Working towards a safer more resilient Arizona: Pilot Study Assessing Unreinforced Masonry Buildings of Prescott, Arizona

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Cover Photo: Historic downtown Prescott - top (K. Lund, CC BY-SA 2.0. Historic downtown Prescott

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Assessing pre-1978 Masonry Buildings in the City of Prescott, Yavapai County, Arizona

Executive Summary

The Federal Emergency Management Agency (FEMA) recognizes that Arizona is at high risk from earthquakes. Communities in Arizona commonly include an unknown number of older, unreinforced or lightly reinforced masonry buildings (URM) that are prone to partial failure or collapse when subjected to substantial ground shaking. In 2021-2022, we launched a pilot program to assess the quantity, scope, and database quality of older masonry building stock, i.e., potential URM buildings, of three Arizona cities with heightened seismic risk: Flagstaff (Coconino County), Prescott (Yavapai County), and Yuma (Yuma County). We coordinated with city authorities of Flagstaff and Yuma Counties and with the County Assessor's Offices of Yavapai and Yuma Counties to retrieve the pertinent building stock data.

This report focuses solely on the pre-1978 masonry building stock of Prescott. These are buildings likely to lack rebar or other forms of reinforcement to enhance stability and improve performance in the face of surface seismic waves. The Yavapai County Assessor's Office shared building stock data for buildings constructed prior to 1978 for the City of Prescott. We identified about 1,400 pre-1978 commercial, residential, and private/public masonry buildings (K-20 schools, churches, theaters, and more).

Results of this report should assist City of Prescott authorities and the public in understanding the scope of unreinforced masonry buildings (URM). This in turn, could fuel a concerted effort to explore funding opportunities, e.g., FEMA's *Building Resilient Infrastructure and Communities*, to prioritize seismic retrofit or replacement of schools, churches, theaters, and other public gathering sites at high risk from ground shaking. A definitive assessment of URM stock in Prescott requires a physical survey of older masonry buildings by trained structural or civil engineers. We conclude with recommendations to the City of Prescott and Yavapai County for mitigating risk from older masonry buildings.

Introduction

The M5.7 earthquake that rocked Magna, Utah, in 2020 illustrated how ground-shaking from a moderate-magnitude temblor can impact communities with older, unreinforced masonry buildings (URM). Rigid, non-ductile structures that place the public at higher risk to fatalities or injuries due to building collapse, collapsing parapets, and failure of chimneys, walls, and roofs (Utah Seismic Safety Commission, 2021). Earthquake impacts on rigid masonry building stock can cripple communities and hamper social and economic recovery. The number of people in Arizona living, learning, working and worshiping in URMs is unknown, and thus the risk is wholly uncertain.

In June 2022, we approached the staff of the Yavapai County Assessor's Office for pre-1978 building stock data for the City of Prescott. The objective: to examine the level of structural detail, data format(s), machine readability, data fidelity, and parameters to assist in identifying older masonry buildings (Appendix 1). Established in 1864, Prescott is a community of about 43,500 people; nearby Prescott Valley is home to an additional 45,500. Prescott's historic downtown is anchored by the Prescott County Courthouse (1916) and Whiskey Row, which comprises older masonry buildings constructed in the 1890s and the first quarter of the 20th century.

This report sheds light on the number, distribution, and knowledge gaps of pre-1978 masonry building stock in Prescott. A fuller understanding of the scope of older masonry buildings should inform city and county efforts when seeking federal and state funds to design a seismic retrofit program tailored to meet Prescott's needs (e.g., FEMA's Building Resilient Infrastructure and Communities Grant Program). Lessons learned in Prescott could assist other Arizona communities as they address their own URM issues.

Earthquake Hazard and Risk in the City of Prescott and Environs

Prescott resides in Arizona's Transition Zone, on the margin of the actively extending Basin and Range Province. Basin and Range normal faulting in Yavapai County is evinced by the presence of faults active in the past 2.6 million years (Quaternary faults).

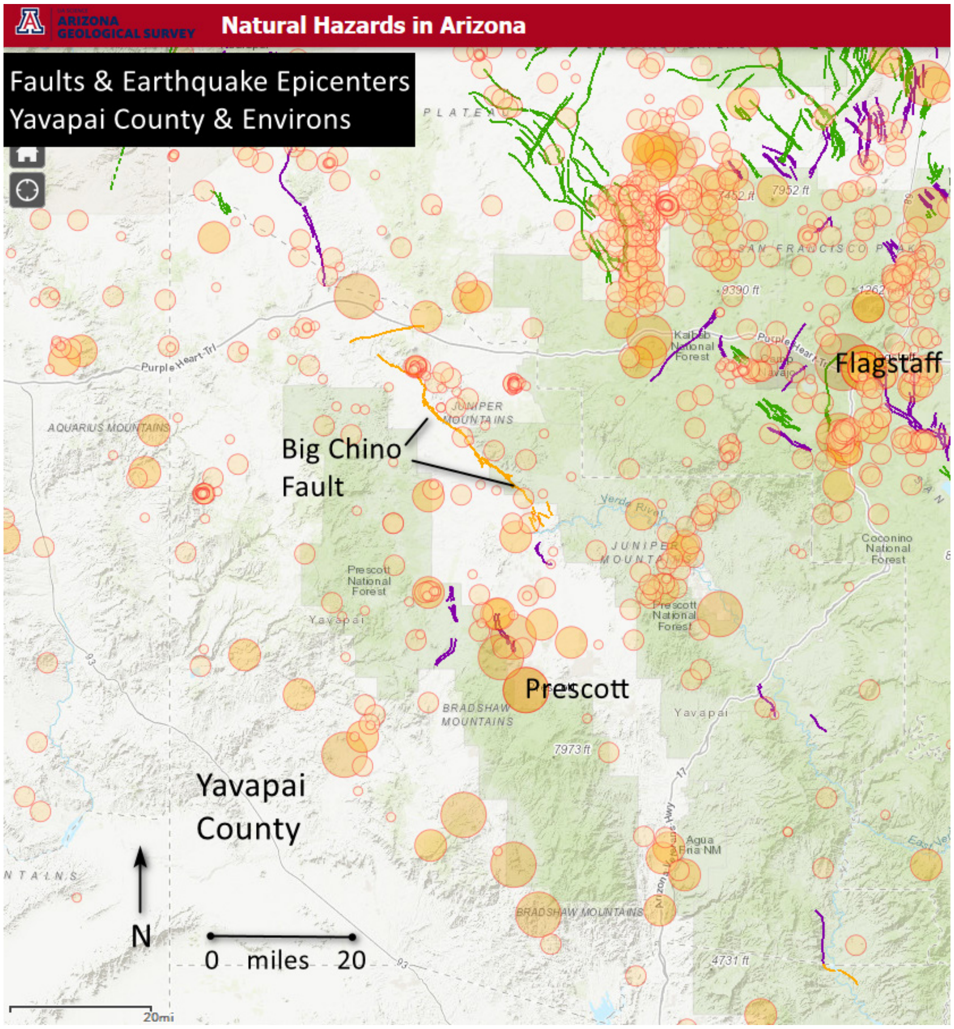


Figure 1. Quaternary faults and historic earthquake epicenters of Yavapai County and environs. Faults are demarcated by orange, green, and purple lines; orange balls represent historic earthquake epicenters - large diameter balls represent moderate magnitude earthquakes, e.g., M4 to M6. Note the proximity of the Big Chino Fault system, with a surface trace of ~35 miles, to Prescott. Quaternary faults of the Northern Arizona Seismic Belt outcrop in the north-central and northeast corner of the map. (Source: Natural Hazards in Arizona interactive viewer, https://uagis.maps.arcgis.com/apps/webappviewer/index.html?id=98729f76e4644f1093d1c2cd6dabb584

The city is situated southwest of the tectonically-active Northern Arizona Seismic Belt (Brumbaugh, 1987), which annually experiences substantial earthquake activity (Baush and Brumbaugh, 1997). While earthquakes of M7+ are rare in Arizona, moderate magnitude events (temblors of ~M4.0 to M6.5) occur with greater frequency. Moderate-magnitude events, thus, pose a higher probability risk to those living in central Arizona (Minson et.al. 2021). Modest ground shaking can be amplified by the geologic substrate, such as the unconsolidated basin fill of valleys in Arizona's Basin and Range Province.

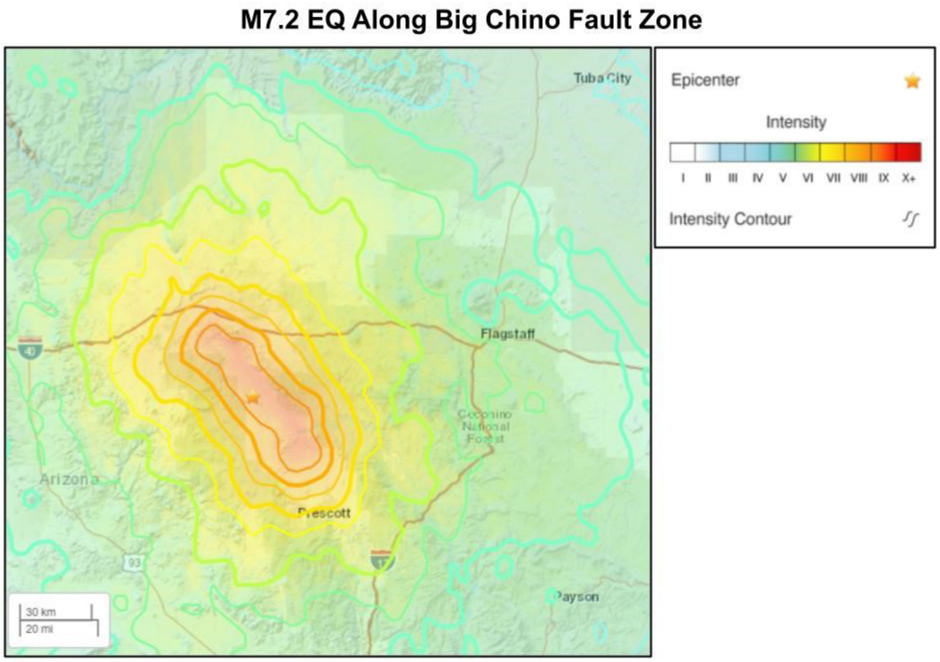
Appendix II includes a geologic map of the Prescott area, rock unit descriptions, a compilation of historic earthquakes in Yavapai County, and fault systems of Yavapai County and environs that could potentially impact the City of Prescott.

Big Chino Fault System. The northwest-southeast trending Big Chino Fault is situated in Chino Valley, 20 miles north of Prescott (e.g., Langenheim and others, 1994; Menges and Pearthree, 1983; Pearthree, 1998). The most recent earthquake on the Big Chino occurred in the late Pleistocene or early Holocene, about 10,000 to 15,000 years ago (Eberhart-Phillips and others, 1981, Pearthree, 1998). Well-developed faults scarp(s) are observed along most of the 35-mile-length (Soule, 1978) of the Big Chino Fault.

A *Hazards United States Multi-Hazard* (Hazus-MS, Appendix III) model for a M7.2 earthquake on the Big Chino Fault forecasts very strong shaking, i.e., Modified Mercalli Intensity of VII, for the city of Prescott and environs (Figure 2). Ground shaking from a large-magnitude earthquake is likely to produce substantial damage to poorly build or badly designed structures in Paulden, Chino Valley, Prescott, Prescott Valley, Williamson, and other smaller communities in Yavapai County. It could also disrupt transportation corridors, bridges, utilities, communication, and infrastructure.

Pre-1978 Masonry Buildings of Prescott

In the western U.S., masonry buildings constructed prior to the mid-1970s are likely to be unreinforced or lightly reinforced; thus lacking the ductility to absorb seismic energy of a moderate- to large-magnitude earthquake (Utah Seismic Safety Commission, 2016). The City of Prescott contains more than 1,400 buildings of pre-1978 masonry construction (Table 1; Figure 3); rigid buildings that commonly lack rebar reinforcement, and thus may perform poorly when subjected to lateral ground-shaking and retrograde ground motion that accompanies moderate to large earthquakes. The number of pre-1978 masonry



Screen capture from HAZUS scenario model, Big Chino M7.2

Figure 2. A HAZUS-MS model illustrating the potential intensity of ground shaking from a M7.2 earthquake on the Big Chino Fault. Ground shaking in and around Prescott would be on the order of VII to VIII on the Modified Mercalli Intensity Scale. (https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale). This would produce considerable damage to poorly build or badly designed structures, collapse of chimneys, factory stacks, columns, and monuments. Appendix III includes the entire HAZUS-MS report for a M7.2 earthquake on the Big Chino Fault.

buildings constructed by decade is illustrated in Figure 4. The majority of commercial and non-commercial masonry buildings were constructed in the 1950s, 1960s, and 1970s.

Table 1. Pre-1978 Buildings of Masonry Construction in the City of Prescott.

- [1]Residential Buildings – 1029 facilities
- Commercial Buildings – 313 facilities
- [2]Public Sites – 23 facilities
- Churches – 24 facilities
- [3]Schools – 25 facilities

[1]Includes 11 duplexes, 59 multi-residential facilities, 4 Triplex, and 955 single-family(?) residences.
[2]Includes public buildings, theaters, multipurpose buildings, auditorium, clubhouses, hospital, government buildings, and museums.
[3]Includes elementary, middle (junior high), and high schools.
Note: These numbers are estimates based on Yavapai County Assessor records. They do not include structures build partially below grade with lower level masonry walls and upper level framed walls.

Pre-1978 masonry residential, schools, churches, and public buildings fall into one of five classes of masonry construction: 'masonry stucco buildings' ~71 percent; 'masonry concrete block' ~18 percent; and 'masonry common brick buildings' ~10 percent. 'Masonry poured concrete' and 'masonry stone' buildings make up only 1-2%. 'Commercial' buildings, on the other hand, are simply classified as masonry, without modifiers.

Over 1,000 pre-1978 masonry buildings are classified as residential buildings. The majority are 1-story ranch homes and bi-level homes (Table 2). Prescott hosts 24 pre-1978 masonry buildings that serve as places of worship – churches, synagogues, and temples (Appendix IV A). Most are one-story but there are 7 two-story and 1 three-story church. There are 25 schools of pre-1978 masonry construction standing in Prescott (Appendix IV B). The Embry-Riddle Aeronautical University possesses 9 additional, stand-alone masonry classrooms build in the late 1960s and with 'effective ages' in the mid-1970s. ('Effective age' is established by the County Assessor's office and reflects substantial(?) renovation of the building. It does not, however, mean that the building meets the building standards of that year.) The Pre-1978 masonry building stock includes at least 23 public facilities: auditoriums, multipurpose buildings, museums, hospital, fellowship hall, theaters, clubhouses, and government buildings (Appendix IV C). More than 300 pre-1978 masonry buildings are listed as 'commercial' (Table 3; Appendix IV D).

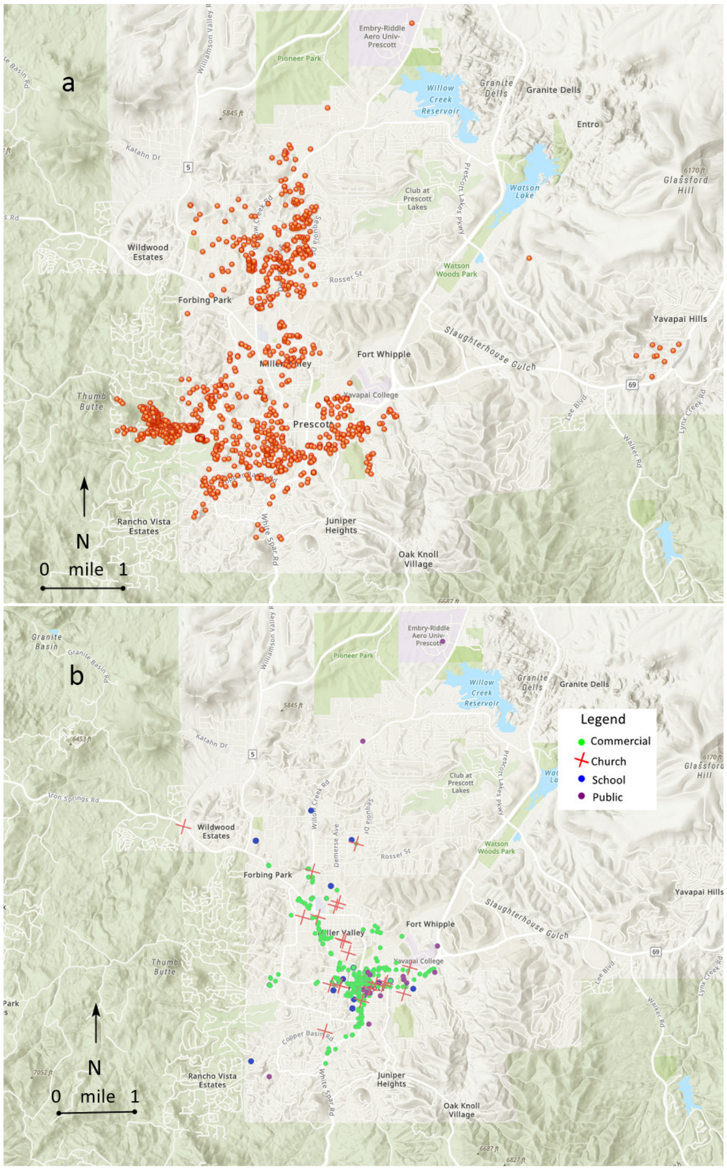


Figure 3. Distribution and type (e.g., residential, public) of ~1,400 pre-1978 masonry buildings of Prescott. a) Residential buildings; b) Commercial, churches, schools, and public buildings.

Table 2. Pre-1978 masonry residential buildings stock of Prescott, Arizona

- 678 Ranch one-story (includes 2 guest houses, 4 multi-residential facilities, and 32 garages)
- 200 Bi-level homes
- 21 Duplexes (1-story)
- 34 Townhouses (1- or 2-story)
- 9 1.5 story homes
- 7 Triplex (four 2-story; two 1-story)
- 11 Three-story apartments
- 32 Two- to three-story condominiums

Table 3. Number of stories of City of Prescott pre-1978 masonry commercial building stock.

- 263 One-story masonry building
- 42 Two-story masonry buildings
- 4 Three-story masonry buildings
- 3 Four-story masonry buildings

Spatial Analysis of pre-1978 Masonry Buildings

We used ESRI's ArcGIS© spatial analysis tools to model the distribution of pre-1978 masonry buildings. The density analysis tool identifies several areas of high concentrations of masonry buildings, e.g., potential URM buildings (Figure 5A). The largest concentration encompasses historic downtown Prescott, centered on the intersection of Gurley St. and Montezuma Ave (AZ 89). A smaller, high concentration area is situated west of downtown Prescott, centered on the residential area near the intersection of Butte Canyon Dr. and Meadowbrook Rd. An area of more diffuse masonry buildings extends northward from downtown Prescott, along Willow Creek Rd. towards the intersection of Douglas Ave. and Demerse Ave.

Applying ArcGIS'© hot spot analysis, a measure of statistically significantly spatial clustering for point data, yields two prominent hot spots at the 99- to 95-percent confidence level for pre-1978 masonry buildings (Figure 5B). The largest hot spot encompasses historic downtown Prescott, extending from Sheldon St. south to Leroux St., and west to east from Park Ave. to Washington Ave. A second, smaller hot spot centers on the residential area near Butte Canyon Dr. and Meadowbrook Rd. Small, isolated cold spots, at the 95- to 90-percent confidence level, crop out in northern-most Prescott, about 3 miles north of historic downtown, and form a narrow, discontinuous 1.3 mile-long north-south trend between the cities two hot spots. Juxtaposing the results of the density analysis with the hot spot analysis reinforces the distribution pattern of pre-1978 masonry buildings (Figure 6).

Database Challenges. The building data provided by Yavapai County reported 6,300 buildings build prior to 1978, which includes the ~ 1,400 masonry buildings discussed in this report. Buildings are characterized by 22 parameters, each of which is noted and briefly described in Appendix I. We encountered few problems with the data. The chief issue involved

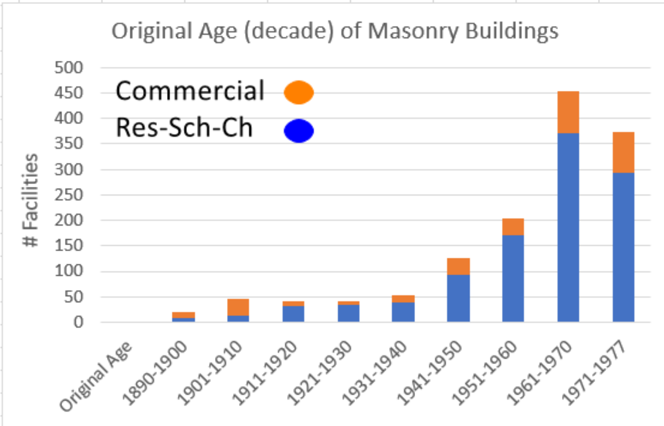


Figure 4. Original age of masonry buildings from 1890 to 1977, by decade. Blue represents an aggregate of residential buildings, schools, churches, and public sites. Orange represents building labeled as commercial.

challenges with the construction type for buildings, residential, public, church and school buildings were documented in the "Exterior" column. For commercial buildings, the type of construction was documented in the "C_Code" column. We stumbled upon this by happenstance; the Yavapai County Assessor confirmed our assessment.

An original age is reported for all buildings; due to historical limitations of building data, in a small number of cases the original age may be a calculated effective age (Pers. Comm, J. McGovern). Buildings that have been refurbished, remodeled, or possibly seismically retrofitted report an effective age that reflects the year of the building upgrade. However, this does not ascertain that the building meets the City of Prescott building standards of that effective year. Hence a building build in 1946 with an effective age of 1978, may not meet the building code standards of 1978. Only an assessment by a trained structural engineer or building inspector could confirm whether a seismic retrofit has occurred.

We performed a spot check of 17 pre-1978 masonry buildings listed in the National Park's National Register of Historic Places. We identified several discrepancies – several missing sites, and incompatible original ages - between the Yavapai County database and that of the National Register. While this spot check is too small to draw firm conclusions regarding overall data quality, it does indicate further work is required to properly validate the data.

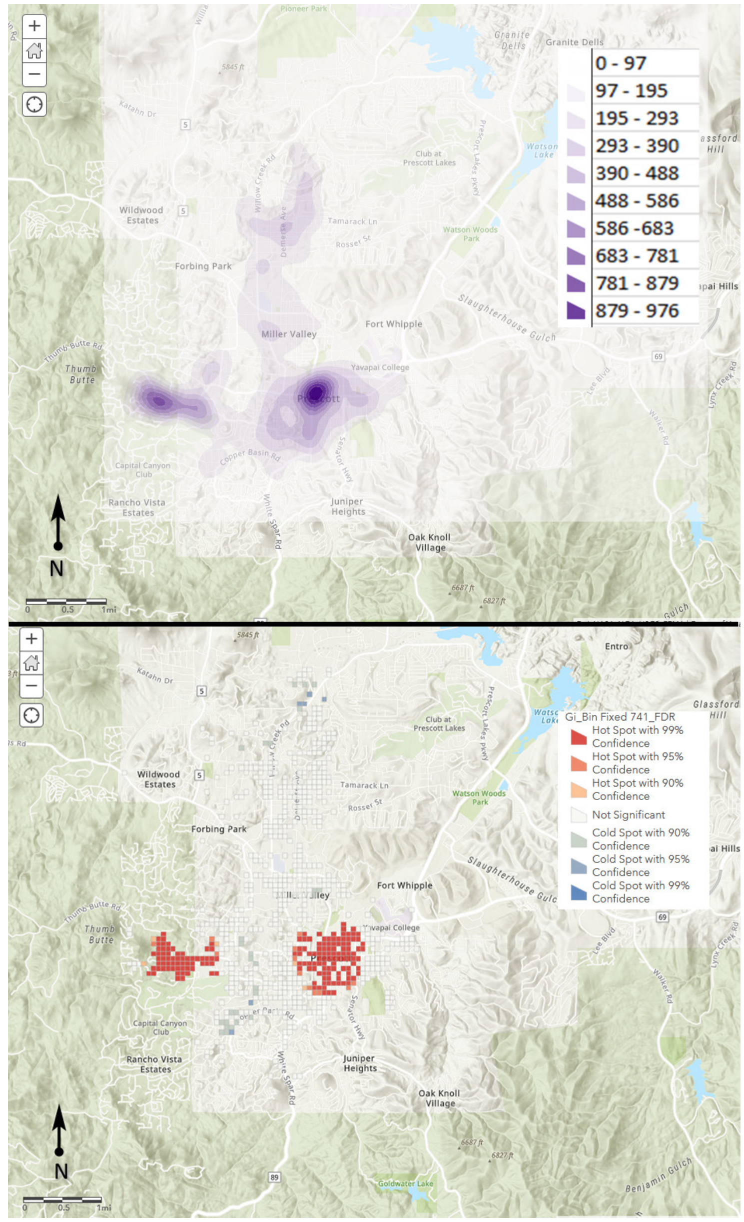


Figure 5. Spatial analysis of the distribution of masonry building in Prescott build prior to 1978. a) Density analysis illustrates a high concentration of masonry buildings, i.e., potential URMs, in Prescott's historic downtown and in a residential area 2-miles west of downtown. Building density ranges from fewer than 0 – 97 buildings per square mile to 614 – 682 to 879-976 building per square mile. b) Hot spot analysis confirms density analysis findings at the 99% confidence level for historic downtown and the residential area 2-miles west of downtown.

Conclusion

Moderate to large earthquakes on the Big Chino Fault are infrequent; the interval between large magnitude earthquakes are probably on-the-order of tens-of-thousands of years. Nonetheless, it is one of several active faults proximal to Prescott with a high probability of future earthquakes. Rupture along the 35-mile length of the Big Chino could produce a magnitude 7.0+ earthquake (Appendix III). The resulting ground shaking would certainly cause substantial damage in Prescott and environs, severely damaging or collapsing older, unreinforced or lightly reinforced

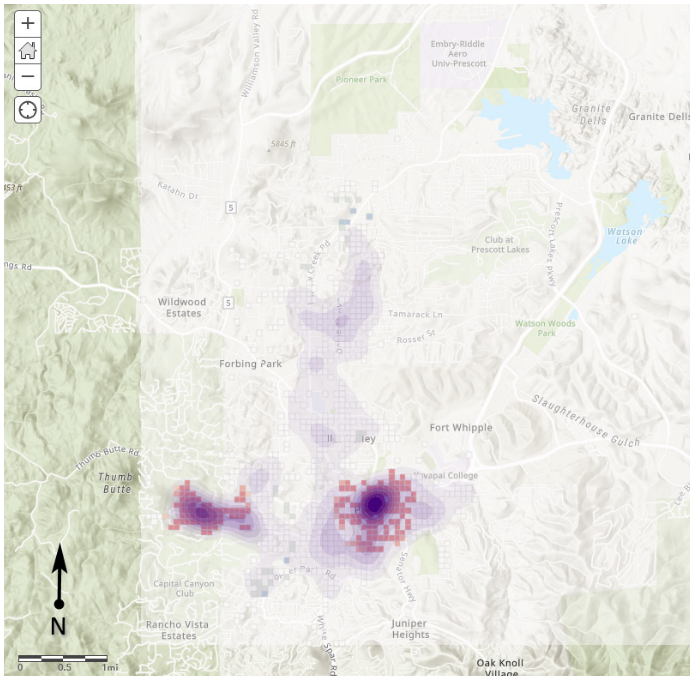


Figure 6. Hot spot results superposed on density analysis results shows areas of high concentration of masonry buildings in Prescott.

masonry buildings. This would involve Prescott's historic downtown, a nexus for Yavapai County tourism. Extensive damage there could result in fatalities and injuries and would dramatically hamper the city's physical and economic recovery.

This report sheds light on the distribution of pre-1978 masonry buildings, those buildings most likely to perform poorly in the face of a moderate to large earthquake and its aftershocks. The City of Prescott and Yavapai County can take steps to improve the performance of older buildings. Other western states, notably California, Utah, and Washington, and midwestern states proximal to the active New Madrid Fault (NAHB Research Center, 2003), have pioneered programs to retrofit older infrastructure to enhance survivability and minimize injuries (e.g., Applied Technology Council, 2022).

Developing a retrofit program to mitigate earthquake risk is costly and requires perseverance and years of effort (Utah Seismic Safety Commission, 2016). The first steps, however, are straight forward and require only those resources readily available to civil authorities of Prescott and Yavapai County. Chiefly, this involves prioritizing structures for retrofit that, should they be severely damaged, could cause disproportionally high fatalities and injuries. This includes schools, churches, and sites where people congregate – libraries, municipal and county buildings, museums, and theaters. Structural assessment by trained engineers would be instrumental in prioritizing URMs at highest risk to failure during ground shaking. The Utah Seismic Safety Commission (2016) provides a guide for seismic improvement of unreinforced masonry buildings.

Recommended Actions for the City of Prescott in mitigating risk from older masonry buildings

1. Engage Prescott civil authorities, Yavapai County Emergency Management, Arizona Dept. of Emergency Management, and FEMA in strategizing how to address Prescott's aging masonry (i.e., URM) building stock.
2. Encourage Yavapai County and the City of Prescott to address aging masonry (i.e., URM) building stock in their multi-jurisdictional hazard mitigation plans.
3. Collaborate/consult with structural engineers and GIS specialists from the City of Prescott and Yavapai County on high-precision filtering of the existing database to better identify and prioritize retrofits of URM building stock.
4. Prioritize physical assessment of pre-1978 masonry schools, churches, and public facilities by civil engineers or other qualified staff.
5. Consult with Utah Emergency Management about best practices in conducting and disseminating information on URM building inventory.
6. Explore federal, state, and local funding agencies for external grants to facilitate URM assessment and remediation.
    a. Pursue opportunities for a *'Fix the Bricks'* and '*Brace and Bolt*' style retrofit programs for Prescott home owners. (sources: Salt Lake City (https://www.slc.gov/em/fix-the-bricks/ ; California Earthquake Authority (https://www.earthquakeauthority.com/Prepare-Your-House-Earthquake-Risk/Brace-and-Bolt-Grants)

Acknowledgments

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NOTE: As per AZGS agreement with the Yavapai Assessor's Office, we are not attaching the City of Prescott database.

Appendix I. Parameters of Pre-1978 Masonry Buildings of the City of Prescott, Yavapai County, Arizona

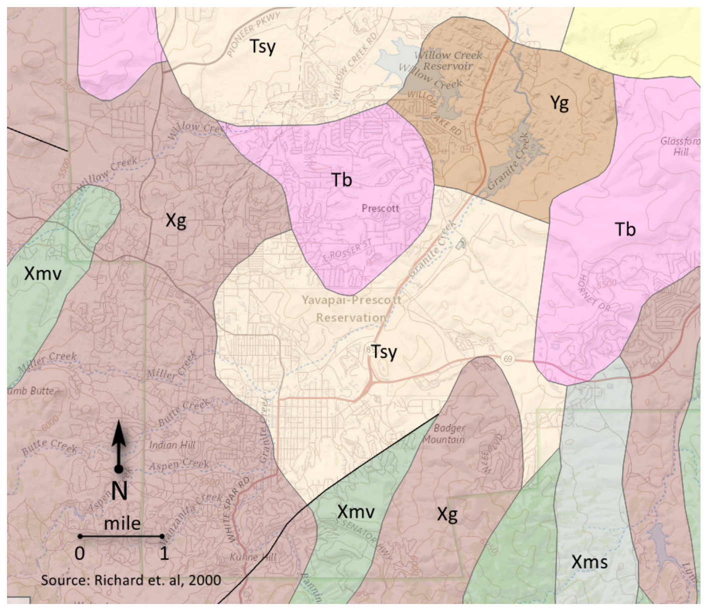
- PARCELNo - Parcel number of property
- Primary Owner
- Secondary Owner
- InCareOf
- Mailing Address
- CityStateZip
- Propadd – Actual property address
- Property City - Prescott
- AuthorityName – Taxing Authority of City of Prescott
- AcctType - Building use: residential, commercial, municipal, state, county, qualified exempt, etc.
- USE_CODE – Property Use Code, for descriptions, see 2000 prop use code manual (azdor.gov).
- Imp_No – Uncertain with number assigned between 1 and 67.
- Story_Count – The number of levels in a structure, e.g, 1 story, 2 story …
- Wall_Height – Average wall height or ceiling height of each level of building. For example a typical home has a wall height of 8'-10'. Wall height values range from 8’ to 20’.
- Foundation- Block, concrete, rock
- Exterior – Exterior construction description
- SquareFT – Square footage of living area. Garage areas and porches are not included in SquareFT.
- Original_Age – Original year of construction
- Effective_Age – Weighted Age or Effective age due to additions or remodels
- Improvement_Description – Description of the facility, e.g., fitness center, church, school, etc.
- AppraisalDate – Date last appraised
- Class_Code – Construction description

Source: Yavapai County Assessor’s Office.

Appendix II. Geologic Map and Earthquake History of Prescott and environs

Most of Prescott is constructed on Pliocene to middle Miocene sedimentary deposits of moderate to strongly consolidated conglomerate and sandstone (Richard and others, 2000). The northern section of Prescott rests on Late to Middle Miocene (16-8 million years before the present) basaltic lava flows (Tb).

The Arizona Statewide Landslide Inventory Database, comprising more than 6,000 mass wasting features, does not show any landslide masses proximal to the City of Prescott. The absence of mass wasting deposits suggests that the local rock units are generally stable and unlikely to collapse or fail during a moderate-magnitude earthquake. The moderate M4.9 earthquake of 4 Feb. 1976 (Eberhart-Phillips and others, 1981), which occurred in nearby Chino Valley, and was felt in Prescott, did not produce ground failure in Prescott.



Geologic map of the Prescott area, 1:1,000,000

<u>Rock Unit Descriptions for rocks exposed in the City of Prescott (Richard and others, 2000)</u>.

Tsy - Age: Pliocene to Middle Miocene (2 - 16 Ma). Mo

erately to strongly consolidated conglomerate and sandstone deposited in basins during and after late Tertiary faulting. Includes lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs.

Tb - Age: Late to Middle Miocene (8 - 16 Ma). Mostly dark, mesa-forming basalt deposited as lava flows. Rocks of this unit are widely exposed south of Camp Verde (Hickey Formation basalts), in the Mohon Mountains north of Bagdad, “The Mesa” east of Parker, and at other scattered locations in western Arizona. Rocks of this unit were not tilted by middle-Tertiary normal faulting except in a narrow belt from north of Phoenix to the northwest corner of the state.

Yg - Age: Middle Proterozoic (1400 - 1450 Ma). Mostly porphyritic biotite granite with large microcline phenocrysts, with local fine-grained border phases and aplite. Associated pegmatite and quartz veins are rare. This unit forms large plutons, including the Oracle Granite, Ruin Granite, granite in the Pinnacle Peak - Carefree area northeast of Phoenix, and several bodies west of Prescott.

Xg - Age: Early Proterozoic (1600 - 1800 Ma). Wide variety of granitic rocks, including granite, granodiorite, tonalite, quartz diorite, diorite, and gabbro. These rocks commonly are characterized by steep, northeast-striking foliation.

Xmv - Age: Early Proterozoic (1650 - 1800 Ma). Weakly to strongly metamorphosed volcanic rocks. Protoliths include basalt, andesite, dacite, and rhyolite deposited as lava or tuff, related sedimentary rock, and shallow intrusive rock. These rocks, widely exposed in several belts in central Arizona, include metavolcanic rocks in the Yavapai and Tonto Basin supergroups.

Appendix III. Earthquake History of Prescott and environs

A number of felt earthquakes have originated in Yavapai County and are reported in the table below.

Date	Magnitude	Location
11-1-2015	4.0	5km NE of Black Canyon City
11-1-2015	3.2	10km NE of Black Canyon City
11-1-2015	4.1	8km NE of Black Canyon City
4-30-2015	2.33	5km NE Clarkdale
7-23-2013	2.20	18km NW Clarkdale
11-14-2012	2.10	6km NE Clarkdale
10-4-2011	2.61	13km NE Clarkdale
6-29-2011	2.27	Clarkdale
6-13-2011	2.0	Sycamore Canyon
6-13-2011	2.29	Clarkdale
5-2-2011	2.26	Clarkdale
4-26-2011	2.5	Sycamore Canyon
3-18-2011	3.7	Clarkdale
2-4-1976	5.2	Williamson
2-9-1976	4.6	Prescott Ntl. Forest
2-23-1976	3.5	Prescott Valley
11-4-1971	3.7	Williams

The table below lists Quaternary fault systems that could impact Yavapai County. MCE reflects the maximum credible earthquake (MCE) of the fault system (Wells and Coppersmith, 1984; (Brumbaugh 1997); and Ben-Horin, pers. communication, 2022).

Fault Name	MCE
Aubrey	7.0
Seligman	6.5
Big Chino	7.1
Big Chino & Little Chino	7.2
Prescott Valley faults	6.2
Williamson Valley faults	6.5
Verde Valley	6.1
Cottonwood Basin	5.9
Horseshoe	~ 6.2 to 6.7

APPENDIX IV. HAZUS-MS Report for M7.2 earthquake on the Big Chino Fault – see zip file.

Appendix V. The locations, footprints, and original- and effective-ages of Prescott's pre-1978 masonry churches, schools, public sites, and commercial buildings.

A. **Masonry Churches in the City of Prescott, Arizona**

Prescott hosts 24 churches of masonry construction build on or before 1977. Several churches listed here did not appear in the Yavapai County Assessor's database as churches, but were instead located in a Google search. Sq. Ft. reflects the footprint of the building in square feet. The original age is the year of construction. The effective age reflects that time when notable modifications were made to the building; a reported effective age of 0 indicates the absence of notable

Address	City	Sq. Ft	Original Age	Effective Age	Type
3000 Willow Creek Rd	Prescott	3,240	1973	1984	Masonry
1400 Pine Dr	Prescott	11,733	1972	0	Masonry
148 S Marina St	Prescott	9,142	1924	1963	Masonry
139 S Cortez St	Prescott	2,484	1902	1960	Masonry
114 S Marina St	Prescott	8,700	1973	0	Masonry
237 S Montezuma St	Prescott	6,840	1946	1962	Masonry
630 Park Ave	Prescott	5,964	1963	0	Masonry
145 S Arizona Ave	Prescott	7,526	1954	1981	Masonry
815 Whipple St	Prescott	7,641	1954	0	Masonry
602 Lincoln Ave	Prescott	2,674	1936	1973	Masonry
581 Lincoln Ave	Prescott	2,732	1968	0	Masonry
609 W Gurley St	Prescott	1,144	1967	0	Masonry
108 S Summit Ave	Prescott	10,818	1871	1949	Masonry
108 S Summit Ave	Prescott	3,198	1961	1970	Masonry
501 Campbell St	Prescott	2,411	1973	0	Masonry
102 N Alarcon St	Prescott	7,372	1943	0	Masonry
908 E Sheldon St	Prescott	4,479	1974	0	Masonry
120 N Mount Vernon Ave	Prescott	7,850	1950	1956	Masonry
406 E Gurley St	Prescott	3,831	1943	0	Masonry
1230 Willow Creek Rd1	Prescott	7,173	1965	0	Masonry
882 Sunset Ave	Prescott	7,050	1977	0	Masonry
520 W Delano Ave	Prescott	4,326	1963	0	Masonry
1001 Ruth St	Prescott	19,412	1971	0	Masonry
937 Ruth St	Prescott	15,185	1972	0	Masonry

B. **Pre-1978 Masonry School Buildings in the City of Prescott, Arizona**

Twenty-five City of Prescott schools of masonry construction were build prior to 1978. The Emory Riddle Aeronautical University campus, at 3700 Willow Creek Rd; reports 15 classroom/lab buildings of masonry construction; mostly constructed in 1968 and carry an 'Effective Year Built' in the mid-1970s to the mid-1980s or later; an Effective Year Built of 0 indicates no substantial changes since the facility was first built. The aeronautical university buildings are not included in this list.

Addreess	Sq. Ft.	Year Built	Effective Year Built	School Type	Class
1446 Moyer Rd	3734	1949	1985	Elementary/Secondary	Masonry
148 S Marina St	18050	1960	1973	Elementary/Secondary	Masonry
219 W Goodwin St	23436	1947	0	Elementary/Secondary	Masonry
258 S Mccormick St	32358	1955	0	Elementary/Secondary	Masonry
258 S Mccormick St	10860	1955	0	Elementary/Secondary	Masonry
258 S Mccormick St	56444	1955	0	Elementary/Secondary	Masonry
258 S Mccormick St	13904	1975	0	Elementary/Secondary	Masonry
201 Park Ave	12047	1959	0	Elementary/Secondary	Masonry
201 Park Ave	11275	1943	0	Elementary/Secondary	Masonry
121 S Rush St	7264	1964	1982	Elementary/Secondary	Masonry
112 N Summit Ave	6188	1972	0	Elementary/Secondary	Masonry
131 N Summit Ave	20755	1956	1966	Elementary/Secondary	Masonry
232 N Granite St	11450	1977	1991	Elementary/Secondary	Masonry
300 E Gurley St	27213	1960	1988	Elementary/Secondary	Masonry
300 E Gurley St	5704	1960	0	Elementary/Secondary	Masonry
124 N Virginia St	7564	1977	0	Elementary/Secondary	Masonry
2100 Willow Creek Rd	1025	1950	1988	Junior High	Masonry
1749 Williamson Valley Rd	5112	1976	0	Junior High	Masonry
1749 Williamson Valley Rd	16290	1976	0	Junior High	Masonry
1749 Williamson Valley Rd	18315	1976	0	Junior High	Masonry
1749 Williamson Valley Rd	35386	1976	0	Junior High	Masonry
1749 Williamson Valley Rd	4955	1976	0	Junior High	Masonry
1845 Campbell Ave	31314	1971	0	Elementary/Secondary	Masonry
1050 Ruth St	166822	1967	1975	High School	Masonry
1050 Ruth St	34959	1967	1975	High School	Masonry

C. Pre-1978 public sites in the City of Prescott, Arizona
Pre-1978 masonry public buildings, including: auditoriums, multipurpose buildings, government buildings, theaters, hospitals, and clubhouses.

Address	Sq. Feet	Year Built	Effective Year Built	School type	Class
1989 Clubhouse Dr	4,050	1973	0	Banquet Halls	Masonry
3700 Willow Creek Rd	11,170	1968	1976	Auditorium	Masonry
3700 Willow Creek Rd	33,837	1968	1986	Multipurpose Buildings	Masonry
137 S Cortez St	5,545	1902	1945	Multipurpose Buildings	Masonry
117 E Gurley St	5,470	1904	1989	Clubhouse	Masonry
117 E Gurley St	15,100	1904	1989	Theatre - Stage	Masonry
202 S Pleasant St	6,460	1902	0	Clubhouse	Masonry
120 S Cortez St	58,352	1900	1959	Government Building	Masonry
101 W Goodwin St	30,096	1971	0	Government Building	Masonry
500 S Marina St	20,385	1961	0	Government Building	Masonry
127 Plaza Dr	16,422	1962	0	Bowling Alley	Masonry
218 N Cortez St	2,570	1910	1950	Clubhouse	Masonry
212 N Cortez St	1,500	1965	0	Clubhouse	Masonry
219 N Cortez St	1,665	1905	1972	Theatre - Stage	Masonry
202 N Marina St	7,888	1898	1944	Theatre - Stage	Masonry
500 N State Route 89	10,000	1950	0	Hospital	Masonry
202 N Arizona Ave	2,274	1951	0	Clubhouse	Masonry
143 N Arizona Ave	5,063	1931	1953	Museum	Masonry
143 N Arizona Ave	3,898	1931	1953	Museum	Masonry
143 N Arizona Ave	720	1974	0	Museum	Masonry
824 E Gurley St	43,641	1939	1973	Community Rec. Center	Masonry
1306 Stetson Rd	2,650	1955	1973	Clubhouse	Masonry

D. Pre-1978 Masonry Buildings listed as ‘Commercial’ in the City of Prescott, Arizona

Not included here because of its size – 311 rows.

Appendix VI. Schema for evaluating and documenting URM building features

SCHEMA MODEL for URM Building Stock: Commercial / Public / Residential / Government buildings

	B	E	F	G	H	I	J	K
4		BUILDING USES				BUILDING FEATURES | LOCATION		
5	**Data sources**	**Business/Industry**	**Communal Spaces (e.g., places where large number of people gather)**	**Residential**	**Government**	**Civil Authority**	**Occupancy Type**	**Physical Location**
6								
7	City Government (facilities)	Retail	Church - Chapel - Synagogue - Mosque- Abbey	Single-family house	Administrative building	Village / City	Assembly	Physical address - street, number, zip code
8	County Govt (assessor's Office)	Offices	School - Public / Private (day care; elementary, junior high, Vocational, high school, college/university)	Apartment	Police Station and Fire Stations	County	Business	Parcel number
9	State Government	Garage	Theater	Condominium	Office buildings	State	Educational	Unique City/County identifer
10	Tribal Government	Factory	Assembly hall	Townhouse	Public Safety Buildings	Tribal Land	Factory & Industrial	Latitude & Longtitude
11		Manufacturing Plant	Arena	Co-op	Courthouses	Unincorporated	Institutional	Building Name
12		Hotels & Motels	Stadium	Multi-family house	Judicial Centers	Colonia	Mercantile	Parcel Type: business / residential
13		Funeral Homes	Auditorium	Bungalow/Cottage	Parks and Recreation buildings		Residential	Property Code
14		Amusement Centers (bowling alleys, theaters, malls)	Movie house	Casita	Embassy		Storage	
15		Power plant	Hospitals				Utility - Miscellaneous	
16		Utility	Care centers (Health					
17								

	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
4											GEOLOGY			COMMENTS
5	**Year built (Year of seismic retrofit)**	**Framing**	**# Building Stories**	**Parapet (Yes / No)**	**Brick/stone chimney (Yes / No)**	**Gross Square Feet**	**Number of rooms (bathrooms)**	**Maximum Occupancy**	**Historic Building (Yes / No)**	**Building Condition E-excellent, G-good, F-fair, P-poor, C-condemned**	**Geologic Substrate**	**Flood Plain - Yes/No / (Liquefaction Zone - (Yes/No)**	**Proximity to geologic structures/features**	**Remarks / Comments**
6														
7		Masonry	1 Story					1 to 10			Bedrock		Earthquake Fault	
8		Masonry bearing walls	2 Stories					10 to 50			Alluvial Fan		Earth Fissure	
9		Solid brick (double brick)	3 Stories					50 to 100			Colluvial		Landslide terrain	
10		Concrete block	4 Stories					100 to 200			Valley Fill		Drainage	
11		Engineering bricks	5 Stories					200-400			Lacustrine			
12		Adobe	6-10 Stories					400 to 600			Karst			
13		Natural stone	10-15 Stories					600 to 1000			Landslide deposit			
14		Non-URM						1000 to 2000			Debris flow deposit			
15		Other (describe)						> 2000			Swell & Shrink Soils			
16														
17														