



**STATE OF ARIZONA**

**THE HONORABLE DOUGLAS A. DUCEY, GOVERNOR**

**ARIZONA DEPARTMENT OF ADMINISTRATION**

**ANDY TOBIN, DIRECTOR**

**ADOA BUILDING SYSTEM INVENTORY HANDBOOK**

**COMPILED BY:**

**GENERAL SERVICES DIVISION**

**PLANNING AND CONSTRUCTION SERVICES**

## INTRODUCTION TO THE ARIZONA DEPARTMENT OF ADMINISTRATION (ADOA) BUILDING SYSTEM

The ADOA Building System was established pursuant to A.R.S. § 41-793 concurrent with those of the Arizona Board of Regents' and the Arizona Department of Transportation's Building Systems. Each of these building systems is responsible for computing building renewal needs for each fiscal year according to a renewal formula selected by the Joint Committee on Capital Review (JCCR) and for allocating building renewal monies appropriated to agencies within each of these three building systems. The ADOA Building System is the largest of the three and includes buildings owned by 24 agencies, whose structures appear in this annual inventory.

The ADOA building system has grown by 62% since FY 2002 (2,793 structures) to its current inventory of 4,500 structures. The ADOA General Services Division (GSD), Planning and Construction Services (PCS) section reports on the condition, maintenance, and utilization of each building inspected during the prior fiscal year on an approximate schedule of 50% of buildings within the first two years and 50% of buildings in the following two years of the four-year (quadrennial) cycle. ADOA revises its building system inventory each year to include structure acquisitions and deletions as reported by building system agencies, escalations or de-escalations of structure replacement values, and two fiscal years of forecasted building renewal requirements for capital funding consideration. If available, the inventory also lists a structure's construction class, year of construction, fire suppression/sprinkler system status, occupancy category, and other allied information.

A variety of entities, including ADOA State Risk Management, the State Fire Marshal, the Governor's Office of Strategic Planning and Budgeting (OSP), and the Arizona State Legislature's Joint Legislative Budget Committee (JLBC) use the building inventory.

### DEFINITIONS, METHODS, AND FORMULA

Building Inventory Number is assigned to each building or structure in the inventory. The characters in the Building Inventory Number are determined by the Agency Code, Building Inventory Inspection District, Location, and Building/Structure number. For example, an ADOA building located at 1850 West Jackson in Phoenix will appear as CG-1-001-0060. The Building Inventory Number is also used to categorize specific structures identified in an agency's annual Capital Improvement Plan (CIP).

Building Renewal means major activities that involve the repair or reworking of a building and the supporting infrastructure that will result in maintaining a building's expected useful life. Building renewal *does not* include new building additions, new infrastructure additions, landscaping and area beautification, routine maintenance, or demolition and removal of a building.

Building Renewal Formula is expressed by the well-known Sherman-Dergis Formula developed in 1981 at the University of Michigan. In simple terms, the Sherman-Dergis Formula is used to estimate at a high level the capital requirements of major maintenance over time. The basic premise is:

The formula to determine the annual appropriation required for building renewal for each building is based on construction costs and is calculated by the following: *Two-Thirds Building Value multiplied by the Building Age, then divided by the Life Expectancy of the structure (n)* or otherwise expressed as  $[2/3(BV)(BA)]/n$ .

The formula reflects the current year building replacement value by updating the *original* construction cost by using a national building cost index. ADOA uses the Marshall & Swift Valuation Service building cost index to reflect its current year building replacement value.

To generate funding consistent with the need, the formula is weighted to skew building renewal funding to older buildings. In order to accomplish this, a building life expectancy is incorporated into the age factor. ADOA incorporates a building life expectancy of 50 years into its age factor.

The Age Factor = Building Age / Life Expectancy of the building ( $n$ ). For example, the ADOA Life Expectancy is 50 years, therefore  $n = 1275$ , which is derived by progressively compounding by addition,  $1 + 2 + 3 + 4 + 5 \dots 49 + 50$ .

Building renewal should, on average, cost no more than two-thirds of the cost of new construction, thus the building renewal constant multiplier of  $2/3$ .

The formula recognizes that building renewal should cost less than building replacement and that older buildings require more building renewal (capital funding) than younger buildings. The formula does not consider accrued deferred maintenance.

The two fiscal years' forecasted building renewal formula for each structure in the inventory is located in the "*FY Renewal*" columns.

Building Value is referred to as Replacement Value in the inventory and is used interchangeably. The Building Value reflects the current year building replacement value by updating the original construction cost using the Marshall & Swift Valuation Service building cost index. The past fiscal year's Building Value for each structure is found in the "*Replacement Value*" column of the inventory. The Building Value/Replacement Value terms are not to be confused with the appraised real estate/real property value of a structure.

Fire Sprinkler Systems are indicated in the "*Fire Suppression*" column of the inventory. The "Y," "N," or "P" indicates the presence, or lack thereof, of fire suppression in a structure as follows: Y = a full fire sprinkler fire suppression system; N = a lack of a fire sprinkler fire suppression system; and P = a partial fire sprinkler fire suppression system.

International Building Code (IBC) is a model building code developed by the International Code Council (ICC). A significant portion of the IBC addresses fire prevention in regard to *construction and design*, whereas the fire code such as the International Fire Code (IFC) addresses fire prevention from an on-going occupancy basis. For example, the *IBC* would address the location of exits in a structure, while the fire code (*IFC* or other fire code standard) would speak to keeping the exits unobstructed for egress. The "*Classes/IBC*" column indicates the fire-resistance rating in number of hours for a structure based on its building construction elements of Types I, II, III, IV, and V.

Life Expectancy of ADOA Building System structures is expressed as 50 years for calculation of building renewal needs. The Life Expectancy of a structure is represented by ( $n$ ), or 1275, in ADOA's utilization of the Sherman-Dergis Formula.

Marshall & Swift is a nationally recognized building cost index used to develop replacement or reproduction costs, depreciation values, and insurable values of buildings and other improvements. Marshall & Swift is a construction and valuation industry benchmark for preliminary budget feasibility, life-cycle costing, estimating and bidding for new construction, insurance and rate-setting purposes, and other real property valuations. For the purposes of this inventory, it is used to determine building replacement values, including the cost of labor, materials and installed components. Construction Class Indicators are located in the "*Classes/Marshall*" column. Construction Class Indicators are defined below in Table 1.

**Table 1**

<b>CLASS</b>	<b>FRAME</b>	<b>FLOOR</b>	<b>ROOF</b>	<b>WALLS</b>
A	Structural steel columns and beams fire proofed with masonry, concrete, plaster, or other incombustible material.	Concrete or concrete covered steel deck, fire-proofed.	Concrete or concrete covered steel deck, fire-proofed.	Non-bearing curtain walls, masonry, concrete, metal, and glass panels, stone.
B	Reinforced concrete columns and beams.	Concrete or concrete covered steel deck, fire-proofed.	Concrete or concrete covered steel deck, fire-proofed.	Non-bearing curtain walls, masonry, concrete, metal, and glass panels, stone.
C	Structural steel columns and beams fire-proofed with masonry, concrete, plaster, or other incombustible material.	Concrete or concrete covered steel deck, fire-proofed.	Wood or steel joist, wood or steel deck.	Brick, concrete block, or tile masonry, tilt-up formed concrete.
D	Wood or steel studs in bearing wall, wood or steel skeleton frame.	Wood or steel floor joists or slabs on ground.	Wood or steel joist, wood or steel deck.	Almost any material except masonry or concrete. May have masonry veneer over steel or wood framing.
S	Steel – No fire protection.	Concrete	Steel – No fire protection.	Steel – No fire protection.

Replacement Value (referred to as Building Value (BV) in the Sherman-Dergis Formula) reflects the current year's building replacement value by updating the original construction cost using the Marshall & Swift construction cost index. The past fiscal year's replacement value for each structure is found in the "*Replacement Value*" column of the inventory. The Replacement Value/Building Value terms are not to be confused with the appraised real estate/real property value of a structure.

Gross Square Feet (GSF) is the sum of all areas on all floors of a building or structure included within the outside faces of its exterior walls ("drip-lines"), including all vertical penetration areas.

Construction Year is the year the building or structure was constructed. Documentation of the exact year of construction is vital to calculating the Replacement Value (Building Value) for a correct estimation of the Building Renewal Formula.

Facility Occupancy Category for insurance purposes reflects the primary use of a facility and is indicative of the types and values of personal property contents contained therein. Facility Occupancy Categories are defined below in Table 2.

**Table 2**

<b>FACILITY OCCUPANCY CATEGORIES</b>	
<b>OCCUPANCY CATEGORY</b>	<b>FACILITY DESCRIPTION</b>
C	Computer facility
CA	Adult correctional facility
CJ	Juvenile correctional facility
GS	Garage for operations support, including vehicle maintenance, repair or fuel depot
GP	Garage for parking
I	Light industrial facility
L	Library
M	Medical facilities such as clinics, infirmaries or hospitals
N	Non-categorized facility
OM	Office buildings where approximately 75% or more of occupants are senior level managers
OS	Office building
SP	Primary school
SS	Secondary school
U	University
W	Warehouse

**Arizona Department of Administration Building System Inventory**  
 General Services Division  
 as of June 30, 2019

Agency	Number of Structures	2019 Replacement Value	FY 2021 Building Renewal	FY 2022 Building Renewal	Gross Square Feet
Administration, Arizona Department of	59	\$868,801,599	\$13,864,277	\$14,027,876	4,474,847
ADOA, Legislature	7	\$80,153,155	\$2,035,211	\$2,059,227	303,388
Agriculture, Arizona Department of	5	\$724,027	\$14,203	\$14,371	10,154
AHCCCS	3	\$35,179,960	\$616,257	\$623,529	164,080
Corrections, State Department of	1,524	\$2,067,890,332	\$26,793,820	\$27,109,987	8,792,214
Deaf and the Blind, Arizona State Schools for the	49	\$128,996,234	\$2,119,832	\$2,144,846	509,799
Economic Security, Department of	109	\$144,099,017	\$3,409,194	\$3,449,422	664,154
Emergency and Military Affairs, Department of	550	\$568,092,539	\$8,966,410	\$9,072,214	3,707,928
Environmental Quality, Arizona Department of	1	\$2,017,373	\$48,522	\$49,095	4,504
Exposition & State Fair Board, Arizona	26	\$112,572,306	\$2,862,115	\$2,895,888	681,147
Forestry and Fire Management, Arizona Department of	4	\$1,884,948	\$35,731	\$36,152	12,206
Game and Fish Department, Arizona	482	\$94,402,848	\$1,157,929	\$1,171,592	859,189
Health Services, Department of	58	\$284,167,450	\$4,110,907	\$4,159,416	812,004
Historical Society of Arizona, Prescott	21	\$17,436,824	\$343,257	\$347,308	63,238
Historical Society, Arizona	23	\$53,963,281	\$1,135,528	\$1,148,927	208,572
Judiciary, Arizona Supreme Court	1	\$71,843,982	\$1,051,833	\$1,064,245	257,207
Juvenile Corrections, Department of	51	\$69,421,506	\$1,337,557	\$1,353,340	225,334
Lottery Commission, Arizona State	2	\$8,768,975	\$146,723	\$148,454	47,600
Parks Board, Arizona State	1,071	\$135,710,985	\$2,280,414	\$2,307,322	794,384
Pioneers Home, Arizona	10	\$14,162,509	\$349,085	\$353,204	66,140
Power Authority, Arizona	3	\$8,726,288	\$66,936	\$67,726	12,324
Public Safety, Department of	401	\$151,167,150	\$2,572,243	\$2,602,595	656,700
Veterans Services, Department of	40	\$225,115,835	\$1,868,392	\$1,890,439	407,577
<b>Grand Total</b>	<b>4,500</b>	<b>\$5,145,299,122</b>	<b>\$77,186,378</b>	<b>\$78,097,177</b>	<b>23,734,690</b>