

## **Historic Preservation - Technical Procedures**

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### CHECKLIST FOR THE ROUTINE INSPECTION OF BUILDINGS

#### INTRODUCTION:

All building materials deteriorate with age and exposure to the weather. Through routine inspection and cyclical maintenance, the useful life span of a building and its historic fabric will be greatly increased. The principal reason for developing this building inspection form is to advise building owners on the maintenance of their properties. The money invested in a building is considerable and care and effort are required to preserve and increase the value of the property. Unfortunately, many building owners use the "squeaky wheel" technique in their approach to maintenance, doing little or nothing until failure occurs. And when it does the owner is hit with high repair bills and great inconvenience. The job of maintenance can be simplified if it is done systematically instead of haphazardly. Preventive maintenance involves regular inspection of those parts of the building that are most likely to get out of working order. The accompanying checklist is intended to help a building owner or manager identify and keep an accurate record or inventory of the building's problems to facilitate systematic repair and maintenance.

This procedure is a brief but comprehensive overall building inspection. Each of the areas addressed may have more extensive inspection procedures which could be followed in the case of specific problems.

#### EXTERIOR INSPECTION:

##### 1. ROOFS:

A roof is all that stands between the interior of a building

and the weather outside. A neglected roof will result in higher costs from damages caused by leaks than a carefully maintained roof. Roofing materials and elements should be inspected twice a year, before and after the harsh weather of winter, to determine maintenance needs. The most common types of roof include gable, hip, hip-and-valley, gambrel, and flat or built-up roof.

- a. Asphalt Shingles: Pay particular attention to shingles on the ridge, hips, and at roof edges; they get the hardest wear. Also watch for lumpiness that indicates a new roof has been applied over old shingles; all sorts of damage could be covered up. Look for:
  - 1) Mineral granules almost totally worn off shingles
  - 2) Mineral granules collecting in gutters and base of downspouts
  - 3) Edges of shingles look worn
  - 4) Nails popping up
  - 5) Roof looks new but lumpy
  - 6) Mold or moss forming on shingles
  - 7) Holes in the roof from guy cables, TV antennas etc.
  - 8) Leading edge of roof damaged by ladders
  
- b. Clay Tiles: Clay tiles will weather well but are prone to breakage from mechanical shock, such as a falling tree limb or people walking on the tiles without protecting them. Check for:
  - 1) Broken tiles
  - 2) Missing tiles
  - 3) Nails popping up
  - 4) Mold or moss forming on tile
  
- c. Slate: Some slates are more durable than others, but a properly laid top quality slate should last a century or more (slate longevity varies depending on slate source). Check for:
  - 1) Broken slates
  - 2) Missing slates
  - 3) Slate flaking apart
  - 4) Nails letting go
  - 5) Slate particles collecting in valley flashing
  
- d. Metal: If the metal isn't copper, zinc, stainless steel, and other corrosion-resistant metal blends your primary task will be to fight rust by keeping the roof painted. Check for:
  - 1) Rust or corrosion spots
  - 2) Signs of previous patch jobs
  - 3) Punctures in metal
  - 4) Joints and seams broken
  
- e. Wood Shingles and Shakes: For maximum roof life, shingles and shakes require proper air circulation underneath so they can dry after rain. Therefore, they should be laid on open sheathing. If you find that they

are improperly laid, you can help them dry by providing adequate ventilation in your attic. Look for:

- 1) Biological attack (moss or mold, insects, birds)
- 2) Cupping and warping
- 3) Deep cracks and splits
- 4) Wood has become unevenly thin from erosion

f. Built-up Roof: The roof membrane of a built-up roof consists of one or more plies of roofing felt bonded together either by hot or cold applied roof coatings. Deterioration of the membrane produces areas of the surface of the roof where leaks can occur. It is particularly difficult to diagnose leaks in flat roofs because water can enter at one point and migrate horizontally for long distance before leaking inside the building. Check for:

- 1) Blisters or slits in the membrane
- 2) Ponding of water (or dried areas where ponding was)
- 3) Drain pipes are plugged
- 4) Drip edges are provided
- 5) Gravel covers roof well
- 6) Flashing are well positioned or seated
- 7) Trash build-up

g. Membrane Roof: A further development and evolution of a built-up roof is a membrane roof composed of rolls/sheets of materials such as synthetic rubber, thermoplastics, or other man-made materials. Such roofs are often installed over a layer of rigid insulation. These types of membrane roofs may not have a stone top layer. Also, these roof are often white or other reflective colors to reduce solar heat gain and the urban heat island effect. Checklist is generally similar as noted in "f. Built-up Roof".

h. Green Roof: The "green roof" with a living plant material layer at the top surface

is typically a membrane roof as noted in "g." above, but with a very important

root-resisting and waterproof layer(s) to isolate the living plant material layer from layers below.

For further reference see the links below from the Whole Building Design Guide:

<http://www.wbdg.org/resources/greenroofs.php>

## 2. ROOFING ELEMENTS:

a. Projections: Anything that breaks through the roof surface, such as a chimney or vent pipe, offers an

entrance for water and so must be adequately flashed. Check that no projection or ornament is so weak or damaged that it could topple and smash roofing materials. Check for:

- 1) Proper flashing around projections
  - 2) Weathering of mortar joints at chimneys
  - 3) Loose mortar joints that admit water
  - 4) Chimney leans
  - 5) Loose and wobbly antennae
  - 6) Loose lightning rods
  - 7) Loose and wobbly weather vane
- b. Galvanic Action: Corrosion of metals can be caused by galvanic action. Check for:
- 1) Ferrous metals touching dissimilar metals, such as galvanized nails in copper flashing
- c. Cornice: Roofs frequently fail first at the edges and admit water into the cornice. Check for:
- 1) Moisture causing paint to peel on cornice, especially at the underside
  - 2) Broken or missing cornice
  - 3) Cracks and other damages
- d. Underside of Roof: Pay particular attention to projections and eaves. Inspect on a rainy day to see if water stains are current or past problem. Look for:
- 1) Water stains on soffit boards
  - 2) Damaged soffit boards
  - 3) Damaged fascia boards
- e. Flashing: Flashing is usually made of thin metal, such as copper, aluminum, or galvanized steel. It should be installed completely around every protrusion through the roof, and at every joint where vertical wall intersects the roof. Check for:
- 1) Loose, corroded, or broken flashing
  - 2) Missing and uncaulked openings at the tops of flashing
  - 3) Daubs of roof cement on flashing (They may hide leaks that have not been corrected)
  - 4) Base flashing and counterflashing of vertical joints
- f. Gutters and Leaders: Leaking gutters can cause extensive damage to the entire building, not just the roof. Pay special attention to built-in gutters which can feed hidden leaks directly to the cornice and down into the main structure. Check for:
- 1) Gutters clogged with debris or ice

- 2) Gutters that are rusty or corroded
- 3) Gutters that are loose, tilted, or missing
- 4) Broken seams in metal linings of built-in gutters
- 5) Birds nests and roosting places

### 3. EXTERIOR WALL MATERIAL:

The accumulated effects of hot sun, wind, rain, hail, dust, winter snow, and ice over the years will weather even the best quality masonry wall and/ or siding. Natural finishes, including paint, deteriorate and show signs of peeling and blistering. Cracks develop as members weather and caulking and mortar joints give way to water penetration. The following checklist will be useful in inspecting buildings on a regular basis to determine maintenance needs.

a. Masonry & Mortar: The inspector should pay particular attention to loose mortar joints, cracks, stains and wet spots on the wall.

- 1) Cracks can be horizontal, vertical, diagonal, hairline or major. Document the nature of the crack, explaining as best as possible the causes of the cracks. Note if cracks are running through just the mortar or also the masonry units.
- 2) Mortar: Inspect mortar joints to determine if they are loose or missing and evaluate their condition as good, fair or poor.
- 3) Brick: Check for stains, wet spots, bulges, spalling, efflorescence, and missing brick.
- 4) Stone: Inspect stone work for wet spots, stains, spalling, bulges, and efflorescence. For a comprehensive inspection checklist for stone, see 04400-01-S.

b. Stucco/Plaster: Inspect for:

- 1) Cracks, staining, loose stucco, soft spots, blisters or bulges, and falling stucco.

c. Siding, Shingles, and Sheathing: Hot sun, wind, rain, hail, dust and winter snow and ice are the principal causes of damages to siding and sheathing. Inspect siding, shingles, soffits and wood trim such as cornices for:

- 1) Cracked boards, loose boards, or broken boards
- 2) Rotted and missing members
- 3) Signs of veins of dirt (termite tunnels)

### 4. EXTERIOR FINISHES:

Finishes need to be renewed periodically by application of a fresh penetrating stain coat or a paint coat when wear begins to show. There are many causes of poor paint wear. Most common are vapor or condensation problems. Other causes are rain or other water behind siding or shingles and also improperly applied

priming coat.

a. Painting: Inspect all finished surfaces for:

- 1) Signs of peeling, cracks, and alligating
- 2) Document the overall findings as good, fair, or poor

b. Decorative Elements: Ornamental elements also undergo wear and tear. Inspect not only the ornament but also its supports, such as anchors, for expansion due to rust.

- 1) Cast iron: Inspect for rust, deterioration, corrosion, and loose and missing members
- 2) Stone/terra cotta: Inspect for loose, eroded, spalled, and stained tiles
- 3) Wood: Inspect for rot, moisture, cracks, missing and loose members

## 5. FENESTRATION:

Doors and windows constitute main sources of energy loss through air infiltration. Energy losses can be reduced by weatherstripping. Inspect to ensure that weatherstripping is properly installed and all sources of infiltration are in check.

a. Doors: Inspect doors, frames, and weatherstripping. Check:

- 1) Door alignment
- 2) All parts for deterioration
- 3) All door hardware for proper operation

b. Windows: Inspect windows for material soundness at sill, joint between sill and jamb, corners of bottom rail and muntins. Check for:

- 1) Proper operation of all sash (including upper sash of double hung units)
- 2) Proper operation of hardware
- 3) Loose, cracked or missing glazing putty
- 4) Soundness of weatherstripping
- 5) Cracks and other damages to lintel
- 6) Rot and/or deterioration of wood framing

## 6. EXTERIOR CEILINGS AND DECKS:

a. Porch: Moisture problems in an exterior ceiling are indications of faulty drainage from the roof above. Inspect the roof to make sure water isn't entering the main structure of the building as well. Check for:

- 1) Peeling paint and water stains on the ceiling
- 2) Rotted and warped boards in the deck
- 3) Damaged and/or loose steps and handrails

- 4) Rotted boards and other damages to ceiling
  - 5) Cracks and other damages on a concrete floor
  - 6) Spalling, cracks, loose and/or missing mortar joints on brick or stone
- b. Wooden Supports: Wood destroying insects and fungi can cause considerable damage to the wooden supports of exterior ceilings and decks. Early detection of pests and decay can help building owners avoid expensive repairs. Inspectors should pay particular attention to:
- 1) Molds and fungus
  - 2) Wood rot and termite infestation
  - 3) Seal of deck at foundation
  - 4) Corrosion of iron fittings on members
- c. Infestation: Chemical treatment of the structure and adjacent soil will drive insects away. No matter what protective measures are taken, a periodic inspection should be made at least every six months. The existence of termites or infestation in older buildings with crawl space is difficult to detect because contact with the soil is usually direct and termite tubes are not evident. Inspection by professional exterminators is essential in such cases. Check for:
- 1) The need of treatment for ants and other wood destroying insects
  - 2) Termites
  - 3) Damage and rot on all wood members

## 7. GROUNDS:

The ground should be properly graded to direct the flow of rainwater away from the building and from the lot to prevent standing water. The property should always be checked after a heavy rain to see if it drains properly.

- a. Driveways and Sidewalks: Check for:
- 1) Safety hazards (heaves and depressions)
  - 2) Cracks on and deterioration of paved material
  - 3) Damages to and curb clearances
  - 4) Oil stains and pools of water
- b. Window Well: Check for:
- 1) Leaks and standing water
  - 2) Leaves and other debris
  - 3) Other damages to window well material
- c. Storm Drains: Check for proper drainage and/or clogging of drain line.
- d. Retaining Wall: Check for:

- 1) Cracks, spalling from subflorescence and freezing
  - 2) Leaning and Bulges
  - 3) Loose, crumbling, and missing mortar joints
- e. Foundation: Inspect to ensure that there is no collection of leaves and other debris at the edges of the foundation and for proper drainage. Check for:
- 1) Cracks, spalling from subflorescence and freezing
  - 2) Leaning and Bulges
  - 3) Loose, crumbling, and missing mortar joints
- f. Landscape: Check all landscape features eg. Trees, Bushes for diseased or dead parts. Check if:
- 1) Trees overhang or touch building which cause damage or trash build-up
  - 2) Creepers and vines are causing damage (paint peeling, joint deterioration etc.)
  - 3) Plants holding water against structure
  - 4) Tree roots damaging structure
  - 5) Bare spots show in lawn and /or shrubs need pruning

#### 8. INTERIOR INSPECTION:

**BASEMENT AND CRAWL SPACE:** Foundation walls are subject to a wide variety of stresses and strains that cause concrete and other masonry to expand and contract. This sometimes results in cracks, leaks or condensation problems. Inspect to ensure that rainwater and other sources of moisture drain away from the building. Check for dampness on surfaces and for mold on joists at the point where the first floor joists meet the foundation wall.

- a. Load Bearing Masonry Wall: Inspect load bearing walls for structural damages paying particular attention to the following:
- 1) Cracks caused by either structural movement or material shrinkage
  - 2) Leaning and bulges
  - 3) Loose/damp mortar joints and spalling
  - 4) Wet spots, stains and water penetration
  - 5) Insect/termite infestation and decay on wood members
- b. Cast-in-Place Concrete Wall: Look for:
- 1) Settlement, cracks, and leaning
  - 2) Water penetration, wet spots, and stains
  - 3) Moisture conditions (dampness etc.)
  - 4) Insect/termite infestation and decay on wood members
- c. Wood Joists & Beams: Check for:

- 1) Sagging at the center of span
  - 2) Springiness or vibration
  - 3) Pronounced slope in one direction
  - 4) Split at bottom of joist or beam
  - 5) Floor squeaking and insect infestation/decay
  - 6) Bearing on masonry
  - 7) Bulging or sagging plaster ceiling
  - 8) Overloading of joists and beams
- d. Steel Beams/Concrete Deck: Check for:
- 1) Deflection at midspan
  - 2) Sloping floor
  - 3) Corroded connections
  - 4) Missing connections and connections bearing on masonry
  - 5) Settlement effects, mechanical or exterior leakage
- e. Reinforced Concrete Floor: Check for:
- 1) Spalling and exposed reinforced steel
  - 2) Wide, regularly spaced cracks in floor
  - 3) Cracks near and parallel to masonry wall
  - 4) Surface dusting and cracked concrete near columns
- f. Masonry Floors: Check for:
- 1) Leaks, cracks, and spalling
  - 2) Alterations and new holes cut on floor for stairs, mechanical installations etc.
  - 3) Efflorescence
  - 4) Sidewalk vaults and subgrade storage
  - 5) Crack at the crown of the arch and between supporting walls
- g. Wood Floor: Wood floors members bearing directly to the soil are susceptible to insect and fungus attack. Check the underside of boards and floor joists for fungus, insect and or termite attack. Look for:
- 1) Cracks and badly damaged boards
  - 2) Twisted boards
  - 3) Squeaking
  - 4) If floor boards need refinishing
- h. Carpet: Inspect for:
- 1) Frayed edges
  - 2) Damaged portions
  - 3) Stains and worn out areas
- i. Ceramic Tile: Inspect for:
- 1) Adherence and grout in joints
  - 2) Loose joints
  - 3) Splits and cracks

- 4) Missing tiles
- j. Interior Wall Finishes: Includes but not is limited to plaster/stucco, gypsum board, wood, and wallpaper.
    - 1) Push on suspect wall surfaces to check for looseness
    - 2) Check for signs of dampness (this suggests leaks, either from the roof or internal pipes)
    - 3) Inspect for cracks, bulges, peeling, blistering and mildew
  - k. Ceiling Finishes: May be plaster/stucco, gypsum board, wood, wallpaper, or any other material. Specify this other material in your inspection record sheet. Check for:
    - 1) Signs of damp plaster on ceilings (this suggests leaks from the roof or plumbing and mechanical pipes)
    - 2) Loose plaster, cracks and bulges
    - 3) Blistering and peeling
  - l. Interior Decorative Masonry: This includes window sills, walls, wainscot, and floors. Check for:
    - 1) Dullness of surfaces
    - 2) Stains, dampness, and spalling
  - m. Fireplace: Inspect active fireplaces thoroughly for fire safety, material soundness, and structural stability. Check:
    - 1) Connection with flues
    - 2) If damper is operable
    - 3) If the flue is lined with a clay-tile liner to prevent fire and fumes leakage into the building
    - 4) If the flue is unobstructed all the way to the roof
    - 5) If the fire box has a firebrick liner
  - n. Metal Surfaces: Brass, cast iron, and bronze. Inspect all exposed ornamental metal trim. Check for:
    - 1) Built-up dirt, stain and rust
    - 2) Corrosion and cracked surfaces
  - o. Stairs: (refers to wooden stairs) Check for:
    - 1) Secureness of all railings
    - 2) Gaps between treads, risers and stringers
    - 3) Stair pulling away from the wall
    - 4) Looseness or other damage to balustrades
    - 5) Looseness and other damage to newel post
    - 6) Irregular riser-tread ratios
  - p. Interior Doors and Wood Trim: Check for:

- 1) Proper door alignment, fit and operation
- 2) Presence of all door hardware
- 3) Proper operation of all locks
- 4) Deterioration of hinges and pins
- 5) Condition of finish and other problems

q. Interior Windows and Wood Trim: Check for:

- 1) Proper window alignment, fit and operation
- 2) Presence and functioning of all window hardware
- 3) Proper operation of locks, hinges and pins
- 4) Signs of water leakage at frames
- 5) Movement of sash up and down the frame
- 6) Seals around window panes
- 7) Condition of finish and record other problems

r. Kitchen Cabinets/Counters: Inspect cabinets and counters to ensure that all drawers and doors are properly hung and secure, and that no movements are restricted and to ensure that all units are securely anchored to walls and floor. Check for:

- 1) Missing handles and hardware
- 2) Badly worn or stained countertops
- 3) Condition of finish

## 9. MECHANICAL AND ELECTRICAL:

a. Electrical: Ascertain that there are sufficient power circuits to run all the appliance and equipment the owner uses. Remember that older buildings were not originally wired to take care of the many electrical appliances and the equipment used today. Check:

- 1) The condition of incoming service wires and supports
- 2) The operation of all exterior outlets and switches
- 3) Whether all exterior plugs and kitchen, bathroom, wet area plugs as required by code are fitted with ground fault connectors
- 4) Whether fuses or circuit breakers trip frequently
- 5) Whether an electrician has periodically checked all aluminum wire connections
- 6) Whether power is brought in overhead rather than underground (if so, look for trees or other hazards that could cause problems)

b. Plumbing and Mechanical Systems: Note which types of heating, ventilating and air conditioning systems the building presently has. Inspect the furnaces, ducts, registers, and radiators.

- 1) Look for any obvious signs of deterioration, damage, stains and rot
- 2) Inspect the water supply and waste pipes for rust

and leaks

- 3) Has the local gas company tested gas lines for leaks (if not, have them do so).

10. ATTIC:

- a. Condensation occurs in the attic principally because of easy pathways for moisture to migrate from the occupied areas, or because of inadequate ventilation. The ventilators (louvers) in the unfinished and unconditioned attic should remain open to

provide circulation of air throughout the year. Check for:

- 1) Any signs of roof or flashing leaks on rafters and insulation
- 2) Signs of mildew on underside of roof boards
- 3) Smoke or water leaks or breaks in the mortar joints of the chimney
- 4) Straightness and sound condition of roof rafters
- 5) Adequacy and condition of insulation
- 6) Nests and blockages of ventilation openings
- 7) Operation of vent and/ or attic fan