



BUSINESS COUNCIL

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## MAIN STREET

# A Guide to Redeveloping and Maintaining Historic Buildings



Author: Lyle T. Murtha, AIA

2021  
VERSION

This brochure is an abbreviated reference for use by property owners, developers, and potential buyers and/or investors of historic properties to provide useful information in layman's terms about the feasibility of redeveloping and maintaining historic buildings. A historic building is defined as any building that is 50 years or older. The check-list format included herein addresses issues on:

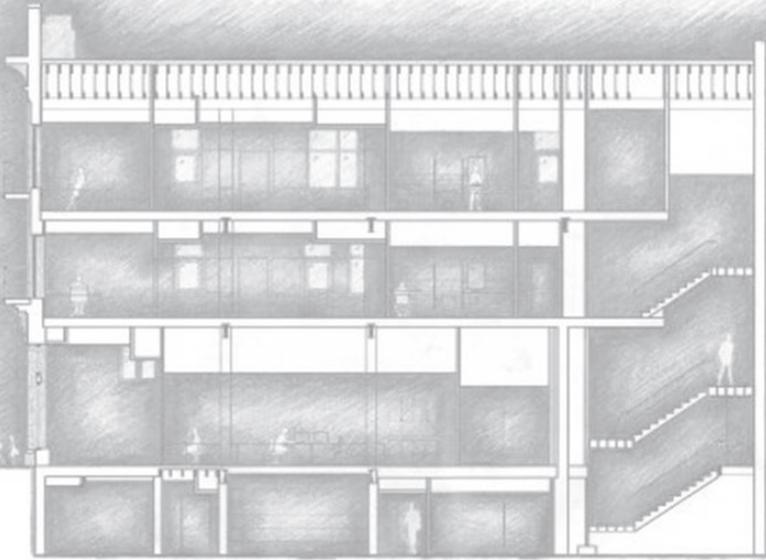
- Environment
- Building Code (including ADA accessibility)
- Facade
- Historic Building Materials
- Structure
- Design

And includes photo illustration examples, handy tips and recommended solutions and/or follow up directions. The information contained is in a "best practices" format that is consistent with the Secretary of Interiors Standards for the Treatment of Historic Properties.

This brochure is not designed to be all-inclusive and may not cover every particular situation, but does cover many of the commonly encountered issues with historic buildings. For further assistance on issues not addressed in this brochure, please contact the Wyoming Business Council - Main Street, the Wyoming State Historic Preservation Office, or consult with a professional architect and/or engineer licensed in the State of Wyoming who has experience working with historic buildings.

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# ENVIRONMENT

INSULATION  
ASBESTOS  
LEAD PAINT  
INFESTATION  
EQUIPMENT  
ACOUSTICS

# INSULATION

Many historic building exterior walls were constructed of multi-wythe brick and/or stone or even wood framing with no furring and/or wall insulation. In some cases, it may be desirable to leave the exposed brick and/or stone in some or all areas for the historic appeal without adding furring and insulation to either the interior and/or exterior side of the wall surface.

It may also be desirable to leave the exposed roof structure or there may be an inaccessible ceiling space due to an existing plaster or tin ceiling, etc. not allowing insulation from the interior side.

## Recommended Solution

If the building is constructed of wood framing and/or a furring space for insulation can be added - even if it's a minimal thickness (typically the interior side of the wall) - and it is not desirable to see an exposed and/or historic surface, the cavity of the wood framing and/or furring can be filled with rigid, batt, or spray insulation to suit the situation and desired thermal resistance.

Where it is desirable to maintain the visual appearance of historic stone/masonry that has no wall cavity space for insulation, it can be of value to increase the insulation of the roof (either in the attic space or on the upper side of the roof) to compensate for lack of insulation





in the walls. Adding insulation on the upper side of the roof can be beneficial when an exposed structure is desired on the interior.

The multi-wythe brick walls (uninsulated) can act as a “mass solar wall” which is a passive solar heating concept. This indirect solar heat gain happens when sunlight warms the exterior masonry during the day and this heat filters through the masonry wall to the interior by evening. This keeps the building interior warm; but is only effective on sun-facing sides of the building.

For those who desire to have an exposed structure ceiling on the interior or have inaccessible ceilings disallowing insulation from the interior side, rigid insulation can be added on the roof deck as noted above with new roofing on top of the insulation. This can be accomplished with both “flat” roof types as well as pitched

roofs, but verification that existing parapet heights will accommodate the added thickness of the insulation on flat roofs should be investigated. The added fascia thickness will be needed to be considered as well on pitched roofs, as this could change the exterior appearance in a negative manner in some cases.

# ASBESTOS

Asbestos was used in many building products prior to being outlawed for production in the U.S., however companies in some other countries have no such regulations against the manufacture of products with asbestos materials and those products can be sold in the U.S. market.

The Wyoming DEQ requires that an asbestos inspection be performed prior to any building renovation and a copy of the report must be kept on site for DEQ inspection at all times during construction.

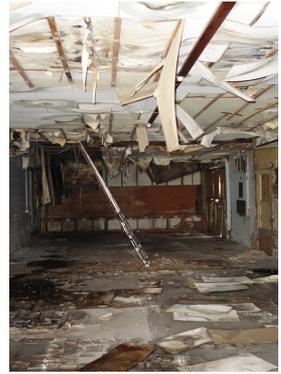
A limited sample list of suspected asbestos-containing materials includes: drywall, plaster, acoustical ceiling tiles, vinyl flooring, flooring mastic, piping insulation, boilers, caulking, roofing, roofing mastic, and many types of insulation materials.

Asbestos cannot be determined by visual means and must be tested by a certified laboratory with samples taken by a certified asbestos inspector. There are a handful of asbestos inspectors operating in the state of Wyoming.

## Recommended Solution

An asbestos inspection is not a typical inspection recommended by most realtors, but it can and should be included if a previous asbestos report does not exist and renovations are expected at any time in the near future after a building purchase. Many times if asbestos is discovered, the cost of removal/abatement can be negotiated for a reduced building purchase price.





Always insist that new construction building products are manufactured in the U.S. and/or a certification that asbestos has not been used in the manufacture of all products used during any remodel by your contractor.

Sometimes abatement of asbestos materials is not the only solution but testing and knowing the extent of the asbestos is always necessary when doing a building renovation. If asbestos is not “friable” (crumbles and/or can become airborne), then generally the materials can remain until they become friable; sometimes genuine historic materials such as vinyl composition tile contains asbestos but are in serviceable condition and can remain. There are also times when “encapsulation” of asbestos may suit a project - for instance if asbestos-containing flooring and/or mastic is difficult and costly to remove, and the new flooring is able to be placed

over the top of existing flooring. However if this approach is taken, care must be taken on any future work to the building and notification to workers (plumbing, electricians, etc.) must be given about the location and extent of any known asbestos that remains or is encapsulated within the building.

Proper disposal and documentation of abated asbestos is required, and it is recommended that records be maintained permanently with the building.

# LEAD PAINT

Lead was a common additive in most paints prior to modern environmental regulations and lead is also found in active and abandoned shooting ranges. When lead paint becomes loose or peals, it can transfer to other locations and even be inadvertently consumed by humans, causing detrimental and irreversible health effects.

The Wyoming DEQ does not regulate lead, however, the EPA and OSHA both regulate lead as it pertains to the environment and to worker safety.

It is very common to have many layers of paint built up on walls over the life of a building and it would be prudent to assume that all painted surfaces in a historic building contain lead - at least on deeper layers of paint. Lead paint can also be found on exterior wood trim, painted siding (wood, brick, etc.) and even on painted stucco (see also the Facade - Exterior Masonry Paint Removal section of this brochure).

## Recommended Solution

A lead inspection is not a typical inspection recommended by most realtors, but it can and should be included if a previous lead report does not exist and renovations are expected at any time in the near future after a building purchase. Many times if lead is discovered, the cost of removal can be negotiated for a reduced building purchase price.

Many products are available to remove lead paint and generally fall into two categories: peel-away



strippers and surface applied liquid (gel) strippers. Both types can be useful depending on your specific situation. Keep in mind that one application of either type of paint stripper may not be enough to remove all layers of paint and repeat applications may be necessary. Many painting contractors also offer paint removal services, and sometimes it can be very expensive, but the results can be worth the effort and costs. Regardless of the type of paint removal selected for your circumstance, it's always best to do some "test" spots around the building to ensure the product is effective before ordering a large quantity.

Proper containment during abatement and disposal of the removed lead paint is required (and of the effluent if liquid applied stripper is used).



# INFESTATION – BATS, PIGEONS, RODENTS

It is common for uninhabited historic buildings to have gaps in either the exterior walls, roof, and/or door and window openings. These voids allow the buildings to become infested with rodents, birds, and other animals seeking shelter.

Over time, the infestation can cause animal feces build-up, which can be hazardous and, in some cases, even lethal. Other concerns include damage caused by animals chewing holes through walls, roofs, etc. which can damage the structural integrity of the building, as well as, the historic look. This can also allow rain, etc. to enter and deteriorate the structure further as well.

## Recommended Solution

Depending on the level of infestation, several steps can be taken.

### Openings

First, and most importantly, repair the openings that are allowing infestation. If windows are broken, replace the glass or plywood over the opening as a temporary measure. If small holes are allowing the infestation, fill the holes with steel wool and/or spray foam to dissuade the intruders. Remove any sources of “food” from the building that may be attracting the intruders.



## Feces

If you choose to clean the feces, ensure that you wear protective clothing and respirators while performing the work. If the feces piles are unmanageable, there are environmental companies that can remove this contamination in a safe manner.

## Rodents

Simple traps and poison can be effective in eliminating the problem.

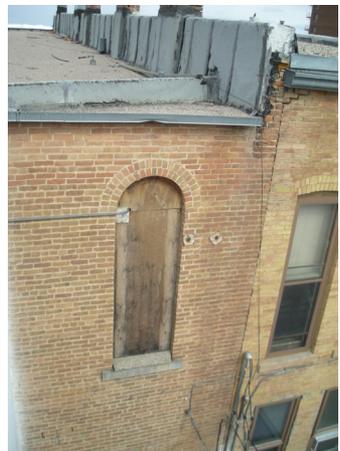
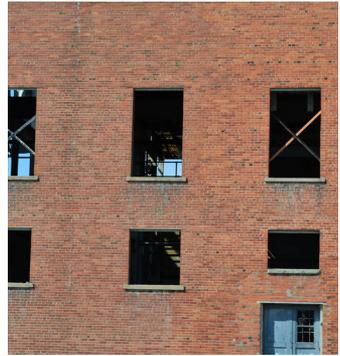
## Bats

For bats, and some other creatures, starving them out may be the only solution.

## Pigeons

Traps can sometimes be effective for pigeons. Faux owl statues sometimes work if the head and eyes of the statue are movable so that the statue remains animated. However, this solution may also require moving the location of the faux owl from time to time or else pigeons will realize over time that it's fake. Other, more extreme measures, include locating a raptor such as a hawk or falcon to exterminate the pigeon population.

However, the most effective solution may be professional extermination and some companies specialize in all types of animal extermination.



# EQUIPMENT – MECHANICAL, ELECTRICAL, FIRE PROTECTION SYSTEMS

Many historic buildings - especially if they have been vacant for some time - require new, modern HVAC, fire sprinkler, and other systems in order to be reoccupied and/or to comply with building codes. Of course, it is preferable that the newer, more modern systems, be “out of view” as much as possible so as not to detract from the historic fabric and character of the building.

## Recommended Solution

If possible, locate new mechanical equipment on the rooftop, out of view from the ground. This may require re-supporting the structure if the rooftop equipment is sizable, and this may necessitate the involvement of a structural engineer. Not only should the mechanical units themselves be concealed from view, but also any exhaust louvers, etc. as well.

There are also mechanical systems that can be located in attic space and/or in the basement but may require large fresh air intakes and exhaust louvers. Basement mechanical systems can be employed when rooftop HVAC units will not work, when the historic building has no “back” side and there is available area on



the site to construct area wells to the basement for air intake and exhaust requirements.

Sometimes, smaller residential style furnaces can be easily located in smaller closets throughout the building in smaller buildings with intake/exhaust routed to the roof or an obscure sidewall.

HVAC units can sometimes be placed on the ground next to the building and ducted through the wall, it's preferable if this is on a "back" side, out-of-view. This is generally a last resort when other concealed options listed above are exhausted.

Many times former boiler and decorative historic radiators are present, but not efficient for re-use. The steam radiators can be cleaned and left in place for their visual appeal even when modern HVAC system have been installed, although the associated piping may want to be removed.

If new ductwork, conduit, and piping is required to be routed, it is preferable that it be located out-of-sight as well - for instance in the attic/truss space, basement/crawl space, or even in a newly constructed soffit if absolutely necessary. It is typically not recommended that an acoustical





ceiling at a lower ceiling height be installed to hide new ductwork, conduit and/or fire sprinkler systems as this can alter the appearance of the space, loses ceiling height, and gives the space too much of a modern feel with the acoustical ceilings, which were not in manufacture during the era of most historic buildings. Sometimes a historic tin ceiling may be present, which can be marked, disassembled, and reassembled after systems are installed above the ceiling - the same goes for wood ceilings and even plaster (see also Design - Concealment of Modern Items section of this brochure).

Sometimes historic light fixtures are still present, but not in working order. These fixtures are easily re-wired by most electricians and can be re-lamped with modern LED lighting and even re-finished. Sometimes the cost of re-wiring a historic fixture is compatible with the cost of a new, modern fixture. Even old electrical conduit, if in

good condition, can be re-used to run modern wiring if located within or behind inaccessible plaster, masonry, or other materials vs. applying modern conduit on the surface of the wall or ceiling (see also Historic Building Materials - Light Fixtures section of this brochure).

If installing fire protection systems in the attic space, make sure to properly insulate and/or use a "dry" fire protection system so that the system does not freeze, which could cause a burst pipe and flooding/water damage to the building.

The use of concealed sprinkler caps on fire sprinkler heads can

conceal fire sprinkler heads in historic areas of the building, but the sprinkler head cap must be painted at the fire sprinkler manufacturer to match your ceiling color to avoid decertification of the fire sprinkler system (no field painting of the caps is allowed).

Museums and other buildings with invaluable and irreplaceable artifacts housed within them (or even the historic buildings themselves) may have concerns about possible leaks and/or inadvertent discharges from fire sprinkler systems. If this is the case, use a pre-action type fire sprinkler system where the piping contains only air until two separate events happen to initiate the water flow and sprinkler discharge: fire detection, as well as, individual sprinkler head release.



# ACOUSTICS

Many historic buildings lack the equivalent of modern building acoustics. Interior glass is typically single pane, walls and floors are not insulated with sound batt insulation, and materials are typically hard surfaces (wood, plaster, tile, etc.) that reflect sound rather than absorb it. Additionally, floors and stairs can be “creaky” from years of use.

## Recommended Solution

In some cases, it might take some “getting used to” that an older building will likely never have the acoustical properties as a newer building.

Sometimes the “creakiness” of floors and stairs can be reduced significantly with additional nails/screws so that the wood does not move as much and cause the creaking noise.

For wood doors, sometimes a “smoke seal” can be added at the perimeter of the door frame and an automatic door bottom at the threshold to help with the acoustics and sound transfer, while maintaining the original/existing doors.

Sometimes plaster walls and ceilings (due to their density) are very good acoustical separations, but blown-in insulation can still be added between the framing studs/



joists to increase the acoustics if needed.

If floor/ceiling acoustics is desired to reduce sound from traveling from one floor level to another, one of two methods can be employed: install drywall with resilient sound channels and acoustic insulation on the bottom of the floor joists above to create a new ceiling (this method is usefully when wanting to retain existing flooring such as hardwood) or install acoustical sound board beneath the flooring on the floor. Both of the above may need to be employed for the most effective acoustics. In the event historic tin and/or wood ceilings and/or historic wood flooring is desired to be retained, these can be removed and re-installed after the above treatments are employed.





# BUILDING CODE

BUILDING CODE OVERVIEW  
ADA CODE  
FIRE SUPPRESSION  
DOORS SWINGING INTO RIGHT-OF-WAY  
GUARDRAILS  
STAIRS  
FIRE ESCAPE

# BUILDING CODE OVERVIEW

The building code adopted in most Wyoming jurisdictions include the International Building Code family of codes, which includes the International Existing Building Code that is specific to existing building repairs, alterations, changes of occupancy, additions to, and relocation of existing buildings. These codes are updated periodically (usually every three years) and new versions must be adopted by the jurisdiction in order to go into effect.

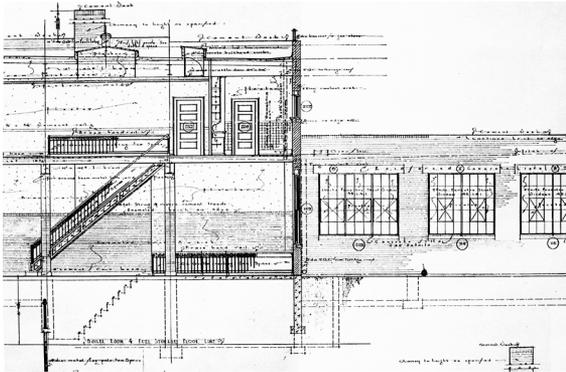
If the International Existing Building Codes are applicable in your jurisdiction for your project, this code offers several compliance methods: prescriptive, work area, and performance. The work area compliance method is the most commonly used and easily understood and is broken down into three “categories” of alterations: Level I, Level II, and Level III:

**Level I** - for most minor remodels and includes the removal and replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose

**Level II** - includes all Level I items, as well as, the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment

**Level III** - includes all Level I and Level II items, as well as, reconfigurations of the floor area that exceed 50 percent of the building area

Of course, the lower level(s) require less code compliance and the higher level(s) require more upgrades in terms of code compliance. Many jurisdictions have also adopted energy code(s).



## Recommended Solution

Please note that some jurisdictions may not follow the International Building Code and/or Existing International Building Code, please consult your local building department/jurisdiction for the building code(s) that apply and are in force and applicable to your specific project. If your area does not have a municipal or county building department that has jurisdiction over your building, it may fall under the jurisdiction of the Wyoming State Fire Marshal (Wyoming Department of Fire Prevention and Electrical Safety), but rarely is a building/renovation project without a code jurisdiction.

It is very common when remodeling a historic building to change the use from the original and/or previous use or to even reconfigure much of the interior wall layout to accommodate a new use/function. Generally,

whenever a Level III remodel is involved (more than 50% of the building area is being reconfigured and/or a change of occupancy to a higher hazard occupancy), most building code items require upgrading as if the building were newly constructed - particularly life safety systems and components. However, each building and each project have particular aspects that make an individual code review necessary to identify all code items that are required to be addressed. It is also advised to meet with the building official

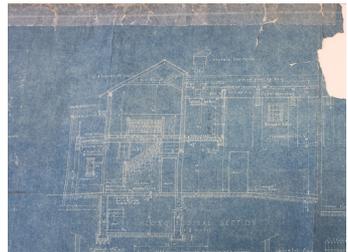
for concurrence on the direction of the code interpretation. It is also advisable that this be done early and to be documented in writing with the building official noting any “agreements” and interpretations at a minimum.



Compliance with energy codes is typically triggered by a Level III project but can also be triggered by replacement of items such as an HVAC system or light fixtures or even a re-roofing. Consult with your jurisdiction for specific requirements on your project.



The advice of a professional architect, engineers, or code consultant who is familiar with the building code - specifically for historic buildings - may be necessary to assist in reviewing how the building codes apply to your specific building.





# ADA CODE

The ADA (Americans with Disabilities Act) is a separate code that must also be complied with that enforces handicapped accessibility.

The ADA code is not enforceable by building officials/jurisdictions, but rather is a judicial mandate that is enforceable through civil litigation for compliance. Over the years, some of the same ADA code requirements have been incorporated within the building codes, which has caused some confusion over jurisdiction/enforcement.

The ADA code requires accessible routes and features in almost any renovation. The first of these is an accessible route into the building. Many historic buildings have monumental stairs at the entry and/or split-level entries, making accessibility a concern.

## Recommended Solution

### Access into the Building When

- The main doors are not accessible due to split-level and/or monumental stairs
- The opportunity does not exist for adding a proper ADA ramp to the main entry (that is also acceptable to the State Historic Preservation Office)

A side or alternate ADA entry can be used for accessibility as long as a sign designates the alternate ADA route is located at the main entry.



## Elevators

One of the main and most costly requirements of the ADA code is the requirement for an accessible elevator for building renovations. The Level III remodel is the first trigger point for an elevator. The second trigger point for an elevator is floor levels of 3,000 square feet or more of floor area on a floor level not accessible directly from exterior grade, however, there are also exceptions for some cases.

### Problems When Adding an Elevator

When a building has no “backside” (is clad with main materials on all exterior sides) and/or when there is no site available, the State Historic Preservation Office requirements may necessitate that the elevator shaft be constructed on the interior of the building, which can be expensive and difficult. Sometimes a LULA (limited use, limited access) elevator can be installed which only requires a shallow pit and minimal over-run, making it easier to install than a conventional elevator on the interior of buildings. These elevators have limited capacity and are meant for intermittent/minimal use only and can be nearly as expensive as a conventional elevator. For conventional



elevators, the pit depth is generally approximately 5 feet deeper than the existing lowest floor level of service, which can cause shoring and undermining of existing foundation concerns as well as waterproofing concerns; all of which can be expensive to mitigate. Sometimes, concrete admixtures can be added to the concrete foundation of the elevator pit to mitigate the waterproofing concerns.

When excavating below the depth of the existing foundation, and with most historic buildings, a proper geotechnical report may not exist. It can be impossible to get a drilling rig to the area (inside the building) to do a proper geotechnical investigation. Sometimes different soil types are encountered and/or even the interruption of underground streams - especially if the site is near a mountainous area. If possible, a small excavator can “pothole” a shallower geotechnical exploration in the lower level for limited soils investigation. In any event, a geotechnical engineer should conduct an analysis and provide recommendations for excavations below existing footings and to evaluate soils for proper foundation design of the elevator, which has both gravity and dynamic loading that must be accounted for.

### **Other Major Concerns**

Most buildings require at least one unisex accessible ADA restroom on the main level of the building and on an accessible route. Other factors, particular to each building renovation, may require additional restroom(s) to be ADA accessible.

A Level III remodel will trigger providing drinking fountains, full ADA restroom(s) design, ADA signage, and accessible countertop heights in work areas. Theaters, and other assembly areas, have other very specific ADA requirements. These can include accessible wheelchair spaces dispersed throughout the seating area, as well as, assisted listening devices, to name a few.



The advise of a professional architect, engineer, or code consultant may be necessary to assist in identifying specific ADA requirements for each individual project. The Rocky Mountain region (Region 8: Colorado, Montana, North Dakota, South Dakota, Wyoming, and Utah) also has an ADA Technical assistance hotline that can be called for advice, as well, for specific requirements: 1-800-949-4232 or questions can be submitted to [www.RockyMountainADA.org](http://www.RockyMountainADA.org).

# FIRE SUPPRESSION

In order to be rehabilitated, many historic buildings require a fire suppression system be installed. Many factors can trigger the requirement, but generally one of two main factors will trigger a fire suppression system to be installed:

- The amount of renovation (more than 50% of the floor plan, typically) in an occupancy that otherwise would require a fire protection system in a newly constructed building
- The change of occupancy (typically, to a more hazardous occupancy)

Most building insurance companies offer a discount for buildings equipped with a fire suppression system and the installation will allow specific leniency in many other areas of the building code - mainly dealing with fire ratings and exiting.

## Recommended Solution

When a fire protection system is required, ensure that an adequately sized water line with adequate flow and pressure is available from an adjacent street. This may require the involvement of a fire protection engineer. If inadequacies are discovered, either a water tank and/or fire booster pump may be required. Otherwise, the building owner may be required to pay for the installation of an adequately sized line from a public water supply that is typically located farther away, which can be costly.



Some jurisdictions and some circumstances (some residential uses) may allow a single water line to serve both the domestic water system, as well as, the fire protection system. However, many jurisdictions and circumstances require a separate fire protection water line from the domestic water line, requiring a separate water tap within the street.

Regardless of the type of fire protection system required, the system is always required to be designed by a licensed fire protection engineer. It is also required to be certified by the code jurisdiction after installation and requires, at a minimum, yearly maintenance.

A Knox box (locked box containing the building keys and only accessible by the Fire Department) is also required for buildings with a fire protection system. A Knox box is meant to prevent fire fighter damage during building access for false alarms. This box can be recessed or surface mounted and is normally required by the Fire Department to be located near the main building entry door.



# DOORS SWINGING INTO RIGHT-OF-WAY

Many historic buildings have egress doors that swing into the public right-of-way (sidewalk boulevard on the front or alley in the rear), which may have been allowable at the time of construction but is not allowable under the current building codes.

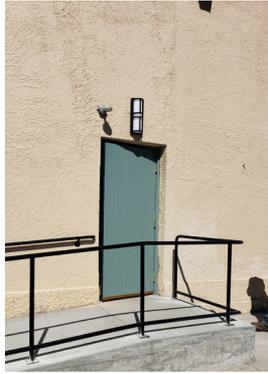
## Recommended Solution

Typically, the enforcement of new building codes onto an existing building - particularly existing requirements - is triggered by renovating 50% or more of the floor plan area (Level III remodel as defined by the International Existing Building Code). If the area of remodel can be limited to less than the 50% limit, then typically, the building official will allow existing items such as exit doors swinging into the public right-of-way to remain.

However, if 50% of the floor plan renovation cannot be avoided and/or the building official requires this item to be brought up to the current code there are a couple routes that can be taken:

- The right-of-way owner (typically a municipal entity in the form of a public street/sidewalk/alley) can grant an “easement” within the public





right-of-way so that the door swing can remain.

- It may be possible to have the doors remain but swing them inward. However, this would require inquiring of the building official for a historic exemption (per Chapter 12, section 1204.7 of the International Existing Building Code) where the other exits may be deemed adequate for exiting purposes. In order to qualify for this type of exemption, the building must be either listed on the National Register of Historic Places, be within a registered historic district, or be designated as historic under a state or local historic preservation program that is approved by the U.S. Department of the Interior. This may also require that the State and/or local Historic Preservation Office agree with and possibly write a letter of support stating that modifying

the door(s) location would cause significant historic damage to the building.

- Recessing the door(s) may be a solution so that the swing of the door falls within the property, but this will alter the appearance of the facade and should only be implemented as a last resort to the other options listed above.

# GUARDRAILS

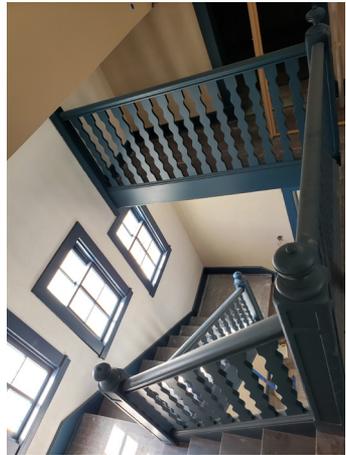
In many historic buildings, guardrails and handrails may not be at current code required heights and configurations.

## Recommended Solution

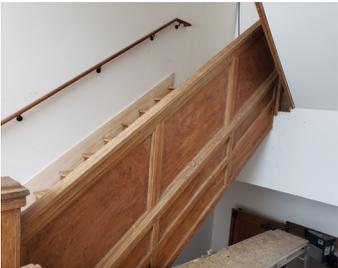
In the case of many handrails, they can simply be removed and installed at a higher code-compliant height. However, some handrails are integral to the guardrails and/or decorative in such a way that they are not easily raised or modified.

In the case of “grand” stairs, there is an exception for historic buildings that allow the guards and handrails to remain as long as they are not structurally dangerous (Section 1203.9 of the International Existing Building Code). The term “grand” is not defined and it may be worth proposing to the building official that if a guardrail/handrail is decorative in nature and cannot be easily modified that it should meet the definition of “grand”.

If the above is not the case and the guardrail is required to be heightened by other means, an additional extension on top of or next to the existing guardrail can be considered to provide the acceptable height.



The existing openings/patterns within existing historic guardrails are acceptable and these elements are allowed to be replaced in a manner that will preserve the historic appearance (Section 1203.10.2 of the International Existing Building Code).



# STAIRS

In many historic buildings, stairs (width, rise, run, landings, etc.) may not be compliant with current building codes. In many cases, it is very difficult to move or modify the stairs to be compliant, and if done could ruin the historic integrity of the interior.

## Recommended Solution

### Width

For the width of the stairs (exit width), the building official has discretion, per Section 1203.3 of the International Existing Building Code, to allow stair width to remain provided there is sufficient width and height for a person to pass through the opening or traverse the means of egress.

### Landings, Risers, Treads, Etc.

Section 805.2 of the International Existing Building Code allows for the means of egress (stairs - landings, risers, treads, etc.) to remain as constructed under the requirement of the building code under which it was built unless the building official determines that a distinct hazard exists.

Where stairs are not eligible for the above listed variances, it may suit the building better to construct a separate egress stair



elsewhere within the building (or alternately an exterior exit stair on a back or side of the building) to satisfy the building code requirements.



# FIRE ESCAPE

Many historic buildings have (or had) fire escapes as a means of egress from upper floors. In fact, many older buildings were constructed with only one stair and other emergency egress was provided by fire escapes that consisted of permanent ladders on the exterior of the building.

## Recommended Solution

When more than one egress is required from a building (assuming the main exit stair is intact), an existing fire escape may still be an acceptable egress or even a newly constructed fire escape if distance to lot lines, etc. limit the stair size. In many instances, especially in congested urban areas, there may be no other solution to exiting from an existing building other than a fire escape. However, the construction of the fire escape must meet specific requirements outlined in the building code.









# FACADE

FACADE OVERVIEW  
OPENINGS  
TUCK POINTING  
EXTERIOR MASONRY PAINT REMOVAL  
GHOST SIGNS  
PARAPET COPING, ROOFING

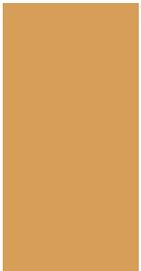
# FACADE OVERVIEW

Many historic building facades have gone through numerous renovations over the years - especially lower/main levels where it is common to “modernize” the look of the building with a false front from time to time, and it can be difficult to determine what “era” to consider as historic and/or to restore the exterior appearance to. Sometimes these later modernizations have removed and/or damaged some of the original historic detailing/ornamentation on the facade.

## Recommended Solution

### Photo Documentation

The first step is to determine through photo documentation what the previous facade appearance was. Genuine historic photos of the facade(s) may be available via a search of the Wyoming State Archives, your local community college history center, your local historic group(s), or even placing an “open call” for information in the local newspaper. This may take some time, and



even a bit of research, but can be invaluable in determining the “look” and historically relevant building materials and fenestration (windows) of a building.

If photos do not exist, you may be left to make interpretations, and in this case it may be advisable to consult an architect with in-depth experience in historic work and/or the Wyoming State Historic Preservation Office, who can be knowledgeable about materials and “looks” that were common to the era of your building. Many times just researching the “style” of the building can provide hints of what may have been the historic look.

### Modern Facade

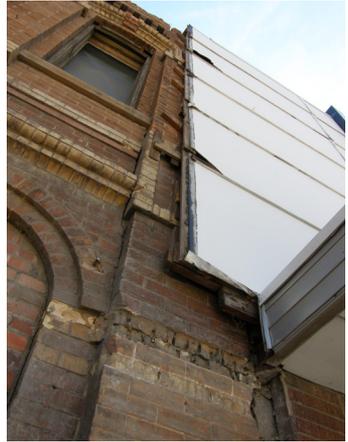
In some cases, a more modern facade was added over the top of the original historic facade and much, or all, of the historic facade still exists behind the built-out modern facade. Some exploration may be needed to reveal what is behind the modern facade. It is also common that detailing that projected from the main facade surface (brick, terra cotta, and other materials) would be removed and or damaged during the installation of a more modern facade. In many cases, these materials can be replicated with some research



into manufacturers who still replicate historic items. These manufacturers may be located far away and it may be expensive, but it can be well worth the effort - see specifics in this brochure in the Facade and the Historic Building Materials sections.

### **Pigment Analysis**

Many historic archive photos will pre-date color photography so paints, mortar colors, and stucco colors are often unable to be determined from these photos alone. However, if the facade exists in some form, often a sample of the paint (by scrapping to the substrate surface), finish layer of stucco, and/or mortar can be sent to a company specializing in pigment analysis who can provide a color match. Even painted buildings, with layers upon layers of paint, can be analyzed down to the original/first paint layer color. In the case of stucco, patches may have been made over the years and it is advisable to obtain a sample in an out-of-the-way location such as up high on the building or a “side” or “back” facade where it is unlikely that damage and/or repairs would have been made.





# OPENINGS

Many historic building facades have gone through numerous renovations over the years and many of those renovations have included replacing/upgrading the windows, skylights, and door openings due to many historic windows and doors being constructed of wood, which can deteriorate over time if not properly maintained and/or due to thermal concerns.

## Recommended Solution

In some cases, some or all of the historic windows, skylights, and doors are in place and can be restored by simply replacing deteriorated components, refinishing, replacing broken glass, glazing, hardware, and even replacing ropes and counterweights. If this is the case, it may be desirable to have more “thermally efficient” windows and skylight openings to conserve energy, as many historic windows are single-pane and not very thermally efficient. The thermal equivalency of a modern window can be similarly achieved by adding a storm window on either the interior or exterior side (whichever side is deemed to be less obtrusive to the historic character) and/or the installation of insulated draperies on the interior.

If some historic windows, skylights, and doors are missing and historic photos are available, replica



windows, skylights and doors are typically available with some research effort. Many window manufacturers offer replica wood frame and steel frame (or replica aluminum) windows, skylights, and doors. Most historic windows, skylights, and doors were true-divided light type, however, the look can be replicated with surface applied muntins for a less-expensive alternate. It is important to work with the State Historic Preservation Office when selecting these types of replacement windows, skylights, and doors to ensure the correct types, reveals and muntins (with proper shadow lines) are selected.

**Warning:** Simply working with a window, skylight, door salesperson and/or contractor alone on window, skylight, and door replacement types may lead to the loss of historic designation of your historic building.

In some cases, the location of windows on the exterior may be desirable from a historic standpoint, but the interior use of the space may have changed and a window and/or natural light on the interior may not be desirable. If this is the case, “spandrel” glass (spandrel glass is glass that is painted black on the back surface) can be used in the window glazing,





which can give the appearance of glass on the exterior and a wall can be installed on the interior to block the window from the interior side, but note to properly insulate the cavity between the window and the wall in this scenario.



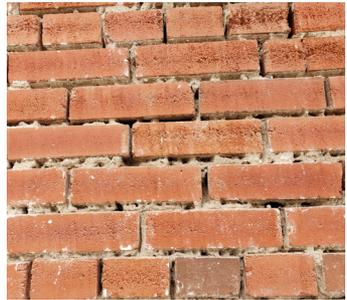
# TUCK POINTING

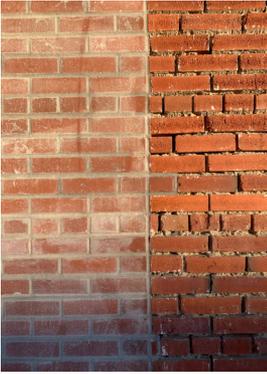
Sometimes the mortar of a masonry wall can begin to deteriorate over time, especially if the incorrect mix was used on the original mortar. Generally, this is easy to identify by rubbing your finger along a mortar joint to see if the mortar deteriorates under the pressure of your finger. In some instances, the mortar may be missing for some depth of the mortar joint, which can allow wind-driven rain to enter the brick wall more readily and can cause overall failure of the wall due to freeze-thaw of the water that gets trapped in the wall.

## Recommended Solution

If the mortar is missing for some depth of the mortar joint or if the mortar crumbles/deteriorates easily, then tuck pointing of the mortar joints may be the only solution. Sometimes only a portion of the building's mortar joints are in a state of failure, however, other times it may be advisable to tuck point all of the mortar joints.

When tuck point is necessary, it involves cutting away the loose/deteriorating mortar to a depth usually  $1/2"$  to  $3/4"$  deep and replacing the mortar with new mortar of a type that is suited for the northern climate. Tuck pointing is somewhat expensive and can be even more expensive on buildings with stone and/or buildings of multiple stories that require scaffolding for the tuck-





pointing operations. In some cases, other restoration of the building masonry can be accomplished while a tuck pointing (due to expense) can be deferred to a short time after the initial restoration if it can be determined that water is not in fact infiltrating to the interior or into the masonry wall cavity.

Some buildings have colored mortar, even historic buildings and the color may be stained by the masonry itself over the years to look different (or even un-colored). Scratching the surface of the mortar with a pointed metal object can typically reveal the original mortar color, but in some cases it's advisable to send a sample of the mortar to a company that specializes in pigment analysis to be certain of the color and for replication purposes.

See also the Historic Building Materials - Masonry section for additional information on missing

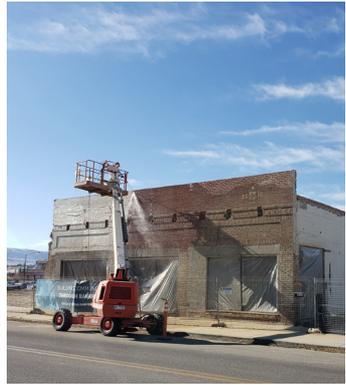
# EXTERIOR MASONRY PAINT REMOVAL

Some of the early masonry buildings represent the first “permanent” buildings, replacing hastily constructed wood structures. Many of these historic masonry buildings have gone through numerous renovations over the years to “modernize” the look of the building and a common method of modernization was simply to paint over masonry and/or stucco facade for a more modern appearance. Of course, the masonry alone was meant to be a durable, low maintenance exterior finish.

## Recommended Solution

In many cases where paint has been installed over masonry and/or stucco, it is repeatedly installed in layer after layer over the years to keep a fresh look after paint fades and/or begins to peel - making removal sometimes rather difficult (see also the Environment - Lead Paint section of this brochure).

Many products are available to remove paint and generally fall into two categories: peel-away strippers and surface applied liquid strippers. Both types can be useful depending on the specific situation. Keep in mind that one application of either type of paint stripper may not be enough to remove all layers of paint and repeat applications may be necessary. Many painting





contractors also offer paint removal services, and sometimes it can be very expensive, but the results can be worth the effort and costs. Regardless of the type of removal selected for the circumstance, it's always best to do some "test" spots around the building to ensure the product is effective before ordering a large quantity.

Another paint removal technique includes "hydro-plasting", which is a process of pressure-spraying a mixture of water and other media (walnuts or other media that is softer than traditional sand media) whose pressure/intensity can be varied to suit the application. This method can be tested, usually as a "last report" on stubborn and difficult to remove paint.

In some rare instances, "milk paint" and/or other types of paint can prove to be irremovable without destroying the masonry surface or the masonry surface itself is too

delicate such as "soft" unfired brick which was a common brick being produced in a Lander brickworks in the 1920's era. In these instances, it may prove to be more valuable to install another layer of paint vs. risking destroying the facade if "test" spots indicate destruction of the masonry surface.

# GHOST SIGNS

Painted advertisements on the facades of buildings were a common and effective “signage” for many historic buildings, and some of these painted signs still exist (or can be uncovered during paint removal) in the form of “ghost signs” or faded versions of the original signage/advertisement. In some instances, these signs were painted over with newer advertising signs when the building, and business housed within, changed hands over the years. In many communities, the existence of these signs is coveted and preservation (or simply leaving as-is) is promoted as the “ghost sign” can be as much about the history as the building itself.

## Recommended Solution

In some cases, the ghost sign is largely intact and although it may be faded over the years, is still legible and in relatively good condition. Depending on funds available and condition of the ghost sign, it may be desirable to simply leave the sign as-is or it can be spruced up to be as vibrant as it was originally.

In the instance where several ghost signs are painted over the top of each other, it may take the expertise of a ghost sign restorationist - of which a handful exist within the region - to work on a solution. In this case, one specific sign/era may need to be selected over others that are present and it is advisable that this determination be made with guidance from the





State Historic Preservation Office.

Some municipalities do not (and should not) recognize these ghost signs as contributing to the overall “signage” regulations for your building since in fact the sign is more about history than advertising a product and/or service. It is advisable to consult with your local municipality about their signage regulations beforehand and also confirm with the State Historic Preservation Office about the historic significance of the ghost sign in order to make the case to your municipality that your ghost sign be exempt from overall building signage requirements if needed.

See also the Facade - Facade Overview section of this brochure for additional guidance on research to locate historic photos.

# PARAPET COPING, ROOFING

Parapets, copings, and roofing tend to take the brunt of the weather - and particularly on masonry buildings these areas generally experience the most deterioration. In some instances, previous winds, etc. have caused portions of parapets to blow over and be reconstructed (or reconstructed at a reduced height). In other instances, lack of maintenance and/or proper coping has caused the upper portion of the facade mortar joints to deteriorate at a faster rate than other portions of the facade. Historically, masonry parapets and copings were constructed with only masonry and grout materials, leaving them vulnerable to water infiltration and deterioration over time.

Lack of roofing and roofing maintenance leading to water infiltration can cause wood framed buildings to rot and become weaker structurally over time, and in some extreme cases may even cause collapse of a structure.

## Recommended Solution

If the building has been without proper roofing for some time, and water has been infiltrating the building, it is advisable to have a licensed structural engineer evaluate the structure to ensure that it has not become structurally weaker due to rot or other concerns. Typically, rotted wood members can be replaced or added to “beef up” the structure. Sometimes roof decking and floor decking may need to be replaced



altogether if exposed for too long. Proper roofing sealed from leaks should be installed on all roof areas. Generally, modern roofing materials and coping are advisable for “flat” roof applications - as long as the components can be concealed from view from the ground. Wood shingled buildings require continual treatment of the shingles in order to achieve maximum life of the product and prevention of shingle warping. In some instances, ice and water membrane installed along the roof eaves and valleys under the shingles may be desirable if ice dams are known to form.

Masonry parapets and coping that are not maintained typically take on water and the freeze-thaw cycle weakens the mortar and sometimes the masonry itself. The remedy may include roofing membrane installed vertically on the back side of the parapet (to the coping) and installation of a metal coping designed to not be seen from the ground on the parapet coping. Any deteriorated masonry on the facade may need to be reconstructed and/or tuck pointed (see also the Facade - Tuck Pointing section of this brochure).







# HISTORIC BUILDING MATERIALS

HISTORIC BUILDING MATERIALS OVERVIEW  
MASONRY  
CLAY ROOF TILES  
INTERIOR WOODWORK  
FLOORING  
PLASTER  
LIGHT FIXTURES

# HISTORIC BUILDING MATERIALS OVERVIEW

Many historic buildings have original building materials both on the interior and the exterior. It is preferable for these materials to remain a part of the historic fabric of the building, especially if they have been properly maintained and/or are still functional.

Some investigation - including somewhat “destructive” investigation - may be necessary to uncover “hidden” original components and materials (see also the Facade - Facade Overview section of the brochure for uncovering built-over facades). For instance, newer flooring may have been installed over the top of (and may be protecting) older flooring such as hardwood or other flooring. Dropped ceilings may have been installed below original plaster and/or historic tin ceilings. Occasionally a fully functioning historic door or window has simply been walled over and left fully intact inside a wall cavity.

## Recommended Solution

In some cases, replacement items can take some investigation if the item(s) are deteriorated to a point that is beyond recognition of the original appearance or if items are missing altogether (see also the Facade - Facade Overview section of the brochure for tips on research of historic photos).

It is advisable to replace in-kind only failing items such as an individual piece of wood that



has rotted, or a missing piece of masonry, windows, doors, etc. (see also other specific sections of this brochure). It is important to only replace materials/items that are deteriorated beyond function vs. replacing all of the facade materials just because a small area is deteriorated and/or missing.

It is important to consult your State Historic Preservation Office, the Secretary of Interior Standards Preservation Briefs, an architect with extensive historic experience, and/or others within the preservation community vs. salespersons and/or contractors who may not have the background to make a qualified judgment about an existing material and/or a suitable material replacement.

Replica historic materials are still in manufacture and there are companies that specialize in this type of work, however, these companies may be located in other parts of the country. For instance, companies specialize in replicating tin ceilings where you can send in a sample/original to replicate tin ceiling tiles that may be damaged or missing. Also, companies exist that replicate terra cotta, and original samples can be sent in for replication of missing pieces. The same goes for ornate precast concrete shapes and all types of



other building materials. Don't be discouraged that you can't find replica/replacement products in your local hardware store or from local contractors, because you probably won't.

In some cases in-kind materials may not be available at all - even from specialty suppliers, and in those instances, it is best to replace the function. However, it is important to make an obvious attempt to not replicate the appearance (so as to be obvious that the replacement area is NOT historic). For instance, when adding new walls to a historic interior of all historic plaster walls, you may want the new, non-historic walls, to be differentiated by using smooth drywall that is obviously modern. For new plumbing fixtures, you may want them to look compatible in finish/color and even style, but do not use fixtures that are attempting to "look" historic that may confuse people as to their authenticity.





# MASONRY

Sometimes masonry is missing, deteriorating, and/or must be patched due to an unwanted opening(s) or other reasons.

## Recommended Solution

If brick and/or stone is missing in portions of the facade, and no local source can be found to match, it is advisable in the case of brick to expand to the greater “region” in search of a brick match by contacting all brick suppliers in the surrounding states and asking for samples. View brick samples for a match by viewing both in the direct sunlight as well as in the shade to ensure a good color and texture match. In some instances a “blend” of two or more other brick colors are needed to match your masonry if there is color variation in your brick. Many times an “exact” match cannot be located, but a good brick match (texture and color) is always preferred.

In the case of stone, the only option for a good match may be from another building in the area with the same/similar stone that is in ruin and/or locating the original stone quarry in order to quarry the few stone that may be needed. Usually these historic quarries are long-forgotten and most likely closed, but if they can





be located and re-opened for the usually small quantity needed - it can prove invaluable. If neither is available, a concrete masonry unit infill painted to match the surrounding brick may be a “temporary” solution until one of the above options becomes available at some point in the future.

It is important to follow the Secretary of Interior Standards Preservation Briefs and NOT install a seal coat over masonry that historically did not have such a seal coat as it may cause other long-term effects to the masonry.

See also the Facade - Tuck Pointing section of this brochure for additional information on masonry mortar and see also the Environment - Insulation section of this brochure for additional information about insulating multi-wythe masonry walls.

# CLAY ROOF TILES

Some buildings have portions or entire roofs of clay roof tiles. Generally, the clay roof tile is a very durable material that has a very long life span compared to nearly all other roofing types. However, this roofing system is a “rain screen” where the clay tile takes the brunt of the wind, rain, hail, etc. as the “outer shell”, but some of the water drains below this outer shell surface on an underlayment material layer which can deteriorate over time. Sometimes the clay tiles themselves can deteriorate or be damaged and/or furring strips supporting the tiles can deteriorate as well.

## Recommended Solution

For replacement of individual clay tiles that have deteriorated or been damaged, many times the same shape and color may not be available in new manufacturer and/or the brightness of the new tile may be distracting from the other original tiles. Generally, the same or similar tile shapes and colors can be found at regional salvage dealers, especially in smaller quantities if extra stock at the building is unavailable.

Where furring strips supporting the clay tile roofing have deteriorated, removal of the roof tile and replacement of the furring strips is necessary. Replacement of the furring strips with pressure treated wood, redwood, or cedar is recommended for longevity of the furring strips. It may be advisable





to check the underlayment while doing these repairs, because if the underlayment is deteriorated or will need replacement soon, then it may be advisable to replace the furring strips and underlayment at one single time in order to save on costs in the future.

If it is determined that the underlayment is deteriorated - for a portion of the roof or the entire roof - removal and replacement of the clay tiles and furring strips may be necessary. This presents an opportunity to clean the roof tiles before re-installation as well as evaluate the longevity of the existing furring strips. A very durable underlayment replacement and/or patch is advised due to the longevity of the clay tile roofing. It is advisable to retain a contractor with experience in replacement of historic clay tile roofing for these types of repairs.

See also the Facade-Parapet

Coping, Roofing  
section of this  
brochure for additional  
information.

# INTERIOR WOODWORK

## - FLOORS, TRIM, DOORS, WINDOWS

Many building interiors have original wood flooring, wood trim, wood doors and/or windows that may be in all states of disrepair, but generally are salvageable (see also the Facade - Openings section of this brochure).

### Recommended Solution

#### Wood Floors

In the case of wood floors, especially if the building has not been in use for some time or the wood has been protected by other flooring overlay, the wood can simply be sanded and refinished. In some cases where the wood floor has taken some abuse it may be advisable to conduct the stages of sanding using a courser grit sandpaper regime rather than the typical. This may leave the floor finish with a somewhat more “distressed” appearance, but it is still advisable over replacement or other types of flooring overlays. Only the replacement in kind of damage/deteriorated pieces of floor should be allowed. After sanding, a durable floor sealer/finish is recommended to protect the wood flooring. Many types are available to suit the amount of traffic expected on the wood flooring.





## Other Wood

The same is true for other wood trim, doors, and windows. However, sometimes these have been painted (see also the Environment - Lead Paint section of the brochure for paint removal and the Historic Building Materials - Overview for replacement of materials) over the original stain and the paint may not be able to be sanded off to the original wood for re-staining. In this case, the wood components can still be sanded and refinished with a new paint coat to at least preserve the historic wood fabric.

Again, only the replacement in kind of damage/deteriorated individual pieces/components of floors, trim, doors, windows, etc. should be allowed by a qualified carpenter.

# FLOORING

Many historic buildings have concrete, terrazzo, marble mosaic, or other floors/sub-floors. It may be desirable to keep these durable floor surfaces, but after many years of use, some flooring such as concrete floor surface may be cracked, damaged and/or otherwise have a rough or irregular surface.

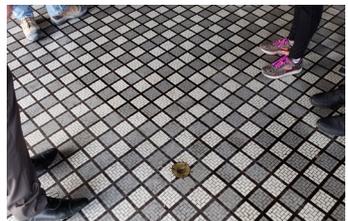
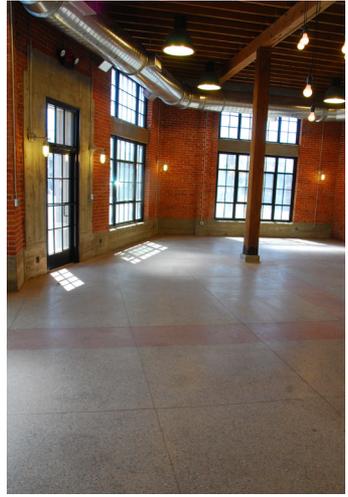
## Recommended Solution

Where concrete floors are in good enough condition (relatively level and in continuous monolithic slab sections), a process of grinding the surface - called concrete polishing - can be employed where diamond studded discs are rotated over the surface to level and smooth out the imperfections. During this process, holes, cracks, control joints, etc. are typically filled with epoxy to maintain a consistent smooth floor finish.

The concrete finish can either be a simple concrete sealer to keep liquid out of the impervious concrete surface, which has to be re-installed periodically, or a “densifier” can be added to the concrete polishing at the end of the process (this is a more expensive option). The densifier fills the impervious surface with a more permanent filler that can be installed in sheen levels of matte to a high gloss finish.



Many other types of flooring, such as terrazzo, can be repaired as this is still a type of flooring being installed in new building construction, although contractors may be scarce. Mosaic floors can often be repaired and many of the missing mosaic tile types can be color matched, but some effort may be required to locate good matches.



# PLASTER

Many building interiors have original plastered walls and ceilings which was a very common finish for almost all older buildings. Cement-based plaster is a very durable material and because of this durability it remains in many older buildings. However, because it is a rigid, contentious product, it can also crack over time due to building movement/settling as well as when it takes on water from roof leaks, etc. Sometimes, plaster can delaminate from its substrate for portions of a wall over time without showing any outward signs at all.

However, because of its durability and historic look, plaster may be desired to be retained as the interior wall finish, even if it has areas that are damaged and/or delaminated from the substrate.

## Recommended Solution

It is advisable to “sound” all areas of the existing plaster walls to determine any areas that may have delaminated from the substrate. If the areas are minor, it may be determined to leave the plaster as-is if there are no signs of failure and falling away. Any loose plaster around cracks should be removed, but cracks and even entire areas of missing plaster can be infilled/re-plastered as there are many companies that still offer plastering, although any ornate plastering may need a specialty historic plastering company.





Sometimes where there are enough intermittent repaired cracks and/or missing sections of plaster, it will warrant a new plaster “skim coat” over the entire wall surface to give it a uniform texture.

# LIGHT FIXTURES

Many historic light fixtures remain on both the interior and exterior of historic buildings, but may not have been in use for some time and/or have non-compliant wiring.

## Recommended Solution

In almost every case, the light fixture itself can be refinished and rewired to modern standards by almost any electrician and even be fitted with modern, efficient LED lighting. In some instances, even the conduit can be reused to feed power to the fixture at its original location.



Sometimes the fixtures have glass housings or reflectors that are cracked and/or missing. In some cases, where other identical fixtures exist for comparison, a replica housing and/or reflector can be located. In the case where a replica glass housing cannot be located, either a lighting manufacturer or a glass artist can “blow” a new replica glass housing if at least one original exists that a mold can be made from.



In other instances where light fixtures may be missing in a portion of the building, a replacement fixture may be necessary that is similar in appearance and finish to original light fixtures that remain





in other parts of the building. Many lighting manufacturers offer new lighting fixtures that are replicas of historic fixtures, and you may need to contact several regional lighting suppliers in order to get a good match. Avoid assistance from salesmen and/or contractors without historic/research experience.

In extreme cases, a unique lighting fixture housing (or entire fixture) may need to be replicated/reconstructed because of its uniqueness and unavailability of anything similar. Some lighting manufacturers offer to construct replica fixtures if at least one original is available as a template, but this process can be very expensive depending on the complexity of the lighting fixture.





# STRUCTURE

STRUCTURE OVERVIEW  
FOUNDATIONS AND WATERPROOFING  
BASEMENTS  
NEW OPENINGS  
LATERAL STABILITY  
PARAPETS AND ROOFS

# STRUCTURE OVERVIEW

Many historic buildings can have the appearance or illusion of structural issues because of their state/condition of disrepair, especially if the buildings have been vacant for some time and have had infiltration of water due to lack of roof and/or other issues such as previous fire, etc.

## Recommended Solution

If there is concern about the structural stability/integrity of a building, it is best to have an inspection by a qualified structural engineer, and preferably one with historic building experience. The engineers should evaluate the foundation system - looking for cracks and movement which can sometimes signal settling and/or other geotechnical issues, the lateral stability, seismic (earthquake) concerns, deflection issues, as well as other specific building concerns.

There are also companies that offer specialized engineering and expertise in ground settling issues, if discovered. The companies can measure the movement of buildings and foundations with instruments over time and other companies offer mud jacking and/or urethane injections for ground stabilization, if necessary to remedy soil stability issues.





# FOUNDATIONS AND WATERPROOFING

Many historic buildings were constructed with basement foundation walls without waterproofing. In some cases, the basement foundation walls are constructed of unreinforced brick or even local rubble stone, making the installation of waterproofing almost impossible.

## Recommended Solution

Where surface or ground water is infiltrating a basement and/or crawl space area to the extent that it is causing the space to be uninhabitable, causing deterioration, mold/mildew, or other issues, mitigation measures should be investigated.

Although expensive, since it involves excavation of the foundation perimeter, an effective way of waterproofing (for surface water infiltration) is to install a membrane or spray-applied waterproofing to the exterior of the foundation.

An alternative, if the foundation wall will not allow the installation of a waterproofing membrane or if the expense of excavation is too high (and if the source of the water is surface water), includes omitting and/or diverting the surface water





- such as omitting irrigation and/or installing hard-surfacing in the areas immediately adjacent to the building.

If the source of water infiltration is deemed to be ground water, which is typically “seasonal”, an underground drainage field and sump pump may be the only alternative. This may also prove to be expensive as the basement floor may need to be removed for the installation of the drain field.

# BASEMENTS

Many historic buildings were constructed with basements of very shallow height that may have been meant for storage and/or mechanical equipment at the time of construction. However, in some instances, the square footage offered by the basement area can be invaluable for other functions besides those originally intended.

There is also a situation where adding basement space is the only alternative for increasing a building's square footage because all of the building's facades are historic and in full view, and a below-grade addition is the only acceptable solution.

Two primary concerns typically need to be evaluated for basement occupancy: proper exiting and proper headroom height.

- Proper exiting: many basement areas have only one exit and depending on the length of travel distance to an exit and/or common path of travel, the basement may require another exit be installed.
- Proper headroom height: many basement areas do not have the code-required minimum head height clearance required to make the space usable, especially when adding plumbing piping, ductwork, etc. to the headroom clearance.

In cases where the basement area is of value for use beyond mechanical equipment, it may be of value to correct the exiting and/or the head height deficiencies.

# Recommended Solution

## Proper Exiting

To accommodate proper exiting, additional stairs from the basement to the floor above can be easy to accommodate in wood-framed buildings and can even be accommodated in other types of buildings for variable additional expense. Sometimes an exit stair on the exterior can be accommodated if there is site available.



## Proper Headroom Height

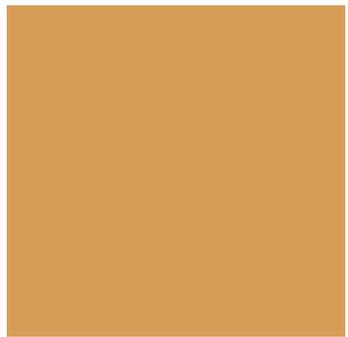
For lack of headroom height, in some cases it can be valuable to excavate and install a new basement floor at a lower level to increase the headroom height. This should only be undertaken with the advice of a qualified geotechnical engineer and structural engineer. Care must be taken to not undermine existing foundations (unless those foundations are also lowered) and to check for possible groundwater, which can be seasonal and vary from year to year depending on rainfall and other factors. In the case where existing foundation is to remain, the usable floor area may be reduced by having to keep the bearing soil under the existing foundations for a distance away



from the foundation. These types of excavation operations can be difficult, sometimes requiring very small excavation equipment and/or excavation by hand that can be time consuming and may require shoring/temporary supporting the structure above. These all make this process expensive to undertake, which must be weighed against the benefits of the added usable floor area.

A below-grade building addition can either be completely buried or projected out of the ground for the height of the foundation wall and the above deck/roof area can be used for a patio, to set mechanical equipment, or other uses.

See also the Building Code - Fire Suppression section of this brochure for possible fire suppression requirements for basements.





# NEW OPENINGS

Many times, new openings are required in a building facade, either for function and/or for building code reasons such as proper exiting, exit width, etc. In wood framed buildings, these openings can be made relatively easily without disrupting the historic fabric of the structure. However, in masonry veneer and masonry load-bearing buildings, the creation of a wall opening for a new door and/or window can be a daunting task.

## Recommended Solution

In both types of masonry buildings, the masonry is supported by gravity, typically down to the foundation of the building. Disruption for a new opening, even a small opening, will necessitate the installation of a properly engineered/designed lintel above the opening in order to carry the weight of the masonry above the opening to either side of the new opening. Of course, if these openings are made on the main facade of a historic building, the new lintel will want to be concealed vs. exposed. Installing a concealed lintel can be accomplished by temporarily shoring the masonry above the opening until the new lintel can be installed (a process sometimes referred to as needle-beaming) that will allow a steel lintel to be almost completely concealed within or behind the facade masonry.





Sometimes replication of other lintels is desired to match original lintels, such as bricked arches, stone, precast concrete, or other types of lintels. For historic buildings, a newly installed window and/or door opening lintel will want to be differentiated from the historic lintels and the absence of a historic decorative lintel is one way to distinguish a new window and/or door opening.

Don't forget that a masonry wall is a type of "rain screen" and is meant to take in water, however minimally, between the brick-and-mortar joints and this water should be allowed to weep out at the bottom of walls - including at lintels. Flashing should be installed along with weeps at the newly installed lintels in order for this weeping process to occur.

# LATERAL STABILITY

Nearly every older building lacks proper lateral stability (when compared with current building codes). In some buildings, this deficiency is visible by the “leaning” of the building in one direction.

Of course this deficiency may not be noticeable or even of concern. However, when a Level III remodel is initiated, it typically triggers enhancements to the existing building structure to meet modern codes, including the lateral stability.

## Recommended Solution

For some wood framed buildings that are “leaning”, the solution may include pulling the structure back into as much of vertical position as allowable and then installing sheathing (either on the interior or exterior) per the direction of a structural engineer to resist the lateral forces.

In many masonry load-bearing buildings - especially with large overhead door openings or a series of smaller openings - metal “portal frames” framing the interior of the opening may be the only solution to bring the building to proper lateral resistance.





# PARAPETS AND ROOFS

It may be visually desirable to reconstruct missing an/or damaged roof parapets on buildings in order to restore the original appearance (and even for hiding rooftop equipment, etc.). Many times the original parapet may have been constructed of unreinforced masonry and/or unbraced, leaving it vulnerable to the wind.

Some of these same historic buildings were constructed with near-flat roof slopes and due to lack of other more modern techniques such as tapered insulation, another (second) roof structure was constructed over the top of the first roof structure at a steeper pitch so as to avoid disruption of the interior/function of the building. Many times this second roof structure is unknown until a renovation reveals a cavity/void when penetrating the roof for ductwork or other items.

Alternately, some historic buildings, especially churches, have very steep sloped roofs that are non-accessible for maintenance without use of proper harnesses for fall protection, etc. These roofs can be difficult to maintain and to re-roof and in most cases are impossible to locate rooftop equipment of any kind.

## Recommended Solution

When reconstructing and/or stabilizing an existing parapet, it is important to engage a qualified structural engineer for the design. Many times the existing parapet height can be retained and/or reconstructed simply by adding reinforcement and/or bracing that in most cases can be completely concealed from view from the ground (on the roof side of the



parapet). The structural engineer should also evaluate the snow load that the parapet places on the roof structure adjacent to the parapet to ensure that the roof structure itself does not require additional support as well.

When re-roofing a steep sloped roof, it is advisable to use a very durable and long-lasting roofing material since the cost of maintenance and/or re-roofing is quite higher than lesser sloped roofs due to the safety requirements and difficulty of access. Sometimes rooftop equipment can be located within the attic space created by the steep roof and louvered through a dormer and/or window opening or even through the vertical gabled end wall with a louver.







# DESIGN

DESIGN OVERVIEW  
REPLICATION AND REPLACEMENT  
CONCEALMENT OF MODERN ITEMS  
EXCAVATIONS

# DESIGN OVERVIEW

Nearly every historic building contains unlevel floors (due to years of sag/deflection), non-plumb walls (sometimes due to construction and other items due to lack of lateral resistance), and a lack of “squareness” to the layout.

## Recommended Solution

It is important to understand that a historic building may not be constructed to the tolerances of modern-day standards. Any contractor working on a historic building will need to be in this mind set in order to work with the building’s character, which may go against the inclination of a traditional carpenter and/or contractor.

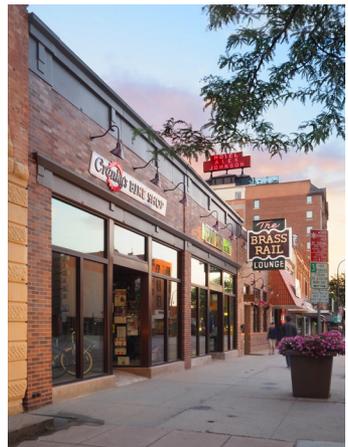
Some examples and “tricks” that can be employed include:

- When an unlevel floor is encountered where new walls with doors are to be constructed, set the top of the doors level, but cut the bottoms of the doors/frames to the slope of the uneven floor. This will result in a more presentable appearance vs. keeping the door/frame height consistent and having the tops of the doors/frames at irregular heights down a hallway.



- In the case of an unlevel ceiling that was removed to install ductwork, piping, conduit, etc. above. There is no need to put the ceiling back level as may be the inclination - rather the ceiling can be reinstated at the same unlevel-ness. If the lack of level was not noticeable before the ceiling removal, it still won't be noticeable with the ceiling replacement either.

Sometimes fixing small building flaws can be obsessive, and in many cases these minor flaws actually add to the overall character and historic appeal of the building.



# REPLICATION AND REPLACEMENT

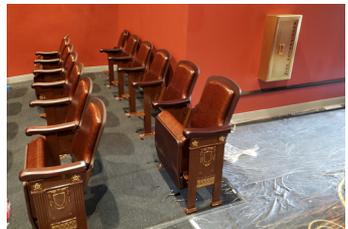
When materials and/or elements are in serviceable/maintainable condition and are of original historic fabric, they should always be kept and maintained. Some historic elements may no longer function properly, such as historic theater seats, which were meant for a generation that required a much narrower seat.

Alternately, many older buildings have materials and/or elements, both on the interior and the exterior, that are deteriorated to the point that they not longer function and/or may be missing altogether and need to be replaced.

## Recommended Solution

Many times historic materials and/or elements are no longer readily available at the local hardware store or through traditional building supply companies. However, there are companies that specialize in historic replica materials - everything from custom ornate rooftop ventilation cupolas to door hardware to custom tin ceilings to light fixtures to light switches and cover plates and everything in between. Even a historic theater seat can be replicated and made wider to accommodate the modern generation of people.

In many cases, custom fabrication of an ornate wood trim profile or





other materials may be the only way to obtain a similar historic replica appearance. Sometimes, salvage dealers can be a good source for materials that are no longer in production for items such as chicken wire glass or even a certain shape/color of clay tile roofing.

The process may take some investigation, both on the side of finding what the original materials or element was (in the case of missing materials or elements) as well as seeking an acceptable match from a material supplier and/or salvage dealer. If the material or element affects the historic appearance, it is always advisable to consult your State Historic Preservation Office for guidance and advice, even when already consulting with an experienced historic architect.

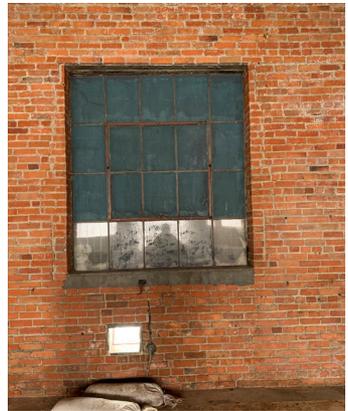
The first step in investigation of missing materials or elements is

the research of historic photos of the building, sometimes located in local, regional, college, or even state archives. Many photos located this way lack close-up detail, but sometimes zooming in close on a high resolution photo can provide enough detail.

For investigating historic building material suppliers, salvage dealers, and even contractors with historic experience, your State Historic Preservation Office can be an invaluable resource. Typically, your State Historic Preservation Office keeps lists of companies, dealers, and contractors on

handwhospecialize in historic work (including lists of architects) and can even access their counterparts in other adjacent states for similar lists when an item appears elusive.

See also the Facade - Facade Overview and Historic Building Materials - Historic Building Materials Overview in this brochure for additional guidance.





# CONCEALMENT OF MODERN ITEMS

When remodeling buildings - especially historic buildings - it is usually necessary to upgrade building systems for functionality, energy efficiency, as well as building code compliance, and often to accommodate a different use. It is usually preferable to conceal as much of the “modern” fabric as possible so as to not “compete with” or distract from the remaining historic fabric and overall look of the building, both on the interior and on the exterior. This can be challenging on buildings that require a full replacement/ installation of systems such as electrical, mechanical, fire protection, and even structural repairs.

## Recommended Solution

It is always prudent to investigate whether existing conduit can be re-used for routing modern wiring, especially if light fixtures, outlets, etc. are planned to remain in the same location and when the conduit is buried in plaster and/or masonry walls that is inaccessible.

### Above Ceilings

In some cases, modern items such as conduit, piping, ductwork, and fire sprinkler piping can be concealed above ceilings in the floor joist or roof joist space - even if there is a historic tin, plaster, or other ceiling that can be removed for these systems to be installed



and then put back. When ceiling, attic, basement, or crawl space is not available, sometimes soffits and chases can be created to route modern items that allow them to be concealed and the soffits and chases can be finished similar to the remaining walls/ceilings. In some instances, existing chimneys that are no longer in use can be used to route piping and flues for concealment.

### **Raised Floors**

In some rare instances, even raised floors can be installed to allow plumbing routing when the space below the floor is unavailable to route the plumbing. Sewage ejector pumps can also be installed when a route for a common gravity sewage system just will not work.

### **Type of Systems**

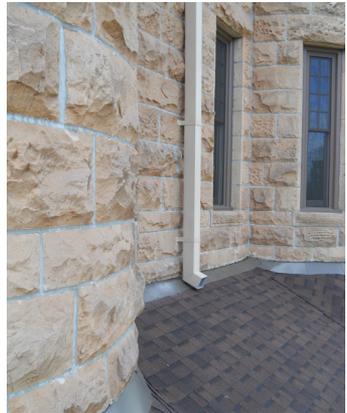
How to conceal the system may even dictate the type of systems that are installed so the planning must begin early, and it may be advisable to involve an architect, civil, mechanical, and/or electrical engineer adept in historic renovations. A primary step should always be an investigation of the infrastructure and utilities and their respective sizes/capacities available to serve the building - whether upgrading systems or

not. For instance, in the case of a historic building with no “back” side, attic, or roof area, it may limit a new HVAC system to a type that can be located in the basement with the ability to have fresh air intake and exhaust via area wells or other means or even a system that can be located on grade with fenced screening. Some remote historic buildings may not have access to certain fuels such as natural gas infrastructure, limiting the system types even further. Or if a fire protection system is required, adequate water pressure and flow must be available or else space for an alternate water tank to supply water to the system. The proximity, size, and invert depth of the sewer can also determine where plumbing ultimately can be placed within the building.

## Exterior Items

For exterior items, such as the installation of gutters and/or downspouts on a building that historically didn't have these items but have been deemed to be necessary for the long-term preservation of the facade, sometimes the color and design of the gutter can be such that it's appearance is very minimal. Downspouts can be located on secondary facades (not on the main facade) in order to preserve as much of the original appearance as possible. The same direction of items located on secondary facades can be applied to fire protection connections, security cameras, electrical service panels, and other modern devices.

In some instances, it is not possible to conceal a modern system/item (or portions of it) and it may need to remain exposed. One trick includes having the finish compatible with the surrounding finishes so that it "blends in" better and does not stand out and become a focus. In "industrial/warehouse" style buildings, sometimes it can be acceptable to leave the modern conduits, ductwork, etc. exposed.



## Historic Systems

While many of the historic systems are no longer in use, some of the non-functioning historic system items such as knob and tube wiring, steam radiators, etc., can be retained for their decorative/historic interpretive purposes.



# EXCAVATIONS

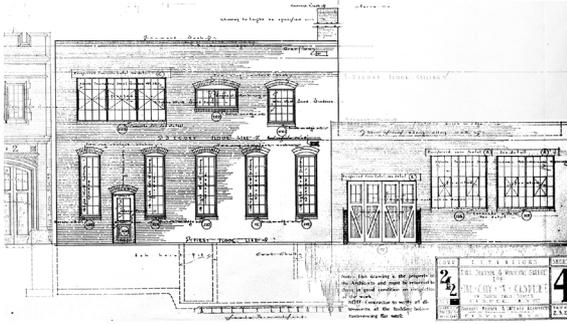
Typically, historic buildings are located in the older part of towns that have the oldest infrastructure. In many instances, both the building and the infrastructure original design drawings/construction documents may no longer exist. Even if they are available, they may not be accurate due to many modifications over the years of their respective lives. Consequently, when excavating near an older building, be prepared for “hand” excavations as unknown items are likely to be discovered. Such items could include: abandoned (or still active) pipes, conduit, vaults, foundations, debris (yes, people buried junk in years past), animal bones, etc., and even contamination from prior spills, with our state’s history of mining and mineral extraction.

Many older buildings in downtown areas also have basements and/or tunnels that extend out from under the above building footprint into the under-sidewalk area. It was common for basements to be connected to each other and to tunnels for the distribution of centralized municipal steam piping that provided heat for the buildings.

## Recommended Solution

At a very minimum, prior to any excavation, a “one call” to locate any known underground utilities is required. Your excavation contractor in particular should be warned and aware, when digging near an older building, that unknown items may be discovered and prepare to do a bit of investigation upon discovery of these items. Prior to excavation, a full investigation should be done of any basement and crawl space





area as sometimes former tunnels, etc. were simply walled off when no longer needed, but can still exist buried.







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