backup.
- **How often is it tested?:** Record how often the system is tested.

All Systems

- **Currently Operational:** Does this system currently work? If it's not currently running it should still be reported as "yes", if it's just down for temporary maintenance.
- **If NO, is this system permanently out of service?:** Y or N
- **Serves:** Specific Building (note Building IDs) or P = Entire Premise:
- **Technology Type:**
  - **I = Internal Combustion Engine:** Internal combustion engines are (usually) larger scale versions of what is in most automobiles. An example of this is a diesel generator, which many older hospitals will have.
  - **G = Gas Turbine:** Gas Turbines combust natural gas and use the exhaust gases to turn the turbine, thereby converting heat energy to mechanical energy. Gas turbines are 100kW and up.
  - **M = Microturbine:** Microturbines are smaller versions of a gas turbine, up to 100kW. Microturbines may be configured in groups, with total power production exceeding 100kW. Record the total system size, even if above 100kW. Be sure to note the unit kW and the number of units in the notes section at the bottom of the form.
  - **PV = Solar Array / Photovoltaic:** Photovoltaic systems use solar panels or an array of solar panels to convert solar radiation into electricity. They consist of multiple components such as mechanical and electrical connections to regulate the electrical output. Solar heating does not produce electrical energy like photovoltaic and are not to be included as a type of on-site power generation. List solar heating as "other" system type.
  - **F = Fuel Cell:** Fuel cells convert chemical energy into electrical energy through chemical reactions with an oxidizing agent. All fuel cells contain and anode,

cathode, and an electrolyte that allows charges to transfer between sides of the fuel cell. The most common fuel type is hydrogen. For back up commercial power generation it would be most common to find fuel cells in remote or inaccessible areas.

- **W =Wind:** Wind can be used to turn wind turbines to make electrical power. Wind turbines consist of a large tower, turbine blades, and a generator that converts mechanical energy into electrical energy. These would most likely be found in windy areas such as Coachella Valley and other high wind areas.
- **O = Other:** Any system type that does not meet the above descriptions.

- **Fuel Type (if applicable):** Fuel type should be chosen from the following list: Natural Gas, Bio Gas, Both Natural Gas and Bio Gas, Diesel, Fuel Oil, Gasoline, or Other. If "other", then an explanation should be provided in the comments.
- **Cycle Type (if applicable):** Any form of cogeneration would be a combined cycle system, as it produces electricity and uses the waste heat directly onsite, or uses it to produce steam to run a turbine, which in turns, produces more electricity for the site.
- **Quantity of similar units:** Record the number of units of this type.
- **What year did the unit/plant begin operation?:** Record the year the system began operation.
- **Did the system receive any utility or Federal incentives?:** Y or N, typically will have to talk to the site contact to find out.
- **What is the unit's (or for PV plant's) generation capacity? (kW):** Record the Capacity, can typically be found on the nameplate, or in talking to the site contact.
- **Manufacturer (if PV: Panel Manufacturer):** Record the manufacturer, can usually be found on the nameplate or on the unit.
- **Model # (if PV: Panel Model #):** Record the nameplate, usually from the nameplate.

Fossil – Fueled

- **COGEN: Use of heat generated (if applicable, select all that apply):** The use for the heat should be circled. Options are: Chilled water, domestic hot water, space heating, pool, process, none, or other. If other, an explanation should be written in the comments.
- **Unit(s) used for utility Demand Response (DR) programs?:** Record if the unit is used for DR programs.
- **What percent of generated electricity is sold back to the utility? (0 if none):** Record a percentage – usually will have to talk to the site contact for this information.
- **Average operating hours per day (If seasonal, describe operation below):** Record the number of hours, site contact should be able to provide.

- **Number of operating days per year:** Record the number of days it operates per day.
- **Does system have dedicated utility metering? If yes list inputs/outputs metered in comments:** Y or N, find out from contact.
- **Does system have Performance Metering/Monitoring?:** Y or N, will need to ask the site contact.

PV Technology

- **Roof Mounted (R), Ground Mounted (G), or Carport (C):** Explain where the PV Panels are located.
- **PV mounting type: F=Fixed S=Single axis D=Dual axis:** Record if the panels are Fixed (F), or if they can pivot or rotate about a Single axis (S) or a Dual axis (D).

5.11 Premise/Site-Plan Sketch (Form SKETCH)

This sketch should provide a high-level view of the premise and its surroundings as it is actually configured. If site plans and/or floor plans are available attach them to the survey form as well. This sketch should be designed as a tool for the surveyor to use while performing the onsite inventory.

All of the buildings and close roads should be sketched and labeled. Connected buildings or other structures that are not related to the premise should be labeled and denoted with diagonal hash marks. For multiple-building sites, use letters to identify the different building IDs. Also indicate the front of the building and its orientation. It is imperative that the surveyor labels and identifies everything that is drawn on the sketch. If some items are represented by a symbol then make a legend in the comments section that explains what the symbol represents.

The first page should contain the premise sketch. The second page, and possibly more for multiple building sites, should contain a building sketch. In the building sketch, activity areas used for sub-sampling and counting measures should be noted on this sketch, using the appropriate Area ID code from the Form ACTAREAs.

Record any additional comments about facility, activity areas, or a map legend to identify symbols on the map should be recorded here.

5.12 Premise-Level Schedule Definitions (Form PREMISESCHD)

The purpose of the fields under this heading is to create monthly schedules, if seasonal business hours are defined. All the holidays when the facility is closed are to be checked and the total numbers of holidays is noted down.

5.12.1 Standard Holidays

Indicate, in the tables show below, standard holidays that the business is closed or operation deviates drastically from normal/typical operations, and indicate on *Form BUS_HRS* what the holiday operation hours are. If the site contact says there are more than the standard holidays that the business is closed record the additional holidays in the "Other 1" and "Other 2" fields. If the business does not close for any holidays check the N/A box.

New Year's Eve	☐	July 4th Celebrated	☐
New Year's Day	☐	Labor Day	☐
New Year's Day Celebrated	☐	Columbus Day	☐
Martin Luther King Day	☐	Veterans' Day	☐
Presidents' Day	☐	Thanksgiving	☐
St. Patrick's Day	☐	Thanksgiving Friday	☐
Easter Sunday	☐	Christmas Eve	☐
Memorial Day	☐	Christmas Day	☐
Flag Day	☐	Christmas Day Celebrated	☐
July 4th	☐	Caesar Chavez Day	☐
Other (1) _____	☐	Other (2)_____	☐

5.12.2 Seasonal Operation Periods

N/A check box

Mark this check box if the facility or business does not have a varying business operation according to seasons.

These hours apply to the *Time Periods* specified under "Seasonal Operation Periods". The data and format is the same as described for the corrected normal business hours above.

Typical Schedule and Seasonal Time Period

Define seasonal operation periods for significant periods of time where business hours and/or equipment operation differs significantly from normal or typical business hours and /or equipment operation. To indicate seasonal operation periods, provide a brief description of the period (e.g. "summer break", "extended holiday hours") and list the beginning/ending months (1-12) and days for up to two seasonal time periods. The months for the typical schedule should also be listed in the first block.

Seasonal time periods will be most common at sites like schools, or retail sites with holiday schedules. Retail sites will generally just have a single seasonal time period, but situations like a school may have multiple seasonal schedules. They will typically have a year-round schedule, and possibly a summer school schedule and several holiday schedules. The following form provides an example:

Typical Schedule			Seasonal Time Period					
1			2			3		
Description Typical School Schedule			Description Summer Schedule			Description Holiday Schedules		
Begin Month/Day	09	01	Begin Month/Day	06	02	Begin Month/Day	12	18
End Month/Day	06	01	End Month/Day	08	31	End Month/Day	01	07
Begin Month/Day			Begin Month/Day			Begin Month/Day	04	07
End Month/Day			End Month/Day			End Month/Day	04	14

In this situation, the Typical School Schedule runs from September to June. The Summer School Schedule runs from June to September. The Holiday Schedules run two weeks end of the year, and one week in the middle of the year for spring break.

5.12.3 Comments

Any information on seasonal operating hours and holidays that is not cover by the in the above questionnaire should be noted down in this section. This would include notes on occupancy rates for hotels in the summer vs. the winter.

5.13 Business Schedule (Form BUS_HRS)

This form will be pre-populated based on what the phone responded stated during the phone survey. However, the phone survey respondent may not always respond with the correct hours. Therefore, the surveyor should check with the site contact to see if any corrections to the hours are needed. They should also check with the sign (if available) on the front door, and ask the site contact about any discrepancies.

Seasonal operation business hours schedules are listed for Time Periods 2 and 3, listed on the previous form. Time Period 2, if applicable, will have been asked about on the phone, but should always be double checked. Time Period 3 is not asked about during the phone survey, and should be asked about by the surveyor while onsite.

NOTE: There can be only one set of Business Hours for a site. If portions of the site have distinctly different business hours, then use the hours that are the most predominant and comprehensive, but record the other hours in comments, and note on the site sketch which portions of the site use which schedule. For example, if a site is 75% warehouse area that operates 7/24/365 and 25% office that operates 8-to-5, then you would use the 7/24/365 schedule as the predominant Business Hours. In a similar situation, if a master-metered multi-use tenant building has a receptionist that is open 8-to-5, and the individual tenants have varying hours, the office hours of the receptionist should be recorded, and a comment should be made about the other tenants.

5.13.1 Business Schedule

The business schedule page, Form BUS_HRS, is divided into three different schedule sets: Primary Business Hours, Secondary Operation Business Hours – Time Period 2, and Seasonal Operation Business Hours – Time Period 3. The first two, Primary and Time Period 2 schedule sets are pre-populated based on the phone survey responses. However, if there are any corrections to be made, the surveyor should fill out the field "*Corrected Business Hours*" in 24-hr time. Also, if the facility is either closed all day or open 24 hours, then "YES" should be written in the corresponding field. The Seasonal Operation Business Hours – Time Period 3 will need to be filled out, if applicable. If it's not applicable, the "*N/A*" box should be checked.

5.14 Hourly Equipment Operation Schedules (Form HRLY_SCHD)

The schedules are used to indicate equipment operation. The different end-uses specified include Outside lighting, Indoor lighting, HVAC cooling, HVAC heating, and Televisions. The schedules should be numbered in order from 1 onwards, regardless if they are for the different end-uses. Specify as many schedules as are needed to characterize the equipment operation, and use additional sheets if required.

Use this form to indicate equipment operation. Circle the applicable days and define a complete week. For non-HVAC equipment, specify the % of equipment on, and remember to include unoccupied times as well. For heating and cooling equipment, specify a temperature in degrees-F for all time periods.

The operation schedule should be created based on conversation with the site contact or other occupants of the building, along with the observation of the onsite surveyor. The actual on/off percent of the lighting should be recorded here, so if the area is on occupancy sensors, the surveyor will need to estimate what percent of time the lights are physically on and off, based on the number of occupants that walk through the area and the reports of the site contact. In these situations, the surveyor should take into account that the lighting will probably have a lower percent on-time in the mornings and the evenings.

- **Schedule #:** This is a unique numerical character. Schedule numbers start with 1, and increase sequentially with each new schedule, regardless of equipment type.
- **SchdType (circle one):** Circle the correct option between - % On or ^{o}F - depending on the end use.
- **EndUse:** The end use helps the surveyor match up the correct schedule number with the correct equipment type on the individual equipment inventory forms. Options to choose from include OL=Outside Lighting, IL=Inside Lighting, TV=Television, HC=HVAC Cooling, and HH=HVAC Heating.

- **Description:** Record an appropriate description for this schedule such as "Hallway Lights", "Private Office lights", "Bathroom lights/OccSensor"
- **Applicable Day Types:** Circle the applicable days and define a complete week, including holidays.
- **Percent (%) of Equipment On/Temperature ^{o}F:** Specify the % of equipment on or temperature in degrees F for all time periods, and capture transition periods if known. You do not need to write a value in every cell; simply draw a line from one value through other cells to indicate that that value applies to all other cells.

Notes for HVAC Schedules: Use '*OFF*' or "0" to indicate that the unit is turned off. The only time HVAC equipment should have a seasonal schedule is if it is at a school that has vacation time periods.

Notes for Lighting Schedules: If the light control type is only a photocell (not combined with motion sensor or time clock), surveyors should use a generic schedule of 6:00 pm to 6:00 am. Surveyors should not assume that all of the lights are off when the premise is unoccupied (security lights, store front light, etc.). Be sure to check with the site contact to confirm the schedule in such cases.

5.15 Building Shell Construction and Windows (Form BLDGSHELL)

This form collects high-level information on the windows and the construction type of the building.

Windows / Fenestration

This section is set up to allow multiple window types for each building to be listed here. A few questions are asked about the window, and then a surveyor estimate needs to be provided to estimate the wall to window ratio.

- **Operable Window?:** Whether the window can be opened or not.
- **# of Pains (1, 2, 3):** This can be determined by looking at the base of the window where it attaches to the frame and counting the number of panes.
- **Film/Glazing Type:** All glazing types can be visually verified, except for LowE. The ETEKT meter should be used to confirm whether the window has LowE coating or not. Windows on each side of the building should be checked, as it is likely that walls facing a certain direction are more likely to have the LowE glazing. If a window has LowE and another type of glazing, the LowE should be recorded, and a comment should be made about the other type.

  NOTE: Single-paned windows will not have a LowE coating, even if the ETEKT meter says that it does.

- **Window Frame Type:** The Window frame type can be Metal (M), Wood (W), Vinyl (V) or Other (O).
- **Interior Shading Type:** The interior shading type can be Fixed (F), Movable (M) or None (N).
- **% of Window to Wall Installed on:** The surveyor should estimate the percentage that the window takes up of the wall. In the example below, the wall with 8 identical windows, it would be estimated that the window to wall ratio on the left side of the building is about 80%.

Building Shell Construction

This section asks about the majority of the construction for each building. Only one column can be filled out for each building, so if there is a building with two different types of construction, the majority should be chosen and the fields filled out accordingly.

- **Exterior Wall Construction Code:** These codes can be chosen from the bottom of the page. The codes are as follows:
  - WF = Wood Frame
  - MF = Metal Frame
  - CON = Solid Concrete
  - BLO = Concrete Block/CMU
  - BRIC = Brick
  - CN = Conditioned Space - Adiabatic
  - OT = Other
- **Exterior Wall dimensions in inches:** This can be estimated by looking at the width of the door frame.

  NOTE: If the code BLO is chosen (Concrete Block / CMU) then the surveyor should remember that Concrete Block is generally 8 inches thick.

- **Masonry Walls: Furred Interior Type:** Furred Construction is a method of insulating the interior side of masonry walls, brick or concrete block. A layer of insulation is installed on the interior of the wall between the masonry wall and drywall. This question asks whether the interior construction of the furred wall is wood, metal, or none.

- **Exterior Insulation:** Exterior insulation can probably not be visually verified, but may be known by the site contact if they are knowledgeable about their building, or from the building plans.
- **Cavity Insulation:** Cavity insulation may be able to be verified from any damages in the walls. It may also be able to be verified from blueprints.
- **Interior Insulation:** Interior insulation can probably not be visually verified, but may be known by the site contact if they are knowledgeable about their building, or from the building plans.
- **Attic / No Attic / Mixed:** Record if there is an attic, no attic or if the building is mixed.
- **Sloped / Flat / Mixed Roof:** Is the roof sloped or flat. If there are areas of both type record mixed.
- **External Surface Type Code:** These codes are listed below in the table at the bottom of the form, and are as follows:
  - AS = Asphalt Roll/Shingle
  - BU = Built-up Surface
    - Built-up roofs are called "built-up" as they are made up of successive layers of what is typically asphalt and roofing felts, but can possibly also be rubber or urethane layers. Typically, gravel will be raked onto the top layer of the roof, but the photos below show a different type of roof that can be considered "built up" also.

Figure 5-3: Non-typical Built-Up Roof Surfaces

- CT = Clay/cement Tile
- RB = Rubber (urethane, etc)
- WS = Wood/fiberglass shingle
- MT = Metal/Sheet
- BF = Bituminous felt
- CN = Conditioned Space (Adiabatic)
- OT = Other

- **Roof Surface Color:** The surveyor should choose whether the roof color is Dark, Medium, or Light, or a Cool Roof, Green Roof, Solar Roof Tiles or OT.
  - **If cool roof, list Manufacturer of material or surface treatment**

NOTE on Cool Roofs: A cool roof is not just a white or light colored roof! In fact, cool roof material is now available in a wide variety of colors. Cool roofs use certified materials that are formulated to reflect and emit the sun's heat away from the building, instead of absorbing the heat. In California, a cool roof material must be certified by the Cool Roof Rating Council (CRRC - http://www.coolroofs.org/). The material, typically a field-applied coating, will be identified by a **CRRC Product ID** number. Products may be looked up and confirmed in the CRRC Rated Products Directory (http://www.coolroofs.org/products/search.php), an excerpt of which is shown below.

CRRC Prod. ID	Manufacturer Information (sorted +)	Brand	Model	Color Category	Product Type
1080-0001	**3M** Frank Klink (651-733-0099)	Scotchkote	Poly-Tech CSM 658	Bright White	Field-Applied Coating
1080-0002	**3M** Frank Klink (651-733-0099)	Scotchkote	Poly-Tech UV 662	Bright White	Field-Applied Coating
0986-0005	**A-1 Grit Company** Harold Newman (951-782-0102)	Glacier White	3/8 inch aggregate. Tested over black asphalt with a maximum solar reflectance of 0.05. Manufacturer recommends 100% granule coverage for proper performance.	Bright White	Other - Other Aggregate for use in Roofing Products
0728-0005	**Advanced Coating Systems, Inc.** Steve McGuinness (678-445-0040)	Energy Seal Coatings	Acu-Flex: 70	Bright White	Field-Applied Coating

More on the specific California Title 24 requirements regarding cool roofs can be found here: http://www.energy.ca.gov/title24/coolroofs/

- **Roof/Ceiling Insulation Present?** This is just a yes/no question. No detail has to be provided for the R-value.
- **Radiant Barrier Present?** If a radiant barrier is attached to the interior of the roof, this should be recorded here.
- **Suspended Ceiling?:** record if there is a suspended ceiling.
  - **Suspended Ceiling Insulation Present:** If a suspended ceiling is present, insulation can be easily checked for while inspecting the light fixtures. A ceiling panel just has to be easily pushed up and ceiling insulation, if present, should be easily noticed.
- **Floor Construction Type Code:** These codes to choose from are listed below in the table at the bottom of the form.
- **Primary Finish Type Code:** The primary finish types are provided and descried what type of flooring is used in the majority of the facility. Options include Carpet, vinyl, stone/ceramic, wood, none and other.

Skylights

The database is set up so that only one type of skylight can be recorded for each building. If there are several types of skylights at a facility, the dominant type should be chosen, and the others should be recorded in comments.

- **Quantity of Skylights:** The number of skylights found in the building.
- **Skylight Shape:** Is the skylight domed, Flat/Pyramid, or solar tube.
- **Glazing Type:** This is the material of the skylight
- **Color:** Is the skylight clear, what or some other color.
- **Edge Type:** A skylight with a curb will have a visible curb (about a foot) off the top of the roof.

5.16 Building-Specific General Information (Form BLDGINFO)

A new building-specific general information form should be filled out for each building at the premise[21]. These buildings should be labeled alphabetically, starting with A.

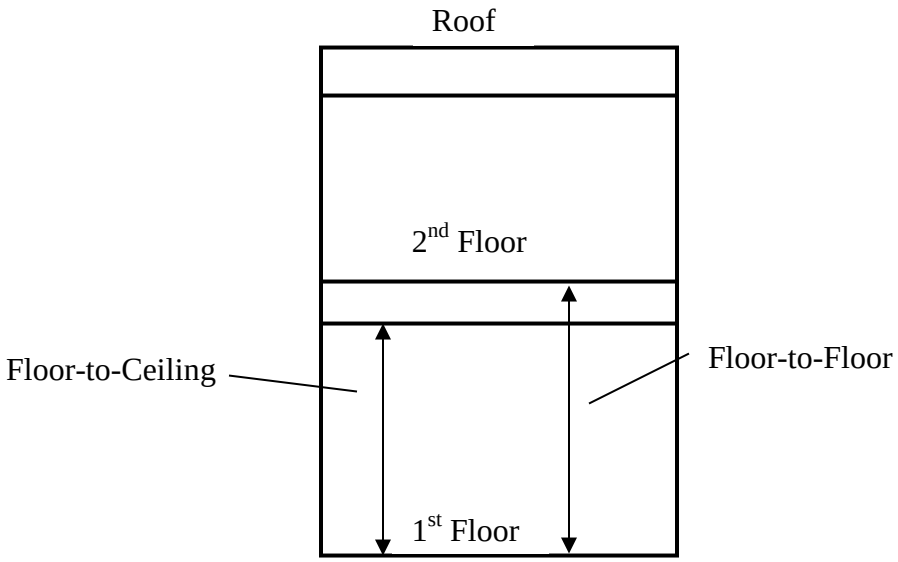
- **Building Activity Type Code:** These 2-letter codes are to be pulled from the Business Activity Type Lookup Table.
  - **Single-Building Sites:** These codes relate to where the building is in relation to other buildings surrounding it. This includes responses like "in a strip mall" or "stand-alone building".
  - **Multiple-Building Sites:** The rest of the codes on this sheet relate to what activity is actually being performed at this building, whether it is a restaurant, or an office, or a gym, etc. For smaller multiple building sites, this code may be the same across all the buildings, but for a site like a school campus, which has gyms, locker rooms, classrooms, offices, etc., these codes will help differentiate between the different types of buildings.
- **Building Type Description:** Briefly describe in a few words, the building and its uses. (e.g. Admin Office building of a large campus, kitchen for a fast food restaurant, etc.)

5.16.1 Building General Information

- **Building Type:** The choices include "1 building, single footprint", "multiple buildings", "part of a building", or "other".
- **Total Represented Floor Area:** The surveyor should record the floor area that is represented by this building.
- **Total Number of Floors:** The surveyor should record the total number of floors
- **Is there a parking garage below the bottom floor?:** Record if there is a parking garage below the building.
- **Floor-to-floor (or floor-to-roof) height, ft.:** For single story buildings, the surveyor should record the total floor to roof height. For multiple-story buildings, the surveyor should record the height from the floor to the next floor, including any space between the two floors. (see Figure 5-4)
- **Floor-to-ceiling height, ft.:** The surveyor should also record the ceiling height. For suspended ceilings, the height recorded here should be to the bottom of the suspended ceiling. (see Figure 5-4)

[21] If there are multiple buildings that are similar in building activity type, size, and electrical load, then they should be grouped as one building. There is a field at the bottom of the form for "total number of buildings of this building type". This would apply for something like a school, which has multiple portable classrooms.

Figure 5-4: Floor to Floor vs Floor to Ceiling Schematic



- **Daylighting controls used?:** Day-lighting controls include photo sensors that will sense the amount of daylighting coming in through windows or skylights, and adjust the lighting accordingly.
- **General Compass Direction of Front Entrance (N, S, E, W):** Record the direction the front of the building points.
- **What year was the majority of the building survey area built?:** Record what year the building was built in.

If the premise has multiple buildings…

These questions should be only asked in situations like portable classrooms, where there are multiple buildings of the exact same size, activity type, vintage, etc., and they can be grouped into a single building ID.

- **What is the total floor area of this building type?** If there are multiple buildings of this building type, include the individual floor area (or average floor area) of one single building.
- **What % of the total floor area is heated or cooled of the surveyed building?:** How much of the building is conditioned at all.
- **Total number of buildings of this building type?:** How many buildings make up this building type?

NOTE: The "total number of buildings of this building type" multiplied by the "Total Floor area of this building type" should be equal to the "Total Represented Floor area"

5.17 Activity Area Descriptions (Form ACTAREA)

This form is used to define the unique areas of activity and equipment operation and/or conditioned space type encompassed by the on-site verification survey area. Activity areas can be areas that are physically separated by walls, or they can be areas where the equipment is uniquely controlled. However they are separated out, the surveyor should remember that in the end, a lighting power density will be calculated at the activity area level, so the activity areas should be correctly defined. In addition, the defined activity areas should be accompanied by and identified on the site-plan sketches (Forms SKETCH1 and SKETCH2).

The fields which must be defined for each activity area are:

- **Area ID#:** This identifier will be used on the measure inventory forms to associate measures with an activity area.
- **Building ID#:** This identifier is used to relate the activity area to a specific building.
- **Activity Area Type Code:** Record the activity area type codes from Form CODES that best describes the activity/facility type for each business. Additional comments should be added in the next field to provide any details or clarification. Multiple areas with the same code can be specified; however, if they are the next field should be used to add a description that explains how the areas are different.
- **Surveyor's Description of Area (include floor or Bldg identifiers if needed):** Use this field to describe the activity area type.

Example:

Area ID#	Building ID #	Activity Area Code (*AA Code*)	Surveyor's Description of Area
1	A	36	1st Floor Office
2	A	36	2nd floor office w/skylights

In addition to this, the surveyor should inspect vacant areas, especially if the areas are in multi-tenant buildings. They should try and determine the type of activity area the vacant space would be used for. If this is possible, they should use the letter "V" after the activity area code to identify the vacant space on the form.

- **% of Total Represented Building Floor Area:** This value is crucial to the calculation of Lighting Power Densities (LPDs). This value will be multiplied by the total building floor area, to determine the square footage of each activity area. Therefore, it is necessary for the surveyor to be as accurate as possible while estimating this percentage. The surveyor should use a digital tape measure to measure the size of the smaller rooms, and use that value to calculate the actual percentage of the building floor area. This won't take much time, and will make the percentages much more accurate, especially for the larger Area IDs which are still being estimated.
- **Windows or skylights:** If any part of the activity area has windows, then circle the "W" and if any part of the activity area has skylights then circle the "S".
- **Conditioned Space Type Code:** Use the codes above the table to record how or if the space is conditioned. (Heated-only, cooled and heated, cooled-only, unconditioned, etc.).
  - HVAC Present but not used (NU**)**: For these scenarios, where the site contact is positive they do not use the HVAC system, the conditioned space type code should be "NU". This space is considered "unconditioned".
- **Total Qty of this Area Actually Surveyed:** This field should represent how many similar areas to this line item were actually surveyed. For example, if a surveyor enters 6 out of 25 classrooms in Building ID A, then the number 6 would be recorded here. This field, along with the following field, will be used to scale up any sampling that is performed at a large facility.
- **Total Represented Qty of this Area On-Site:** This field will be used to note if there are multiples of a given area on a site. In case there is only one of a kind activity area it should be noted as 1. Example: If there were 10 portable classrooms on a school campus, then "10" would be entered into this field. If there were 20 similar private offices in an office building, then 20 would be entered here.
- **End-Uses ***NOT* **Surveyed (all that apply – explain):** The three options for the surveyor to choose from are "LT", "OF", and "TV". This field is to be used in the case that the surveyor is not able to take an inventory of the measures of a certain end-use within an activity area, yet those measures do exist.
- **Similar to these Area ID groups (MM-MT only):** This field is for MM-MT sites only where not all of the suites were surveyed. If there are suites that have a similar shape, activity area distribution and energy intensity they can be sampled. This box will say what activity areas to refer to for the suite.

5.17.1 Comments

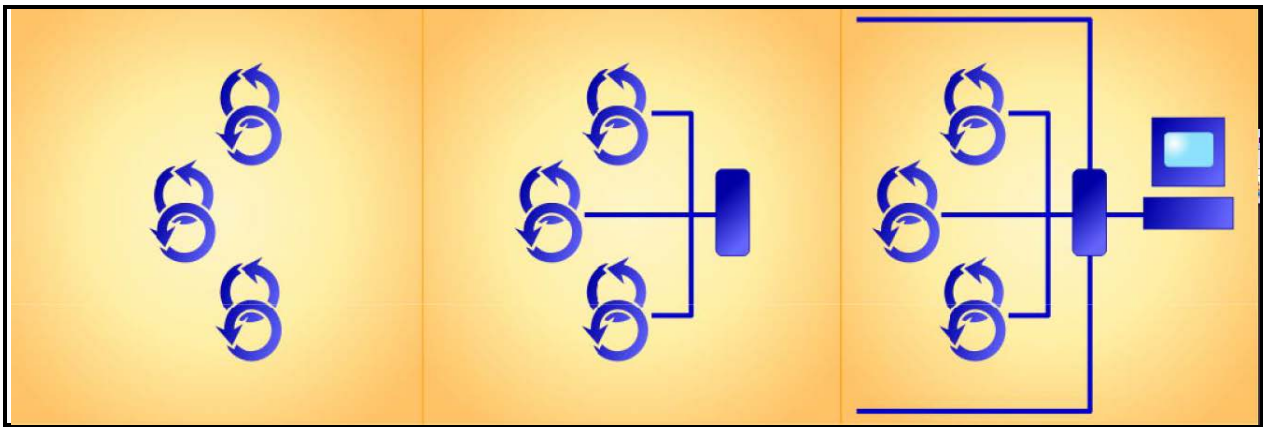
Any additional comments, information from the contact or observations during the survey should be written down in this section.

5.18 Energy Management System (Form EMS)

An Energy Management System (EMS) is a network that combines local distributed control with centralized coordination and management to monitor, control, and optimize the energy usage throughout the facility. This form is used to collect information on a broad range of automatic control system from simple building automation system (BAS) to high-level, facility-wide integrated energy control network. Figure 5-5 shows three levels of facility controls that reflect three levels of system integration and sophistication.

- **Local-loop controls** automate the operation of a single piece of equipment. Each system component has its own sensor that adjusts the equipment as needed. The leftmost graphic would depict several independent local loop control systems, and would not be considered an EMS.
  - The most common example of this would include switches to control lighting, or thermostats to control HVAC.
- **Building automation system (BAS)** connect the local-loop controls to the building overall control system through automation from a central location (shown in the center graphic). Most building automation systems are designed with an emphasis on saving manpower rather than conserving energy. For our purpose, this should be considered as an EMS.
- **High-level EMS** adds "intelligence" to the building automation system, with emphasis on power-saving operation, like optimum start stop control.

Figure 5-5: Examples of Distributed Control[22]



Local Loop Control **Building Automation** **High-Level EMS**

[22] Energy management System, Strategies for Energy Savings and Networking Concepts, ASW Engineering Management Consultants

NOTE: There are a large number of fields on the EMS form, but many of them may be difficult to obtain without the right contact person. The most important fields are those which identify the presence and active use of an EMS, contact information for the EMS expert (person and/or company), the end uses controlled, and the use of the EMS for Demand Response or any other advanced load control strategies. These fields are noted in ***bold, italic text*** below.

- **Page __ of __:** If there are multiple and significantly different EMS system types, then complete multiple EMS forms and use this field to indicate that there are multiple forms. However, you do not need to fill out a form for every physically separate EMS system that is present. A separate EMS form should only be used if there are significant differences between the systems, such as the end uses controlled. [*NOTE: The first number entered will be used as an Item # in the data entry database*].
- **When was the EMS system physically installed?** Record the appropriate age range for the initial installation of the EMS system. The age of the central control system is usually clear; however some multi-building sites may have more than one EMS system. In that case, a separate form should be used to record the information for each separate EMS system, or if the controls are the same for all buildings, then a single form can be used and note in General Comments that each building has its own EMS system. When unclear how to fill this out, please use the OT code and describe the situation in comments. The age ranges are:
  - **N = New (<=5 yrs)** and **O=Old (>5 yrs):** These fields are self-explanatory.
  - **OT = Other (describe):** This option might be used if the site contact cannot categorize the system due to multiple phases/stages**.** If that is the case, please explain the situation in comments.
- **When was the last time the EMS system was updated (year)?** Ask the site contact when the last time a major (non-maintenance) change was made to the EMS hardware and/or software or new strategies programmed, and describe that update in comments. A very common "major" change in older buildings is to upgrade the local loop control from pneumatic (air compressors) control to DDC. If this comes up in discussion as the reason for the update, provide this information as a note in the General Comments section.
- **EMS controls:** Describe what portion of the site is controlled by the EMS. If anything other than A (All) is selected, please note in comments which Building IDs are served by each EMS. The options for this field are:
  - **A = All/entire premise:** Circle "A" if the EMS controls the specified end uses for the entire site. No additional comments are needed if it truly controls the entire site.
  - **P = Part of premise:** Circle "P" if the EMS controls the specified end uses for only a portion of the site. Additional comments identifying at least the Building IDs and

possibly the Activity Area IDs that are controlled should be provided on the General Comments page. If there are multiple EMS items.

- **O = Other/unknown:** Select this option if neither of the previous options are applicable, and explain the actual situation in comments.

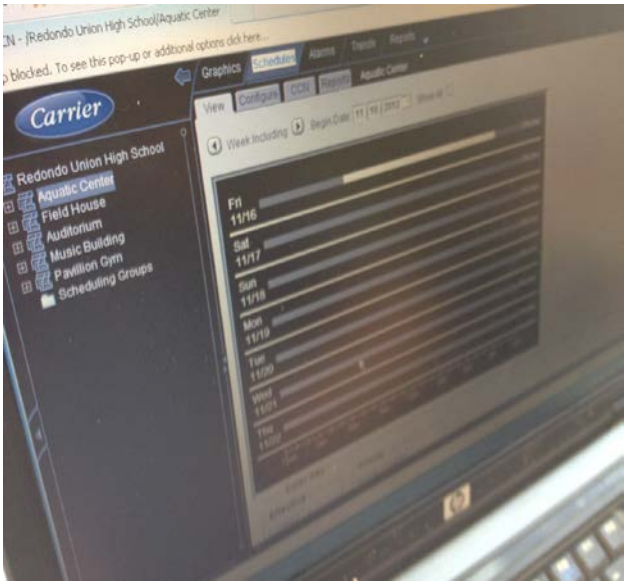
- **Which end uses does the EMS control? (Circle all that apply.)** Record the type of equipment that is controlled by the EMS. Inside lighting and HVAC are the most commonly controlled end uses. Note that refrigeration is not included in this list because those control systems would be recorded on the Remote Refrigeration Rack Controller form. The end use options are:
  - IL = Inside Lighting
  - OL = Outside Lighting
  - HV = HVAC units
  - CP = Central Plant (chiller, boiler, etc.)
  - AX = HVAC auxiliary pumps/fans
  - WH = Domestic/Service Water heating
  - PR = Process equipment (describe)
  - OG = On-site generation
  - OT = Other (describe in comments)

> ***NOTE:*** *If lighting and HVAC systems are indicated as controlled by the EMS on this form, then on the Lighting Inventory and HVAC on-site survey forms, the lighting fixtures and HVAC equipment that are controlled by the EMS must also be reflected.*

- **EMS is controlled and operated by:** Indicate where and how the EMS is controlled. In most cases, the EMS system will be locally controlled, but for some of the larger chain stores (Home Depot for one), the EMS may be controlled off-site from the corporate office. In either case, the EMS operator's contact information should always be obtained.
  - **O = On-site Personnel:** Circle "O" if the EMS is controlled by on-site personnel.
  - **C = Central headquarters (off site):** Circle "C" if the EMS is controlled by central headquarters, and provide additional information in comments if it is not entered elsewhere on this form.
  - **T = External third-party:** Circle "T" in the case where an external third party manages the EMS. This may be the case for smaller businesses when there are no trained personnel on site and the business is not part of a chain store.
  - **OT = Other:** Select this option if neither of the previous options are applicable, and explain the actual situation in comments.

- **EMS has central control computer front end?** A front end is a human-to-machine interface where the EMS can be controlled and monitored. This is usually in the form of a desktop computer using specialized software. There might not be a dedicated physical front end computer for the browser-based applications. For these kinds of EMS system, the EMS operator is able to perform all normal operator functions from anywhere in the world using a standard web browser. Figure 5-6 shows Carrier i-Vu which is an example of a web-based user interface for building automation systems.

Figure 5-6: Carrier i-Vu Web Based User Interface



- **Who is the EMS manufacturer and/or service provider?** Provide the manufacturer/brand of the software front end and the controls. Two fields are provided for this data, as there may be different providers for these two key components of an EMS system. You may need to get this information from the site contact, from the EMS/facilities manager, or from a label or schematic.
  - **Front End.** The front end is the software that provides monitoring/viewing capabilities for the EMS system. The contact or EMS operator should be able to easily provide the manufacturer or provider info for the front end since they work with the software on a regular basis and they see the logo of the provider on the software.
  - **Controls.** It is possible that the front end and the physical control devices are from the same manufacturer. However, there often are several different manufacturers for the various controllers and components of the EMS system. In this case, the most prevalent manufacturer should be listed here, and the others listed in a general comment.

- ***Contact information for EMS expert (if different than site contact):*** This is a critical field, and every effort should be made to obtain this information, as it will be used if needed to follow-up on any EMS information. If the EMS operator is the site contact, this field can be slashed through. If the EMS expert cannot be determined, then record "UNK". If the EMS operator is different than the site contact, such as when the EMS is controlled off-site, it is necessary to obtain contact information for the EMS operator.
- **External Network Communication Link.** A network, in the context of energy management and control systems, is a collection of hardware, software, and firmware that links together multiple energy management and control components. A network today can have a wide range of configurations and capabilities based on the technology they employ. The options are:
  - **HE = In House Network:** Some of the traditional and older versions of EMS systems have an in-house network, which means there are no external (to the outside world, internet, etc.) communication links.
  - **IV = Internet/VPN.** Most modern EMS systems are accessible through an internet connection which adds the ability to communicate information from operator to system, system to operator, and system to system.
  - **M = Modem/Telephone Dial Up.** Different subsystems (e.g. HVAC, lighting, security) are connected through telephone network (similar to how older credit card reader devices communicate).
  - **S = Standalone (no network access).** In some older version if EMS, different subsystems are independent. These older stand-alone subsystems are typically proprietary, meaning they are not typically compatible with other standalone systems.
  - **OT = Other (explain):** Select this option if none of the previous options are applicable, and explain the actual situation in comments.
- **Is End Use Operation/Control Data Available?** For some high-level EMS configurations with reporting and data trending functions, trend data may be available for export as hardcopy or as electronic data. If this data is readily available and decipherable, it may be possible to use this data to fill out survey hourly equipment operation and HVAC schedules (Form HRLY_SCHD).
- **EMS System Layout:** The Processing power of EMS system may be located in a central location, or it may be distributed throughout the system and located at the component device (in the field), or in both type of location.
  - **S = Single Central Controller:** Control/processing is done by a single, central controller at the management or operations level- when downstream devices are relatively dumb.

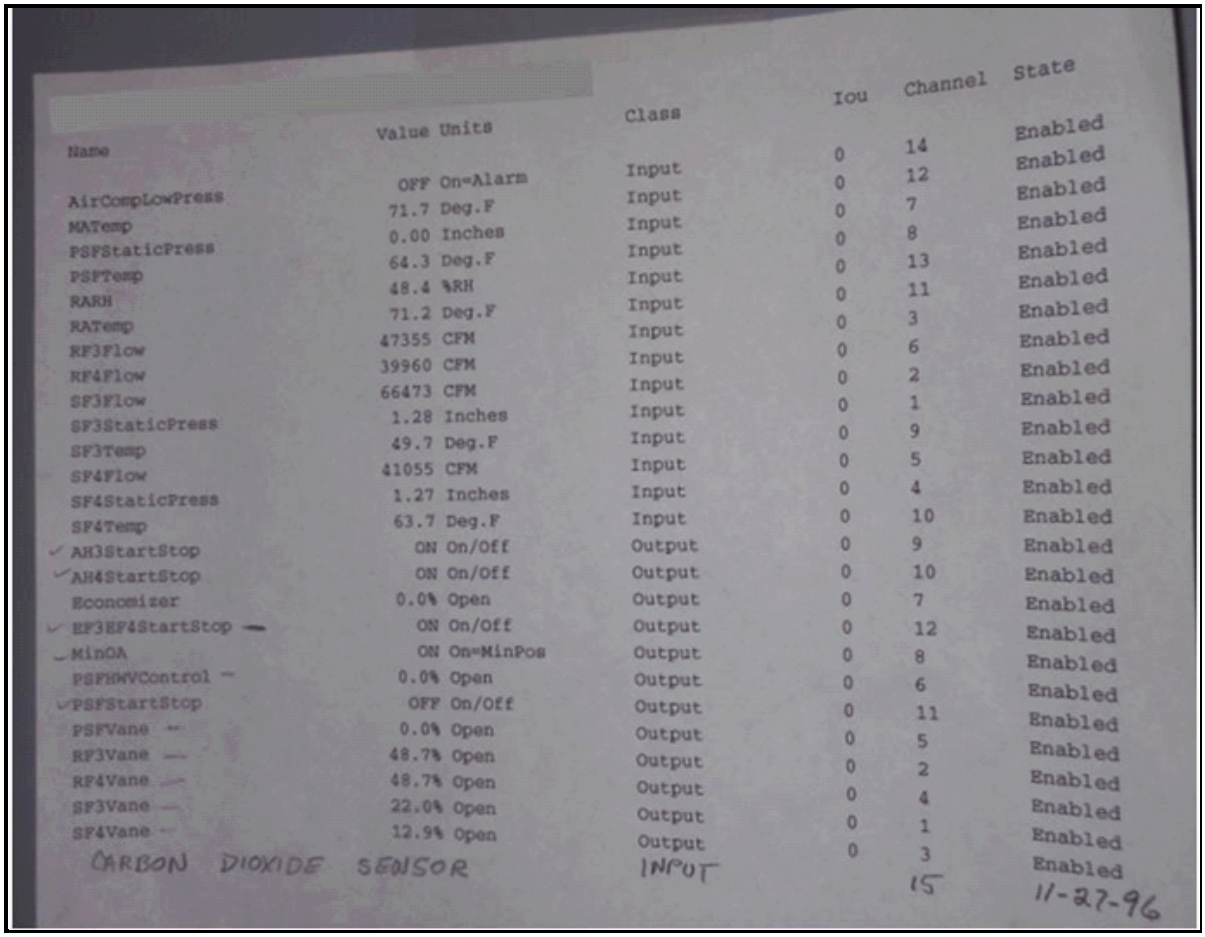
- **D = Distributed Control:** In distributed system, much of the day-to-day data collection and processing takes place in the field panel, and data controlling server performs only high-level functions such as managing the overall network and integrating major systems- when downstream devices are intelligent. In

Key System Metrics

The more detailed and key metrics of the EMS system are discussed in this section including system- specific levels of system control, different ways to control a local loop, and EMS functions.

- **Number of Points per Controlled System (both Input and Output):** This may be difficult field to populate accurately, as the number of points per system depends on the type of each system controlled. It also depends on the site-specific operating and control strategies and the size of the site. An easy approach is to find a controlled point data sheet onsite which will show all the all the input and output controlled points for all the systems. It is easier if just one type of system is controlled, e.g. only air handlers. Otherwise, we can inquire about the total number of systems as well as the total number of control points and calculate the average. Figure 5-7 below shows a screen shot of an EMS controlled point data sheet that was found in one of the sites. As seen, there are a total of 15 inputs and 12 outputs, for a total of 27 points controlled.

Figure 5-7: Example of EMS Control Points Data Sheet



Name	Value	Units	Class	Iou	Channel	State
	OFF	On=Alarm	Input	0	14	Enabled
AirCompLowPress	71.7	Deg.F	Input	0	12	Enabled
MATemp	0.00	Inches	Input	0	7	Enabled
PSFStaticPress	64.3	Deg.F	Input	0	8	Enabled
PSFTemp	48.4	%RH	Input	0	13	Enabled
RARH	71.2	Deg.F	Input	0	11	Enabled
RATemp	47355	CFM	Input	0	3	Enabled
RF3Flow	39960	CFM	Input	0	6	Enabled
RF4Flow	66473	CFM	Input	0	2	Enabled
SF3Flow	1.28	Inches	Input	0	1	Enabled
SF3StaticPress	49.7	Deg.F	Input	0	9	Enabled
SF3Temp	41055	CFM	Input	0	5	Enabled
SF4Flow	1.27	Inches	Input	0	4	Enabled
SF4StaticPress	63.7	Deg.F	Input	0	10	Enabled
SF4Temp	ON	On/Off	Output	0	9	Enabled
AH3StartStop	ON	On/Off	Output	0	10	Enabled
AH4StartStop	0.0%	Open	Output	0	7	Enabled
Economizer	ON	On/Off	Output	0	12	Enabled
EF3EF4StartStop	ON	On=MinPos	Output	0	8	Enabled
MinOA	0.0%	Open	Output	0	6	Enabled
PSFHWVControl	OFF	On/Off	Output	0	11	Enabled
PSFStartStop	0.0%	Open	Output	0	5	Enabled
PSFVane	48.7%	Open	Output	0	2	Enabled
RF3Vane	48.7%	Open	Output	0	4	Enabled
RF4Vane	22.0%	Open	Output	0	1	Enabled
SF3Vane	12.9%	Open	Output	0	3	Enabled
SF4Vane						

CARBON DIOXIDE SENSOR — INPUT — 15 — 11-27-96

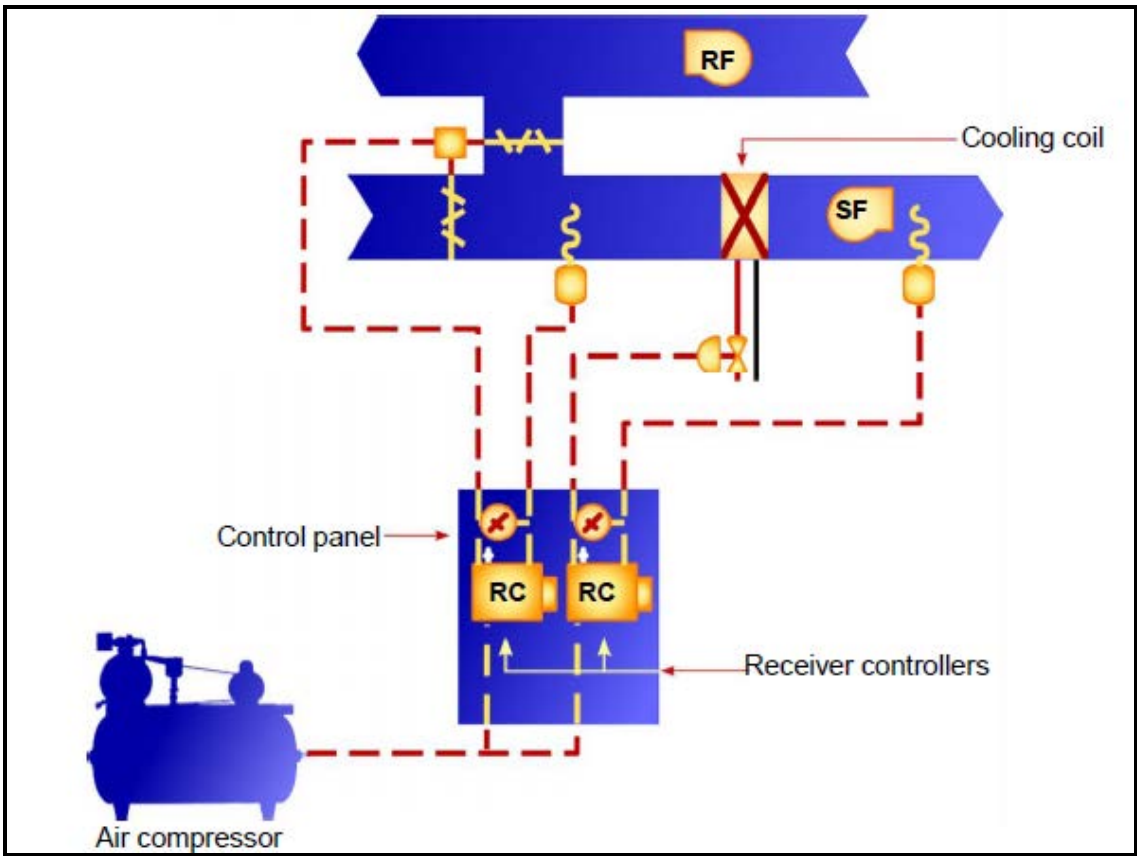
- **End/control point device type (Circle all that apply – note predominant type in comments).** As for most EMS fields, the best way to gather information about control point type is by asking the operator, although some characteristics may be able to be determined by visual inspection. These are basic kinds of local-loop control:

  - **PN = Pneumatic:** Pneumatic systems use compressed air which is supplied to the controller that regulates the pressure supplied to the controlled device. Look for a compressed air lines or compressor itself. This kind of control type can be found in old commercial buildings. Sometimes "local" pneumatic controls for a particular system are tied in to a larger electronic or DDC EMS, or vice versa. In this case we circle both and comment on which control point type is most common. Figure 5-8 shows an example of pneumatic local loop control.
  - **E = Electronic/DDC:** Electronic controls provide relatively precise control using solid state technologies. They use low or line level voltage, supplied to equipment through a controller that regulates the energy directly or through relays or pneumatic

transducers. Figure 5-9 and Figure 5-10 show examples of electronic and DDC controls.

- **OT = Other (describe):** Select this option if neither of the previous options are applicable, and explain the actual situation in comments.

Figure 5-8: Pneumatic Local Loop Control[23]



[23] Energy management System, Strategies for Energy Savings and Networking Concepts, ASW Engineering Management Consultants

Figure 5-9: Electronic/ Electric Control[24]

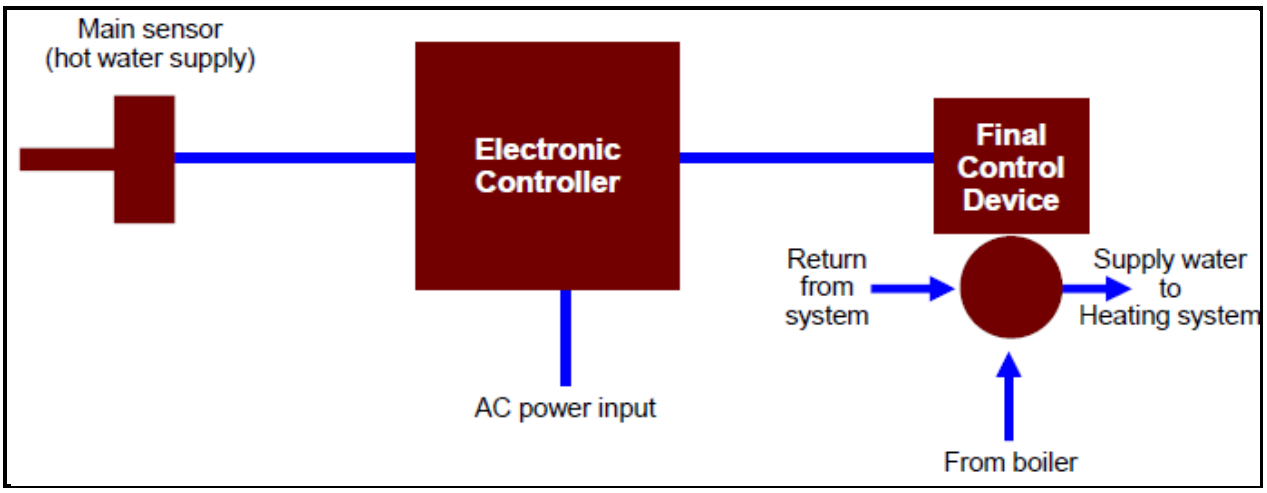
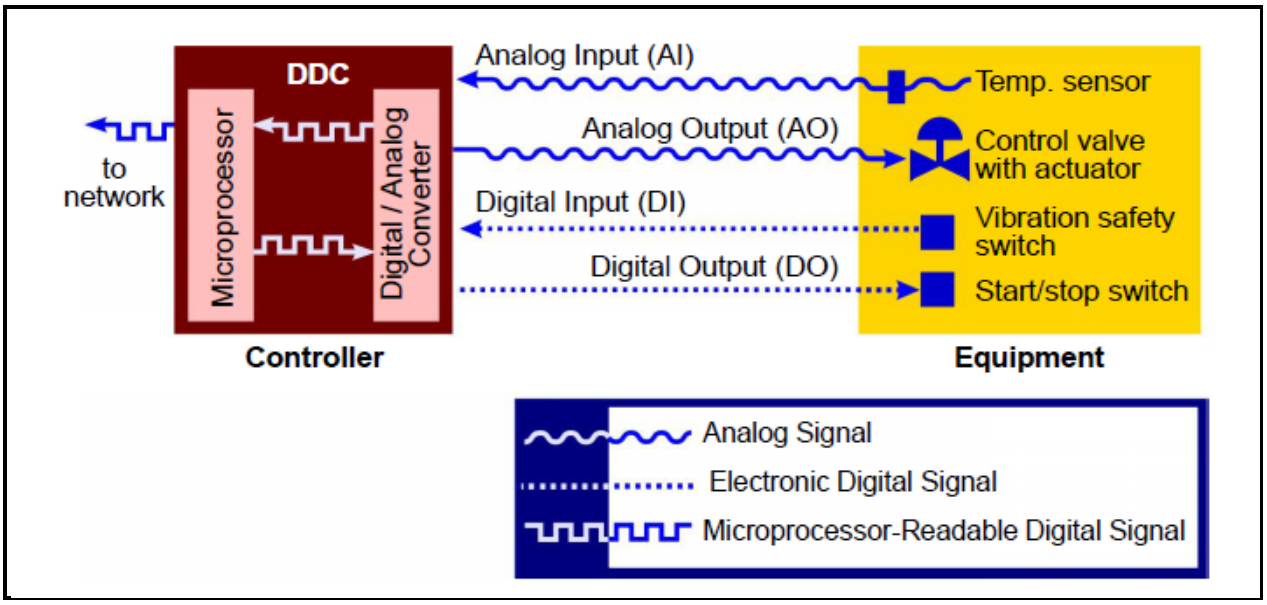


Figure 5-10: Direct Digit Control[24]



- **Control Capability features (Circle all that apply):** Energy management systems offer a broad range of control capabilities or functions that are used to implement site-specific control strategies. These options are used to attain the ultimate goal of EMS which is to improve energy efficiency through monitoring and controlling the energy-consuming systems in a facility. The site contact or EMS operator should be familiar with these

[24] Energy management System, Strategies for Energy Savings and Networking Concepts, ASW Engineering Management Consultants

terms, and be able to identify the capabilities of their system. These options are different levels of control or functionality that might be applied to different controlled system:

- **B = Basic Control (time & temp):** The goal of time and temp basic control function is to ensure equipment operates only when it is needed. With this function, a clock is programmed with the hours a building is scheduled to be occupied. This is typically the most beneficial EMS functions which provides consistent control and saves on energy and manpower cost.
- **D = Data Trending:** At the highest level of control, data trending is used to gather operating or energy use data from **different** systems to establish system efficiency trends. The data collect can be analyzed and used to discover possible ways to improve system efficiency. Another aspect of data trending is runtime reporting which may tell you that it's time for maintenance for a particular piece of equipment.
- **O = Optimized start/stop:** With this function the controller adjusts its response for optimum control under all load conditions. This function is used to start equipment at late as possible (**optimum** start), and shutdown equipment as early as possible (optimum stop). For instance the optimum start program enables the HVAC system to start as late as possible in the morning and still reach the comfort range by the time the building is occupied.
- **R = Reset Optimization:** Reset optimization describes high-level, real time, optimization strategies in which ongoing adjustments are made by the system. Examples of reset optimization strategies are: chilled water pumping pressure reset, chilled water supply temperature reset, condenser water temperature reset, duct static pressure reset, and supply air temperature reset.
- **DL=Demand Limiting or load limiting:** This is essentially an electric rate-based behavior, and is done to limit the monthly peak billing demand charge. Demand limiting strategies shut down equipment during on-peak or partial-peak billing demand periods in order to reduce monthly demand charges for the building. Anticipation of future behaviors is key to this strategy, and this approach requires a sophisticated algorithm, or active manual monitoring and control.

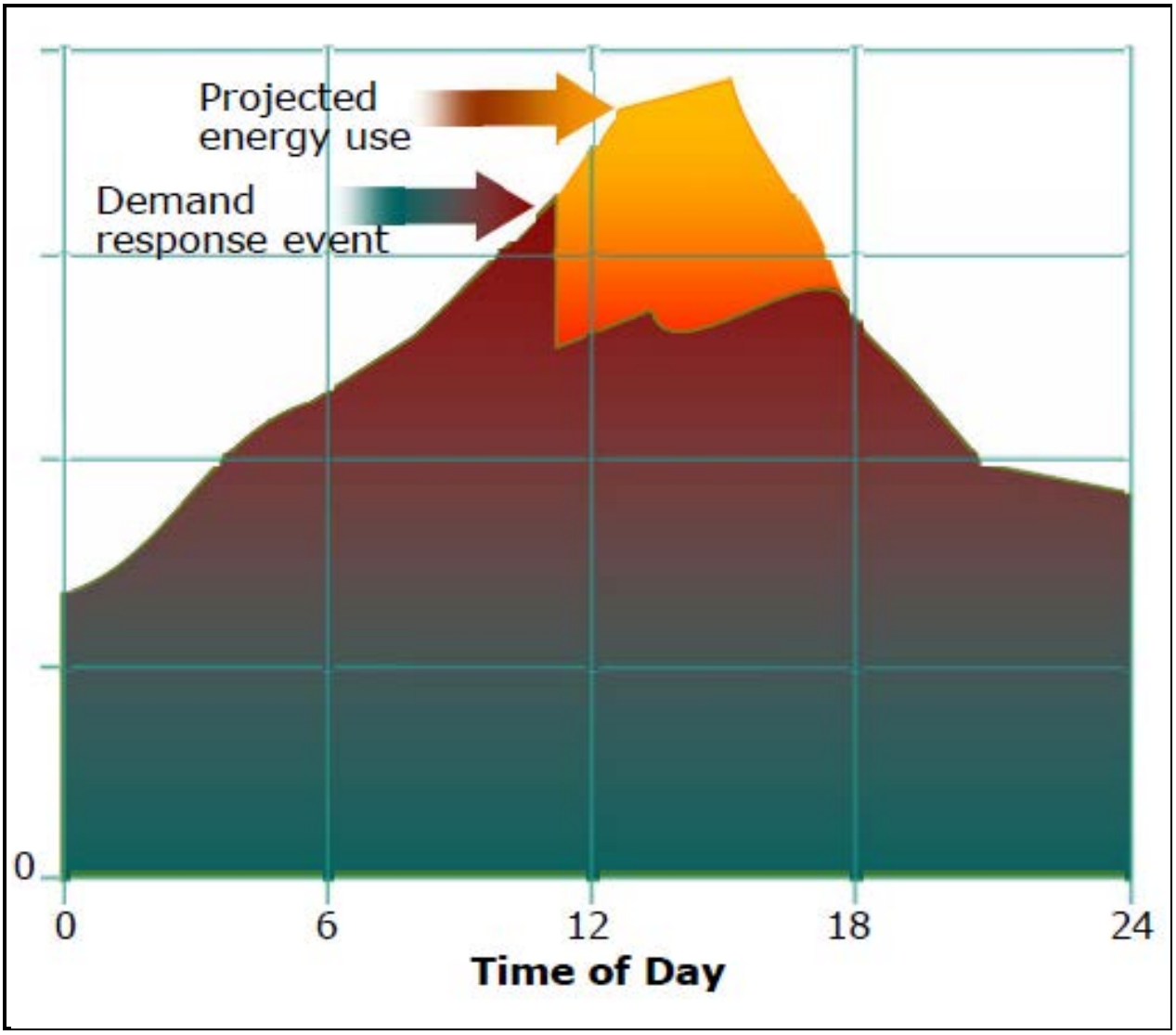
Is the EMS used for Demand Response (DR) control? Y N

Demand Response (DR) involves taking action that leads to a reduction (usually temporary and short-term) demand in electric load. Demand response is offered by many utilities in which customers respond to an elevated demand on the electric grid[25] by voluntarily reducing electrical load at their facility. In exchange for this, they receive incentive payments and/or bill credits. Figure 5-11 shows the effect of calling a demand response event on the electrical grid's overall demand, as well as the primary characteristics of DR.

[25] The daily grid outlook for California is available here: http://www.caiso.com/Pages/TodaysOutlook.aspx.

NOTE: In most cases, it may be difficult to answer many of the questions in this section. However, surveyors should do all they can to determine if and how the EMS is used for DR, the type of DR program, the name of the utility (or other) DR program, and if nothing else, at least the name of the contact responsible for this participation, especially if it is different from the EMS contact.

Figure 5-11: Demand Response[26]



- **For which Demand Response Program is the EMS used?** Utilities typically offer their customers several options for participating in DR, referred to as DR Programs. Commonly offered DR programs include:

[26] Energy management System, Strategies for Energy Savings and Networking Concepts, ASW Engineering Management Consultants

- Capacity Bidding Program (CBP)
- Demand Bidding Program (DBP)
- Base Interruptible Program (BIP)
- Critical Peak Pricing (CPP) [renamed Summer Advantage Incentive (SAI) for SCE]

Some customers will sign a contract with a third party, also referred to as an aggregator. In this case, the third party will be responsible for initiating load shed during a DR event. The code AGG could be used to indicate this situation. It is also possible for a customer to be enrolled in more than one program, make sure to indicate additional enrolled programs.

- **Estimate of DR-controlled kW reduction:** The EMS operator may have an idea of the amount of kW reduced in a DR event, as incentives were likely paid based on the amount of load shed. If not, they may be able to find the actual kW reduced by looking at data from the last Demand Response event day, if available.
- **The DR decision to** turn **off equipment is made by: (circle all that apply)**
  - **E = EMS algorithm (semi-auto):** Semi-Automated Response involves the use of existing building automation systems (BAS) or energy management systems (EMS) for load shedding, where a preprogrammed load shedding strategy is initiated by facilities staff to occur on a regular basis.
  - **O = On-site operator (manually)**
  - **C = Central HQ (remotely)**
  - **A = Automatic signal from utility(auto DR):** The automated demand response (Auto-DR) program lets utility company customers participate in demand responses by reducing electricity usage during periods of peak demand without manual intervention. **Auto**-DR connects the utility company system to facility systems to enable automated load shed for DR response. When the auto –DR event occurs, a central system sends a signal through the internet to a device on the customer's site, which then triggers the energy management system to reduce load.
  - **OT = Other:** Select this option if neither of the previous options are applicable, and explain the actual **situation** in comments
- **What are the Demand Response strategies (circle all that apply):** This is a partial list of strategies that may be employed to reduce kW during a DR event. If additional strategies are listed in the interview process, write in "OT" for a code and describe the strategy in a comment.
  - TR = Temperature Reset (for HVAC systems)
  - TL = Turn lights off
  - DL = Dim Lighting

- CR = Chiller reset
- FSR = Fan speed reduction
- PR = Cycling Process load

- **What electrical loads are included in the DR control: (circle all that apply):** This is a fairly complete list of facility loads that may be tied in to DR controls. HVAC and lighting are the loads most likely to be DR-enabled.
  - IL = Inside Lighting
  - OL = Outside Lighting
  - HV =HVAC units
  - CP = Central Plant (chiller, boiler, etc.)
  - AX = HVAC auxiliary pumps/fans
  - WH = Water heating
  - PR = Process equipment (describe)
  - OG = On-site generation
  - OT = Other (describe)
- ***Does the EMS activate on-site generators during peak hours?*** On-site generation is sometimes used to supplement electricity purchased from utilities in order to avoid time-of-use and peak-related charges. This cost-saving strategy does not qualify as Demand Response.

Comments

Use this block to record any additional comments for the fields above. Be sure to link your comments to specific fields, if appropriate.

5.19 HVAC Form (Form HVAC_INV)

This form takes a general inventory of all HVAC equipment at the premise. This form is to be filled out for all CSS sites, and all CMST-HVAC sites. However, the CSS/CMST focus is on small packaged HVAC systems. Therefore, it is important to know whether a site has a built-up HVAC system, but detailed information on the system is not needed. The surveyor will only collect the following information on these built up systems:

- What kind of system it is
- What the central plant is (chiller, purchased water, cooling towers, pumps, etc.)

They will not need to collect detailed information like capacities or make/model numbers for these built up systems. Similarly, information on industrial process heating is not needed to be collected, even if this is used indirectly to heat a business. If the process equipment is used indirectly, then a note should be made about it, but no information needs to be captured.

5.19.1 HVAC Systems

- **HVAC Not Surveyed:** This box should be marked if the surveyor is not able to access the HVAC system for any reason, AND they are not able to obtain information off the HVAC systems from the site contact or the HVAC contractor. If they are able to obtain information, like distribution system type, cooling equipment type, heating equipment type, fuel type, and make and model numbers, from either one of these two sources, then the information is still considered valid, and will still be used in the analysis.
- **NO HVAC onsite:** This box should be checked if there is no HVAC onsite.
- **Item #:** This is a system identifier used to distinguish each type of HVAC system.
- **HVAC Typical Schedule # (Cooling | Heating):** This field correlates to the premise schedule forms. The schedule forms contain both cooling and heating schedules for the premise. This field involves cross-referencing with a separate form and it is very important that the surveyor double checks that the schedule numbers match up and are consistent on all forms.
- **Schools: Season Schedule (vacation) (Cooling | Heating):** For schools, the surveyor must also include seasonal cooling and heating schedules. Many schools operate differently with summer school and intersession class schedules so it is important to confirm the seasonal schedules and operation with the site contact.

  NOTE: In cases that there are three seasonal schedules, one for a summer school schedule, and one for a holiday schedule, note only the dominant seasonal schedule (probably the summer school schedule).

- **Building ID or Area ID# served:** List all Activity Area ID numbers that correspond with the given schedule. This field also involves cross-referencing and it is important for the surveyor to double check that the correct Activity Area ID numbers are assigned to the correct schedule number.
- **Units are *operational* and actively used by customer:** All units present on site need to be accounted for and recorded. The operational condition must be noted by the surveyor. When possible, the units should be turned on and off to confirm they are in working condition. For sites where the activity area of the unit is unknown, ask the site contact for the operational condition.
- Nameplate is present and readable: Circle Y or N to indicate if the nameplate is readable. In addition to noting if the nameplate is readable, the surveyor should take pictures that can be used to identify the unit as well as look up the product information via the model number.
- **Distribution System Type:** *This code is required to be filled in for every HVAC item number listed on the form.* The distribution system type should be listed from the form CODES. The surveyor should be familiar with all types of distribution system types and able to decipher between the different systems type while on site. Always be sure to take pictures of the distribution systems so they can be clearly identified and double checked after the on-site survey has been completed. If the surveyor is confused about a certain distribution system, they are encouraged to call one of the engineers for assistance and take lots of photos.
- **Quantity of units of this type:** This field indicates the number of similar units that exist on the premise. This number can be used to compare the cooling and heating load to the area of the premise.
- **Recent Retrofit/Replacement or Newly Added equipment:** This field indicates whether the HVAC units were a recent retrofit or if they are new equipment. The units would only constitute as "new equipment" if they were not replacing any existing units and are new additions to the premise. This should be filled out for any equipment installed post-2009.
- **Condition of Units (New, Good, Fair, Poor):** The judgment of the surveyor is used to assess the condition of the units.
- **Year Manufactured (nameplate) or Year Installed (site contact):** The primary date the surveyor should be concerned with is the installation date of the equipment. This information could be written on the unit by the service technician or known by the site contact. If neither source can provide the year of installation, the manufacturing date should be recorded from the nameplate.
- Temperature Control Type: Using the codes on the *HVAC Code Descriptions* form, record the temperature control type. The choices are as follows:

- **M = Manual:** This option indicates the presence of a manual switch or non-programmable thermostat.
- **A = Always On:** constant temperature: This option is utilized in areas with sensitive equipment or environments that require 24/7 temperature control.
- **T = Time Clock:** This option indicates the presence of a time clock that automatically turns on and shuts off the HVAC system at specified times.
- **E = EMS:** This option indicates the presence of an energy management system that uses sensors and logic to control the temperature and ventilation requirements of the space.
- **P = Programmable Thermostat:** This option indicates the presence of a programmable thermostat.

NOTE: Utility demand response (DR) control units, such as those shown in Figure 5-12, may be found attached to outdoor HVAC units. These units are used to cycle the A/C units during electric system peak periods. One example of this program is the SDG&E Summer Saver program. The presence of these can be noted in comments if observed, but it does not need to be formally noted on the survey form. If needed for the analysis, DR program participation information will be obtained from the utility tracking data.

Figure 5-12: Example of Utility-Controlled A/C Demand Response Unit

- **Fan Control:**
  - **A = Always on / continuous:** This option indicates that the fan runs 24/7.
  - **C = Cycles w / HeatCool:** This option indicates that the fan cycles on and off as the facility is heated or cooled.
  - **M = Manual / as-needed:** This option indicates that the fan is turned on and off when needed.
  - **N = Night Cycling:** This option indicates that the fan is set to Night Cycle when one or more zones become too hot or too cold.
  - **O = Off / Not Used:** The fan will stay off no matter how hot or cold the zones may be.
- **Variable Speed (VSD/VAV) fan drive:** Circle Y or N, depending on whether a VSD or VAV is present.

- **Optimal start/stop:** Optimal start controls provide a means for gradual, optimized startup of HVAC systems to avoid a sharp peak in the morning. Indicate whether or not optimal start controls are used for the system. This is only applicable if the on/off control is EMS. This information can be obtained by asking the premise contact.
- **Outside Air/Econ. Configuration:** Record if there is No Outside Air intake (N), Fixed Damper (F), Economizer (E) or Other (OT).
- **% Outside Air:** Estimate the percent of outside air used by the system. This can be estimated by looking into the economizer and estimating the position of the damper.

- **If economizer present, appears functional:** Inspect the economizer to verify that it is functional and indicate if it is or not. If the functionality of the economizer cannot be determined, circle "UNK" for unknown.

Cooling Equipment [CH]

- **Cooling Equipment Type:** *This code is required to be filled in for every HVAC item number listed on the form. If there is no cooling equipment, the surveyor must circle "N".*
  - N = None
  - DX = Direct Expansion
  - DC = Dedicated Compressor
  - C = Chilled Water
  - E = Evaporative Cooler
  - P = Purchased Chilled Water

If there is none, then skip the remainder of this section. If the cooling type is direct expansion, record whether it is water or evaporative cooled. If the cooling type is Evaporative and not direct

expansion, then indicate whether it is indirect/direct or indirect only. Otherwise, enter the nameplate information requested below.

- **Refrigerant Type [CH]:** Circle the type of refrigerant used by the cooling equipment. The refrigerant information can be found on the nameplate.
- **# of Compressors [CH]:** Record the number of compressors that the unit has. For large package units with an unclear number of compressors, refer to the nameplate or use the model number to find the information on the internet.
- **Capacity Output [CH]:** For non-chiller systems, record the rated output capacity of the cooling unit in nominal tons. Note: The capacity output is most likely given in BTUs but it should be listed in either Tons or kBtuh. Circle the appropriate units.
- **Equipment Manufacturer Brand [CH]:** Document the name of the equipment manufacturer and model number, available from the nameplate or premise plans. If the unit is a split system, enter the evaporator model number below.
- **Efficiency [CH]:** For non-chiller systems, specify the efficiency as an EER or SEER as appropriate. Efficiency information is not readily available from the nameplate, but can sometimes be obtained from the model number or the mechanical plans. Efficiencies of smaller units may be specified as a Seasonal Energy Efficiency Ratio (SEER). This is a ratio of the total seasonal cooling output in kBtu to the total electrical input in kWh.

Heating Equipment [HE]

- **Heating Equipment Type [HE]:** *This code is required to be filled in for every HVAC item number listed on the form. If there is no heating equipment, the surveyor must circle "N".*
  - N = None
  - F = Furnace
  - HP = Heat Pump
  - B = Boiler
  - ER = Electric Resistance
  - RH = Radiant Heater
  - BB = Baseboard Heater
  - P = Purchased Steam
  - OT = Other

If type is a boiler, enter the hot water loop number and skip the remainder of this section. If type is Other, describe the system in the space provided or on the comments.

- **Fuel Type [HE]:** *This code is required to be filled in for every HVAC item number listed on the form that has heating equipment.* Select the fuel used by the heating equipment.
  - E = Electricity
  - G = Natural Gas
  - F = Fuel Oil
  - L = LPG
  - W = Water

- **Input Rating/Heating Capacity [HE]:** For non-boiler systems, indicate the fuel input rating in the units specified.
- **Units of Input Rating [HE]:**The units of input rating are kW or kBtuh so be sure to convert from W or Btuh if the number has not already been converted. Also circle the appropriate units.
- **Equipment Manufacturer and Model # [HE]:** If the heating equipment is different than the cooling equipment, document the name of the equipment manufacturer, available from the nameplate or premise plans.
- **Efficiency [HE]:** Enter the efficiency as a percent AFUE or Thermal efficiency. For heat pumps enter the efficiency as a COP or HSPF. Circle the appropriate identifier (A = AFUE, T = Thermal η, H = HSPF and C = COP) to indicate the efficiency units. The surveyor should also cross check to make sure that the efficiency units compliment the distribution system type.
- **Zonal Reheat Type [HE]:** If the system is using zonal reheat **s**elect whether the system has Hot Water (H), Electrical Resistance (E) or Other (O).
- **Supplemental Heating Capacity (kW) [HE]:** For heat pumps only, record the capacity of the backup/supplemental electric resistance heating coil in kW.

5.20 HVAC Quality/Maintenance (Form HVAC_Q)

The site contact should be asked these questions. If he/she cannot answer because the HVAC system is maintained by an outside contractor, then obtain the contractor's contact information and ask them these questions. Also, if customer does have any type of service agreement, attempt to get copies of any documents that show the terms and list of services provided.

- **Question 1: How often is maintenance/tune-up service performed on your HVAC equipment?:** Record if there is maintenance preformed on their HVAC equipment and fill out how often maintenance is performed.

If **Never**, skip all the questions below.

- **Question 2: When was the last time your organization had maintenance performed on your cooling equipment. By maintenance, I mean servicing to improve the performance, not repair of a broken or malfunctioning unit:** Record the last time that maintenance was performed at the facility in terms of months or years.
- **Question 3: What did this maintenance consist of- that is, what diagnostics and adjustments were performed on your cooling equipment?:** Self Explanatory
- **Question 4: Is maintenance/tune-up performed on a continual, on-going basis?:** Self Explanatory
- **Question 5: Who handles your HVAC system maintenance/tune-up?:** Self Explanatory
- **Question 6: Do you currently have, or in the past have you had, an HVAC system maintenance agreement with an HVAC contractor?:** Self Explanatory
- **If yes, please provide HVAC contractor info:** Self Explanatory
- **Question 7: Is your HVAC service contract part of a utility-sponsored quality maintenance program?:** Self Explanatory
- **Question 8: Do you have a long-term energy management plan or just a standing maintenance agreement?:** Self Explanatory

5.21 General Lighting Inventory (Form LTG-GENL)

For CSS sites, this form is used to take a complete inventory of all indoor and outdoor lighting in the facility. This includes all linear fluorescents, CFLs, incandescent, LEDs, metal halides, and any other type of lighting technology that is found at the site. For *CMST-Only* sites, only linear fluorescents are inventoried.

NOTE: Lighting plans should only be used as a secondary resource, and for areas that are not physically accessible! Lighting inventory data should always, and as much as possible, be obtained from walking through and physically inventorying the site.

Directions for filling out each field on the form are provided below:

- **Item #:** This is a system identifier used to distinguish each type of lighting and lighting characteristics on the premise. Records should be numbered sequentially beginning with 1.
- **Same as Item #:** ☐ ___ These fields are used as short-hand to duplicate a previous column of data, and are provided to help reduce the time it takes the surveyor to fill out the lighting form. If there are multiple lighting items that are virtually identical, the check box is checked and the Item # to be duplicated is entered in the blank space next to the check box. In addition, the Item # and Area ID # must always be filled out too. For all other fields**,** those that differ from the referenced item may be left blank, and only those that are different need to be filled in. Additional requirements for using this field are:
  - If there are more than 7-10 fields that differ between a lighting item and the referenced item, the *Same as Item #* option may not be used, and all fields for that item must be completely filled out, as usual.
  - If a field applies to one column, but not to another column, it must be crossed out. For example, if column 1 is a Dimmable CFL, but column 2 (the *Same as Item #* column), which has been marked as "Same as Column 1", is not dimmable, then the field that asks whether the CFL is dimmable or not must be crossed out in column 2 to show that it is not the same.
- **Activity Area ID #:** This refers to the Activity Area in which the lights operate. Be sure that Activity Area ID numbers on the *Premise Sketch, Activity Area Form, and Lighting Inventory Form* all match.
- **Typical Schedule #:** This refers to the hourly operation schedule that the lights correspond with.
- **Seasonal Schedule #:** If the premise has a seasonal schedule list the schedule numbers that correspond to the lighting item number.
- **Indoor or Outdoor Lighting:** Indicate if the lighting is indoor or outdoor. It is important to make sure all lighting has an activity area and a schedule number so do not forget to include that for outdoor lighting.
- **Lighting Application Type Code:** Refer to the lighting codes and list what Lighting Application Type Code corresponds to the given light. The lighting application type codes can be found on the Form CODES.

- **Lamps/Fixtures are Accessible:** Indicate whether or not the light and/or light fixtures are accessible. If they are not accessible still try to get a picture of the make and model number if possible. If they are too difficult to photograph, explain why in comments.
- **Lighting System Age: Year of Installation:** Ask the site contact the year in which the lighting system was installed and record it in this field. This would typically be the date that any hardware/fixtures were installed, not just lamps changed out. If the site contact does not know the year of installation, this date might be able to be obtained from the tracking and rebate program data. However, you should always get the site contact for confirm, and not just automatically assume use this date.
- **Condition of Fixtures (New, Good, Fair, Poor):** Observe and assess the condition of the fixtures and indicate whether they are new, good, fair, or poor. A new fixture would most likely have to have been installed in the same year that the survey was completed.
- **Counted All [C] or Estimated Qty [E]:** Indicate if the exact quantity was counted or if it was an estimated value. If it was estimated, explain why in the comments.

Total Quantity

- **Total # of Fixtures (all inclusive):** Record the total number of fixtures that coincide with the given item #. This includes all operational, non-operational, and partially lit fixtures.[27]
- **#of 24/7 Battery-Backup Fixtures:** Indicate how many fixtures use a battery-backup to stay on 24/7. This means that the lights stay on using battery power when the switch they operate on is turned off. These types of fixtures are commonly used for security lighting and will most likely have a sensor that indicates that they have battery-backup. In order to avoid double counting, fixtures operating on battery-backup should not be included as a percentage on the operation schedule because that information is already known. However, if there are fixtures that stay on 24/7 without using a battery-backup (i.e. the light switch is always on) they must be included as a percentage on the operation schedule and recorded as a new item # on the General Lighting Inventory Survey Form. Lastly, exit signs do should not be recorded as 24/7 battery-backup lighting.
- **# of Inoperable Fixtures:** Record the quantity of inoperable fixtures, not lamps, that are present. Partially lit fixtures and burnt out lamps do not count as inoperable. (If all four lamps in a fixture are out, then the fixture is considered inoperable, as it is impossible to tell just by looking at the fixture whether all lamps are burnt out, or if the fixture isn't working).

[27] For track lighting, one track is considered one fixture. Each lamp on that track is considered separate lamps within that fixture.

- **# of Lamps burnt out in part lit fixts:** Determine the **total** number of burnt out lamps in the fixtures and record the quantity in this field. This does not refer to the number of lamps burnt out per fixture, but rather the total number of lamps burnt out amongst all fixtures.

Control Type

- **Control Type Code:** Indicate from the Form *CODES* what type of control the given lights use.

- **Multilevel: Fixtures or Lamp Switched:** If the light fixtures have multilevel switching, note that in this field. There are two types of multilevel switching that can be used: multilevel fixture (ML-F) and multilevel lamp (ML-L). Multilevel fixture switching is when a switch controls an entire fixture or group of fixtures. Multilevel lamp switching is when a switch controls a lamp or multiple lamps within a fixture but does not control the entire fixture. If neither of these switch types exist, circle N/A.
- DR Controlled: Indicate if the lights are demand response controlled. Demand response is a way for the utility companies to manage customer energy consumption as a function of supply conditions. If the customer is participating in a demand response program, there will be an electrical demand response switch somewhere on the end use that is using it. Also, be sure to cross check with the tracking data to confirm that
- **# Occupancy Sensors [OS]:** Record the number of occupancy sensors present. If there are none write "0" or cross out the field.
- **# of Sensors Working [OS]:** If there are occupancy sensors on the premise, test them to verify that they work and record the number of properly functioning sensors. Confirm this number with the site contact as well as confirm with the contact that all occupancy sensors have been accounted for.
- **Manual Override on [OS]:** Determine if the system has a manual override on. A manual override is a system that allows the user to take over complete control of an automated system. For a manual override to be present on-site there must be occupancy sensors in place.

Fixture Details

- **Inside Fixtures: Height from Floor, ft.:** Record in feet, the height of the light fixtures from the floor. Use a tape measure or laser measure when possible. This measurement is from the surface of the floor to the bottom of the light fixture. This is not required for outdoor fixtures.
- **Fixture Mounting Type Code:** Use the Fixture Mounting Type Codes on the Form *CODES* to show how the lights are mounted.

- **# of Lamps per Fixture:** This is the total number of lamp-holders found within the fixture. If there are any lamps missing, they should be recorded in the comments.
- **Hardwired, Plug-in, Battery, Solar:** This shows how the light fixture or lamp gets its power. Most fixtures will be hardwired, but table lamps and shop lamps may be plug-in. Outside lighting may be solar powered.
- **Tandem Fixture [LF]:** For linear fluorescents, record whether the light fixtures are tandem or not. Tandem fixtures mean the lamps operate on the same power supply and with a single ballast. Tandem fixtures share the same housing and the lamps are in line. These were typically 8ft fixtures with 4ft retrofit lighting installed.
- **Shiny/Polished Reflector [LF]:** If a shiny or polished reflector is observed on the fixture, indicate that in this field. This information is used because the cost of a reflector increases the fixture cost in the DEER database.

Delamping

- **EE Delamping Observed [LF]:** Indicate if delamping has taken place in the fixtures. Delamping does not simply mean one or more of the lamps in the fixture was removed. For delamping to occur, the connection to one or more of the lamps in the fixture must be disabled. This includes removing the wiring to that connection and/or removing the tombstones. One sign to look for are shadows where the tombstones used to be. The shadows show that there used to be an operational lamp in place that has since been delamped. This is considered true delamping, and should be marked as "Y". If one or two lamps from every[28] fixture have been removed, but the tombstones are still in place and operational, then this is not considered true delamping and "Inc" for Incomplete, should be circled.
- **Lamps Removed per Fixture [LF]:** If delamping is observed, indicate the number of lamps per fixture removed.

Lamp Details

- **Lamp Type Code:** Specify the lamp type by using the lamp type codes shown below. The lamp type codes are listed on the *CODES* form.

Lamp Details – "LF" block

Details specific to linear fluorescent lamps (LF, UT) are specified here. For non-LF lamp types, this block can be slashed out.

- **[LF] Lamp/ Tube Length:** Record the appropriate linear fluorescent tube length in feet (2, 4, 6, or 8).

[28] It is not considered delamping if just one or two fixtures have a lamp missing. It should be visually apparent that someone went through and systematically removed lamps from each fixture or a group of fixtures.

- **[LF] Lamp/ Tube Diameter:** Record the appropriate linear fluorescent tube diameter (T5, T8, or T12).

Lamp Details – "ICL" block

"ICL" stands for Incandescent-CFL-LEDs, and as such these fields apply to all of those lamp types (INC, EIS, HAL, CFL, LED, and CC). Note that quartz/halogen lamps are a type of incandescent lamp. For non-ICL lamp types, this whole block can be slashed out.

- **Lamp Shape/Features Code [ICL]:** For incandescent, CFL, and LED (ICL) lights record the appropriate lamp shape/features code. The codes can be found on the *CODES* form.
- **Lamp Base Type Code [ICL]:** For incandescent, CFL, and LED lights record the appropriate lamp base type code. The codes can be found on the *CODES* form.
- **Dimmable or 3-Way [ICL]:** For incandescent, CFL, and LED lights, record if the lights are dimmable or 3-way. The light fixture and switches need to be tested to confirm dimmable or 3-way lamps. If the lamps are neither dimmable nor 3-way, simply cross out the field on the survey form.
- **Energy Star Observed [ICL]:** For incandescent, CFL, and LED lights, observe the lamp to see if it is Energy Star certified.
- **Other Lamp Types in Fixture [ICL]:** For incandescent, CFL, and LED lights, indicate if there are other lamp types present in the fixture.

Lamp Details – "LED Fix" Block

- **LED Dimension/Length Desc.:** If an LED fixture is found, a description should be made about it. If it's an LED panel, the dimensions of the panel should be recorded here (ex. 2'x4'). If it's an LED strip, the length of the strip should be recorded (ex. 4ft).

Lamp Details – "Lamp & LED Fix." block

- **Lamp Manufacturer:** Record the lamp manufacturer. This information is printed on the bulb or the lamp base. Take a picture of the lamp manufacturer to provide a back-up record.
- **Lamp Model Number:** Record the lamp model number. This information is printed on the bulb or the lamp base. Take a picture of the lamp model number to provide a back-up record. The model number can be used as a future reference to gather more information about the lamp and can also be useful to confirm information in certain fields when filling out the survey.

Note for CFLs: If the surveyor finds the model number "EDXO-##" this is not a unique model number. Continue to look for a model number (may be listed as a serial number) and be sure to take photos of the lamp. If no other number is found, the "EDXO-##" number should be written down, but only as a last resort. If this number is found, a photo of the CFL nameplate must be taken.

- **Watts (3W = W-W-W):** Record the wattage of the lamp. This number is usually printed on the lamp near the model number and manufacturer. Sometimes the lamp wattage is coded in the model number. For example, a lamp coded F32T8 would be a 32 watt T8 lamp. However, the codes can sometimes be misleading, such as with 8 foot linear fluorescents. A model number F96T8 would refer to an 8 foot T8 lamp where the 96 is the total lamp length in inches. If the lamp is a 3-way bulb, record the three wattages, separated out by dashes (-).

In the rare scenario that the fixture has both T8 and T12 bulbs inside, the surveyor should use the following instructions to fill out this section of the survey form:

- **Number of lamps per fixture:** Surveyor should count all the bulbs in the fixture, regardless of Lamp Type
- **Lamp Type Code:** LF
- **Lamp/Tube Diameter:** Surveyor should circle both the T8 option and the T12 option.
- **Lamp Manufacturer/Lamp Model Number:** The surveyor should choose the predominant lamp type, and record the secondary lamp type in the comments.
- **Watts per Lamp:** The surveyor should record the wattage of both lamps here, separated by a "-". For example, a 32W bulb and a 40W bulb in the same fixture would be recorded as "32-40".

Finally, the surveyor should also record the appropriate percent in comments (for example, 50% T8/50% T12, or 25% T8/75% T12).

Ballast Details

- **Ballast: Electronic or Magnetic [LF/HID]:** For linear fluorescent and high intensity discharge lamps, determine if the ballast is electronic or magnetic. Take apart a fixture and physically inspect the type of ballast. If the fixtures or ballasts are inaccessible, use a Flicker Checker to determine the ballast type. It is more common for recently rebated lights to have electronic ballasts.
- **Ballast Item # (Form BAL) [LF/HID]:** This is an identifier that links the ballast item number from the *Ballast Storage* form to the given lighting item on the *General Lighting*

Inventory Survey Form. This eliminates the need to keep recording the ballast manufacturer and model number on all of the lighting items.

- In the event that there are different types of ballasts, within the same fixture, the ballast item numbers should be separated by a "-".

- **# of Ballasts per Fixture {LF/HID]:** Record the number of ballasts in each fixture. Physically open and inspect the fixture to account for all the ballasts. Note**:** the number of ballasts can often be deduced from how the lights are switched. If a switch can turn on a subset of lights in the fixture, then there must be more than one ballast per fixture.

Recent Retrofit

The recent retrofit fields should be filled out for all equipment installed since 2009, especially for LF equipment. The QC team will use these fields to confirm that the equipment can be classified under CMST equipment.

- **Recent Retrofit [RR] or New [N]:** Indicate if the lighting is a recent retrofit or a brand new installation. New refers to a new addition of lighting and does not include new lamps or fixtures replacing existing ones.
- **Recent Retrofit Lamp-Fixture Description:** Describe the lamp or fixtures that previously existed before the retrofit. For example, if T8 LFs replaced T12 LFs, the surveyor would simply write "T12" in this field.
- **Approximate Year of Retrofit:** Confirm the year of the retrofit with the site-contact.

NOTE: Changing out T12 lamps to T8 lamps while retaining a (T12) magnetic ballast is not considered a retrofit! Instead, the lamp change-out should just be noted in comments, along with the list of associated lighting Item #s.

General Comments

Comment on any information or details that would be helpful for the quality control process. If the comments do not fit in the space provided, make a comment number and write the comment on the *General Comments* form.

5.22 Ballast Description and Storage Lighting Inventory (Form BAL_STORE)

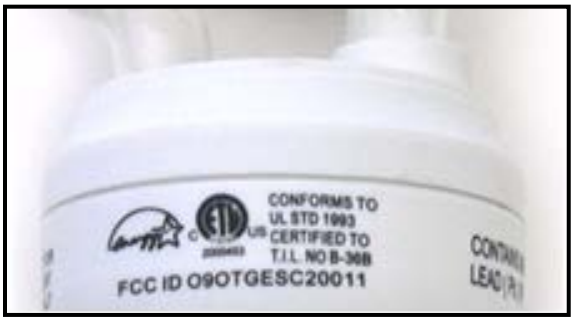
5.22.1 Ballast Description Form

- **Ballast Item #:** This is a system identifier that sequentially orders and organizes multiple ballasts that may be present on-site. This number is used on the *Lighting Inventory* form and matches a lighting item with its correctly detailed ballast.
- **Ballast Type Code:** Determine the ballast type by physically taking apart the light fixture and inspecting the ballast. Take pictures of the ballast and be sure to include the manufacturer and model number in the pictures.
- **Ballast Manufacturer:** Record the ballast manufacturer and be sure to take a clear picture of that information.
- **Ballast Model #:** Record the ballast model number. This is important information that can be used to look up the ballast and find its performance.

5.22.2 Storage Lighting Inventory Form

If there is storage lighting present, account for the lamps using this sheet. Include the additional information required for linear fluorescent and incandescent, CFL, or LED (ICL) lamps found in storage.

- **Storage Item #:** This is a system identifier that sequentially orders the different types of storage lighting.
- **Lamp Type Code:** Record the lamp type code from the same table used to record the lamp type code on the *CODES* form.
- **Lamp Length [LF]:** For linear fluorescents, record the lamp length (2, 4, 6, 8ft).
- **Lamp Diameter [LF]:** For linear fluorescents, record the lamp diameter (T5, T8, T12).
- **Lamp Shape Code [CFL]:** Refer to the lamp shape codes and record which lamp shape the storage lighting has. The lamp shape codes can be found on the *CODES* form.
- **Lamp Base Code [CFL]:** Refer to the lamp base *CODES* form and record the type of base that the storage lights have.
- **Dimmable or 3-Way [CFL]:** For CFL lights circle if it is dimmable (D) or 3-way (3). 3-way bulbs produce three levels of light that act like a step function with respect to the lights intensity. Unlike dimmable bulbs, the light emitted by 3-way bulbs does not change color over the different levels of intensity.
- **Energy Star [CFL]:** Indicate whether or not the lamp is Energy Star certified. There will be an Energy Star icon somewhere on the lamp or lamp base if it is certified. Below are examples of the Energy Star logo.



- **IOU Rebate Sticker [CFL]:** For IOU rebated CFL bulbs, indicate the appropriate IOU on the rebate sticker (PGE, SCE, SDGE)
- Make: Observe and record the storage lighting make/manufacturer.
- **Model #:** Record the model number of the storage lighting and be sure to document it with a picture as well.
- **Watts:** Record the lamp wattage for the storage lighting. If the wattage is not labeled on the lamp, use to model number to look up the appropriate wattage.
- **Quantity:** Count and verify total number of storage lamps per storage item number.

5.23 Exit Sign and Advertising Lighting (Form EXIT-AD)

Data for exit signs and advertising signs are entered on this form.

5.23.1 General Lighting Inventory Survey Form

- **Item #:** This is a system identifier used to distinguish each type of lighting and lighting characteristics on the premise. Records should be numbered sequentially beginning with 101.
- **Activity Area ID #:** This refers to the Activity Area in which the lights operate. Be sure that Activity Area ID numbers on the *Premise Sketch, Activity Area Form, and Lighting Inventory Form* all match.
- **Exit Sign or Advertising Lighting:** Record whether the site is an exit sign or advertising lighting.
- **Indoor or Outdoor Lighting:** Indicate if the lighting is indoor or outdoor. It is important to make sure all lighting has an activity area and a schedule number so do not forget to include that for outdoor lighting.

- **Schedule Set #:** For Advertising signs only, this field refers to the hourly operation schedule that the lights operate on. *For exit signs:* This field is not required as they are on continuously, so the field should be slashed out.
- **Control Type Code:** For Advertising signs only, indicate from the Form *CODES* what type of control the given lights use. *For exit signs:* A control type code is not required and this field can be slashed out.
- **Lamps/Fixtures are Accessible:** Indicate whether or not the light and/or light fixtures are accessible. If they are not accessible still try to get a picture of the make and model number if possible. If they are too difficult to photograph, explain why in comments.
- **Lighting System Age: Year of Installation:** Ask the site contact the year in which the lighting system was installed and record it in this field. If the site contact does not know the year of installation this data might be able to be obtained from the tracking and rebate program data.
- **Condition of Fixtures (New, Good, Fair, Poor):** Observe and assess the condition of the fixtures and indicate whether they are new, good, fair, or poor. A new fixture would most likely have to have been installed in the same year that the survey was completed.

5.23.2 Exit Signs

This section must not be left blank. If there are no exit signs anywhere onsite, a comment must be made, so that it is clear that the surveyor didn't forget to collect this information. From an analysis perspective, the exit signs need to be collected at a building level. However, due to the way the data entry database has been set up, it is asked to be recorded at the activity area ID level. Therefore, there are two options for the surveyor to record these:

1) The exit signs can be recorded at an activity area level. These would follow the same sampling procedures as lighting, office equipment, and televisions. The surveyor should record the exit signs in the areas they actually surveyed.
2) If the surveyor is able to count all exit signs in the building (no sampling was performed), and the exit signs are all of the same type, then the surveyor will need to record multiple records for each exit sign, by activity area. However, as the exit signs are not needed to be recorded at the activity area level, and only at the building level, the surveyor is allowed to group all the exit signs into a single area ID. The surveyor should make sure that the exit signs are not grouped in an area ID that has sampling associated with it, otherwise the quantity of exit signs will be scaled up, based on the sampling.

- **Exit Sign Lamp Type:** The options to choose from are Incandescent, LED, CFL, or Reflective. The reflective option is for paper, reflective, or other non-powered exit signs.

- **Is there a battery backup?** If the exit sign has a battery backup, which will power in the event of a power failure, there will be a battery pack attached to the exit sign, and it should have a red light to show that the battery is working.
- **Make & Model #:** This information is generally not available unless the fixture can be opened and looked inside.
- **Total Fixture Watts:** It is hard to find this information on most fixtures, even looking inside the fixture. It may say on the lamp themselves.
- **Quantity:** Total number of exit signs in this area ID.

5.23.3 Advertising and Display Lighting

The lighting that is recorded here should include any outside advertising signs that display the name of the store. It should also include any store-front signs (like a neon "open" sign).

Fixture Details and Quantity

- **Qty of Identical Ad/Display Fixtures:** This field provides the surveyor a chance to record multiple *identical* fixtures in a single column. This value used here should be greater than 1, only if the fixtures, and the bulbs inside the fixtures, are identical.
- **Display or Advertising Sign Description:** Provide a brief description of what the sign is used for.
- **Sign Type Code:** This can be found from the form *CODES*.
- **Mounting Type Code:** This can be found from the form *CODES*.
- **Hardwired, Plug-in, Battery, Solar:** This shows how the light fixture or lamp gets its power. Most fixtures will be hardwired, but table lamps and shop lamps may be plug-in. Outside lighting may be solar powered.
- **Total Number of Lamps in Sign:** This may be hard to determine, but if possible, it should be filled out.
- **# of Lamps Burnt Out:** Total number of lamps burnt out in the sign.
- **Channel Signs: # of Letters:** The number of letters in the sign should be noted for channel signs. In the example below, the number would be 6.

- **Sign Width & Height (ft.):** If the sign is too high to physically measure, it should be estimated by the surveyor.

Lamp Details

- **Lamp Type Code:** Specify the lamp type by using the lamp type codes shown below. The lamp type codes are listed on the *CODES* form.
- **Linear Fluorescent Length [LF]:** Record the appropriate linear fluorescent tube length in feet (2, 4, 6, or 8).
- **Linear Fluorescent Diameter [LF]:** Record the appropriate linear fluorescent tube diameter (T5, T8, or T12).
- **Lamp Shape/Features Code [ICL]:** For incandescent, CFL, and LED (ICL) lights record the appropriate lamp shape/features code. The codes can be found on the *CODES* form.
- **Lamp Base Type Code [ICL]:** For incandescent, CFL, and LED lights record the appropriate lamp base type code. The codes can be found on the *CODES* form.
- **Energy Star Observed [ICL]:** For incandescent, CFL, and LED lights, observe the lamp to see if it is Energy Star certified.
- **Lamp Manufacturer:** Record the lamp manufacturer. This information is printed on the bulb or the lamp base. Take a picture of the lamp manufacturer to provide a back-up record.
- **Lamp Model Number:** Record the lamp model number. This information is printed on the bulb or the lamp base. Take a picture of the lamp model number to provide a back-up record. The model number can be used as a future reference to gather more information about the lamp and can also be useful to confirm information in certain fields when filling out the survey.
- **Watts per Lamp (10 if NEON):** Record the wattage of the lamp. This number is usually printed on the lamp near the model number and manufacturer. Sometimes the lamp wattage is coded in the model number. For example, a lamp coded F32T8 would be a 32 watt T8 lamp. However, the codes can sometimes be misleading, such as with 8 foot linear fluorescents. A model number F96T8 would refer to an 8 foot T8 lamp where the 96 is the total lamp length in inches. If the lamp is NEON, the value 10 should be written, and the total wattage will later be evaluated based on the length of the neon tube.
- **If NEON, Total Length:** This refers to the total length of neon tubing, if it were to be stretched out. Estimated wattage is about 10W/ft. for these lamps, so we need to collect this information to estimate the total wattage.

Ballast Details

- **Ballast: Electronic or Magnetic [LF/HID]:** For linear fluorescent and high intensity discharge lamps, determine if the ballast is electronic or magnetic. Take apart a fixture and physically inspect the type of ballast. If the fixtures or ballasts are inaccessible, use a

Flicker Checker to determine the ballast type. It is more common for recently rebated lights to have electronic ballasts.

- **Ballast Item # (Form BAL) [LF/HID]:** This is an identifier that links the ballast item number from the *Ballast Storage* form to the given lighting item on the *EXIT-AD Form*. This eliminates the need to keep recording the ballast manufacturer and model number on all of the lighting items.
- **# of Ballasts per Fixture {LF/HID]:** Record the number of ballasts in each fixture. Physically open and inspect the fixture to account for all the ballasts. **Note:** the number of ballasts can often be deduced from how the lights are switched. If a switch can turn on a subset of lights in the fixture, then there must be more than one ballast per fixture.

Recent Retrofit

- **Recent Retrofit [RR] or New [N]:** Indicate if the lighting is a recent retrofit or a brand new installation. New refers to a new addition of lighting and does not include new lamps or fixtures replacing existing ones.
- **Recent Retrofit Lamp-Fixture Description:** Describe the lamp or fixtures that previously existed before the retrofit. For example, if T8 LFs replaced T12 LFs, the surveyor would simply write "T12" in this field.
- **Approximate Year of Retrofit:** Confirm the year of the retrofit with the site-contact.

General Comments

Comment on any information or details that would be helpful for the quality control process. If the comments do not fit in the space provided, make a comment number and write the comment on the *General Comments* form.

5.24 TV and Connected Devices Inventory Survey Form (Form TV)

TVs and other business/consumer electronics (referred to as "connected devices") are collected on this form. A TV can be distinguished from a monitor because a TV will have a tuner as well as a coaxial cable/antenna connector, usually on the back of the TV. In addition to TVs, other types of business/consumer electronics are also of interest for this survey. These are listed under the "Connected Devices" section of the form, however, *any of the listed equipment encountered on site should be recorded in this table, even if it is not connected to a TV.*

Retail Stores: In the event that a retail store is surveyed, which displays and sells televisions, the televisions that are plugged in and on display will still want to be counted for the CSS study. These televisions are part of the electrical load on the facility, and should be inventoried. However, the CMST study does not want these TVs. During the analysis, a site is flagged as a

CMST-TV site if the year of manufacture or year of purchase is 2009 or later. Therefore, the surveyor is instructed *not* to record the date of manufacture for these "display" televisions, so they do not get analyzed as part of the CMST-study. During the make and model look-ups, these televisions will still be able to be characterized into their correct performance groups so there will not be any missing information for the CSS report.

5.24.1 Televisions

- **Item #:** This is a system identifier that sequentially orders.
- **Area ID:** Indicate which Area ID corresponds to the location of the TV. This ID is found on the *Activity Area* form. It is important to double check that TV(s) are in the correct activity area. It can also be helpful to label TVs (especially for CMST TV sites) on the site sketch.
- **TV Usage Description:** Briefly describe the TVs primary use. For example, a TV in a gym might be "used for general viewing".
- **Self-Report TV Purchase Date:** Ask the site contact when they purchased the TV(s). If the site contact does not know then ask them to make an educated guess.
- **Control Type:** Indicate the TV control type using the Control Type Codes on the *TV and Connected Devices Inventory Survey Form.* The codes are as follows: Manual/ IR Remote (S), TV Smart Strip (SS), Continuous/ Always On (C), Timer (T), Smart Strip OS (SSO), Other (OT), and Not in Use (NIU). NIU should be used for new TVs only that are in storage. If the site has plans to install the TV in the future, then we will want to record it. However, if the TV is an old TV that they are waiting to throw out, then we do not need to record it here.

TV Details

- **TV Type:** Indicate which TV type is present using the appropriate TV Type Code at the top of the *TV and Connected Devices Inventory Survey Form.* The codes are as follows: Liquid Crystal Display (LCD), Cathode Ray Tube (CRT), Plasma (PDP), LED – LCD (LED), Projection TV (DLP), Organic LED (OLED), and Other OT).
- **Nameplate Accessible:** Circle yes (**Y**) or no (**N**) to indicate if the nameplate is accessible. If it is accessible write down all of the appropriate information and take a picture for further documentation. If it is not accessible, explain why in comments.
- **Manufacturer:** Record the manufacturer of the TV.
- **Model Name/Number:** Record and take a picture of the model name or number (whichever is listed).

- **Diagonal Screen Size (inches):** Record the diagonal screen size of the TV in inches. If it is on the nameplate then use that value. If it is not on the nameplate or anywhere else on the TV, use a tape measure to get the diagonal screen size measurement.
- **Rated Capacity: Units (Watt / Amps):** Record the watts or amps that the TV uses during operation. Indicate which base unit was used by circling **W** for watts and **A** for amps. It is most common for TVs to have amps listed.
- **Date of Manufacture:** Record the date that the TV was manufactured. This information is on the back nameplate. If the nameplate is not accessible, check with the site contact to see if they have a user manual or pamphlet that came with the TV that would have the date of manufacture information on it.
- **Total Quantity:** Count and verify the total quantity of TVs of the same type. Compare this with the TV tracking data quantity and comment to explain any discrepancies.
  - **Fractional Quantities:** In some cases, more likely in hotels, schools, or situations with larger purchases of televisions, the facility may provide an invoice of all televisions purchased for the facility. A sample of these will be verified by the surveyor, but the surveyor will not be able to physically confirm that the invoice matches every television in the building. Television equipment should follow the sampling procedure similar to the lighting and office equipment.

    When the surveyor has been provided a total number of televisions via a credible source (**invoices**, other records), this invoice serves as better information than the sampling procedures will, so to ensure the correct number of televisions are recorded, a fraction quantity should be calculated.

    Example:

    There is a hotel with 68 rooms and 50 new televisions. Invoice confirms the purchase of 50 televisions. The surveyor was able to verify the make and model number of the televisions in four of the 68 rooms. To get the fractional quantity (which will be written on the survey form), the following calculation will be followed:

$$\frac{TotalNumberofTelevisions}{TotalNumberofAreasRepresented} \times NumberofAreasAcutallySurveyed$$

So, for the above example, the fraction quantity would be:

$$\frac{50}{68} \times 4 = 2.94\ televisions$$

TV Features

- **LED: Edge-lit or Back –lit:** For LED TVs, indicate if it is edge-lit or back-lit. Sometimes this can be very difficult to determine and a model number look up should be used to determine if the TV is edge-lit or back-lit.
- **External Power Supply:** Circle yes (**Y**) or no (**N**) to indicate if the TV has an external power supply. An external power supply refers to a power supply that would be on the power cord, similar to a laptop power cord, because there is not enough room to house the power supply inside the TV. This is common on very thin TVs, such as LED TVs.
- **Web-Capable, 3D, E-Star:** Circle all that apply to indicate if the TV is Web-Capable (**WC**), 3D (**3D**), or Energy Star certified (**ES**). If these fields are not listed, they can be verified through a model number look up.
- **HDTV Resolution:** For HDTVs, indicate if it is 720p, 1080i, or 1080p. These fields can also be found through a model number look up.

TV Usage

- **Schedule #:** Refer to the schedule that was created for the particular TV item and record it in this field. If no schedule is available, ask the site contact for an estimation of hours per week usage. This would be relevant in cases where the TV doesn't have a set schedule, but is used intermittently.
- **TV Position:** Circle the appropriate position type, fixed (**F**) or portable (**P**), that represents the TVs position.
- **Primarily used as Monitor:** Circle yes (**Y**) or no (**N**) to indicate if the TV is primarily used as a monitor. If it is, it will likely be hooked up to a computer.

Recent Retrofit

The recent retrofit fields should be filled out for all equipment installed since 2009, especially for LF equipment. The QC team will use these fields to confirm that the equipment can be classified as a CMST measure.

- **Additional TV [A] or Replaced TV [R]:** Indicate if the TV(s) were a new addition or replaced an older one. Only adding a TV that is new to the premise, and not replacing an old TV, counts as new addition.
- **Prior TV Type:** Use the TV Type codes at the top of the form to indicate which type of TV was replaced.
- **Prior Diagonal Screen Size:** Ask the site contact what the diagonal screen size (in) of the prior TV(s) was.

5.24.2 Connected Devices

All devices connected to a TV need to be accounted for and documented. This section of the form details the necessary information that needs to be gathered from the connected devices.

- **Cable or Satellite:** Determine if there is a cable or satellite box and indicate which one by circling the appropriate field on the survey. Next, record the cable/satellite provider and indicate if it is an HD device or not.
- **ID#:** This is a system identifier that sequentially orders the connected devices on the survey form. Each TV item number can be paired with up to three connected device item numbers to show which devices and TVs are connected.
- **Connected Type:** Used the connected type codes on the form to identify which type of device is connected to the TV(s). The connected types are as follows:
  - VGC = Video Game console
  - VCR = Videocassette Recorder
  - DVD = DVD Player
  - BR = Blu Ray Player
  - CB = Cable/Satellite Box
  - DTV = Digital TV Converter
  - DVR = DVR/TiVo (stand-alone)
  - MF = CB Multifunction DVR
  - HAS = Home Audio System
  - PC = Media PC
  - DMR = Digital Media Receiver
  - VGDMR = Video Game Console + Digital Media Receiver
  - MFDMR = Multifunction CB & DMR
- **Manufacturer:** Record the manufacturer of the connected device. This information is usually on the nameplate on the bottom of the device or printed on the faceplate.
- **Model Name / Number:** Record the model name/number of the device from the nameplate. Take a photograph of the nameplate to provide further documentation.
- **Watts/Amps:** Record the watts or amps that the device uses, whichever is listed on the nameplate, and circle the appropriate base unit.
- **Control Type:** Identify the control type of the device using the control type codes that are listed on the form. The control type codes are as follows: Manual/ IR Remote (S), TV Smart Strip (SS), Continuous/ Always On (C), Timer (T), Smart Strip OS (SSO) or Other (OT)

- **Same Hours as TV or Hours/Week:** This field represents the usage of the connected device. If the device is used on the same schedule as the TV that it is connected to, simply check the box to indicate the same schedule. If it operates on a different schedule than the TV it is connected to, provide an hours per week value that the connected device operates. The surveyors will have to ask the site contact questions regarding this field and hours of operation.
- **Comments:** Use the comments box as well as the general comments page to further explain anything that may not be clear to the person performing the QC.

5.25 Office Equipment Inventory and Spot Check (Form OfficeEquip)

5.25.1 Office Equipment Inventory

Because the CSS survey collects data on all of the energy using measures on a particular site, all of the office equipment needs to be accounted for and documented. This form provides an organized way to record data and gather accurate counts of all the office equipment on a premise. This information needs to only be collected for CSS sites, not for CMST-only sites.

- **Item #:** This is a system identifier that sequentially orders and organizes the list of office equipment.
- **Activity Area Code:** Identify the location of the office equipment by assigning an activity area code from the *Activity Area* form that corresponds to one of the previously defined activity areas. Be sure to double check that the activity area codes are consistent between the two forms.
- **Office Equipment Code:** Use the office equipment codes provided at the bottom of the form to identify the office equipment type. If the office equipment code is "OT" an equipment description is required.
- **Usage:** Determine, either from talking to the site contact or personal observation, whether the office equipment is used for personal or general reasons and circle the appropriate field.
- **In Use:** Indicate if the office equipment is in use by circling Y or N. If it is plugged in it is considered in use.
- **Smart Strip:** Circle "Y" or "N" to indicate if the equipment uses a smart strip. A smart strip is a surge protector that regulates electrical current to computer peripherals, such as printers and scanners, and is able to turn off devices that are not in use.
- **Energy Star:** Circle "Y" or "N" if the office equipment item is Energy Star certified. The Energy Star logo will likely be on the nameplate or the faceplate of the device.
- **Turned Off or Standby at Night:** Circle "Y" or "N" to indicate is the equipment is turned off or put on standby at night.

- **Sub-Sampled:** Circle "Y" or "N" to indicate if the units were sub-sampled. If they were all accounted for they would not be sub-sampled.
- **Number of Units:** List the quantity of similar units found on-site.

5.25.2 Office Equipment Inventory (Spot-Check Detail Form)

This form is to be used as an spot-check of shared office equipment rather than getting full details for every piece of equipment. The Item # and Office Equipment Code will match up with the corresponding items on the previous page. At least one of each shared equipment item in the list of *Detailed Office Equipment Codes* below should be inspected if available. Also, new computers purchased since January 2009 should also be inspected, regardless of whether they are personal or shared equipment.

- **Item #:** The item number on this form should match with the Item # on the "Full Inventory" form on the previous page. Double check to make sure the item numbers are consistent and refer to the same piece of office equipment.
- **Office Equipment Code:** Use the Detailed Office Equipment Codes table to identify the detailed office equipment type. If the office equipment is not detailed in the Office Equipment Code table, shown below, an equipment spot check does not need to be filled out.

Detailed Shared Office Equipment Only

- **Manufacturer:** The manufacturer of the equipment should be listed here
- **Model Name/Number:** This may be a little be harder to find. If necessary, consult the site contact for any paperwork on this equipment.
- **If E-STAR, Year of Manufacture:** If available, this information will be found on the nameplate.
- **Rated Capacity: Units (Watts/Amps):** Record this information from the nameplate, if available, and circle the appropriate units.
- **# of similar units:** If there are other units like this, record the total number of units.

Printers / Copiers / Fax Machines / All-in-Ones

- **Color or Monochrome:** Record whether the unit prints in black and white or color too.
- **Ink Jet or Laser:** Record if the printer is Ink Jet or Laser
- **Options (Print, Copy, Scan, Fax):** Circle all that apply

Monitors/Displays

- **Avg Size Range:** Small monitors are less than 14 inches, Medium are between 14 and 17 inches and Large is over 17 inches.
- **CRT, LCD, or LED:** It may be hard to differentiate between LCD and LED, but if LED, it may say somewhere on the monitor housing.

5.26 Supplemental Refrigeration System Information (Form Refrig-Contact)

This form is used to obtain supplemental information that could not be physically observed and collected on site, or that is best obtained from the contact that is most familiar with the refrigeration system. Contact information for the refrigeration maintenance staff should be available in the mechanical room from a posted sticker or equipment maintenance log, from the store manager or from the primary site contact.

5.26.1 Refrigeration Maintenance Company Contact Information

- **Does the premise have a refrigeration contractor that maintains, repairs, and/ or installs new refrigeration equipment? (Must be answered):** Circle Y or N, this information can typically be found by asking the site contact or looking for a sticker in the mechanical room. If the site has a refrigeration contractor, the contact information should be filled out in the table below:

Maintenance Company Name	Company Phone Number	Contact Name(s)	Contact Phone #s	Contact Email

5.26.2 Interview/Supplemental Information Questions

- **1) If night covers are present, what hours are they deployed (24 hr. military time)?:** Record the times that the night covers are deployed, this can typically be found by asking the site contact, or someone who works in that area.
- **2) Are high-efficiency evaporator fans used on any of the cases or walk-ins, and if so, what type?:** Circle the type of evaporator fans that are used: Electronically Commutated Motor (ECM) or Permanent Split Capacitor motor (PSC). If no high efficiency motors are used then circle None (No) or Unknown (UNK) if the site contact does not know and the surveyor cannot tell by looking at them.
- **3) Were high-efficiency evap. Fans recently retrofit on any of the cases or walk-ins?:** Circle Y or N
    - **A. What year was the retrofit preformed?:** Record the year that the retrofit was performed.

- **4) <u>If T10/ T12s used in the cases/walk-ins:</u> Are there any magnetic ballasts (Use Spinner)?:** Circle Y or N, if the lights are not accessible a spinner should be used to determine the ballast type.
- **5) Has LED lighting been recently retrofit in and display cases?:** Circle Y or N
    - **What type of lighting did the LEDs replace? (Use Lighting type Codes):** Record the baseline lighting type using the Codes form.
- **6) General anti-sweat heater control type used on display cases:** Circle whether the anti-sweat heater control is Always On (A) or Cycles with the Humidistat (C). If there is no anti-sweat heater control circle None (N) or circle Unknown (UNK) if the surveyor cannot determine the anti-sweat heater control type.
- **7) <u>Self- Contained/ Unitary Only:</u> What year was the majority of the equipment installed?:** Record what year the self-contained refrigeration equipment was installed.
- **8) <u>Remote Refrig. Only:</u> Is Floating head pressure control used?:** Circle Y or N, does the system use a floating head pressure control, this may be found from the electronic controller or the site refrigeration contact should be able to provide this information.
- **9) <u>Remote Refrig. Only:</u> Are external liquid suction heat exchangers used on any of the display cases?:** Circle Y or N, may need to contact the refrigeration contact to obtain this information.
- **10) <u>Remote Refrig. Multiplex System Only:</u> Is the condenser a high-efficiency design?:** Circle Y or N, record if the condenser is a high-efficiency design.
- **11) Were any other recent (on or after Jan 2009) equipment retrofits preformed on the refrigeration equipment? If so, please list and describe:** Record any other measures and the year that the retrofit was performed.

5.27 Self-Contained/ Unitary Refrigeration Equipment (Form SC-Refrig)

This includes equipment where the compressor, condenser, and refrigerated compartment are combined into a single package, and usually contained within a conditioned space. These are split into residential and commercial units. Although this study focuses on commercial equipment, a question is asked whether or not residential-type units are found onsite.

5.27.1 Residential-Type Refrigerator/Freezers

The CSS-CMST survey is not interested in a detailed inventory of residential-type refrigeration equipment. Instead, only a single question is asked:

Residential-Type Units: ***Are there any Residential type refrigerators/freezers here? Y N.*** If residential type refrigeration equipment is used on site, then circle Y = Yes, if not then circle N = No.

5.27.2 Commercial Ice Makers

- **Item #:** This is a system identifier that sequentially orders and identifies the Ice-Makers.
- **Area ID:** Indicate which Area ID corresponds to the location of the Ice-Maker. This ID is found on the *Activity Area* form. It is important to double check that Ice-Makers(s) are in the correct activity area. It can also be helpful to label Ice-Makers on the site sketch.
- **Machine Type:** Ice makers typically will fall into one of three categories: Ice Making Head Only (IM), Remote Condensing Unit (RC) or Self Contained (SC). An IM makes the ice, but does not have built in storage. An RC unit will have a condensing unit that is not contained in the unit. The condensing unit will typically be located outside. These units will also have the ability to store the ice it make. SC units are similar to RC units with the exception that the condensing unit will be contained within the unit.
- **Ice Type:** Ice makers will produce ice in one of three different shapes: Cubes (C), Flakes (F) or Nuggets (N). The reason this question is asked, is because one of the classifications for rebates relates to the Ice Type.
- **Energy Star:** Confirm whether the Ice Maker has an Energy Star label.
- **Make / Brand:** Should be visible from a nameplate or printed on the unit.
- **Model Number:** This model number will be printed on the nameplate. If the nameplate is not observed, the surveyor should write "N/O"
- **Total Qty:** Total quantity of similar units onsite.
- **Year Manuf:** This should be available from the nameplate.
- **Condition of Fixtures (New, Good, Fair, Poor):** Observe and assess the condition of the Ice Maker and indicate whether they are new, good, fair, or poor. A new Ice Maker would most likely have to have been installed in the same year that the survey was completed.

5.27.3 Commercial Self-Contained Refrigerated Cases and Other Equipment

- **Item #:** This is a system identifier that sequentially orders and identifies the Self-Contained Refrigeration Units.
- **Area ID:** Indicate which Area ID corresponds to the location of the Self-Contained Refrigeration Units. This ID is found on the *Activity Area* form. It is important to double check that Self-Contained Refrigeration Units are in the correct activity area. It can also be helpful to label Self-Contained Refrigeration Units on the site sketch.

- **Equip Code:** Enter the appropriate equipment code from the table at the bottom of the form.
- **Temp. Service Type:** Record whether these are refrigerators (R) or freezers (F).
- **Case Style Type:** The different case types are Reach-in (RI), Roll-in (RO), Workshop Table (WT), Pass-through (PA), Under Counter (UC) and other (OT).
- **Length (ft.):** Determine the length of the case, in feet.
- **# of Doors:** Count the number of doors on the case.
- **Energy Star:** Confirm whether the Ice Maker has an Energy Star label.
- **Make / Brand:** Should be visible from a nameplate or printed on the unit.
- **Model Number:** This model number will be printed on the nameplate. If the nameplate is not observed, the surveyor should write "N/O"
- **Vol ft3:** Indicate the volume of the unit in ft3, if it can be determined. Estimate if not on the nameplate.
- **Total Qty:** Total quantity of similar units onsite.
- **Year Manuf:** This should be available from the nameplate.
- **Refg Ltg Type:** No detailed information about refrigerator lighting needs to be collected, but the light type is asked for:
  - T8, T12, T10 = Linear Fluorescent
  - INC = Incandescent
  - CFL = CFL
  - LED = LED Strip
  - N = None
  - OT = Other
- **Total Lamp Qty*:** Enter the total number of lamps across all of the refrigerated cases for each item #. This is not on a per-case basis.
- **Lamp Watts:** Enter the typical per-lamp wattage.
- **RCU:** This stands for Remote Condensing/Compressor Unit. In some cases, rather than the condenser and/or compressor being housed inside the same case as the display case, the unit(s) are housed in another location, usually on the roof. The only information that is needed here is a "Yes" or "No".
- **Condition of Fixtures (New, Good, Fair, Poor):** Observe and assess the condition of the equipment and indicate whether they are new, good, fair, or poor. New equipment would most likely have to have been installed in the same year that the survey was completed.

5.28 Walk-Ins and Preparation Areas (Self-Contained & Remote) (Form Refrig-Walk-in)

This form is to be used for both self-contained and built-up walk-in coolers and freezers. In the case that the walk-ins are self-contained, no other information needs to be filled out on the remote-refrigeration pages. However, if the walk-ins are built-up systems, the following remote refrigeration section must be filled out.

- **Small pre-fab (SP) unit or Large Built-Up (LB):** Determine if the system is a s small pre-fab unit. These units will be smaller units that are typically self-contained. Large built-up systems are going to be built into the building and are more likely to be remote refrigeration.
- **Walk-in Item #:** This item number is a unique identifier, and will be numbered sequentially starting with W1.
- **Area ID:** Indicate which Area ID corresponds to the location of the Walk-In(s). This ID is found on the *Activity Area* form. It is important to double check that Walk-in(s) are in the correct activity area. It can also be helpful to label Walk-in(s) on the site sketch.
- **Served by Rack/Suction Group Item #** *(For Remote/Rack Systems Only):* This field references the form *Remote Refrigeration: Compressor/Rack Systems*. The Rack/Suction Group Item # is the unique identifier from this field.
- **Approx. Year of Installation:** The site contact may have an estimate of when the walk-in coolers/freezers were installed.
- **Walk-in Unit Type:** The three options to choose from here are *Remote/Rack System, Self-contained packaged unit, and Self-contained w/ remote cond-comp unit.* The different options are described below:
  - **Remote/Rack System:** These systems are going to be built up refrigeration systems with racks of compressors and condensers. These will be referenced on the remote refrigeration forms.
  - **Self-contained Packaged Unit:** These packaged units have the compressor and condenser packaged within the walk-in unit. The compressor and condenser are not likely able to be inspected.
  - **Self-contained w/ remote cond.-comp. unit:** These systems will have a single condenser and compressor serving them, which will housed remotely from the walk-in unit. These are likely to be housed either on the roof, or in a mechanical room somewhere onsite. These are not considered to be remote refrigeration, as there is only a single compressor and condenser serving the walk-in, not a rack, or group of units.

- **Self-Contained Units Only – Make/Brand & Model Number:** If the unit is self-contained refrigeration unit, the make and model number of the walk-in should be provided. The compressor or condenser make or model number is not needed.
- **Suction Tempe Range:** The surveyor should determine whether the walk-in area is considered a Freezer, a Cooler, or a Prep-Area. These three areas are determined by the temperature that they are set at:
  - **Freezer:** Freezers will range between -10 to 0 ºF
  - **Cooler:** Coolers will range between 28 to 40 ºF
  - **Prep Area:** Prep Areas will range between 40 to 55 ºF
- **Floor Area (ft^2):** Surveyor should provide the floor area in sq. ft. of the walk-in.
- **Ceiling Height (ft):** Surveyor should provide the ceiling height of the walk-in.
- **Defrost Control Type:** There are several different defrost types that can be used to heat the evaporator coil and ensure that the coils do not freeze over. These options are *Electric, Hot Gas, Timed off,* or *None.*
- **Door Type H=Hinged or S=Sliding**? Self-explanatory.
- **Auto-Closer on door?** Self-explanatory.
- **Strip Curtains present?** Self-explanatory.

Lighting

This section provides the surveyor an area to record up to two different lighting types within the walk-ins, because there are often both screw-in and linear fluorescent lighting in walk-ins. No detailed information is needed here, just basic information in lighting types and number of lamps.

- **Refg Ltg Type:** The options to choose from here are linear fluorescents, CFL (CFL), incandescent (INC), LED (LED), none (N) or other (OT). For linear fluorescent measures the code will provide more details such as T12, T10 or T8.
- **Occupancy Sensors?:** Self-explanatory.
- **Number of Fixtures:** Self-explanatory.
- **Number of Lamps per Fixture:** Self-explanatory.

Evaporator Fan

Evaporator fans pull air over the evaporator coil and circulate the cold air through the refrigerator unit.

- **Evaporator Fan Motor Type:** The different motor types to choose from are:
  - **SP = Shaded Pole Motor:** These conventional induction motors are the least efficient, but most typically installed, evaporator fan motor type.
  - **ECM = Electronically-Communicated Motor:** ECMs are smaller, more expensive, variable speed and more efficient than PSC motors that operate from a single-phase power source with an electronic controller mounted in or on the motor.
  - **PSC = Permanent Split-Capacitor Motor:** PSC motors are more efficient than shaded-pole motors and are a common choice for case fan motors with an efficiency rating between 50% and 70% with efficiency increasing with size.
  - **EFF = Unknown High Efficiency Motor:** This option should be chosen if the contact has confirmed that the motor is considered high efficiency, but the motor type is unknown.
  - **UNK = Unknown Motor:** If nothing about the motor type is known, then the surveyor should choose this last option, but still get any information they can off of the motor nameplate.
- **Evap. Fan Make/Manufacturer/Model Number:** The make and model number can be found on the nameplate of the Evaporator fan unit.
- **# of Evaporator Fans:** Count the total number of fans in the walk-in. This is a total across all of the evaporator fans in the walk-in.
- **Motor Size, Fractional HP:** Can be found on the nameplate
- **Amps & Volts:** Surveyor should record the amps in the first field, and the volts in the second field, off of the motor nameplate.
- **Display Case Type:** If the walk-in has a display case, record the display case type here.
- **For G or R types, Display Case Item #:** Link to the Display Case Item Number.

5.29 Remote Refrigeration Equipment

Remote refrigeration equipment systems are systems built-up from individual components, that is, the display cases or walk-in refrigerated areas are *separated* from the compressors and condensers that serve them. Compressors and condensers are typically installed together in an equipment room, while the cases are located in the retail sales area. This is the arrangement usually found in grocery stores, refrigerated warehouses, cafeterias, or other food preparation facilities.

The information for these built-up refrigeration systems is gathered on a two-part form. The data for display cases and walk-in/prep areas is entered in the *Display Cases* and *Walk-Ins and Preparation Areas* tables. The data for compressors and condensers is entered in their respective

tables. When completing the form, note that display cases and walk-in/prep areas must be linked to the compressors that serve them, and that compressors must be linked to the condensers that serve them. Data recording requirements for each of the four tables are explained below. Note: that if you use more than one page of a Form, be sure to increment the item numbers accordingly on the second page.

NOTE: The best source of information for remote refrigeration equipment data is the "refrigeration schedule" or the Refrigeration Map that most stores post in their machinery rooms. Look around or ask your contact about this. If it is not posted, it may be available from the refrigeration equipment maintenance service.

5.29.1 Display Cases (Form RRefg-Display)

This form is to be filled out for Display cases served by a remote refrigeration system. The case will need to be linked up with the compressor rack or suction group on the compressors page.

- **Refrig. Sched Fixture ID:** This schedule does not refer to any schedule on the form; this will be any schedule or reference ID that is on the display case. It is optional and only used to match the case to the suction group.
- **Display Case Item #:** This item number is a unique identifier, and will be numbered sequentially starting with D1.
- **Area ID:** Indicate which Area ID corresponds to the location of the Display Cases. This ID is found on the *Activity Area* form. It is important to double check that the Display Cases are in the correct activity area. It can also be helpful to label the Display Cases on the site sketch.
- **Served by Rack/ Suction Group Item #:** The Rack/ Suction Group Item relates the Display Case with the Suction group. The Item number can be found on the Compressor/ Rack Systems form.
- **Approx. Year of Installation:** What year was the display case installed. This may be evident from the nameplate, or from asking the site contact.
- **Type/ Suction Temperature:** Display cases can be divided into four groupings, Ice cream (IC), Frozen Food (FF), Fresh Meat (MD) and Dairy/ Produce (DP).
- **Anti-Sweat Heater Control:** What type of anti-sweat system does the display case have, Always on (A), Cycling with Humidistat (C), Unknown (U) or None (N). This can typically be found from the controller or the site contact.
- **Suction Line Insulated:** Are the suction lines coming into the cases insulated? This can be found by looking at the smaller of the two pipes entering the case.
- **Predominant Evaporator Fan Motor:** What type of motor does the evaporator fan have: Shaded Pole (SP), Electronically-Commutated Motor (ECM), Permanent split-

Capacitor Motor (PSC) High Efficiency (EFF) or Unknown (UNK). High efficiency should only be used when the motor type is unknown, but they know it is high efficiency.

Display Case Types and Characteristics

- **Single-Deck Display Cases**
  - **Open Single-Deck:** Cases that are open but only have on shelf. Typically used for bakery goods and meats.
  - **Closed Service Case:** These are cases with covers on them, typically glass. They will often times have meat in them and will not be directly accessible to the public.
  - **Island coffin/ Tub:** Shop around cases, typically frozen food or dairy. Will typically be in the middle of aisles.
- **Multiple Deck (Vertical) Display Cases:** This case will have multiple shelves on it. Very common to find with dairy or deli meats in them.
- **Are night Covers Present?** Do the cases that are open to the environment have covers that are placed on them during unoccupied times?
- **Glass-Door Cases**
  - **Number of Doors:** Total number of doors for this case. If cases are next to each other and served by the same suction group the total number of doors should be entered here.
  - **Door Heater Sticker Present?:** Y or N, is a door sticker visible
  - **Sticker Amps (Per Door):** If the door heater sticker is present then record the number of amps per door here.
  - **Sticker Volts:** Record the number of volts for the case.
- **Lighting**
  - **Refg Ltg Type:** What type of lighting is found in the cases using the codes at the top of the page: Incandescent (INC), CFL, LED, None (N) or Other (OT). For linear fluorescents use T10, T12, T8 or T5 depending on the diameter of the lamp.
  - **# of Rows (Shelves) of lighting:** How many rows of lighting are there, this includes the top row of lighting as well as the number of shelves with lighting.
  - **# of Lamps per row:** How many lamps are in each row, record the predominant number of lamps per row here.
  - **Total # of Lamps:** Record the total number of lamps found in the Display Case. This does not have to be equal to **the** total number of lamps per row, multiplied by the number of rows.
  - **Lamp Watts:** Record the **predominant** wattage for the lamp.

- **Lighting Control Type Code:** Record the control type from the Codes form.

5.29.2 Compressor/ Rack Systems (Form RRefg-CompRack)

This form is used to fill out information on the compressor or rack systems. The racks will be referenced to the condenser that is serving the rack as well as the walk-ins and cases that are serving being served by the compressor rack. It is important that the temperature type matches up with the cases it is serving.

- **Refrig. Shed. Fixture ID:** This schedule does not refer to any schedule on the form; this will be any schedule or reference ID that is on the display case. It is optional and only used to match the case to the suction group.
- **Rack/ Suction Group Item #:** This item number is a unique identifier, and will be numbered sequentially starting with 1.
- **Area ID:** Indicate which Area ID corresponds to the location of the Compressor/ Rack System. This ID is found on the *Activity Area* form. It is important to double check that the Compressor/ Rack System are in the correct activity area. It can also be helpful to label the Compressor/ Rack System on the site sketch.
- **Controlled by Controller Item #:** Reference to the controller item number found on the remote refrigeration Controllers page.
- **Served by Condenser Item** #: Reference to the condenser item number found on the Remote Refrigeration Condensers form.
- **Approx. Year this rack was installed?:** Record the year that the compressor/ or rack was installed. Typically found on the nameplates or from the site contact.
- **Suction Group Temperature type:** There are four temperature groups for this field. Low Temperature (LT) which is frozen foods, ice cream and any kind of freezer. Medium (MT) Temperature is fresh meat or dairy. High temperature (HT) is produce coolers or prep areas. The last is Other (OT) used if the temperature group does not fit with one of these categories and it needs a comment supporting why it is OT.
- **System Type:** The system type can be: Conventional (C), 2-Stage Multiplex (S), Twins (T), Multiplex (M), Distributed (D) or Other (OT). The most common types for smaller systems are conventional, which is a single compressor per suction group; Multiplex which is a multiple compressors serving one suction group; and distributed, which is where the compressors are distributed around the site in order to be closer to the cooling loads. For larger cooling a 2-stage multiplex system can be used and is typically an ammonia system.
- **Secondary Glycol Loop and Heat Exchanger?:** Record is there is a secondary glycol loop and heat exchanger. Meaning that there is a secondary loop that provides cooling to the loads.

- **Compressor Type:** Record the type of compressor that is being used: Open Reciprocating (OR), Screw (SCW), Scroll (SCL) or Semi-Hermetic Reciprocating (SHR).
- **Compressor Head Cooling Fan Motor Type:** Record what type of motor the cooling fan has. This will only be used for Low Temperature systems.
- **Number of Compressor in The Rack-System Line Up:** Record the number of compressors serving this suction line.
- **Suction Lines Insulated?:** Record if the suction lines are insulated.
- **Control Type?:** Record if the rack/ suction group controlled by conventional controls, mechanical pressure switches, or by electronic controls. If there are electronic controls there should be an obvious controller, but the site contact can typically confirm the control type.
- **Rack Features:** Circle all that apply.
- **Compressor Refrigerant Type:** Record the refrigerant type for the rack/ suction group.
- **Hot Gas Defrost?:** Record if the system has hot gas defrost, should be able to tell by the piping. In order to have hot gas defrost the system has to have an extra set of piping to provide the hot gas, but also electronic controller should have the defrost type.
- **Subcool Type:** If the system has Subcooling record if it is ambient or mechanical. Mechanical will require a heat exchanger.
- **Heat Recovery Type:** Record if there is heat recovery for the system. Two forms of heat recovery, for water heating and for space heating. If the recovery is used for water heating there will be a water take with pipes running into it from the compressors. If it has space heating, heat recovery then there will typically be a pipe running to an air handler, or HVAC unit on the roof.
- **Total Qty of systems of this Type:** Record the number of suction groups with this exact same setup.

5.29.3 Condensers (Form RRefg-Cond)

In this section information will be recorded about the condensers onsite. They will reference back to the controller and the compressor page. There can be multiple racks or suction groups going into a single condenser.

- **Condenser Item #:** This item number is a unique identifier, and will be numbered sequentially starting with 1.
- **Area ID:** Indicate which Area ID corresponds to the location of the Condenser. This ID is found on the *Activity Area* form. It is important to double check that the Condenser is

in the correct activity area. It can also be helpful to label the Condenser on the site sketch.

- **Approx. year of Installation:** Record the year that the Condenser was installed. Typically found on the nameplates or from the site contact.
- **Condenser Type:** Record what type of condenser is being used onsite. They will be either Air-Cooled (A) or Evap-Cooled (E).
- **Condenser Make:** Record who manufactures the condenser. This will be on the nameplate or somewhere on the outside of the condenser.
- **Condenser Model #:** The model number can typically be found on the nameplate.

Air-Cooled Condenser

- **Quantity of Fans:** Record the number of fans for the Air-Cooled Condenser.
- **Motor HP per Fan:** Record the motor HP. This will be on the nameplate of the motor.
- **Motor Nameplate Accessible?**
- **Motor Eff.:** If the nameplate is accessible record the nominal efficiency, if not record NA.
- **Fan Control:** What kind of fan control is present: Modulated Speed (M), Staged Pairs (S), None (N) or unknown (UNK).

Evap-Cooled Condenser

- **Total Quantity of Fan Motors:** How many motors are present for the Eva-Cooled Condenser?
- **Primary Fan Motor**
  - **Primary fan Motor HP:** Record the efficiency of the HP from the primary motor.
  - **Quantity of Motors:** Record the total number of primary motors.
  - **Motor Nameplate is Accessible?**
  - **Motor Eff.:** If the motor nameplate is accessible record the nominal efficiency.
- **Secondary Fan Motor**
  - **Secondary fan Motor HP:** Record the HP of the secondary Motor.
  - **Quantity of Motors:** Record the total number of secondary motors.
  - **Motor Nameplate is Accessible?:**
  - **Motor Eff.:** If the motor nameplate is accessible record the nominal efficiency.
  - **Fan Control:** What kind of fan control is present: Two-Speed (TS), Variable Speed (VSD), None (N) or Unknown (UNK).

- **Pump Motor**
  - **Pump Motor HP:** Record the HP of the Pump.
  - **Motor Nameplate Accessible?**
  - **Motor Eff.:** If the motor nameplate is accessible record the nominal efficiency.

5.29.4 Rack Controllers (Form RRefg-Control)

This section will record information about the Rack Controller and will also record information about the system. A majority of the fields can be read directly from the controller. This form only needs to be filled out for systems with electronic controls.

- **Controller Item #:** This item number is a unique identifier, and will be numbered sequentially starting with 1.
- **Area ID:** Indicate which Area ID corresponds to the location of the Rack Controller. This ID is found on the *Activity Area* form. It is important to double check that the Rack Controller is in the correct activity area. It can also be helpful to label the Rack Controller on the site sketch.
- **Controller Description/ Brand:** Record the controller brand or description. This will usually include who makes it as well as the model number.
- **Compressor Refrigerant Type:** Record what type of refrigerant is being used in the compressors. This can typically be found in the suction group settings.
- **Controller is Accessible Locally?:** Record if there is a terminal unit at the location where the setting can be adjusted, or if it is a blind controller with no human interface.
- **Controller Condition:** Observe and assess the condition of the controller and indicate whether it is new, good, fair, or poor. A new fixture would most likely have to have been installed in the same year that the survey was completed.
- **Approx. Year of Installation:** Record the year that the controller was physically installed.
- **Approx. Year of Last Update:** Record the last time the software was updated.
- **Suction Group Temperature Type:** Each line of the controller can only control one temperature group either Low temperature (LT), Medium Temperature (MT) High Temperature (HT) or Other (OT). If there are multiple suction groups controlled by the controller then a new line will have to be created on the controller form for each temperature group it controls.
- **Defrost Control Type:** Record what type of defrost the system has: Electric (E), Hot Gas (G), Timed-Off (T), None (N) or Unknown (U). This will usually be read directly from the controller or the Refrigeration Schedule.

Condensing Temperature Parameters

- **Minimum SCT:** The minimum saturation condensing temperature for the system. This only applies if the system is using floating head pressure control.
- **TD for Floating Head Pressure:** Temperature differential for the floating head pressure. This can be read directly from the controller.
- **Fixed Head Pressure:** If the system is using a fixed head pressure then record the temperature or pressure set point here.
- **Units:** Record the Units of the Fixed head pressure here, either pressure or temperature.

Floating Suction Pressure Parameters

- **Degrees of Float allowed:** Record how many degrees of float the system permits. Only record if a floating suction pressure is used.

Subcooling Parameters

- **Subcooled Liquid Temperature:** If the system has subcooling record the subcooled liquid temperature. Should be able to get this information from the controller.
- **Which Rack/ Suction group # Provides Cooling?:** Record which suction group item number is providing the subcooling.

Anti-Sweat Heater Control Scheme

- **Minimum % Humidity Set point:** The minimum humidity value that can be reached before the Anti –sweat goes off.
- **Maximum % Humidity Set point:** The maximum humidity value at which the Anti-sweat is 100% on.

Additional Controller Data

- **Display Case Lighting Schedule:** If the controller has lighting controls for the refrigeration lighting then schedules should be made and referenced here.
- **Heat Recovery Holdback Temperature:** If heat recovery holdback is actively used at the site, a temperature will be indicated on the display, and that temperature should be recorded on the form.

5.30 General Comments (Form COMMENTS)

The general comments section is an area for the surveyor to record comments about the site that do not necessarily below on other pages, or

- **Item #:** This is a sequentially increasing identifier that differentiates between comments entered by the surveyor.
- **Form Name:** Provides the name of the form that the comment is associated with.

5.31 Site Photo Log (Form PHOTO)

Use this form to record information about the photos taken at the site. The photos will be used for many purposes including quality checking the survey form, reviewing lighting logger installations, evaluating the state of rebated equipment, documenting unusual situations, and improving the survey procedures. The descriptions recorded on this form will be linked to the photos by following this naming convention:

SiteID_Item#.jpg => For example PGE_0567891234_1.jpg, PGE_0567891234_2.jpg

Enough photos should be taken to characterize the site and the inspected equipment and each unique configuration of equipment and/or lighting logger installation method. Extra photos can be taken for use in completing the survey form, for example some surveyors will take a photo of the survey form cover page to act as a separator between set of photos for different sites. However, the final set of photos that are recorded here should be trimmed down to a small number that adequately characterizes the site and equipment and any unique situations. These photos should not be greater than the 20 that the photo form has room for. Any additional photo should also be turned in with the site, and saved in a folder named "Additional Photos". A typical set of photos should include the following:

- The business storefront and/or site clearly showing the business and type of building/site.
- At least one photo of each rebated measure and/or upstream lighting fixture or packages, and the various configurations of that measure present at the site. For example if there are 1, 2, and 3-lamp configurations a photo of each would be taken. If a lighting logger study site, then the photo should show the installed lighting logger.
- Any unusual and/or unique situations that are encountered. Examples include "delamped" fixtures where the tombstones and/or ballasts were left behind, T12 lamps stuck into T8 sockets, etc. These will be used for the site reports, but may also be used in the survey handbook and used to update survey procedures.

- Indoor photos that show the general lighting layouts. Always check to make sure it is OK with the site contact before taking these photos, and try to keep people out of the photos whenever possible.
- Photos of inspected ballasts – especially of old T12 ballasts are still intact – as well as lamp make/model numbers. However, do not rely on the make/model photos for obtaining the make/model later, as these photos will often be blurry. Always make sure you record the lamp make/model before leaving the site.
- Any other photos needed to complete the job and characterize the site and equipment.

The fields on this form are:

- **Item #:** A unique identifier, 1 to 20 (but you should never use all 20 slots unless it is a very large with multiple measures and configurations of those measures).
- **Description/Comments/Measure Code:** Enter a brief description of the photo (business storefront, rebated 4-L T8 fixture, CFL fixture, CFL marked for retention, T12 ballast left-in place, etc.).

Naming Photos

This list of procedures highlights the process taken for the surveyor to quickly and efficiently rename the photos and fill out the photo form. The reason for renaming photo forms and writing descriptions assists the QC team in their work, allowing them to go back and review pictures for missing or confusing information. The photo log may also be used in the future to easily find photos for procedure documents.

As this photo form can be quite time consuming, no more than one form, which can record up to 20 photos, needs to be filled out per site. If the surveyor takes more than 20 photos, they should still include them when they turn in the photos and completed survey form, but they should include them in a separate folder called “Extra Photos”.

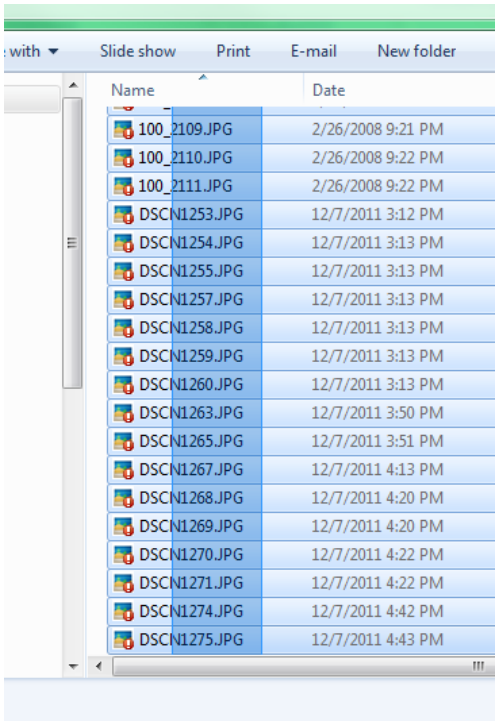
The photo form example, shown in Figure 5-13 below, outlines the information needed to be collected on this form.

Figure 5-13: Photo Form Example

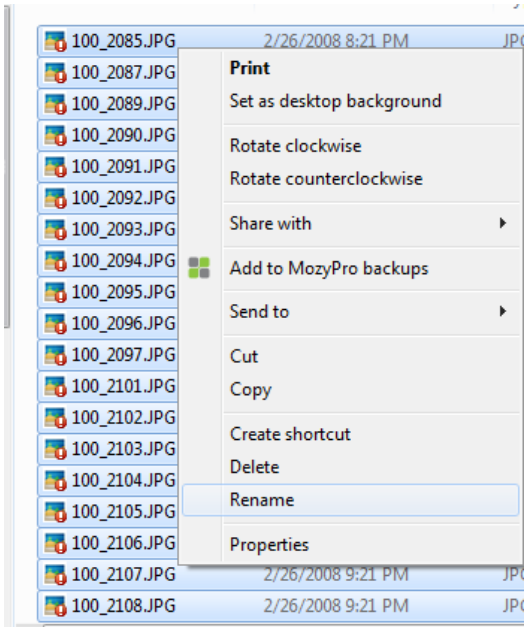
#	Identifier	Description/Comments/Measure Code *(do not data enter)*
1	Bldg	Photo of the front of the building, showing location of the elec/gas meters
2	CF	Photo of one of the CFL's found onsite. Lighting Item # 4.

The next set of figures describes an easy way to rename all photo files in a single easy step. Prior to this, the surveyor must go through all of their photos to remove any photos they deem not necessary for the QC purpose. This includes any duplicate photos or any blurry photos. They should then identify which 20 photos they want to include on the photo form, and then place the remaining photos in the "Extra Photos" folder.

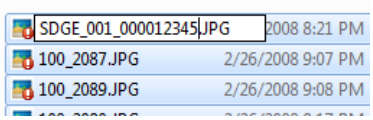
Step 1: Highlight all photo files in the folder.



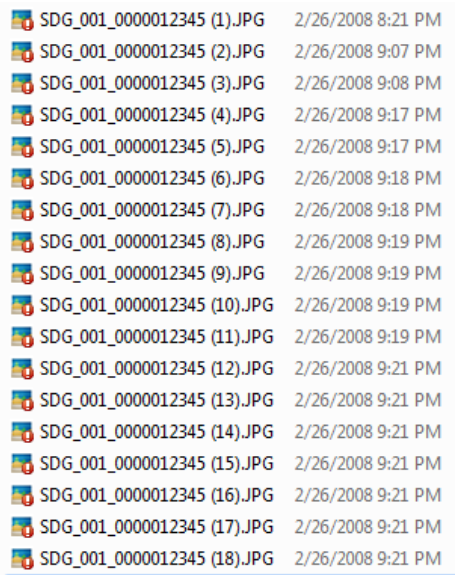
Step 2: With *all* the files still highlighting, right click on the first one and click *rename*.



Step 3: Type in the Site ID into the file name and click enter.



Step 4: All files have been automatically renamed with an item number.



Step 5: The number in parenthesis can be considered the item number on the Photo form. The surveyor should match up the photo item number with the item number on the Photo form, and use this number to fill in the appropriate photo description and photo identifier.

Step 6: This step should be repeated for all sites in the Extra Photos folder. These photos should be named – SiteID_Extra_#.