Chapter 3
Inventory Data: Collection and Classification

3.1.   Introduction

This chapter describes the classification of different buildings and lifeline systems, data and attributes required for performing damage and loss estimation, and the data supplied with the methodology.   The different systems covered in this chapter include buildings and facilities, transportation systems, utility systems, and hazardous material facilities. In addition, census data, county business patterns, and indirect economic data are discussed. Sources and methods of collecting inventory data can be found in the User's Manual.

Required input data include both default data (data supplied with the methodology) and data that must be supplied by the user. Data supplied with the methodology include default values of classification systems (i.e., mapping relationships) and default databases (e.g., facility location, census information, and economic factors). Default data are supplied to assist the user that may not have the resources to develop inventory data and may be superseded by better information when the user can obtain such for the study region of interest.

3.2.   Direct Damage Data - Buildings and Facilities

This section deals with the general building stock, essential facilities, and high potential loss facilities.

3.2.1. General Building Stock

The general building stock includes residential, commercial, industrial, agricultural, religious, government, and educational buildings. The damage state probability of the general building stock is computed at the centroid of the census tract. The entire composition of the general building stock within a given census tract is lumped at the centroid of the census tract. The inventory information required for the analysis to evaluate the probability of damage to occupancy classes is the relationship between the specific occupancy class and the model building types. This can be computed directly from the specific occupancy class square footage inventory.

3.2.1.1. Classification

The purpose of a building inventory classification system is to group buildings with similar damage/loss characteristics into a set of pre-defined building classes. Damage and loss prediction models can then be developed for model building types which represent the average characteristics of the total population of buildings within each class.

The building inventory classification system used in this methodology has been developed to provide an ability to differentiate between buildings with substantially different damage and loss characteristics.   The following primary parameters affecting building damage and loss characteristics were given consideration in developing the building inventory classification system.

- Structural parameters affecting structural capacity and response
    Basic structural system (steel moment frame)
    Building height (low-rise, mid-rise, high-rise)
    Seismic design criteria (seismic zone) (Refer to Chapter 5)
- Nonstructural elements affecting nonstructural damage
- Occupancy (affecting casualties, business interruption and contents damage)
- Regional building practices (Refer to Chapter 5)
- Variability of building characteristics within the classification

To account for these parameters, the building inventory classification system consists of a two-dimensional matrix relating building structure (model building) types grouped in terms of basic structural systems and occupancy classes.

The basic model building types are based on FEMA-178 (FEMA, 1992) building classes. Building height subclasses were added to reflect the variation of typical building periods and other design parameters with building height. Mobile homes, which are not included in the FEMA-178 classification, were also added.   A listing of structural building types, with corresponding labels, descriptions, and heights, is provided in Table 3.1.

The general building stock is also classified based on occupancy. The occupancy classification is broken into general occupancy and specific occupancy classes. For the methodology, the general occupancy classification system consists of seven groups (residential, commercial, industrial, religion/nonprofit, government, education and lifelines).   There are 33 specific occupancy classes. The building occupancy classes are given in Table 3.2, where the general occupancy classes are identified in boldface. The distribution of specific occupancies classes within each general occupancy class can be computed for each census tract based on the occupancy square footage inventory (Section 3.6). These relationships are in a form shown in Table 3A.1 of Appendix 3A.

Table 3.1: Building Structure (Model Building) Types

No.	Label	Description	Height			
			Range		Typical	
			Name	Stories	Stories	Feet
1	W1	**Wood, Light Frame (£ 5,000 sq. ft.)**		1 - 2	1	14
2	W2	**Wood, Commercial and Industrial (> 5,000 sq. ft.)**		All	2	24
3	S1L		Low-Rise	1 - 3	2	24
4	S1M	**Steel Moment Frame**	Mid-Rise	4 - 7	5	60
5	S1H		High-Rise	8+	13	156
6	S2L		Low-Rise	1 - 3	2	24
7	S2M	**Steel Braced Frame**	Mid-Rise	4 - 7	5	60
8	S2H		High-Rise	8+	13	156
9	S3	**Steel Light Frame**		All	1	15
10	S4L	**Steel Frame with Cast-in-Place**	Low-Rise	1 - 3	2	24
11	S4M	**Concrete Shear Walls**	Mid-Rise	4 - 7	5	60
12	S4H		High-Rise	8+	13	156
13	S5L	**Steel Frame with Unreinforced**	Low-Rise	1 - 3	2	24
14	S5M	**Masonry Infill Walls**	Mid-Rise	4 - 7	5	60
15	S5H		High-Rise	8+	13	156
16	C1L		Low-Rise	1 - 3	2	20
17	C1M	**Concrete Moment Frame**	Mid-Rise	4 - 7	5	50
18	C1H		High-Rise	8+	12	120
19	C2L		Low-Rise	1 - 3	2	20
20	C2M	**Concrete Shear Walls**	Mid-Rise	4 - 7	5	50
21	C2H		High-Rise	8+	12	120
22	C3L	**Concrete Frame with Unreinforced**	Low-Rise	1 - 3	2	20
23	C3M	**Masonry Infill Walls**	Mid-Rise	4 - 7	5	50
24	C3H		High-Rise	8+	12	120
25	PC1	**Precast Concrete Tilt-Up Walls**		All	1	15
26	PC2L	**Precast Concrete Frames with**	Low-Rise	1 - 3	2	20
27	PC2M	**Concrete Shear Walls**	Mid-Rise	4 - 7	5	50
28	PC2H		High-Rise	8+	12	120
29	RM1L	**Reinforced Masonry Bearing Walls**	Low-Rise	1-3	2	20
30	RM2M	**with Wood or Metal Deck Diaphragms**	Mid-Rise	4+	5	50
31	RM2L	**Reinforced Masonry Bearing Walls**	Low-Rise	1 - 3	2	20
32	RM2M	**with Precast Concrete Diaphragms**	Mid-Rise	4 - 7	5	50
33	RM2H		High-Rise	8+	12	120
34	URML	**Unreinforced Masonry Bearing Walls**	Low-Rise	1 - 2	1	15
35	URMM		Mid-Rise	3+	3	35
36	MH	**Mobile Homes**		All	1	10

Table 3.2: Building Occupancy Classes

Label	Occupancy Class	Example Descriptions
	Residential	
RES1	Single Family Dwelling	House
RES2	Mobile Home	Mobile Home
RES3	Multi Family Dwelling RES3A Duplex RES3B 3-4 Units RES3C 5-9 Units RES3D 10-19 Units RES3E 20-49 Units RES3F 50+ Units	Apartment/Condominium
RES4	Temporary Lodging	Hotel/Motel
RES5	Institutional Dormitory	Group Housing (military, college), Jails
RES6	Nursing Home	
	Commercial	
COM1	Retail Trade	Store
COM2	Wholesale Trade	Warehouse
COM3	Personal and Repair Services	Service Station/Shop
COM4	Professional/Technical Services	Offices
COM5	Banks	
COM6	Hospital	
COM7	Medical Office/Clinic	
COM8	Entertainment & Recreation	Restaurants/Bars
COM9	Theaters	Theaters
COM10	Parking	Garages
	Industrial	
IND1	Heavy	Factory
IND2	Light	Factory
IND3	Food/Drugs/Chemicals	Factory
IND4	Metals/Minerals Processing	Factory
IND5	High Technology	Factory
IND6	Construction	Office
	Agriculture	
AGR1	Agriculture	
	Religion/Non/Profit	
REL1	Church/Non-Profit	
	Government	
GOV1	General Services	Office
GOV2	Emergency Response	Police/Fire Station/EOC
	Education	
EDU1	Grade Schools	
EDU2	Colleges/Universities	Does not include group housing

3.2.1.2. Specific Occupancy-to-Model Building Type Mapping

Default mapping schemes for specific occupancy classes (except for RES1) to model building types by floor area percentage are provided in Tables 3A.2 through 3A.16 of Appendix 3A. Table 3A.2 through 3A.10 provide the suggested mappings for the Western U.S. buildings and are based on information provided in ATC-13 (1985). Tables 3A.11 through 3A.16 provide the mapping for buildings in the rest of the United States and are based on proprietary insurance data, opinions of a limited number of experts, and inferences drawn from tax assessors records. Table 3C.1 in Appendix 3C provides regional classification of the states. Table 3A.17 through 3A.21 provide model building distribution for the specific occupancy class "RES1" on a state-by-state basis. Tables 3A.2 through 3A.10 provide the mapping based on the height of buildings and the age of construction. The user must provide, for census tracts on the west coast, the proportion of buildings in low, mid, and high rise categories, and the proportion of buildings in the three categories according to age (pre- 1950, 1950-1970, and post 1970). These proportions are used to compute a weighted sum of matrices in Table 3A.2 through Table 3A.10 to arrive at the default specific occupancy class to model building type mapping. For the rest of the United States, Tables 3A.11 through 3A.16 provides the mapping based on the height of buildings only and the user must provide the proportion of buildings in low-, mid-, and high-rise categories to compute the default specific occupancy class to model building type mapping. The default mapping provided in Tables 3A.2 through 3A.16 should be considered as a guide: Accurate mapping may be developed based on the particular building type distribution within in the study region.

3.2.2. Essential Facilities

Essential facilities are those facilities that provide services to the community and should be functional after an earthquake. Essential facilities include hospitals, police stations, fire stations and schools. The damage state probabilities for essential facilities are determined on a site-specific basis (i.e., the ground motion parameters are computed at the location of the facility). The purpose of the essential facility module is to determine the expected loss of functionality for these critical facilities. Economic losses associated with these facilities are computed as part of the analysis of the general building stock (general building stock occupancy classes 12, 26, 27 and 28). The data required for the analysis include mapping of essential facility's occupancy classes to model building types or a combination of essential facilities building type, design level and construction quality factor. In addition, the number of beds for each hospital and the number of fire trucks at each fire station are required. The fire truck information is used as input for the fire following earthquake analysis (Chapter 10).

3.2.2.1. Classification

The essential facilities are also classified based on the building structure type and occupancy class. The building structure types of essential facilities are the same as those for the general building stock presented in Table 3.1. The occupancy classification is broken into general

occupancy and specific occupancy classes. For the methodology, the general occupancy classification system consists of three groups (medical care, emergency response, and schools). Specific occupancy consists of nine classes. The occupancy classes are given in Table 3.3, where the general occupancy classes are identified in boldface. Relationships between specific and general occupancy classes are in a form shown in Table 3B.1 of Appendix 3B.

Table 3.3: Essential Facilities Classification

Label	Occupancy Class	Description
	Medical Care Facilities	
EFHS	Small Hospital	Hospital with less than 50 Beds
EFHM	Medium Hospital	Hospital with beds between 50 & 150
EFHL	Large Hospital	Hospital with greater than 150 Beds
EFMC	Medical Clinics	Clinics, Labs, Blood Banks
	Emergency Response	
EFFS	Fire Station	
EFPS	Police Station	
EFEO	Emergency Operation Centers	
	Schools	
EFS1	Grade Schools	Primary/ High Schools
EFS2	Colleges/Universities	

3.2.2.2. Occupancy to Model Building Type Relationship

Default mapping of essential facility occupancy classes to model building types is provided in Tables 3B.2 through 3B.16 of Appendix 3B. For the regional designation of a particular state, refer to Table 3C.1 in Appendix C. The default mapping of specific occupancy to model building type mapping is based on general building stock occupancy classes 12, 26, 27 and 28.

3.2.3. High Potential Loss Facilities

High potential loss facilities are facilities that are likely to cause heavy earthquake losses if damaged. For this methodology, high potential loss (HPL) facilities include nuclear power plants, dams, and some military installations. The inventory data required for HPL facilities include the geographical location (latitude and longitude) of the facility. Damage and loss estimation calculation for high potential loss facilities are not performed as part of the methodology.

3.2.3.1. Classification

Three types of HPL facilities are identified in the methodology (dams, nuclear power facilities and military installations) are shown in Table 3.4. The dam classification is based on the National Inventory of Dams (NATDAM) database (FEMA, 1993).

Table 3.4: High Potential Loss Facilities Classification

Label	Description
	Dams
HPDE	Earth
HPDR	Rock fill
HPDG	Gravity
HPDB	Buttress
HPDA	Arch
HPDU	Multi-Arch
HPDC	Concrete
HPDM	Masonry
HPDS	Stone
HPDT	Timber Crib
HPDZ	Miscellaneous
	Nuclear Power Facilities
HPNP	Nuclear Power Facilities
	Military Installations
HPMI	Military Installations

3.3.   Direct Damage Data - Transportation Systems

The inventory classification scheme for lifeline systems separates components that make up the system into a set of pre-defined classes. The classification system used in this methodology was developed to provide an ability to differentiate between varying lifeline system components with substantially different damage and loss characteristics. Transportation systems addressed in the methodology include highways, railways, light rail, bus, ports, ferries and airports. The classification of each of these transportation systems is discussed in detail in the following sections. The inventory data required for the analysis of each system is also identified in the following sections.

For some transportation facilities, classification of the facility is based on whether the equipment is anchored or not. Anchored equipment in general refers to equipment designed with special seismic tie-downs or tiebacks, while unanchored equipment refers to equipment designed with no special considerations other than the manufacturer's normal requirements. While some vibrating components, such as pumps, are bolted down regardless of concern for earthquakes, as used here "anchored" means all components have been engineered to meet seismic criteria

which may include bracing (e.g., pipe or stack bracing) or flexibility requirements (e.g., flexible connections across separation joints) as well as anchorage.

3.3.1. Highway Systems

A highway transportation system consists of roadways, bridges and tunnels. The inventory data required for analysis include the geographical location, classification, and replacement cost of the system components. The analysis also requires the length of each highway segment.

3.3.1.1. Classification

The classes of highway system components are presented in Table 3.6. For more details on how to classify these components, refer to section 7.1.5 of Chapter 7.

Table 3.6: Highway System Classification

Label	Description
	Highway Roads
HRD1	Major Roads
HRD2	Urban Roads
	Highway Bridges
HWB1	Major Bridge - Length > 150m (Conventional Design)
HWB2	Major Bridge - Length > 150m (Seismic Design)
HWB3	Single Span – (Not HWB1 or HWB2) (Conventional Design)
HWB4	Single Span – (Not HWB1 or HWB2) (Seismic Design)
HWB5	Concrete, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
HWB6	Concrete, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB7	Concrete, Multi-Column Bent, Simple Support (Seismic Design)
HWB8	Continuous Concrete, Single Column, Box Girder (Conventional Design)
HWB9	Continuous Concrete, Single Column, Box Girder (Seismic Design)
HWB10	Continuous Concrete, (Not HWB8 or HWB9) (Conventional Design)
HWB11	Continuous Concrete, (Not HWB8 or HWB9) (Seismic Design)
HWB12	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
HWB13	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB14	Steel, Multi-Column Bent, Simple Support (Seismic Design)
HWB15	Continuous Steel (Conventional Design)
HWB16	Continuous Steel (Seismic Design)
HWB17	PS Concrete Multi-Column Bent, Simple Support - (Conventional Design), Non-California
HWB18	PS Concrete, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
HWB19	PS Concrete, Multi-Column Bent, Simple Support (Seismic Design)
HWB20	PS Concrete, Single Column, Box Girder (Conventional Design)
HWB21	PS Concrete, Single Column, Box Girder (Seismic Design)
HWB22	Continuous Concrete, (Not HWB20/HWB21) (Conventional Design)
HWB23	Continuous Concrete, (Not HWB20/HWB21) (Seismic Design)
HWB24	Same definition as HWB12 except that the bridge length is less than 20 meters
HWB25	Same definition as HWB13 except that the bridge length is less than 20 meters
HWB26	Same definition as HWB15 except that the bridge length is less than 20 meters and Non-CA
HWB27	Same definition as HWB15 except that the bridge length is less than 20 meters and in CA

HWB28	All other bridges that are not classified (including wooden bridges)
	Highway Tunnels
HTU1	Highway Bored/Drilled Tunnel
HTU2	Highway Cut and Cover Tunnel

3.3.2. Railways

A railway transportation system consists of tracks, bridges, tunnels, stations, and fuel, dispatch and maintenance facilities. The inventory data required for analysis include the geographical location, classification and replacement cost of the facilities, bridges, tunnels, and track segments. The analysis also requires the length of the railway segments.

3.3.2.1.Classification

The various classes of railway system components are presented in Table 3.7. For more details on how to classify these components refer to section 7.2 of Chapter 7.

Table 3.7: Railway System Classification

Label	Description
	Railway Tracks
RTR1	Railway Tracks
	Railway Bridges
RLB1	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
RLB2	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
RLB3	Steel, Multi-Column Bent, Simple Support (Seismic Design)
RLB4	Continuous Steel (Conventional Design)
RLB5	Continuous Steel (Seismic Design)
RLB6	Same definition as HWB1 except that the bridge length is less than 20 meters
RLB7	Same definition as HWB2 except that the bridge length is less than 20 meters
RLB8	Same definition as HWB4 except that the bridge length is less than 20 meters and Non-CA
RLB9	Same definition as HWB5 except that the bridge length is less than 20 meters and in CA
RLB10	All other bridges that are not classified
	Railway Urban Station
RST	Rail Urban Station (with all building type options enabled)
	Railway Tunnels
RTU1	Rail Bored/Drilled Tunnel
RTU2	Rail Cut and Cover Tunnel
	Railway Fuel Facility
RFF	Rail Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)
	Railway Dispatch Facility
RDF	Rail Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
	Railway Maintenance Facility
RMF	Rail Maintenance Facility (with all building type options enabled)

3.3.3. Light Rail

Like railways, light rail systems are composed of tracks, bridges, tunnels, and facilities. The major difference between the two is with regards to power supply, where light rail systems operate with DC power substations. The inventory data required for analysis include the classification, geographical location, and replacement cost of facilities, bridges, tunnels, and tracks. In addition, the analysis requires the track length.

3.3.3.1. Classification

Table 3.8 describes the various classes of light rail system components. For more details on how to classify these components refer to section 7.3 of Chapter 7.

Table 3.8: Light Rail System Classification

Label	Description
	Light Rail Tracks
LTR1	Light Rail Track
	Light Rail Bridges
LRB1	Steel, Multi-Column Bent, Simple Support (Conventional Design), Non-California (Non-CA)
LRB2	Steel, Multi-Column Bent, Simple Support (Conventional Design), California (CA)
LRB3	Steel, Multi-Column Bent, Simple Support (Seismic Design)
LRB4	Continuous Steel (Conventional Design)
LRB5	Continuous Steel (Seismic Design)
LRB6	Same definition as HWB1 except that the bridge length is less than 20 meters
LRB7	Same definition as HWB2 except that the bridge length is less than 20 meters
LRB8	Same definition as HWB4 except that the bridge length is less than 20 meters and Non-CA
LRB9	Same definition as HWB5 except that the bridge length is less than 20 meters and in CA
LRB10	All other bridges that are not classified
	Light Rail Tunnels
LTU1	Light Rail Bored/Drilled Tunnel
LTU2	Light Rail Cut and Cover Tunnel
	DC Substation
LDC1	Light Rail DC Substation w/ Anchored Sub-Components
LDC2	Light Rail DC Substation w/ Unanchored Sub-Components
	Dispatch Facility
LDF	Light Rail Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
	Maintenance Facility
LMF	Maintenance Facility (with all building type options enabled)

3.3.4. Bus System

A bus transportation system consists of urban stations, fuel facilities, dispatch facilities and maintenance facilities. The inventory data required for bus systems analysis include the geographical location, classification, and replacement cost of bus system facilities.

3.3.4.1. Classification

Table 3.9 describes the various classes of bus system components. For more details on how to classify these components refer to section 7.4 of Chapter 7.

Table 3.9: Bus System Classification

Label	Description
	Bus Urban Station
BPT	Bus Urban Station (with all building type options enabled)
	Bus Fuel Facility
BFF	Bus Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)
	Bus Dispatch Facility
BDF	Bus Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
	Bus Maintenance Facility
BMF	Bus Maintenance Facilities (with all building type options enabled)

3.3.4.2.Ports and Harbors

Port and harbor transportation systems consist of waterfront structures, cranes/cargo handling equipment, warehouses and fuel facilities. The inventory data required for ports and harbors analysis include the geographical location, classification and replacement cost of the port and harbor system facilities.

3.3.4.3. Classification

Table 3.10 describes the various classes of port and harbor transportation system components. For more details on how to classify these components refer to section 7.5 of Chapter 7.

Table 3.10: Port and Harbor System Classification

Label	Description
	Waterfront Structures
PWS	Waterfront Structures
	Cranes/Cargo Handling Equipment
PEQ1	Stationary Port Handling Equipment
PEQ2	Rail Mounted Port Handling Equipment
	Warehouses
PWH	Port Warehouses (with all building type options enabled)
	Fuel Facility
PFF	Port Fuel Facility Facility (different combinations for with or without anchored components and/or with or without backup power)

3.3.4.4.Ferry

A ferry transportation system consists of waterfront structures, passenger terminals, fuel facilities, dispatch facilities and maintenance facilities. The inventory data required for ferry systems analysis include the geographical location, classification and replacement cost of ferry system facilities.

3.3.4.5. Classification

Table 3.11 describes the various classes of ferry transportation system components. For more details on how to classify these components refer to section 7.6 of Chapter 7.

Table 3.11: Ferry System Classification

Label	Description
	Water Front Structures
FWS	Ferry Waterfront Structures
	Ferry Passenger Terminals
FPT	Passenger Terminals (with all building type options enabled)
	Ferry Fuel Facility
FFF	Ferry Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)
	Ferry Dispatch Facility
FDF	Ferry Dispatch Facility (different combinations for with or without anchored components and/or with or without backup power)
	Ferry Maintenance Facility
FMF	Piers and Dock Facilities (with all building type options enabled)

3.3.5. Airports

An airport transportation system consists of control towers, runways, terminal buildings, parking structures, fuel facilities, and maintenance and hangar facilities. The inventory data required for

airports analysis include the geographical location, classification and replacement cost of airport facilities.

3.3.5.1. Classification

Table 3.12 describes the various classes of airport system components. For more details on how to classify these components refer to section 7.7 of Chapter 7.

Table 3.12: Airport System Classification

Label	Description
	Airport Control Towers
ACT	Airport Control Tower (with all building type options enabled)
	Airport Terminal Buildings
ATB	Airport Terminal Building (with all building type options enabled)
	Airport Parking Structures
APS	Airport Parking Structure (with all building type options enabled)
	Fuel Facilities
AFF	Airport Fuel Facility (different combinations for with or without anchored components and/or with or without backup power)
	Airport Maintenance & Hangar Facility
AMF	Airport Maintenance & Hangar Facility (with all building type options enabled)
ARW	Airport Runway
	Airport Facilities - Others
AFO	Gliderport, Seaport, Stolport, Ultralight or Baloonport Facilities
AFH	Heliport Facilities

3.4. Direct Damage Data - Lifeline Utility Systems

Lifeline utility systems include potable water, waste water, oil, natural gas, electric power and communication systems. This section describes the classification of lifeline utility system and their components, and data required to provide damage and loss estimates.

3.4.1. Potable Water System

A potable water system consists of pipelines, water treatment plants, wells, storage tanks and pumping stations. The inventory data required for potable water systems analysis include the geographical location and classification of system components. The analysis also requires the replacement cost for facilities and the repair cost for pipelines.

3.4.1.1. Classification

Table 3.13 describes the various classes of potable water system components. For more details on how to classify these components refer to section 8.1 of Chapter 8.

Table 3.13: Potable Water System Classification

Label	Description
	Pipelines
PWP1	Brittle Pipe
PWP2	Ductile Pipe
	Pumping Plants
PPPL	Large Pumping Plant (> 50 MGD) [different combinations for with or without anchored components]
PPPM	Medium Pumping Plant (10 to 50 MGD) [different combinations for with or without anchored components]
PPPS	Small Pumping Plant (< 10 MGD) [different combinations for with or without anchored components]
	Wells
PWE	Wells
	Water Storage Tanks (Typically, 0.5 MGD to 2 MGD)
PSTAS	Above Ground Steel Tank
PSTBC	Buried Concrete Tank
PSTGC	On Ground Concrete Tank
PSTGS	On Ground Steel Tank
PSTGW	On Ground Wood Tank
	Water Treatment Plants
PWTL	Large WTP (> 200 MGD) [different combinations for with or without anchored components]
PWTM	Medium WTP (50-200 MGD) [different combinations for with or without anchored components]
PWTS	Small WTP (< 50 MGD) [different combinations for with or without anchored components]

3.4.2. Waste Water

A waste water system consists of pipelines, waste water treatment plants and lift stations. The inventory data required for waste water systems analysis include the geographical location and classification of system components. The analysis also requires the replacement cost for facilities and the repair cost for pipelines.

3.4.2.1. Classification

Table 3.14 describes the various classes of waste water system components. For more details on how to classify these components refer to section 8.2 of Chapter 8.

Table 3.14: Waste Water System Classification

Label	Description
	Buried Pipelines
WWP1	Brittle Pipe
WWP2	Ductile Pipe
	Waste Water Treatment Plants
WWTL	Large WWTP (> 200 MGD) [different combinations for with or without anchored components]
WWTM	Medium WWTP (50-200 MGD) [different combinations for with or without anchored components]
WWTS	Small WWTP (< 50 MGD) [different combinations for with or without anchored components]
	Lift Stations
WLSL	Large Lift Stations (> 50 MGD) [different combinations for with or without anchored components]
WLSM	Medium Lift Stations (10 MGD - 50 MGD) [different combinations for with or without anchored components]
WLSS	Small Lift Stations (< 10 MGD) [different combinations for with or without anchored components]

3.4.3. Oil Systems

An oil system consists of pipelines, refineries, pumping plants and tank farms. The inventory data required for oil systems analysis include the geographical location and classification of system components. The analysis also requires the replacement cost for facilities and the repair cost for pipelines.

3.4.3.1. Classification

Table 3.15 describes the various classes of oil system components. For more details on how to classify these components refer to section 8.3 of Chapter 8.

Table 3.15: Oil System Classification

Label	Description
	Pipelines
OIP1	Welded Steel Pipe with Gas Welded Joints
OIP2	Welded Steel Pipe with Arc Welded Joints
	Refineries
ORFL	Large Refinery (> 500,000 lb./day) [different combinations for with or without anchored components]
ORFM	Medium Refinery (100,000 - 500,000 lb./ day) [different combinations for with or without anchored components]
ORFS	Small Refinery (< 100,000 lb./day) [different combinations for with or without anchored components]
	Pumping Plants
OPP	Pumping Plant [different combinations for with or without anchored components]
	Tank Farms
OTF	Tank Farms with Anchored Tanks [different combinations for with or without anchored components]

3.4.4. Natural Gas Systems

A natural gas system consists of pipelines and compressor stations. The inventory data required for natural gas systems analysis include the geographical location and classification of system components. The analysis also requires the replacement cost for facilities and the repair cost for pipelines.

3.4.4.1. Classification

Table 3.16 describes the various classes of natural gas system components. For more details on how to classify these components refer to section 8.4 of Chapter 8.

Table 3.16: Natural Gas System Classification

Label	Description
	Buried Pipelines
NGP1	Welded Steel Pipe with Gas Welded Joints
NGP2	Welded Steel Pipe with Arc Welded Joints
	Compressor Stations
NGC	Compressor Stations [different combinations for with or without anchored components]

3.4.5. Electric Power

An electric power system consists of substations, distribution circuits, generation plants and transmission towers. The inventory data required for electric power systems analysis include the geographical location, classification and replacement cost of the facilities.

3.4.5.1. Classification

Table 3.17 describes the various classes of electric power system components. For more details on how to classify these components refer to section 8.5 of Chapter 8.

Table 3.17: Electric Power System Classification

Label	Description
	Transmission Substations
ESSL	Low Voltage (115 KV) Substation [different combinations for with or without anchored components]
ESSM	Medium Voltage (230 KV) Substation [different combinations for with or without anchored components]
ESSH	High Voltage (500 KV) Substation [different combinations for with or without anchored components]
	Distribution Circuits
EDC	Distribution Circuits (either Seismically Designed Components or Standard Components)
	Generation Plants
EPPL	Large Power Plants (> 500 MW) [different combinations for with or without anchored components]
EPPM	Medium Power Plants (100 - 500 MW) [different combinations for with or without anchored components]
EPPS	Small Power Plants (< 100 MW) [different combinations for with or without anchored components]

3.4.6. Communication

In the loss estimation methodology, a communication system consists of telephone central offices. The inventory data required for communication systems analysis include the geographical location and the classification. The analysis also requires the replacement cost of the facilities.

3.4.6.1. Classification

Table 3.18 describes the various classes of central offices. For more details on how to classify these components refer to section 8.6 of Chapter 8.

Table 3.18: Communication Classification

Label	Description
	Central Offices
CCO	Central Offices (different combinations for with or without anchored components and/or with or without backup power)
	Stations or Transmitters
CBR	AM or FM radio stations or transmitters
CBT	TV stations or transmitters
CBW	Weather stations or transmitters
CBO	Other stations or transmitters

3.5. Hazardous Materials Facilities

Hazardous material facilities contain substances that can pose significant hazards because of their toxicity, radioactivity, flammability, explosiveness or reactivity. Significant casualties or property damage could occur form a small number or even a single hazardous materials release induced by an earthquake, and the consequence of an earthquake-caused release can vary greatly according to the type and quantity of substance released, meteorological conditions and timeliness and effectiveness of emergency response. Similarly to the case of critical faculties with a potential for high loss, such as large dams, the methodology does not attempt to estimate losses caused by earthquake which caused hazardous materials releases. Thus, the hazardous materials module of **HAZUS** is limited to inventory data concerning the location and nature of hazardous materials located at various sites. Section 11.1.2 describes the scheme used to define the degree of danger of hazardous materials.

3.6. Direct Economic and Social Loss

In this section, information related to inventory data required to determine direct economic and social loss is presented. The two main databases used to determine direct economic and social loss are demographic and building square footage databases.

3.6.1. Demographics Data

The census data are used to estimate direct social loss due to displaced households, casualties due to earthquakes, and the estimation quality of building space (square footage) for certain occupancy classes. The Census Bureau collects and publishes statistics about the people of the United States based on the constitutionally required census every 10 years, which is taken in the

years ending in "0" (e.g., 1990). The Bureau's population census data describes the characteristics of the population including age, income, housing and ethnic origin.

The census data were processed for all of the census tracts in the United States, and 29 fields of direct importance to the methodology were extracted and stored. These fields are shown in Table 3.19 and are supplied as default information with the methodology. The population information is aggregated to a census tract level. Census tracts are divisions of land that are designed to contain 2500-8000 inhabitants with relatively homogeneous population characteristics, economic status and living conditions. Census tract divisions and boundaries change only once every ten years. Census tract boundaries never cross county boundaries, and all the area within a county is contained within one or more census tracts. This characteristic allows for a unique division of land from country to state to county to census tract. Each Census tract is identified by a unique 11 digit number. The first two digits represent the tract's state, the next three digits represent the tract's county, while the last 6 digits identify the tract within the county. For example, a census tract numbered 10050505800 would be located in Delaware (10) in Sussex County (050).

Table 3.19: Demographics Data Fields and Usage

Description of Field	Module Usage			
	Shelter	Casualty	Occupancy Class	Lifelines
Total Population in Census Tract	*			*
Total Household in Census Tract	*			*
Total Number of People in General Quarter	*			
Total Number of People < 16 years old	*			
Total Number of People 16-65 years old	*			
Total Number of People > 65 years old	*			
Total Number of People - White	*			
Total Number of People - Black	*			
Total Number of People - Native American	*			
Total Number of People - Asian	*			
Total Number of People - Hispanic	*			
Total # of Households with Income < $10,000	*			
Total # of Households with Income $10 - $20K	*			
Total # of Households with Income $20 - $30K	*			
Total # of Households with Income $30 - $40K	*			
Total # of Households with Income $40 - $50K	*			
Total # of Households with Income $50 - $60K	*			
Total # of Households with Income $60 - $75K	*			
Total # of Households with Income $75 - $100K	*			
Total # of Households with Income > $100k	*			
Total in Residential Property during Day		*		
Total in Residential Property at Night		*		
Hotel Occupants		*		
Vistor Population		*		
Total Working Population in Commercial Industry		*		
Total Working Population in Industrial Industry		*		
Total Commuting at 5 PM		*		
Total Number of Students in Grade School		*		
Total Number of Students in College/University		*		
Total Owner Occupied - Single Household Units	*		*	
Total Owner Occupied - Multi-Household Units	*		*	
Total Owner Occupied - Multi-Household Structure	*		*	
Total Owner Occupied - Mobile Homes	*		*	
Total Renter Occupied - Single Household Units	*		*	
Total Renter Occupied - Multi-Household Units	*		*	
Total Renter Occupied - Multi-Household Structure	*		*	
Total Renter Occupied - Mobile Homes	*		*	
Total Vacant - Single Household Units			*	
Total Vacant - Multi-Household Units			*	
Total Vacant - Multi-Household Structure			*	
Total Vacant - Mobile Homes			*	
Structure Age <40 years			*	
Structure Age >40 years			*	

3.6.2. Default Occupancy Class Square Foot Inventory

The default square footage estimates for occupancy classes RES1, 2,3,5, are based on census data on the number of dwelling units or the number of people for that occupancy class. Table 3.20 provides the conversion factors for these occupancy classes. These conversion factors are obtained from expert opinion and modifications to ATC-13 values. The conversion factors were also calibrated against tax assessors data for region-specific counties. The square foot estimates are calculated using the following expression:

$$SFI = UD * CF \qquad\qquad (3\text{-}1)$$

where,

        SFI = building square footage for an occupancy class
        UD = unit of data for that occupancy class
        CF = conversion factor for that occupancy class (Table 3.20)

The building square footage estimates for the remaining occupancy classes were obtained using a building square footage inventory database purchased from the Dun and Bradstreet Company (D&B). The square footage information was classified based on Standard Industrial Code (SIC) and provided at a census tract resolution. The SIC codes were mapped to NIBS occupancy classes using the mapping scheme provided in Table 3.20. There is no default information for occupancy class COM10.

3.7.   Indirect Economic Data

The indirect economic data refers to the post-earthquake change in the demand and supply of products, change in employment and change in tax revenues. The user can specify the levels of potential increase in imports and exports, supply and product inventories and unemployment rates.

Table 3.20: Mapping of Standard Industrial Codes, Conversion Factors to Estimate Occupancy Square Footage and Square Footage Per Occupancy Class

Label	Occupancy Class	Source of Data		Dun and Bradstreet
		Census		
		Unit of Data	Conversion Factor	SIC Code
	Residential			
RES1	Single Family Dwelling	# of Units	variable	
RES2	Mobile Home	# of Units	1000 sq. t./unit	
RES3	Multi Family Dwelling	# of Units	1000 sq. t./unit	
RES4	Temporary Lodging			70
RES5	Institutional Dormitory	# in Group Quarters	700 sq. ft./person	
RES6	Nursing Home			8051, 8052, 8059
	Commercial			
COM1	Retail Trade			52, 53, 54, 55, 56, 57, 59
COM2	Wholesale Trade			42, 50, 51
COM3	Personal/Repair Services			72,75,76,83,88
COM4	Prof./Technical Services			40, 41, 44, 45, 46, 47, 49, 61, 62, 63, 64, 65, 67, 73, 78 (except 7832), 81, 87, 89
COM5	Banks			60
COM6	Hospital			8062, 8063, 8069
COM7	Medical Office/Clinic			80 (except 8051, 8052, 8059, 8062, 8063, 8069)
COM8	Entertainment & Rec.			48, 58, 79, (except 7911), 84
COM9	Theaters			7832, 7911
COM10	Parking			
	Industrial			
IND1	Heavy			22, 24, 26, 32, 34, 35 (except 3571, 3572), 37
IND2	Light			23, 25, 27, 30, 31, 36 (except 3671, 3672, 3674), 38, 39
IND3	Food/Drugs/Chemicals			20, 21, 28, 29
IND4	Metals/Minerals Processing.			10, 12, 13, 14, 33
IND5	High Technology			3571, 3572, 3671, 3672, 3674
IND6	Construction			15, 16, 17
	Agriculture			
AGR1	Agriculture			01, 02, 07, 08, 09
	Religion/Non/Profit			
REL1	Church/ N.P. Offices			86
	Government			
GOV1	General Services			43, 91, 92 (except 9221, 9224), 93, 94, 95, 96, 97
GOV2	Emergency Response			9221, 9224
	Education			
EDU1	Schools			82 (except 8221, 8222)
EDU2	Colleges/Universities			8221, 8222

3.8.   References

ATC - 13 (1985). *Earthquake Damage Evaluation Data for California,* Applied Technology Council, Redwood City, CA.

FEMA, 1993. "Water Control Infrastructure, National Inventory of Dams 1992," FEMA 246, Federal Emergency Management Agency and U.S. Army Corps of Engineers, Washington, D.C., October 1993.

U.S. Bureau of the Census, May 1991. *Standard Tape File 1 (STF-1A).*

U.S. Bureau of the Census, May 1992. *Standard Tape File 3 (STF-3).*

APPENDIX 3A
General Building Stock

Table 3A.1: Distribution Percentage of Floor Area for Specific Occupancy Classes within each General Occupancy Class ··

			General Occupancy Class						
			RES	COM	IND	AGR	REL	GOV	EDU
Specific Occupancy Class			1	2	3	4	5	6	7
No.	Label	Occupancy Class							
1	RES1	Single Family Dwelling	··						
2	RES2	Mobile Home	··						
3	RES3	Multi Family Dwelling	··						
4	RES4	Temporary Lodging	··						
5	RES5	Institutional Dormitory	··						
6	RES6	Nursing Home	··						
7	COM1	Retail Trade		··					
8	COM2	Wholesale Trade		··					
9	COM3	Personal and Repair Services		··					
10	COM4	Professional/Technical		··					
11	COM5	Banks		··					
12	COM6	Hospital		··					
13	COM7	Medical Office/Clinic		··					
14	COM8	Entertainment & Recreation		··					
15	COM9	Theaters		··					
16	COM10	Parking		··					
17	IND1	Heavy			··				
18	IND2	Light			··				
19	IND3	Food/Drugs/Chemicals			··				
20	IND4	Metals/Minerals Processing			··				
21	IND5	High Technology			··				
22	IND6	Construction			··				
23	AGR1	Agriculture				100			
24	REL1	Church					100		
25	GOV1	General Services						··	
26	GOV2	Emergency Response						··	
27	EDU1	Schools							··
28	EDU2	Colleges/Universities							··

♦ The relative distribution varies by census tract and is computed directly from the specific occupancy class square footage inventory. For Agriculture (AGR) and Religion (REL) there is only one specific occupancy class, therefore the distribution is always 100%.

Table 3A.2: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type															
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34	36
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
1	RES1	For State-Specific "Res1" Distribution, Refer to Table 3A.17															
2	RES2																100
3	RES3	73		1	1	1		6		3	3			1		9	2
4	RES4	34		2	1	2	1	19		16	3			4		18	
5	RES5	20		5	1		1			28	18			6		21	
6	RES6	45				10		5		10				20		10	
7	COM1		22	2		6	3	20		17	1			6		23	
8	COM2		8	3		4	2	41		18	1	3		5	2	13	
9	COM3		28	1	1	3		18		7		1		8		33	
10	COM4		27	2	1	3		19		15				7		26	
11	COM5		27	2	1	3		19		15				7		26	
12	COM6		8	5	2	11		11		27	2	1		27		6	
13	COM7		25	5	2	10		10		15	2	1		20		10	
14	COM8		8	12	1	2	3	16		27	4			5	1	21	
15	COM9		5	20	7			15		20	3			10		20	
16	COM10				8		8	18		43	7		1	6	3	6	
17	IND1		3	29	13	2	2	15		14	7	1		4	2	8	
18	IND2		4	14	8	22	1	18		16	1	1		2		13	
19	IND3		1	18	8	3	3	20		22		2		3		20	
20	IND4		2	24	12	7	2	13		16		2		2	6	14	
21	IND5			21	5	5		3		35	2	10	2	15		2	
22	IND6		32	3	2	10		18		8	7					13	7
23	AGR1	56		3	2	14		2		9					1	13	
24	REL1	22		8		2		21		15	5			8		19	
25	GOV1		9	8	1	3	4	12		42	4			6		11	
26	GOV2	45					2			37				3		13	
27	EDU1	11		6		3	3	21		21	4			9		22	
28	EDU2	2		5	10		5	15		20				20	5	18	

*   Refer to Table 3C.1 for states' classifications.

Table 3A.3: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, 1950-1970 , West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type															
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34	36
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
1	RES1	For State-Specific "Res1" Distribution, Refer to Table 3A.18															
2	RES2																100
3	RES3	72		1	2	2		1		6	2			8		3	3
4	RES4	55		1	2	2	2	3		11	2			18	1	3	
5	RES5	39		3	3		1	8		16	6			18	1	5	
6	RES6	70				3	1	1		5				20			
7	COM1		34	3	1	3	2	4		13	5	10	1	18	2	4	
8	COM2		12	4	5	5	3	3		18		22	1	19	4	4	
9	COM3		12	3	5	5	2	3		23	4	12	1	22	4	4	
10	COM4		34	3	3	1	2	3		17	5	3		23	4	2	
11	COM5		34	3	3	1	2	3		17	5	3		23	4	2	
12	COM6		32	5	2	4	3			16	6			28	4		
13	COM7		46	13	1	3	3			9				20		5	
14	COM8		13	17	12	3	3			13	6			30	3		
15	COM9		10	10	30			5		10		5		30			
16	COM10			5	8		20			34			5	20	6	2	
17	IND1		10	25	30	3			7	14				9	2		
18	IND2		8	5	14	17	4			10	5	22	3	12			
19	IND3			14	16	6	1		5	17		28	1	10	2		
20	IND4			18	25	9			11	10		7		15	3		2
21	IND5			4	9	3	2		4	20		35	3	15	4		1
22	IND6		30		1	15				7		4		20	3		20
23	AGR1	51		4	8	12				2		10		11	2		
24	REL1	20		4	1	3	3			24		4		37	4		
25	GOV1		21	6	3	2	2			26	5	4	2	27	2		
26	GOV2	50								13		7		20	10		
27	EDU1	25		3	4	5	4			20		4	2	29	4		
28	EDU2	5		2	12		5			20				50	6		

* Refer to Table 3C.1 for states' classifications.

Table 3A.4: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Post-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type															
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34	36
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
1	RES1	For State-Specific "Res1" Distribution, Refer to Table 3A.19															
2	RES2																100
3	RES3	73				2	3			6	1		1	9			5
4	RES4	53		3		2	3		4	13				20	2		
5	RES5	33		3	3		6		5	24				23	3		
6	RES6	70								5		5		20			
7	COM1		26	9	1	2	1		6	10	1	15	5	21	3		
8	COM2		8	4	1	3	4		2	12		41	3	19	3		
9	COM3		13	3	2	2	3		3	13		20	5	34	2		
10	COM4		35	3	2	1	3		4	15		8	3	24	2		
11	COM5		35	3	2	1	3		4	15		8	3	24	2		
12	COM6		31	6	1	1	7		4	13		7		28	2		
13	COM7		47	16			5		4	6		2		20			
14	COM8		4	23	8	1	3		2	15		4	1	32	7		
15	COM9		5	27	20					12		4		27	5		
16	COM10			8	8		6		3	49		3	13	7	3		
17	IND1		11	19	28	3	2		1	9		11	3	11	1		1
18	IND2		3	13	9	6	3			10		41	3	12			
19	IND3		2	15	10	5	3			12		28	7	18			
20	IND4		1	26	18	5	4		1	11	1	12	5	15	1		
21	IND5		1	12	8	2	3			10		38	7	17	1		1
22	IND6		30	4	6	11				8		16	6	14			5
23	AGR1	40		8	11	8				3		11	1	15	1		2
24	REL1	23		12	3	1	6			26		1	3	22	3		
25	GOV1		8	15	4	3	7		2	32			4	16	9		
26	GOV2	40		3	7		23			10			7	3	7		
27	EDU1	24		9	6	1	5		3	16	3	4	3	21	5		
28	EDU2	5		10	10		5			20		5		40	5		

*   Refer to Table 3C.1 for states' classifications.

Table 3A.5: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type										
		4	**7**	**11**	**14**	**17**	**20**	**23**	**27**	**30**	**32**	**35**
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
3	RES3	15	4	5		1	19	25		8		23
4	RES4	18	4	12		1	20	20		8		17
5	RES5	16	1	5			40	20				18
6	RES6	20		5			35	20		10		10
7	COM1	8	6	3			21	34		11	1	16
8	COM2	8					27	53		5		7
9	COM3	18					22	42		5		13
10	COM4	25	7	10		2	22	16		9		9
11	COM5	25	7	10		2	22	16		9		9
12	COM6	18	4	6		1	35	19		8		9
13	COM7	20	5	5			30	20		10		10
14	COM8	25		20			40	5				10
15	COM9	30		10			40	10				10
16	COM10		10	5		2	55	18		3	2	5
17	IND1											
18	IND2			10			5	75				10
19	IND3	32	3	1		1	14	41		3		5
20	IND4	25	3	1			9	52				10
21	IND5	35	10				30	5		20		
22	IND6						20	80				
23	AGR1						25	75				
24	REL1						10	90				
25	GOV1	30	15	5		3	23	10		4		10
26	GOV2											
28	EDU2	10		20			60	3		5		2

*   Refer to Table 3C.1 for states' classifications.

Table 3A.6: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, 1950-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type										
		4	**7**	**11**	**14**	**17**	**20**	**23**	**27**	**30**	**32**	**35**
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
3	RES3	10	15	6		4	37		1	21	6	
4	RES4	9	24	9		5	34	1		14	4	
5	RES5	6	1	11		9	45			18	10	
6	RES6	15	10	15		5	25			25	5	
7	COM1	7	25	5		3	31			22	7	
8	COM2	21	3			2	34		1	34	5	
9	COM3	10	3				28			54	5	
10	COM4	17	18	9		9	18		2	23	4	
11	COM5	17	18	9		9	18		2	23	4	
12	COM6	14	10	14		5	23		3	23	8	
13	COM7	15	10	15		5	25			25	5	
14	COM8	5		28			52			10	5	
15	COM9	5		30			50			10	5	
16	COM10	5	8	8		7	39		8	18	7	
17	IND1		10	20			40			20	10	
18	IND2		15	10			50			20	5	
19	IND3	11	4	10		30	20		1	15	9	
20	IND4					100						
21	IND5	10	5	13			32			30	10	
22	IND6											
23	AGR1											
24	REL1						80			10	10	
25	GOV1	15	6	15		11	28		2	18	5	
26	GOV2	5	10	10		5	60				10	
28	EDU2	20		15		5	35			15	10	

*   Refer to Table 3C.1 for states' classifications.

**Table 3A.7: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Post-1970, West Coast*
(after ATC-13, 1985)**

No.	Specific Occupancy Class	Model Building Type										
		4	7	11	14	17	20	23	27	30	32	35
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
3	RES3	9	23	8		10	28		7	12	3	
4	RES4	16	28	8		11	18		3	13	3	
5	RES5	9	10	11		16	34		4	11	5	
6	RES6	25	10	15		10	35			5		
7	COM1	34	9	3		12	17		5	15	5	
8	COM2	20	17			15	10		8	15	15	
9	COM3	11	17	3		10	17		12	17	13	
10	COM4	37	10	12		9	15		3	9	5	
11	COM5	37	10	12		9	15		3	9	5	
12	COM6	25	9	15		10	33		1	6	1	
13	COM7	25	10	15		10	35			5		
14	COM8		10			90						
15	COM9		10			90						
16	COM10	4	8	3		4	66		8	6	1	
17	IND1											
18	IND2											
19	IND3	62	5	1		23	4		1	3	1	
20	IND4	100										
21	IND5	18	14	3		34	13		5	10	3	
22	IND6											
23	AGR1											
24	REL1		5			90					5	
25	GOV1	25	11	15		22	12		4	9	2	
26	GOV2	25	20	35			20					
28	EDU2	20	5	10		25	25			10	5	

*   Refer to Table 3C.1 for states' classifications.

Table 3A.8: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	8	12	15	18	21	24	28	33
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
3	RES3	39	1	2		8	24	23	3	
4	RES4	45	3	3		8	20	18	3	
5	RES5	15	5	10			30	40		
10	COM4	47	10	4		1	21	16	1	
11	COM5	47	10	4		1	21	16	1	
12	COM6	56	9	1		1	24	8	1	
13	COM7									
16	COM10									
23	AGR1									
25	GOV1	53	5	5		3	30	3	1	
28	EDU2	5	5	35			40	15		

*   Refer to Table 3C.1 for states' classifications.

Table 3A.9: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, 1950-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	8	12	15	18	21	24	28	33
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
3	RES3	30	21	6		13	24		3	3
4	RES4	48	10	9		12	19		1	1
5	RES5	20	15	25		30	5			5
10	COM4	40	26	18		6	7		1	2
11	COM5	40	26	18		6	7		1	2
12	COM6	35	27	17		4	15		1	1
13	COM7									
16	COM10									
23	AGR1									
25	GOV1	46	13	22		10	8			1
28	EDU2	35	20	20		25				

*   Refer to Table 3C.1 for states' classifications.

Table 3A.10: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, Post-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
3	RES3	44	6	5		18	20		5	2
4	RES4	56	10	6		16	9		2	1
5	RES5	25	18	20		37				
10	COM4	56	10	14		14	5		1	
11	COM5	54	10	15		15	5		1	
12	COM6	45	6	19		13	17			
13	COM7									
16	COM10									
23	AGR1									
25	GOV1	52	14	14		14	6			
28	EDU2	30	10	10		50				

*   Refer to Table 3C.1 for states' classifications.

Table 3A.11: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Mid-West*

No.	Specific Occup. Class	Model Building Type															
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34	36
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
1	RES1	For State-Specific "Res1" Distribution, Refer to Table 3A.20															
2	RES2																100
3	RES3	75												2		23	
4	RES4	50												3	2	45	
5	RES5	20							4	13	2	22	4	2		33	
6	RES6	90														10	
7	COM1		30	2	4	11	6	7		5		5		2		28	
8	COM2		10	2	4	11	6	7	2	10	2	14	2	2		28	
9	COM3		30	2	4	11	6	7		5		5		2		28	
10	COM4		30	2	4	11	6	7		5		5		2		28	
11	COM5		30	2	4	11	6	7		5		5		2		28	
12	COM6				2	4	2	2	6	21	4	33	6	2		18	
13	COM7		30	2	4	11	6	7		5		5		2		28	
14	COM8		30	2	4	11	6	7		5		5		2		28	
15	COM9			2	6	14	8	10	4	13	2	22	4			15	
16	COM10			2	4	11	6	7	6	21	4	33	6				
17	IND1			5	10	25	13	17	2	7	2	12	2			5	
18	IND2		10	2	4	11	6	7	2	10	2	14	2	3		27	
19	IND3		10	2	4	11	6	7	2	10	2	14	2	3		27	
20	IND4			5	10	25	13	17	2	7	2	12	2			5	
21	IND5		10	2	4	11	6	7	2	10	2	14	2	2		28	
22	IND6		30	2	4	11	6	7		5		5		2		28	
23	AGR1		10	2	4	11	6	7	2	10	2	14	2	2		28	
24	REL1	30			3	5	3	4		5		5		2	2	41	
25	GOV1		15	14	21				7	6		4		3		30	
26	GOV2		14	7	17				4	12					3	43	
27	EDU1		10	5	12				5	7				11		50	
28	EDU2		14	6	12			2	8	11					10	37	

*   Refer to Table 3C.1 for states' classifications.

Table 3A.12: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Mid-West*

No.	Specific Occupancy Class	Model Building Type										
		4	7	11	14	17	20	23	27	30	32	35
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
3	RES3		10	7	3	14	39		7		2	18
4	RES4		10	7	3	14	37	2	7		2	18
5	RES5					25	62	2	11			
6	RES6											
7	COM1	3	20	16	6	11	27	2	5		2	8
8	COM2		7	3		14	37	2	7		3	27
9	COM3	3	20	16	6	11	27	2	5		2	8
10	COM4	3	20	16	6	11	27	2	5		2	8
11	COM5	3	20	16	6	11	27	2	5		2	8
12	COM6	3	20	16	6	12	30	2	6			5
13	COM7	3	20	16	6	11	27	2	5		2	8
14	COM8	3	20	16	6	11	27	2	5		2	8
15	COM9											
16	COM10	2	14	10	4	17	43	2	8			
17	IND1											
18	IND2		7	3		14	37	2	7		3	27
19	IND3		7	3		14	37	2	7		3	27
20	IND4											
21	IND5		7	3		14	37	2	7		3	27
22	IND6											
23	AGR1		7	3		14	37	2	7		3	27
24	REL1	3	20	16	6	11	27	2	5		2	8
25	GOV1	20	24			11	9				5	31
26	GOV2											
28	EDU2	7	14			9	13				13	44

* Refer to Table 3C.1 for states' classifications.

Table 3A.13: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, Mid-West*

No.	Specific Occup. Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
3	RES3	3	13	4		16	44	7	7	6
4	RES4	3	13	4		16	44	7	7	6
5	RES5					26	74			
10	COM4	7	29	9		12	32	4	4	3
11	COM5	7	29	9		12	32	4	4	3
12	COM6	7	29	9		13	36	2	2	2
13	COM7	7	29	9		12	32	4	4	3
16	COM10	5	19	6		18	52			
23	AGR1	2	6	2		16	44	11	11	8
25	GOV1									
28	EDU2									

*   Refer to Table 3C.1 for states' classifications.

Table 3A.14: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, East Coast*

No.	Specific Occup. Class	Model Building Type															
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34	36
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML	MH
1	RES1	For State-Specific "Res1" Distribution, Refer to Table 3A.21															
2	RES2																100
3	RES3	62			3				2	2				5	4	22	
4	RES4	48		5	4			4	8	4		3	3	3	3	15	
5	RES5	7		7	6			6	17	6	3	8	6	5	5	24	
6	RES6	22		11	8			8	8	3	2	4	3	5	4	22	
7	COM1		14	20	15	5		16	3	2		2		4	2	17	
8	COM2		10	21	15	7		16	3	2		2		3	4	17	
9	COM3		25	7	5	11		5	3	2		2		6	4	30	
10	COM4		26	11	8	4		9	4	2		3		5	4	24	
11	COM5		13	13	9	13		10	5	3		2	2	5	3	22	
12	COM6		2	22	15			18	10	4	2	5	4	3	2	13	
13	COM7		24	10	7	15		8	3	2		3		4	4	20	
14	COM8		19	19	13	6		15	3	2		2		3	3	15	
15	COM9		5	20	13	12	2	16	7	2		3	3	3	2	12	
16	COM10			10	7			8	30	11	6	14	12			2	
17	IND1		5	22	15	4	2	17	7	3		3	3	3	3	13	
18	IND2		10	15	9	15		11	5	3		2	2	4	5	19	
19	IND3		7	25	18	3		19	4	2		2	2	3	2	13	
20	IND4		7	26	19	3		20	3	2		2		2	3	13	
21	IND5		5	25	17	3	2	20	7	3		3	3		2	10	
22	IND6		10	21	14	7	2	16	5	2		2	2	2	3	14	
23	AGR1		48	8	6	12		7	2					3	2	12	
24	REL1	36		4	4			3	2	2		2		7	6	34	
25	GOV1		7	24	16	3		19	5	3		2	1	3	3	13	
26	GOV2		8	16	11	4		13	8	3	2	4	3	4	5	19	
27	EDU1		13	17	13			13	5	3		2	2	5	5	22	
28	EDU2		4	18	13			14	8	3	2	4	3	5	4	22	

*   Refer to Table 3C.1 for states' classifications.

Table 3A.15: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, East Coast*

No.	Specific Occupancy Class	Model Building Type										
		4	7	11	14	17	20	23	27	30	32	35
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
3	RES3	3	4			6	3		14		13	57
4	RES4	9	12		3	18	9	2	11		7	29
5	RES5	7	10		3	23	11	3	12		5	26
6	RES6											
7	COM1	23	29	2	8	5	3		5		5	20
8	COM2	23	30	3	8	4	3		5		5	19
9	COM3	10	13		3	5	4		11		10	44
10	COM4	14	19	2	5	7	4		9		7	33
11	COM5	15	21	2	6	8	5		8		6	29
12	COM6	21	27	2	8	12	6	2	7		2	13
13	COM7	15	20	2	5	7	4		9		6	32
14	COM8	22	30	3	8	5	3		5		5	19
15	COM9											
16	COM10	10	13		3	38	17	6	11			2
17	IND1											
18	IND2	22	28	2	8	10	5	2	6		3	14
19	IND3	25	32	3	9	6	4		4		3	14
20	IND4											
21	IND5	24	32	3	9	9	6		5		2	10
22	IND6											
23	AGR1	19	25	2	7	4	2		7		6	28
24	REL1	5	9		2	4	3		12		12	53
25	GOV1	24	30	3	9	7	5		5		3	14
26	GOV2											
28	EDU2	17	23	2	6	10	5	2	8		4	23

* Refer to Table 3C.1 for states' classifications.

Table 3A.16: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, East Coast*

No.	Specific Occup. Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
3	RES3	8	21	8		34	17	2	5	5
4	RES4	8	21	8		34	17	2	5	5
5	RES5	6	16	6		40	20	3	5	4
10	COM4	15	36	15		15	8		2	9
11	COM5	15	36	15		15	8		2	9
12	COM6	14	35	14		17	8	2	2	8
13	COM7	15	38	15		14	8		2	8
16	COM10	5	12	5		43	21	4	6	4
23	AGR1	7	4	18		20	42			9
25	GOV1									
28	EDU2									

    *   Refer to Table 3C.1 for states' classifications.

Table 3A.17: Distribution Percentage of Floor Area for Model Building Types within "RES1" Building Occupancy Class, Pre-1950, West Coast

State FIPS*	State Abbreviation	State	Model Building Type					
			1	**9**	**13**	**19**	**29**	**34**
			W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				25	16
06	CA	California	99				1	0
08	CO	Colorado	76				15	9
15	HI	Hawaii	92			1	4	3
16	ID	Idaho	95				3	2
30	MT	Montana	98				1	1
35	NM	New Mexico	74				16	10
32	NV	Nevada	97				2	1
41	OR	Oregon	99				1	
49	UT	Utah	82				11	7
53	WA	Washington	98				1	1
56	WY	Wyoming	92				5	3

  *   State FIPS are two digit unique number representative of each state and US territory. Refer to Table 3C.1 of Appendix C for a complete list of State FIPS.

Table 3A.18: Distribution Percentage of Floor Area for Model Building Types within "RES1" Building Occupancy Class, 1950-1970, West Coast

State FIPS	State Abbreviation	State	Model Building Type					
			1	9	13	19	29	34
			W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				36	4
06	CA	California	99				1	0
08	CO	Colorado	76				21	3
15	HI	Hawaii	92			1	6	1
16	ID	Idaho	95				4	1
30	MT	Montana	98				2	
35	NM	New Mexico	74				23	3
32	NV	Nevada	97				3	
41	OR	Oregon	99				1	
49	UT	Utah	82				16	2
53	WA	Washington	98				2	
56	WY	Wyoming	92				7	1

Table 3A.19: Distribution Percentage of Floor Area for Model Building Types within "RES1" Building Occupancy Class, Post-1970, West Coast

State FIPS	State Abbreviation	State	Model Building Type					
			1	9	13	19	29	34
			W1	S3	S5L	C2L	RM1L	URML
02	AK	Alaska	99			1		
04	AZ	Arizona	60				40	
06	CA	California	99				1	0
08	CO	Colorado	76				24	
15	HI	Hawaii	92			1	7	
16	ID	Idaho	95				5	
30	MT	Montana	98				2	
35	NM	New Mexico	74				26	
32	NV	Nevada	97				3	
41	OR	Oregon	99				1	
49	UT	Utah	82				18	
53	WA	Washington	98				2	
56	WY	Wyoming	92				8	

Table 3A.20: Distribution Percentage of Floor Area for Model Building Types within "RES1" Building Occupancy Class, Mid-West

State FIPS	State Abbreviation	State	Model Building Type		
			1	**19**	**34**
			W1	C2L	URML
05	AR	Arkansas	87		13
19	IA	Iowa	92		8
17	IL	Illinois	77	1	22
18	IN	Indiana	80		20
20	KS	Kansas	91		9
21	KY	Kentucky	88		12
22	LA	Louisiana	89		11
26	MI	Michigan	86		14
27	MN	Minnesota	95	1	4
29	MO	Missouri	76		24
28	MS	Mississippi	94		6
38	ND	North Dakota	98		2
31	NE	Nebraska	89	1	10
39	OH	Ohio	76		24
40	OK	Oklahoma	71		29
46	SD	South Dakota	97		3
47	TN	Tennessee	90		10
48	TX	Texas	100		
55	WI	Wisconsin	90		10

Table 3A.21: Distribution Percentage of Floor Area for Model Building Types within "RES1" Building Occupancy Class, East Coast

State FIPS	State Abbreviation	State	Model Building Type		
			1	**19**	**34**
			W1	C2L	URML
01	AL	Alabama	95		5
09	CT	Connecticut	96		4
11	DC	District of Columbia	21	3	76
10	DE	Delaware	71	1	28
12	FL	Florida	25	5	70
13	GA	Georgia	93		7
25	MA	Massachusetts	96		4
24	MD	Maryland	71	1	28
23	ME	Maine	99		1
37	NC	North Carolina	90		10
33	NH	New Hampshire	97	1	2
34	NJ	New Jersey	91		9
36	NY	New York	85	1	14
42	PA	Pennsylvania	66		34
44	RI	Rhode Island	98		2
45	SC	South Carolina	92		8
51	VA	Virginia	75		25
50	VT	Vermont	96	2	2
54	WV	West Virginia	72		28

APPENDIX 3B
Essential Facilities

Table 3B.1: Distribution Percentage of Floor Area for Specific Occupancy Classes within each General Occupancy Class

Specific Occupancy Class			General Occupancy Class		
			Medical Care	**Emergency Response**	**Schools**
No.	**Label**	**Occupancy Class**	**1**	**2**	**3**
1	EFHS	Small Hospital	X		
2	EFHM	Medium Hospital	X		
3	EFHL	Large Hospital	X		
4	EFMC	Medical Clinics	X		
5	EFFS	Fire Station		X	
6	EFPS	Police Station		X	
7	EFEO	Emergency Operation Centers		X	
8	EFS1	Grade Schools			X
9	EFS2	Colleges/ Universities			X

Table 3B.2: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type														
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML
1	EFHS		8	5	2	11		11		27	2	1		27		6
2	EFHM		8	5	2	11		11		27	2	1		27		6
3	EFHL		8	5	2	11		11		27	2	1		27		6
4	EFMC		8	5	2	11		11		27	2	1		27		6
5	EFFS	45					2			37				3		13
6	EFPS	45					2			37				3		13
7	EFEO	45					2			37				3		13
8	EFS1	11		6		3	3	21		21	4			9		22
9	EFS2	2		5	10		5	15		20				20	5	18

Table 3B.3: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, 1950-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type														
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML
1	EFHS		32	5	2	4	3			16	6			28	4	
2	EFHM		32	5	2	4	3			16	6			28	4	
3	EFHL		32	5	2	4	3			16	6			28	4	
4	EFMC		32	5	2	4	3			16	6			28	4	
5	EFFS	50								13		7		20	10	
6	EFPS	50								13		7		20	10	
7	EFEO	50								13		7		20	10	
8	EFS1	25		3	4	5	4			20		4	2	29	4	
9	EFS2	5		2	12		5			20				50	6	

* Refer to Table 3C.1 for states' classifications.

Table 3B.4: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Post-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occup. Class	Model Building Type														
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML
1	EFHS		31	6	1	1	7		4	13		7		28	2	
2	EFHM		31	6	1	1	7		4	13		7		28	2	
3	EFHL		31	6	1	1	7		4	13		7		28	2	
4	EFMC		31	6	1	1	7		4	13		7		28	2	
5	EFFS	40		3	7		23			10			7	3	7	
6	EFPS	40		3	7		23			10			7	3	7	
7	EFEO	40		3	7		23			10			7	3	7	
8	EFS1	24		9	6	1	5		3	16	3	4	3	21	5	
9	EFS2	5		10	10		5			20			5	40	5	

Table 3B.5: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type										
		4	7	11	14	17	20	23	27	30	32	35
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
1	EFHS	18	4	6		1	35	19		8		9
2	EFHM	18	4	6		1	35	19		8		9
3	EFHL	18	4	6		1	35	19		8		9
4	EFMC	18	4	6		1	35	19		8		9
5	EFFS											
6	EFPS											
7	EFEO											
9	EFS2	10		20			60	3		5		2

*   Refer to Table 3C.1 for states' classifications.

Table 3B.6: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, 1950-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type										
		4	**7**	**11**	**14**	**17**	**20**	**23**	**27**	**30**	**32**	**35**
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
1	EFHS	14	10	14		5	23		3	23	8	
2	EFHM	14	10	14		5	23		3	23	8	
3	EFHL	14	10	14		5	23		3	23	8	
4	EFMC	14	10	14		5	23		3	23	8	
5	EFFS	5	10	10		5	60				10	
6	EFPS	5	10	10		5	60				10	
7	EFEO	5	10	10		5	60				10	
9	EFS2	20		15		5	35			15	10	

Table 3B.7: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Post-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type										
		4	**7**	**11**	**14**	**17**	**20**	**23**	**27**	**30**	**32**	**35**
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
1	EFHS	25	9	15		10	33		1	6	1	
2	EFHM	25	9	15		10	33		1	6	1	
3	EFHL	25	9	15		10	33		1	6	1	
4	EFMC	25	9	15		10	33		1	6	1	
5	EFFS	25	20	35			20					
6	EFPS	25	20	35			20					
7	EFEO	25	20	35			20					
9	EFS2	20	5	10		25	25			10	5	

*   Refer to Table 3C.1 for states' classifications.

Table 3B.8: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, Pre-1950, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
1	EFHS	56	9	1		1	24	8	1	
2	EFHM	56	9	1		1	24	8	1	
3	EFHL	56	9	1		1	24	8	1	
4	EFMC	56	9	1		1	24	8	1	
9	EFS2	5	5	35			40	15		

Table 3B.9: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, 1950-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
1	EFHS	35	27	17		4	15		1	1
2	EFHM	35	27	17		4	15		1	1
3	EFHL	35	27	17		4	15		1	1
4	EFMC	35	27	17		4	15		1	1
9	EFS2	35	20	20		25				

Table 3B.10: Distribution Percentage of Floor Area, for Model Building Types within Each Building Occupancy Class, High Rise, Post-1970, West Coast*
(after ATC-13, 1985)

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
1	EFHS	45	6	19		13	17			
2	EFHM	45	6	19		13	17			
3	EFHL	45	6	19		13	17			
4	EFMC	45	6	19		13	17			
9	EFS2	30	10	10		50				

*   Refer to Table 3C.1 for states' classifications.

Table 3B.11: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, Mid-West*

No.	Specific Occup. Class	Model Building Type														
		1	2	3	6	9	10	13	16	19	22	25	26	29	31	34
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML
1	EFHS		30	2	4	11	6	7		5		5		2		28
2	EFHM				2	4	2	2	6	21	4	33	6	2		18
3	EFHL				2	4	2	2	6	21	4	33	6	2		18
4	EFMC		30	2	4	11	6	7		5		5		2		28
5	EFFS		14	7	17				4	12					3	43
6	EFPS		14	7	17				4	12					3	43
7	EFEO		14	7	17				4	12					3	43
8	EFS1		10	5	12				5	7				11		50
9	EFS2		14	6	12			2	8	11					10	37

Table 3B.12: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, Mid-West*

No.	Specific Occupancy Class	Model Building Type										
		4	7	11	14	17	20	23	27	30	32	35
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
1	EFHS	3	20	16	6	11	27	2	5		2	8
2	EFHM	3	20	16	6	12	30	2	6			5
3	EFHL	3	20	16	6	12	30	2	6			5
4	EFMC	3	20	16	6	11	27	2	5		2	8
5	EFFS											
6	EFPS											
7	EFEO											
9	EFS2	7	14			9	13				13	44

* Refer to Table 3C.1 for states' classifications.

Table 3B.13: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, Mid-West*

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
1	EFHS	7	29	9		12	32	4	4	3
2	EFHM	7	29	9		13	36	2	2	2
3	EFHL	7	29	9		13	36	2	2	2
4	EFMC	7	29	9		12	32	4	4	3
7	EFEO									
9	EFS2									

Table 3B.14: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Low Rise, East Coast*

No.	Specific Occup. Class	Model Building Type														
		1	**2**	**3**	**6**	**9**	**10**	**13**	**16**	**19**	**22**	**25**	**26**	**29**	**31**	**34**
		W1	W2	S1L	S2L	S3	S4L	S5L	C1L	C2L	C3L	PC1	PC2L	RM1L	RM2L	URML
1	EFHS		24	10	7	15		8	3	2		3		4	4	20
2	EFHM		2	22	15			18	10	4	2	5	4	3	2	13
3	EFHL		2	22	15			18	10	4	2	5	4	3	2	13
4	EFMC		24	10	7	15		8	3	2		3		4	4	20
5	EFFS		8	16	11	4		13	8	3	2	4	3	4	5	19
6	EFPS		8	16	11	4		13	8	3	2	4	3	4	5	19
7	EFEO		8	16	11	4		13	8	3	2	4	3	4	5	19
8	EFS1		13	17	13			13	5	3		2	2	5	5	22
9	EFS2		4	18	13			14	8	3	2	4	3	5	4	22

*   Refer to Table 3C.1 for states' classifications.

Table 3B.15: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, Mid Rise, East Coast*

No.	Specific Occupancy Class	Model Building Type										
		4	**7**	**11**	**14**	**17**	**20**	**23**	**27**	**30**	**32**	**35**
		S1M	S2M	S4M	S5M	C1M	C2M	C3M	PC2M	RM1M	RM2M	URMM
1	EFHS	15	20	2	5	7	4		9		6	32
2	EFHM	21	27	2	8	12	6	2	7		2	13
3	EFHL	21	27	2	8	12	6	2	7		2	13
4	EFMC	15	20	2	5	7	4		9		6	32
5	EFFS											
6	EFPS											
7	EFEO											
9	EFS2	17	23	2	6	10	5	2	8		4	23

Table 3B.16: Distribution Percentage of Floor Area for Model Building Types within Each Building Occupancy Class, High Rise, East Coast*

No.	Specific Occupancy Class	Model Building Type								
		5	**8**	**12**	**15**	**18**	**21**	**24**	**28**	**33**
		S1H	S2H	S4H	S5H	C1H	C2H	C3H	PC2H	RM2H
1	EFHS	15	38	15		14	8		2	8
2	EFHM	14	35	14		17	8	2	2	8
3	EFHL	14	35	14		17	8	2	2	8
4	EFMC	15	38	15		14	8		2	8
7	EFEO									
9	EFS2									

• Refer to Table 3C.1 for states' classifications.

APPENDIX 3C

States' Classifications

Table 3C.1: Regional Distribution of States

State Fips	State Abbreviation	State Name	Group
02	AK	Alaska	West
01	AL	Alabama	East
05	AR	Arkansas	Mid-West
04	AZ	Arizona	West
06	CA	California	West
08	CO	Colorado	West
09	CT	Connecticut	East
11	DC	District of Columbia	East
10	DE	Delaware	East
12	FL	Florida	East
13	GA	Georgia	East
15	HI	Hawaii	West
19	IA	Iowa	Mid-West
16	ID	Idaho	West
17	IL	Illinois	Mid-West
18	IN	Indiana	Mid-West
20	KS	Kansas	Mid-West
21	KY	Kentucky	Mid-West
22	LA	Louisiana	Mid-West
25	MA	Massachusetts	East
24	MD	Maryland	East
23	ME	Maine	East
26	MI	Michigan	Mid-West
27	MN	Minnesota	Mid-West
29	MO	Missouri	Mid-West
28	MS	Mississippi	Mid-West
30	MT	Montana	West
37	NC	North Carolina	East
38	ND	North Dakota	Mid-West
31	NE	Nebraska	Mid-West
33	NH	New Hampshire	East
34	NJ	New Jersey	East
35	NM	New Mexico	West
32	NV	Nevada	West
36	NY	New York	East
39	OH	Ohio	Mid-West
40	OK	Oklahoma	Mid-West
41	OR	Oregon	West
42	PA	Pennsylvania	East
44	RI	Rhode Island	East

Table 3C.1(cont.): Regional Distribution of States

State Fips	State Abbreviation	State Name	Group
45	SC	South Carolina	East
46	SD	South Dakota	Mid-West
47	TN	Tennessee	Mid-West
48	TX	Texas	Mid-West
49	UT	Utah	West
51	VA	Virginia	East
50	VT	Vermont	East
53	WA	Washington	West
55	WI	Wisconsin	Mid-West
54	WV	West Virginia	East
56	WY	Wyoming	West
60	AS	American Samoa	West
66	GU	Guam	West
69	MR	Northern Mariana Islands	West
72	PR	Puerto Rico	East
78	VI	Virgin Islands	East