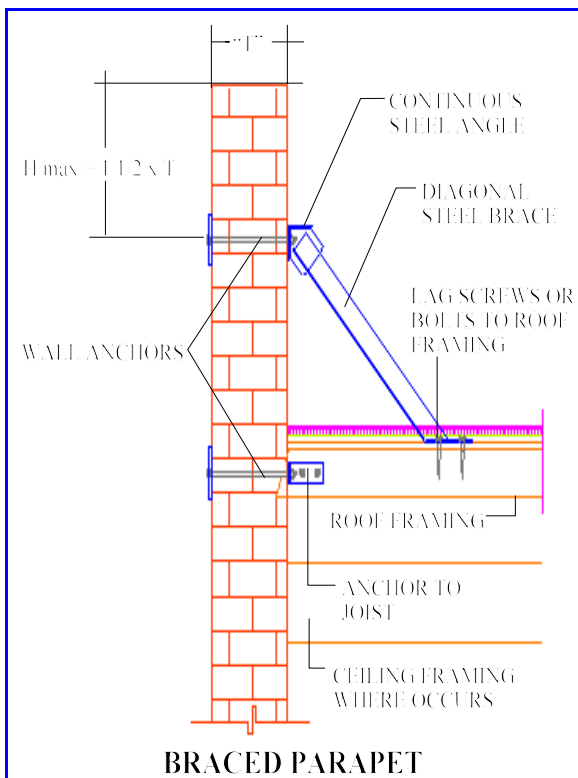
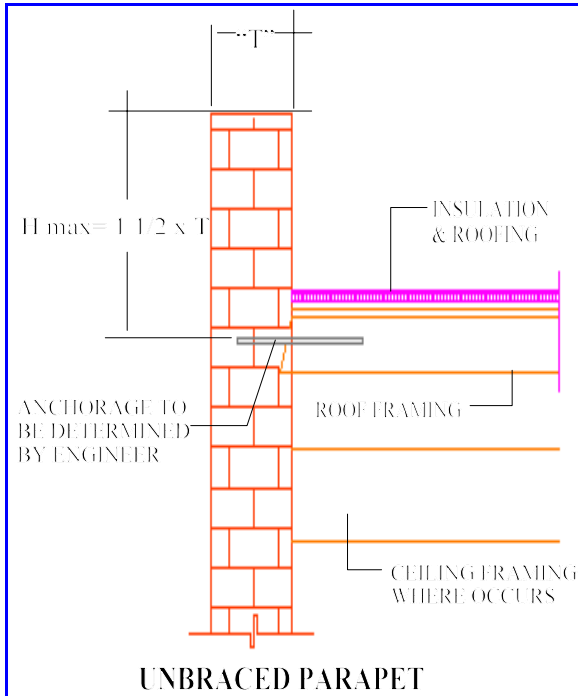


## SAMPLE BRACING DETAILS



## ADDITIONAL RESOURCES

The “*Utah Parapet Ordinance*” only addresses the most common life safety hazards posed by older buildings; i.e., parapets and appendages. Even after complying with the ordinance, your building may still be vulnerable to severe damage or collapse in an earthquake due to: inadequate floor anchorage, inadequate wall strength, weak mortar joints, inadequate foundation anchorage, etc. You may want to consider additional seismic risk reduction measures. You can obtain additional information from the following sources:

1. The Federal Emergency Management Agency (FEMA) ([www.fema.gov/mit/](http://www.fema.gov/mit/)) produces a number of publications on the retrofitting of existing buildings. The publications are available at no charge, but some are quite technical in nature.

2. The Utah Division of Comprehensive Emergency Management ([www.cem.state.ut.us](http://www.cem.state.ut.us)) has publications and brochures on earthquake preparedness, including some typical details for seismic retrofit of existing unreinforced masonry homes. (801) 538-3400.

3. A structural engineer can be hired to perform study on your building. This will help identify additional retrofit measures to further reduce the risk posed by earthquakes. See [www.seau.org](http://www.seau.org).

4. If your building or home qualifies as a historic structure, there may be funds available to help defray the cost of seismic retrofit and restoration of your building. Contact the State Historic Preservation Office. (801) 533-3500 [www.history.utah.org](http://www.history.utah.org).

5. The *Uniform Code for Building Conservation* (UCBC) is a widely recognized code, published by the International Conference of Building Officials ([www.icbo.org](http://www.icbo.org)), which specifically addresses seismic strengthening of unreinforced masonry buildings. (800) 284-4406.

6. The “*Utah Parapet Ordinance*” amends the 1997 *Uniform Building Code*, Section 3403.2. See Utah Administrative Code Rule R156-56-704. <http://www.rules.state.ut.us/publicat/code/r156/r156-56.htm>.

## UPCOMING SEMINARS

In order to educate and inform the public, many organizations will be offering seminars which will discuss the “*Utah Parapet Ordinance*” in more detail. These seminars are being sponsored by organizations such as: The Utah League of Cities and Towns, Bonneville and Utah Chapters of The International Conference of Building Officials ([www.icbobonn.org](http://www.icbobonn.org), [www.utahicbo.org](http://www.utahicbo.org)), The Utah Roofing Contractors Association, The State Division of Occupational and Professional Licensing, and the Structural Engineers Association of Utah. Contact the State Building Codes Training Staff for the location of upcoming seminars: (801) 530-6391, (801) 530-6076, or (801) 530-6457.

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Pictures courtesy of Alison James, Montana Historical Society, and Standard Examiner.

# EARTHQUAKES

and

# ROOFING

## WHAT YOU NEED TO KNOW ABOUT SEISMIC BRACING WHEN REROOFING AN EXISTING BUILDING



This brochure describes the “*Utah Parapet Ordinance*” and its implications to you.



# INTRODUCTION

Time and again, earthquakes in Utah and other parts of the United States have shown the vulnerability of parapets, chimneys, and other roof appendages to even moderate levels of ground shaking (Richter Magnitude 5 and greater). Many deaths and injuries occur due to these roof elements being shaken from the roof.

In 1991, a statewide amendment to the Uniform Building Code was adopted requiring the bracing of seismically hazardous roof appendages at the time of reroofing. The ordinance refers to parapet walls, cornices, spires, towers, tanks, statuary, and other appendages that have exhibited a high rate of failure during earthquakes. It also requires that anchors connecting the wall to the roof be reviewed and strengthened if needed. This ordinance is sometimes referred to as the “*Utah Parapet Ordinance*,” although it deals with more than just parapets.

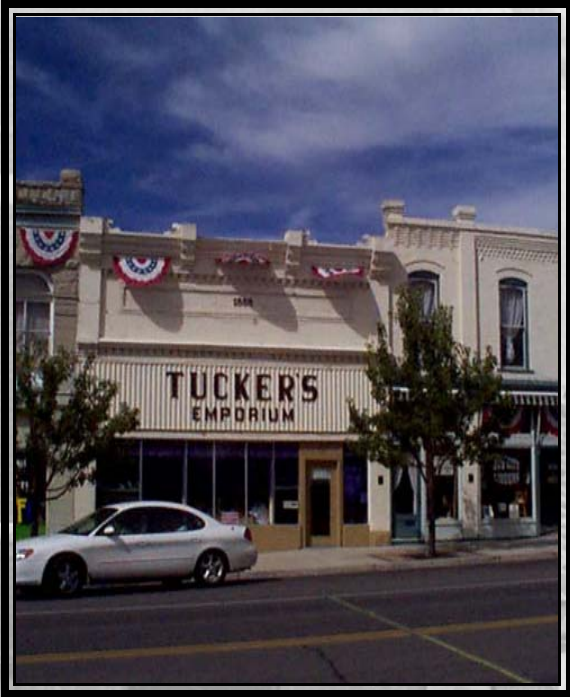
The “*Utah Parapet Ordinance*” was adopted to provide an opportunity to protect the health, safety, and welfare of the public with regard to seismic risk. It is intended to correct a known seismic life-safety hazard at a time when it is most cost effective to perform the work.

## DOES IT APPLY TO ME?

The ordinance requires that roof elements be reviewed by a licensed engineer prior to a reroof project on buildings built before to 1975. However, just because a building was built prior to 1975, it does not mean that it will require bracing. The engineer will determine if the ordinance applies to the specific building. Although many older homes could benefit from adding bracing and anchors, this ordinance applies primarily to commercial structures.

A significant amount of public benefit is accomplished by bracing roof elements. The

ordinance is currently in effect. Building owners, architects, engineers, roofing contractors, and government officials are required to comply with it.



## NOT JUST A WASATCH FRONT PROBLEM

Walter Arabasz of the University of Utah Seismic Stations notes that damaging earthquakes in Utah have struck places like Cache Valley, Richfield, St. George, and Kanab. Earthquakes in Utah are not just a Wasatch Front problem. According to Arabasz, moderate size earthquakes of magnitude 5.0 and greater occur, on average, about once every four years somewhere in the Utah region, and about once every 10 years in the Wasatch Front region.

## WHAT CAN BE DONE?

The first step is to determine whether or not the

specific building needs bracing and/or wall anchorage. An engineer can determine this.

**Building Owner:** When planning to reroof a building, the building owner can approach the ordinance requirement in several ways.

- Hire a roofing contractor who will procure the necessary engineering services, obtain the proper permits, and perform the work.
- Hire a structural engineer to perform an analysis and provide the necessary bracing and anchorage details (if required). These details would then be given to a selected roofing contractor.
- Hire an architect or roofing consultant. This individual will procure the necessary engineering services and also provide drawings and specifications which could be bid by several roofing contractors.

**Roofing Contractor:** The roofing contractor is critical to the success of the ordinance. Contractors must become familiar with the ordinance and the impact it may have on their work. All roofing contractors must be aware of this ordinance, and they must inform the building owner of it’s implications to the reroof project. A roofing contractor can do the following:

- Hire a structural engineer to perform an analysis and provide the necessary bracing and anchorage details.
- Have the owner provide the engineering analysis and necessary bracing and anchorage details.
- Do the bracing work as required by the engineering analysis, or have a subcontractor do it.

**Structural Engineer:** The structural engineer must become familiar with the ordinance and be familiar with typical and economical methods for bracing and anchoring parapets and roof elements. A number

of publications are available which provide details and methods of analysis.

**Building Official:** The building official must become familiar with the ordinance and enforce it. Currently, not all jurisdictions require building permits for a reroof. This makes enforcement of the ordinance more difficult, but it does not mean that the ordinance cannot or should not be enforced. As jurisdictions begin requiring permits for this type of work, implementing and enforcing the ordinance will become easier.

**Public Official:** All public officials must be made aware of the ordinance so they can ensure compliance within their jurisdiction.

## HOW MUCH WILL IT COST?

There are many variables which will affect the cost of both roofing and bracing. Depending on the outcome of the building analysis, bracing may or may not be required for your project. The graphic below is intended to indicate additional bracing costs relative to typical roofing costs. The additional costs may be more or less for your specific project.

