Interior spaces and circulation

Principles

1.3 Balance of use and preservation (cautious conversion)
2.3 Work in order
2.6 Second opinions when in doubt
3.5 Specifics of uniqueness (pattern, ensemble, detail)
4.4 Respect for uniqueness (pattern, ensemble, detail)
4.6 Minimal conjecture/informed invention
5.2 Fitting use of existing spaces
5.3 Minimal alteration, minimal intrusiveness
5.6 Minimal removals
5.7 Reconstruction for wholeness
6.2 Maximum retention
6.4 Respect for craft
7.1 Traditional repair (proven technology)
7.2 Replacement in kind/ recycled materials
7.3 Reversible repair
7.4 Cautious high-tech repair
7.6 Maintainable repairs
8.1 Distinctive new work

References

For general matters of planning interior spaces in existing buildings, see AUST88, NATI80, STAH84, WARN78 and WILL78. For background on appreciating existing spatial character and detail, see ICOM86, KIRK84, LAND82, MILL87, OLDH85, POOR83, RADF83, SEAL79, THOR84 and VICT84.

Technical aspects of repairs and replacements are covered in references to other topics in *Interior features*, but in general see CHAM76, DAVE80/86, FEIL82, FINE86, HANS83, OLDH85, POOR83, SAND84, STAH84, TECH82 and VILA81. Matters of handicapped accessibility are dealt with in BALL83, and fire safety in NIBS80 and PARNnd.

For descriptions and availability of legal regulations, see Appendix 5, "Codes and regulations for conservation work in Ontario".

The life of interiors

Interior spaces must change to meet new problems and requirements much more frequently than exteriors. Interiors are subjected rarely to the corrosive weathering endured by exterior surfaces but often to the perhaps more severe effects of human use and abuse. Interior features may have survived virtually unchanged for a century or more — or radically altered every decade.

The general public rarely sees private interiors, so that the public interest in conserving interior architecture is less compelling than for exteriors. But many important public or publicly accessible spaces demand attention and conservation. Just as there is a growing taste for the "antique" in furniture and domestic artifacts, so there is growing interest in conserving interiors of genuine heritage value, beyond the more typical restorations of dubious authenticity.

Interiors vary even more than exteriors, though most spaces are domestic in character and small in scale. Large factory spaces are wide open and undefined; highly specialized interiors such as theatres are very clearly laid out and walled in. Each type requires a different approach to understanding and preserving its character, and each demands a different approach to new insertions.

Consequently, there is a much wider range of possibilities for architectural conservation of interior spaces than for building exteriors. This range covers radical alteration and reverential restoration, and all points in between, none of which can be automatically ruled out in planning the conservation of specific spaces. Much depends on what may have survived from the original or early period of the building. Rooms and spaces may be unaltered in both layout and surface treatment. Or the layout may survive with mildly or greatly altered finishes. Or all permanent traces of earlier occupants may have disappeared, except for some ghostly outlines of vanished partitions or plasterwork.

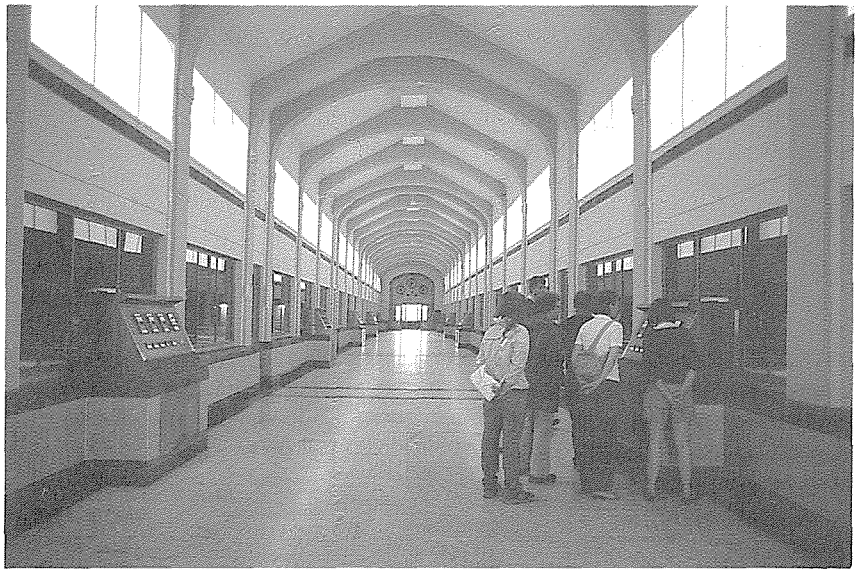
The conservation principles are clear in calling for maximal retention of the valuable material that still exists from the past, but new requirements for habitability and function may require some difficult choices and compromises. Good conservation practice must tilt the balance in favour of preservation by insisting on and capitalizing on the flexibility and adaptability of users and functions rather than by making the building "flex" to suit an arbitrary standard.

New-building codes and old-building heritage

Literal interpretation of codes for new construction can have devastating effects on existing buildings — nowhere more drastically than in planning and finishing of their interiors. Building officials have some discretion in interpreting code requirements, and many are prepared to consider means of satisfying safety requirements other than the standard approaches required by the Ontario Building Code or the Ontario Fire Code retrofit regulations. The scope for that discretion is partly built into those documents. The Building Code permits many compliance alternatives for residential occupancies in existing buildings, as well as a process for approving other alternative measures case by case. Compliance alternatives for other occupancies have been under study since 1985, and special cases have been allowed. The Fire Code permits alternatives to the standard requirements on the basis of a qualified life safety study and the discretion of the local fire official.

Specialized professionals in fire safety and code interpretation can help develop strategies to accommodate the safe performance required by the codes in ways that will minimize disruption of the historic and architectural value of a building's spaces and circulation routes. The advice that follows is meant to provide the foundation for such strategies so as to maximize conservation of what deserves to be retained. Achievement of those strategies will necessarily be the subject of negotiations and of experts — and certainly the subject of another book altogether.

(opposite)
The qualities of light, view and detail in interiors are well worth preserving in order to enhance existing or new uses (top, middle). Even some of the properties of plain surfaces such as plaster, here unfortunately removed (bottom), cannot be reproduced.



Conserving interior character

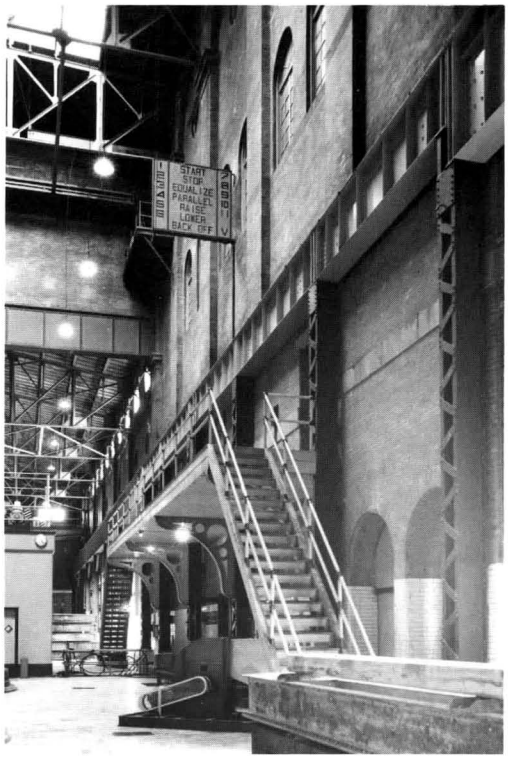
- Assess and record existing floor plan(s) before making any decisions about arrangement or rearrangement of uses in rooms. Do not alter or demolish defining walls and partitions of any notable spaces.
- Assign priorities of value to individual spaces — those to be preserved as is or faithfully restored, those that can be altered with respect, those that can be altered radically, and those that can be treated as completely new work. Follow these priorities rigorously, especially in using existing spaces for new uses.
- Pay careful attention to *all* the characteristics of interior spaces and their points of access — structure, dimensions, surface materials and textures, lighting, acoustics, ventilation, and relation to adjacent spaces (see INSPECTION). Use these attributes as guides for improving the qualities of existing and new uses.
- Do not puncture or alter floors, ceilings or walls that define important and highly visible rooms and spaces, unless every alternative has been thoroughly evaluated.
- Maintain ceiling heights and surfaces as much as possible. Do not lower ceilings in any important space or room: as much as possible try to avoid doing so even in less important spaces. Preserve ornamented ceilings in the course of conservation. Remove discordant fixtures that impinge on or cut through historic surfaces and make good the damage.
- Retain or re-establish the historic conditions of daylighting in any conserved interior space. Wherever possible, unblock obscured windows, clerestories or skylights; use traditional means such as operable blinds, shutters and curtains to control the light.
- Whenever possible, do not remove interior finishes and features; cover them over if need be (with readily removable materials) but add or leave alone rather than subtract any sound and stable material.
- If finishes and features must be removed, record fully all removals, especially hidden finishes when they are exposed. Treat such removals with the same respect accorded

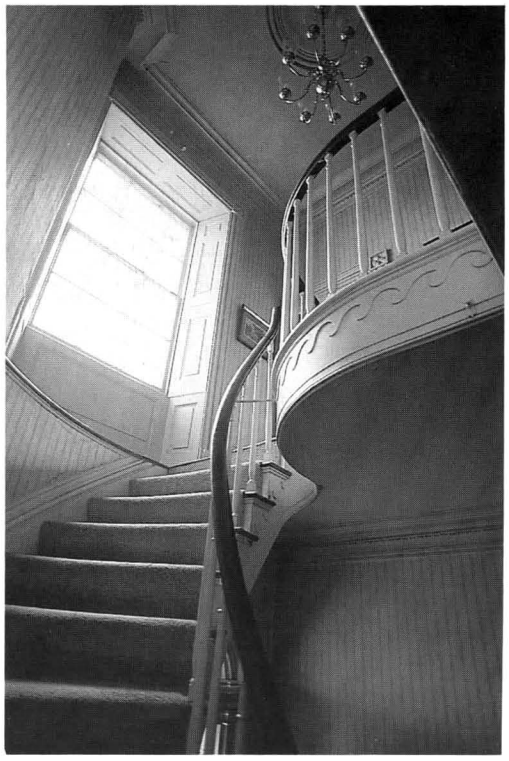
When conservation work involves major disruptions of interior spaces — in this case the excavation of a new basement — it is vital to protect finishes from damage with interior "hoarding" (above and right).

archaeological sites — note the layering of wallpapers and paints and signs of previously covered-over ornamentation (see INTERIOR FINISHES).

- Keep the building secure from unauthorized visitors before and during all interior work. The popularity and recyclability of interior trim and fixtures make them vulnerable to vandalism and theft. If temporarily removing any features for safe storage, record their location first, keep a complete inventory of features in storage, and assign custodial responsibility for their safety and return.
- Where distinctive interior spaces have been subdivided previously in a nondescript or even damaging manner but retain comprehensible traces of their former ornament and scale, remove the subdivisions and re-establish the whole. Remove partitions, dropped ceilings and intrusive fixtures that distort the space or butt into earlier decorative details.
- Do not obscure historic interior elements and finishes with heavy furniture or new partitions — indeed, wherever possible arrange furnishings in ways that respect historic traffic patterns and formal symmetries or asymmetries of the space.

Stairways and their vertical spaces are often the most exciting interior spaces, whether in a power plant or a house, though new-building codes sometimes make them difficult to retain.





Lightwells are not common features in historic residences, and are thus especially valuable (below); here, fire codes required that a glazed barrier be installed. It is even more rare that vintage elevator cabs survive (indeed, this one exists only because it was out of use for 50 years). Documentary or physical evidence may provide enough information to enable restoration of their finishes and materials while accommodating modern operating standards.

Circulation and access

- ❖ Maintain historic sequences and patterns of access and circulation. Restore the use of any blocked passageways where these can serve the rehabilitated or new use of the building. Do not relocate important historic entrances and hallways.
- ❖ Do not remove or relocate interior doors and doorways, even if they are no longer to be used. Lock them and leave them undisturbed.
- ❖ Do not cut new doorways into existing walls when an existing doorway can be adapted for the purpose. Make new doorways simple and unobtrusive: locate them in logical relationship to existing openings and symmetries, and detail them using the proportions and spirit of historic openings, without attempting slavishly precise replication.
- ❖ Make any necessary code-mandated safety additions discrete and removable; do not damage historic materials. Added fire doors in corridors should be glazed as much as possible or installed as normally opened with alarm-actuated automatic closers. Emergency-exit signs should be as small as possible and mounted so as to cause as little damage to historic surfaces as possible.

See PROGRAMMING AND USING SPACE.

Stairs

- ❖ Retain stairways in their historic locations and maintain their use in the building's circulation system. Enclose open stairways only where there is no alternative means of complying with current building regulations; make such enclosures as visually open as possible to retain at least an impression of their historic context.
- ❖ Assure the structural integrity of all staircases before undertaking finishing work. Reinforce the capacity of the stair if required by changes in use but in such a way that they do not damage historic materials and finishes; they should be adjustable and reversible.
- ❖ Tighten any rods and bolts that hold the staircase structure and balustrade together. Make no repairs that will block future accessibility to such adjustments.
- ❖ Reverse and reinstall wooden or marble treads only when they are *excessively* worn; leave such signs of age and use so long as they pose no hazard.
- ❖ Maintain the proportions, dimensions, and direction(s) — straight, angled, curved, switchback — of stairways requiring reconstruction or major repairs.

Elevators

Early elevator cabs in many office blocks and public buildings were splendid wood and metal extravagances in classical or modernistic styles. Renovations to accommodate increasingly strict operational standards have left very few cabs with their historic materials, finishes and colours intact. Where early designs and finishes remain, take every possible action to retain and restore their historic character. Where historic photographs and drawings survive, consider restoring elevator interiors to their original appearance in any upgrading of their function.

Woodwork and plaster

Principles

2.3 Work in order
2.5 Appropriate skills
4.1 Respect for (natural) aging process
4.4 Respect for uniqueness (pattern, ensemble, detail)
4.6 Minimal conjecture/informed invention
5.3 Minimal alteration, minimal intrusiveness
5.6 Minimal removals
6.2 Maximum retention
6.3 Patina preserved
6.4 Respect for craft
7.1 Traditional repair (proven technology)
7.2 Replacement in kind/ recycled materials
7.4 Cautious high-tech repair
7.5 Recipes tested before application
7.6 Maintainable repairs
7.7 Gentle cleaning
8.1 Distinctive new work

References

The most careful and exhaustive of the careful texts for interior woodwork repair is DAVE80/86. Good backups are KAPL86 and POOR83. LITC82 and LITC83 are useful for technique, but suggest some things that are not good conservation in general — use with caution. For plaster, STAG76 is by far the most encyclopaedic guide, for both traditional and modern plasterwork and framing. ASHU83 covers earlier traditional practice and formulas briefly but comprehensively. FEIL82 covers the tricky removal repair and re-erection of decorative plaster. KAPL78/86 and POOR83 deal well with do-it-yourself domestic work. See CHAM76 and SAND84 regarding maintenance.

Older texts are quite useful for fastening details of both wood and plaster; see MACE98, RADF83 and VICT84.

See also FINE86, JOHN83, KIRK84, LAND82, OLDH85, PRIN81, REMP80, SEAL79, SHOP86, STAH84, THOR84, TIMM76 and VILA81.

Craft and style

The character of interior spaces lies in the colour, texture and modulation of their fixed surfaces of wood and plaster no less than their changing furnishings and artifacts. Both wood and plaster are readily workable materials and display the skill of the hands (and sometimes machines) that made them and the stylistic preferences of their periods. These factors, along with their proximity to hand and eye, make them vulnerable to use and abuse as well as periodic modernization. Because they can be reproduced with considerable fidelity to historic originals, new reproductions must be faithful to true originals distinctive to the building, locale and period.

Historic interior trim has both functional and aesthetic attributes. Mouldings and applied ornaments physically conceal imperfections and gaps in surfaces and joints, sometimes even hiding the edges of "secret" operable panels or doors. They also distract the eye from imperfections that cannot be concealed, an important role both functionally and aesthetically. Chair rails and wainscots protect brittle plaster from impacts; picture rails permit hanging of decorations without constant damage from nails and picture hooks. Cornices and friezes alter the impression of height or lack of height in rooms of awkward proportions; they may even conceal or enhance artificial lighting.

Window and door frames cover the awkward construction — and the occasional adjustment or reconstruction — of the actual opening. They also add visual interest and style to the ceremony of entering and leaving. Most historic interior trim has been painted, sometimes with grained or marbled surfaces to conceal its more humble insides — both wood and plaster can be made to produce similar three-dimensional effects and are often used together beneath the paint.

Wooden and plaster trim of particular size and profile makes an aesthetic "bridge" to details of furnishings — light, classically proportioned Georgian furniture fits more assuredly with the interior spaces of its own time than with the heavier shapes and styles of High Victorian eclecticism. Furniture of some periods can fit into rooms of other periods, but some matches of furniture and architecture are more successful than others.

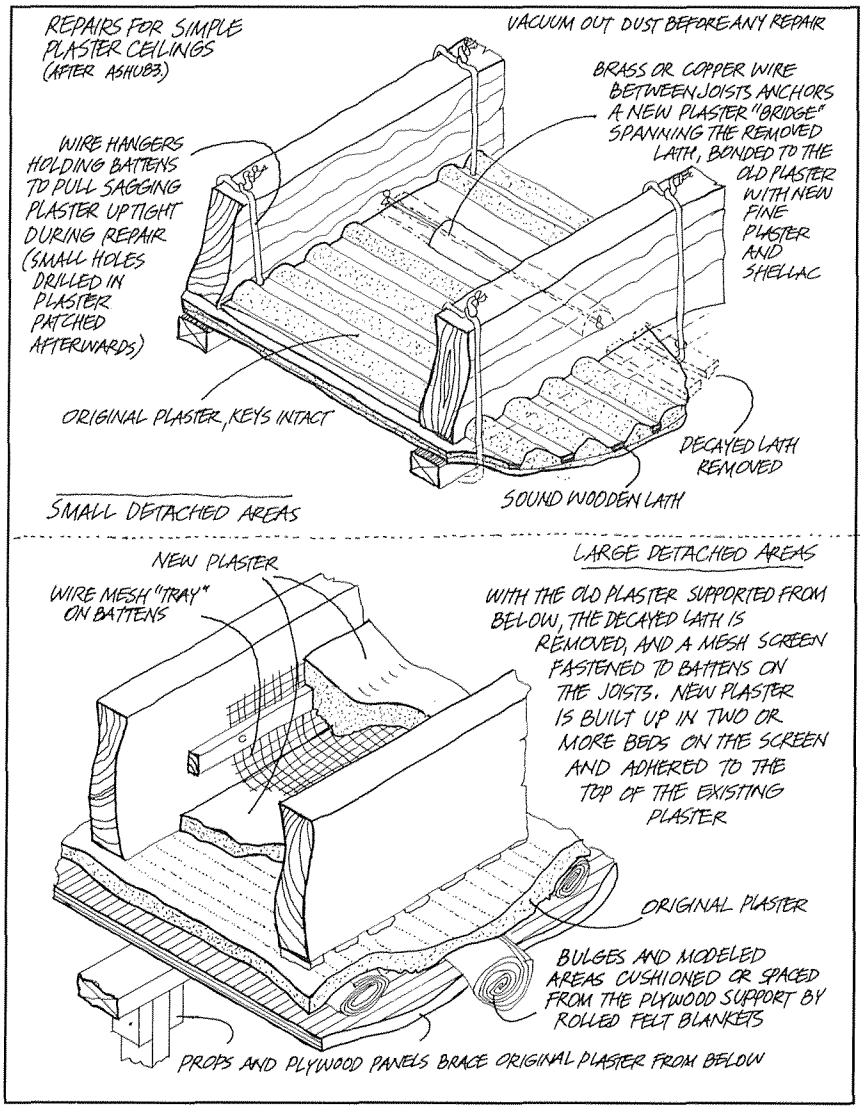
Interior woodwork is vulnerable to fungus, insects and damp, especially where it is adjacent to hidden moist conditions. In extreme cases of wood rot or decay, the accumulation of painted surface may be the only thing holding the element together. Plasterwork is also a victim of moist conditions — it may break down directly or lose its grip on its backing lath, and the wooden lath itself may fall victim to structural movements or its own decay.

Woodwork repair and replacement

Much of the advice about exterior woodwork applies equally to interiors. The agents of wood decay are not so aggressive inside, though interior woodwork may be attacked by dampness, insects and rot through the structure behind and may suffer impact damage and general wear and tear from the exposed (human) side as well.

- Inspect carefully for any signs of wood deterioration from insect or fungus infestation before beginning interior woodwork repairs. Check for hidden damage by knocking on apparently sound wooden surfaces to determine their solidity. Cure the source of any infestation and replace any infested wood.
- Make all required structural repairs and correct damp conditions before beginning work on interior wood trim. Reinforce any sagging wooden flooring by strengthening joists and inserting shims where floorboards no longer bear on a joist.
- Store all new wood for interior work inside the building in conditions of similar moisture and temperature (out of harm's way) long enough to stabilize its dimensions. Don't fix *any* new wood into permanent position until it has "seasoned", for several weeks at least.
- Remove damaged trim for repairs (or to permit structural or plaster work) only when necessary. Pry moulding or casing very gently from its backing, doing as little damage as possible to adjacent plaster or woodwork. Use cardboard or wooden wedges and blocks as cushions and pry the trim off a bit at a time rather than all at once.

Well crafted woodwork and plaster complement each other, with motifs that even follow through to the tile floor.



- Use dovetails, tenons, dowels, splines and other wood-to-wood joints in keying new wood to old, rather than (or in addition to) metal fasteners. Do not glue woodwork to other finishes. Keep any epoxy or filler repairs from adhering to other surfaces.
- Replace severely damaged trim with wood of the same species, cut and section. Replace simple mouldings in one piece; build up complicated sections from two or more simpler sections. Do not use plastic or metal replicas of wooden moulding.
- Do not replace missing trim with mouldings out of character or style with the style(s) of the building. Use fine-quality millwork to fill in for missing trim of that character, rougher sections to suit a less refined context, and so on.

See SUPERSTRUCTURE and EXTERIOR WOODWORK.

Plaster and lath

Plaster at its most basic is simply powdered lime or gypsum, mixed in water and normally applied to a supporting lath — traditionally a series of wooden strips fastened to wall studs or ceiling joists; more recently a heavy-duty metal mesh. Its base coat, traditionally reinforced with binders such as animal hair and inert aggregates such as sand, pushes through and "keys" to the lath. A second coat of similar constitution, keyed in turn to the roughened or scratched surface of the base, straightens out any obvious irregularities. The third coat, its surface whitened and smoothed (in traditional practice with added lime), provides a relatively soft but sound base for paint or wallcoverings. Historic lime-based plaster tends to be softer and more porous than modern gypsum-based plaster, Though the two can and do bond to each other reasonably well under dry and stable conditions, dampness will bring out their different rates of absorption and expansion or shrinkage, creating stresses and cracks, even disintegration.

Drywall (plasterboard, sheetrock, gypsum board, Gyproc, etc.), a hard plaster board with a paper surface, has now supplanted most wet-plaster work, either as a surface for direct finish or as a substitute for the base coats and lath beneath a more traditional finish coat. Traditional plaster on lath is usually thicker

than drywall and much slower to apply (it needs to dry and cure properly between coats). It demands more skill in application, but because it is softer and thicker, it is a far better absorber and insulator of sound than drywall. It absorbs noise rather than transmitting it and deadens the harshness of reflected sounds.

- Make sure that existing plaster is sound, solid, and well-keyed to its lath. Where the surface has bulged, crumbled or detached, concealed moisture is most often the culprit. Ensure that no exterior surface leaks are letting water in behind the plaster; keep humidity differences between rooms to a minimum. Repair all subsurface problems before finish plaster work.

An ornamental plaster ceiling worth preserving (above): though the sprinkler system's pipes interfere with it visually, they have not actually caused much physical damage; perhaps they may be concealed in the course of future work. And a woodwork detail worth preserving (right): sliding wood doors with overlapping covers that conceal the slots when the doors are fully retracted.

- In patching small cracks or areas of damage, make sure that the edges of the existing plaster have been cleaned up and undercut to hold the patching material. Use a non-shrinking compound to fill in damaged areas and use at least two coats for any repair (even three if keying the repair directly to the lath), making the final finish coat no thicker than 3 mm (about an eighth of an inch).
- In major repairs, where large sections of plaster require replacement, maintain the thickness of the original plaster in whatever combination of wood, metal, or gypsum lath and new plaster is used. Remove carefully any wooden trim before working on the repair and refasten it afterwards in the same location.
- Wet the wooden lath before applying any plaster repair that must key to the lath, to keep it from drawing water out of the drying plaster too quickly. In addition, when using a bonding agent to help tie the repair to the existing plaster, use a compound formulated specifically for plaster, not a more general-purpose agent.
- In repairing or replacing concealed utilities or correcting structural deficiencies, remove as little sound plaster as possible. Do not gut old plaster walls and ceilings wholesale. Do not remove sound historic plaster merely to substitute plasterboard. Historic plaster has a number of hard-to-reproduce thermal and acoustical characteristics; it is not merely a neutral flat surface.
- Retain and repair existing bowed or sagging ceilings rather than replace them, if at all possible (for both acoustical and decorative considerations; see below). The lath itself may have separated from the joists, or the plaster may have lost many of its keys into the lath (because of other structural problems, moisture, deterioration of the nails holding the lath, even animal infestations). Reattach loose

lath and detached but sound plaster from above (by temporarily lifting floorboards if necessary), vacuuming out all accumulated debris and broken plaster, repairing any broken lath, and screwing detached lath back into the joists. Make sure to undercut the edges of any plaster removed for these repairs, to permit a good bond with subsequent patches. Large areas of sagging may be pushed back into place from below and reinforced from above by bonding new plaster to the old to re-key it to the lath, reinforced with wire mesh and battens tied to the joists as required.

- In reattaching wall lath that has pulled away from partition studs or the structure itself, remove only enough plaster to reconnect the lath securely (with screws and with perforated or wire-mesh washers to help key the repair) and cover the repair with plaster of similar composition to the rest of the wall. More severe problems can be handled with techniques similar to those for ceilings.
- Give all plaster repairs sufficient time to dry and cure properly. Allow extra time for the finish coat to cure before applying paint or other coating.
- Before refinishing repairs, apply a coat of white shellac over new plaster to seal its surface and keep it from absorbing moisture from paint or other covering.

A mildly eclectic Victorian public interior (below), with an ornate plaster ceiling rose yet modest Classical woodwork. A more unusual example (bottom) of Georgian plasterwork: the decorative baseboards, cornices and door surrounds are different in each room.

Decorative plaster

Decorative plaster ranges from relatively simple cornices that keep irregularities of domestic walls from clashing too horribly with irregularities in their ceilings to the ornate coffered ceilings of monumental public interiors. In between are mouldings, brackets, columns, pilasters, baseboards, ceiling medallions, even architectural sculpture. Plasterwork was recognized as a sculptural skill, and its practitioners were regarded as expert craftsmen. As building became industrialized in the 19th century, many of these ornate features were mass-produced as prefabricated plaster-and-wood concoctions, attached by less skilled labourers and plastered into place.

- Consult an expert before undertaking major repairs of any decorative plaster. Anything beyond the most simple repair of cracks or pits in plaster ornament is the province of skilled craftworkers. In many cases ceiling rosettes and cornices may be consolidated and repaired along the lines of the basic repairs above. But in extreme cases the decoration will have to be carefully removed and reattached, often piece by piece.
- If decorative plaster has disappeared or deteriorated so badly that its substructure and internal composition cannot be rehabilitated, replace or restore the feature according to project records and historical documentation. Some ornamental plaster firms stock cast-plaster cornices, columns and other interior features that may match exactly a deteriorated feature. They may also make a mould in latex or plaster of a sound existing feature for replication in plaster-of-paris or a stronger compound. These can be attached to the wall or ceiling structure with screws or bolts, and any small gaps plastered over discreetly.
- Do not, however, install a stock decoration as "historic" without evidence for such a feature's historic existence. In the absence of interior photographs, inspection of the ceiling plasterwork from above should indicate locations where ornaments and fixtures were formerly fastened, and inspection from below may reveal a faint outline of a former ornament.

Interior finishes

Principles

2.1 Co-ordinated work
2.2 Co-operation among specialties
2.3 Work in order
4.1 Respect for (natural) aging process
4.4 Respect for uniqueness (pattern, ensemble, detail)
4.6 Minimal conjecture/informed invention
6.2 Maximum retention
6.3 Patina preserved
6.4 Respect for craft
7.1 Traditional repair (proven technology)
7.2 Replacement in kind/ recycled materials
7.3 Reversible repair
7.4 Cautious high-tech repair
7.5 Recipes tested before application
7.6 Maintainable repairs
7.7 Gentle cleaning
9.2 Faithful maintenance

References

There are many quite helpful references for repairing and reproducing interior finishes, but the most important book to mention here is SAND84 — though it is specifically about cleaning and housekeeping, it is those that are in fact the most careful conservation treatments.

For guidance on paint sampling, and on matching colour and chemistry, see KITC83, MILL77 and FEIL82. For help on preparation and repainting for conservation projects, see DAVE80/86, OLDH85, POOR83 and WRIG86. On special painted finishes, see ONEI71 and PARR85, for wood, see JOHN83.

Other useful sources are FINE86, KAPL78/86, KIRK84, LAND82, MCCA85, MILL87, PAIN78, SEAL79, SHOP86, STAG76, STAH84, THOR84, TIMM76 and VILA81.

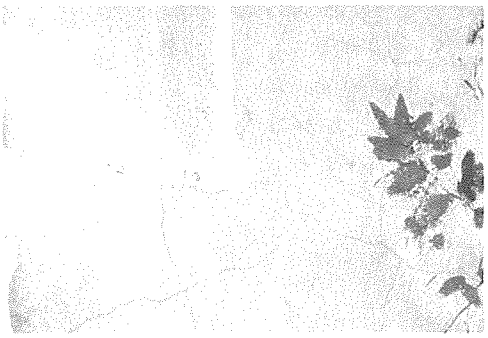
Respecting interior finishes

It is extremely rare for interior finishes to survive use, age and changing fashion for more than a few years without being altered or covered over. Traces of early finishes may appear inside subsequent walls, or beneath mouldings or repairs, and may be corroborated by historic photographs, even family snapshots. Because historic "authenticity" must vie with current taste in renewing the finish of many interiors, the modern-day use of the space must direct conservation and maintenance decisions — a private residence endures wear and tear quite different from that of a museum-house.

- Protect all delicate surfaces and finishes from inadvertent damage during conservation. Do the work in order, so that any repairs to such surfaces are carried out at the end, after heavy-duty tasks are completed and cleaned up.
- Repair any underlying deterioration behind the surfaces of walls, floors and ceilings before conserving their finishes or refinishing. Correct any moisture damage, consolidate weakened base material, and stabilize any structural problems. Cure any damp conditions. Interior finishing should be the last major task. Clean up major messes before delicate finishing work.
- Use only the gentlest means possible in cleaning surfaces and finishes. Safeguard texture and sheen where these are essential qualities of the interior. Clean all delicate finishes by hand.
- Unless there is evidence of significant material deterioration, do not add protective finish to historically unfinished materials.
- Do not alter the character of historical finishes — do not substitute a stripped-and-sealed wood finish for a previously painted or grained finish.
- Do not expose an unfinished structural or historically hidden surface by removing historic finishes.

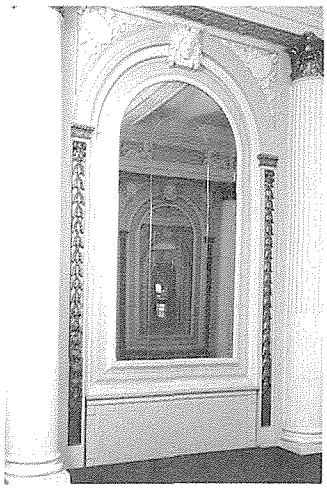
Paint

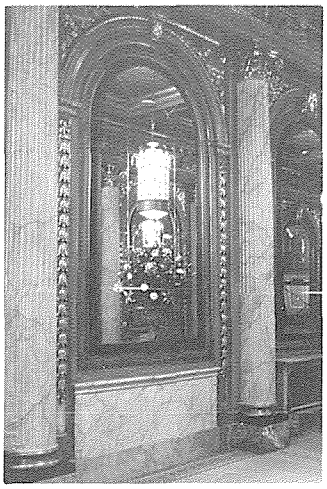
- Take paint samples from all surfaces requiring renewal of paint and analyze and catalogue them with the project records. Determine the type of woodwork beneath the layers of paint; if hardwood, look very closely for signs that it may have originally had a clear finish (softwoods, even when used as finished flooring, tend to have been painted from the beginning, often grained to resemble hardwood).
- Be especially watchful for indications of stencil work, marbling, graining, and even figurative art painted directly onto the walls. Wherever possible, maintain or restore early decorative finishes, but at the very least cover them with easily removable protection (strippable wallpaper or removable varnish) before refinishing. Consult an expert on paint or fine art conservation before either revealing or covering any historic decorative finishes.
- If the actual historic colours are not suitable for current taste, at least maintain the general qualities of lightness or darkness appropriate to the original period and to other adjacent finishes. In regard to "authenticity" of colour, see PAINT, COLOUR AND LIGHT.



Taking special care to record colour schemes, as well as the progress of careful cleaning.

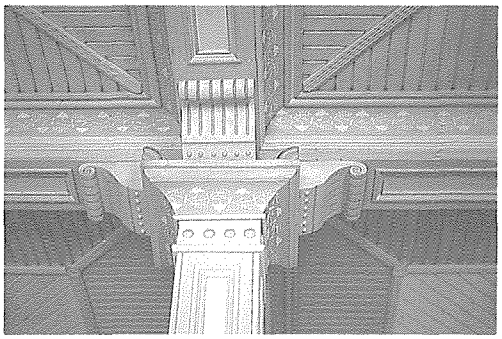
The process of restoring the original marbled finish to the plaster walls, pilasters and details, based on colours and patterns identified by documentary research and professional paint analysis (below).





- Maintain historically painted surfaces as painted surfaces. Repair damage to base materials and to painted finishes as required and record both the pre-existing state and the finished one for inclusion in the property's maintenance files.
- Use the gentlest means possible to remove deteriorated paint and remove only down to the next sound layer unless paint build-up obscures or conceals profiles of decorative trim. Keep a record of the colours of all paint layers removed.
- In removing lead-based paints, take all appropriate safety measures — wear a safety-approved face-mask, wash up thoroughly after each session, and dispose of all residues carefully in sealed containers. Do not sand lead-painted surfaces. Do not use a blowtorch to soften interior paint; hot-air guns or heat plates are sufficient aids and offer the least risk of releasing toxic lead as vapour or dust.
- Preserve and protect decorative paint finishes such as marbling and graining. Clean them with the most gentle methods possible (by hand, with art gum or bread dough). Where they are too extensively damaged to repair, reproduce them according to traditional techniques.
- Use vapour-*permeable* paint on interior walls where it is necessary that repairs and undercoats "breathe" and maintain equilibrium with the interior environment.
- Use vapour-*impermeable* paints on interior surfaces of exterior walls to help any vapour barrier keep humid interior air from condensing or freezing in the exterior parts of the wall section.
- When painting embossed features such as radiators, match their colour combinations to historic precedents and to the paint colours of the room as a whole. Paint the background colour last, wiping the embossed surfaces to reveal the highlight colour.

Other historic painting techniques that involve special care in conservation and restoration include stencilling and painting embossed surfaces (below).



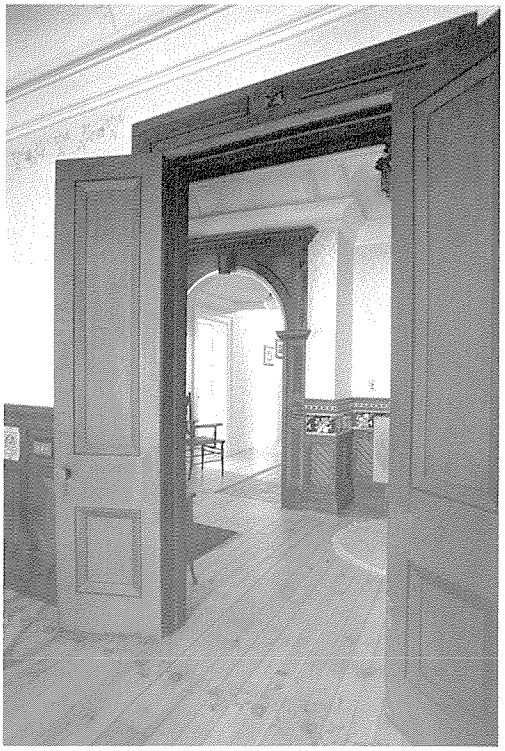
Wallpapers and fabrics

- In taking paint samples or in removing existing wall finishes, identify and record any traces of wallpaper or wall fabric in the layers beneath the existing surface. If possible, uncover as much of a single pattern-repeat as possible; if it is particularly old and rare (consult appropriate reference works or someone with knowledge of historic interiors), record it at life-size for the historical records of the building and the project.
- In some instances it may be possible to restore portions of old wallpaper, but consult an expert. Consider reproducing the original paper or replicating a similar pattern as a new finish if appropriate to the new use of the space. Be very careful not to damage the paper if removing it as a sample for reproduction.
- Conserve existing wallpaper if it is reasonably sound and historically valuable. Clean it with the gentlest means possible. Consult a conservator well versed in historic interiors when considering restoration — even cleaning — of any rare and valuable covering.

Floors

- Do not expose and treat wooden subfloors as finish flooring. Perhaps there never was a wooden floor on the subfloor; many late-19th- and early-20th-century residential floors had linoleum or even wall-to-wall carpeting installed directly on the subfloor. Traditional subfloors were invariably softwood good enough for a floor structure but not to be exposed.
- Provide protective coverings over delicate finishes in areas of heavy use. Put padded carpeting, or even a separate protective wooden floor, over historic wooden or tile floors in areas of heavy foot traffic.
- Be wary of using "low-maintenance" finishes, especially polyurethane, on woodwork. They will not adhere well to the wood if earlier finishes were oil-based or if there have been putty repairs to splits or nailholes. Polyurethane is hard and rigid and will not forgive movements in wood, especially softwood. It is prone to impact damage and burns and is hard to spot-repair. Oils, waxes, varnishes and shellacs are far preferable for wooden surfaces.
- Retain sound historic linoleum floors where possible. If they are damaged, replace them in kind or with a substitute material of colour and texture that match the historic finish as closely as possible.

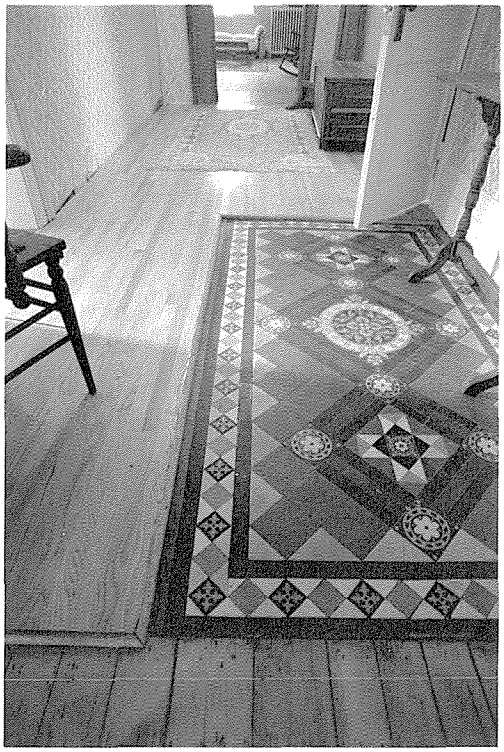
Behind a hinged wallpapered panel survives an important preserved archaeological fragment — a sample of the finishes before restoration (below).



(opposite and below)
This house is a treasure-chest of late 19th-century interior finishes — paint, tile, plaster, woodwork — all carefully treated in different ways. Some, such as the fresco-like wall and ceiling paintings and the tiled vestibule, have been protected and maintained rather than restored, while other walls and floors have been re-stencilled according to historic practice and surviving bits of old paint.

Other finishes

- Retain and protect any ornate manufactured finishes such as pressed-metal ceilings or wall-panelling, embossed wallpapers or Lincrusta-Walton dados or friezes. Replace these in kind if badly deteriorated. If at all possible use an authentic pattern from the building for matching and reproduction rather than a non-matching stock pattern. To make small pressed-metal repairs, use a patch of auto-body putty compound moulded from a wax impression of a sound portion or sculpted to match the embossing; make sure that the patch is keyed neatly into the original.
- Remove paint and any other coatings built up over historically unpainted metal finishes. Use an appropriately gentle cleaning technique and restore as well as possible the characteristic sheen of the surface — do not presume that the finish of brass, for instance, was necessarily mirror-bright. Use paste wax or clear lacquer of similar sheen to protect brass and bronze from heavy use. Do not use heavy or abrasive polishes.
- Retain and repair early ceramic-tile wall and floor surfaces rather than replace them. Ceramics are especially durable interior finishes, though damaged by impact. Ensure that damp conditions and moisture damage are attended to before any repairs — where necessary, replace damaged or rotted subsurface woodwork with treated or marine-grade wood and make sure that the area behind the repairs is ventilated to reduce future dampness. If a perfect match cannot be made, reattach broken tiles rather than replace them with new — rearrange them if need be to place sound tiles in conspicuous areas.



Fixtures

Principles

2.2 Co-operation among specialties
3.5 Specifics of uniqueness (pattern, ensemble, detail)
4.4 Respect for uniqueness (pattern, ensemble, detail)
4.6 Minimal conjecture/informed invention
5.6 Minimal removals
6.2 Maximum retention
6.4 Respect for craft
7.1 Traditional repair (proven technology)
7.2 Replacement in kind/ recycled materials
7.7 Gentle cleaning
8.1 Distinctive new work
9.2 Faithful maintenance
9.4 Conservation commemorated

References

Most advice about maintenance or replacement of fixtures is part and parcel of other conservation work; for general advice, see FEIL82, FINE86, GAYL80, HANS83, KAPL78/86, KIRK84, LYNC82, MILL77, MILL87, SHOP86, STAH84, STEP72, TECH82, THOR84 and VILA81.

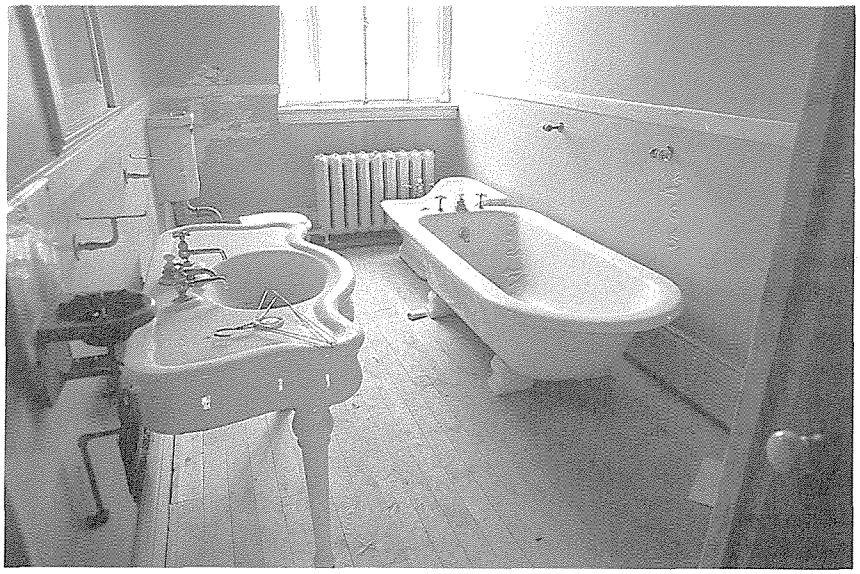
Keeping, reusing, recycling

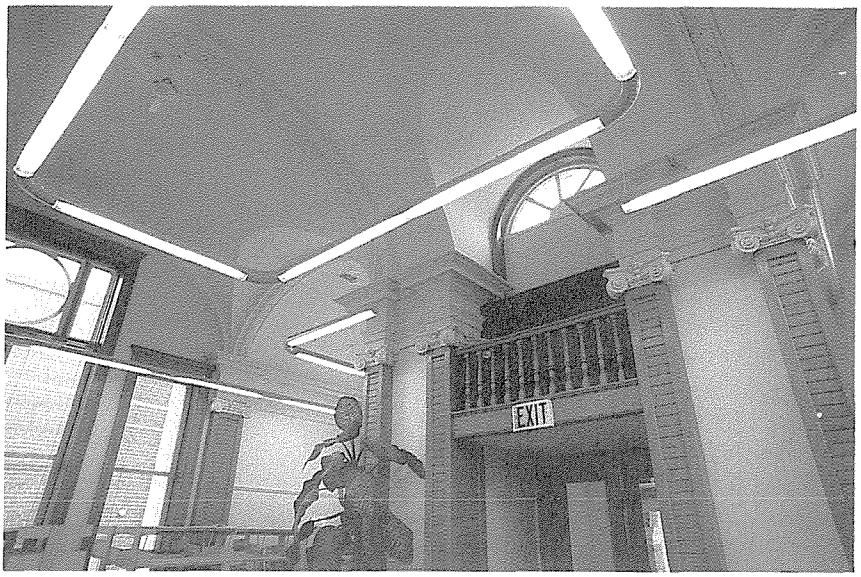
Fixed features of interior architecture shade gradually into movable furnishings. Features such as fireplaces, lighting fixtures, doors, built-in cabinetry, sinks and bathtubs, ventilation grilles and radiators sit astride the visible and tactile boundary between real and movable property. They often also comprise the "interface" between the normally hidden utilities and the appearance and uses of the interior.

Where interior fixtures survive that are distinctly part of the original or early years of a building, they afford a great opportunity to "key" rehabilitated or new uses and furnishings into existing spaces, just as plaster keys to its lath. Unfortunately, like doors, fixed (but detachable) fixtures tend to travel about like furniture in the antique market — and even into museums. This is both a problem and an opportunity: if fixtures have survived the antique hunters it is possible to recycle them within a building where they can no longer be useful in their original context or when they can complete a more prominent interior.

Some interior fixtures may be historically important for their use or technology as well as (or perhaps despite) their appearance. Industrial and commercial spaces may have many strictly utilitarian features — fire-hose cabinets, glazed partitions, machinery and so on — that may or may not still function but evoke historical activities. There is a trade in these utilitarian objects as well, so that many end up in shops or museums. When such items remain in a historic building, they offer an opportunity to give the building a new role in re-presenting and celebrating its own history, as a sort of museum without museum walls that keeps more of its history and interest alive as part of its everyday use.

- ❖ Retain and restore the operation of historic interior hardware — doorknobs and locks, kick panels, window latches, and so on. Do not substitute "period" hardware out of character and style with the building, and certainly none that antedates the building.
- ❖ Retain — where necessary restore — the quality and quantity of the original artificial lighting. Do not add "period" fixtures that were never there to increase overall lighting. Most historic interiors were not lit at the high-energy levels typical today. Provide discrete task lighting to satisfy any increased functional requirements and use concealed indirect lighting to supplement overall levels only if necessary.
- ❖ Retain and repair surviving fireplaces and mantels (even where they will no longer be used as fireplaces). Mantelpieces have been made out of almost every imaginable material and combination of materials, including hardwood, slate, ceramic tile, cast iron and marble. Refinish their surfaces according to the material. If a disused fireplace is to be used once more, ensure that the flue is clear and operable, that the chimney lining has been cleaned of hazardous creosote and other residues, and that the chimney itself is structurally sound from bottom to top.
- ❖ Retain and repair kitchen and bathroom fixtures, repairing their plumbing and refinishing them as required. Cure any moisture damage in the woodwork beneath, seal all junctions and gaps against water penetration, and keep those seals maintained. When seeking reproduction or replacement faucets and other fittings, try to find accurate matches to the originals where there is some evidence of their appearance. Retain and repair any historic marble or glazed washroom partitions and surfaces.
- ❖ Repair and restore the operation of interior window shutters. Remove excess paint build-up and ensure that shutters fold and fit properly into their pockets.
- ❖ Continue to use interior shades, blinds and draperies, as part of window operation.
- ❖ Do not automatically dispose of hardware or fixtures no longer integral to the building's basic uses. Retain and recycle fixtures to other purposes where possible, when they possess intrinsic visual or historical importance and can be used and interpreted to add interest to interior spaces of size and function suitable for their display.





New fixtures to match or fit

- Replace missing features in kind where possible — if necessary, where some elements (radiators, for example) are missing, consider swapping surviving features from less important locations and consolidate historic features in prominent areas. Base any substitutions on historic photographs and on archaeological traces of earlier fixtures.
- For modern services, use simple and inconspicuous fixtures that correspond in colour, dimension and proportion to their surroundings. Do not use inauthentic "period" fixtures — Georgian-style ornamental electrical switchplates and other obviously "olde-style" modern features.
- Incorporate the air handling and ventilating louvres of concealed systems discreetly, as slots or grilles aligned with and disguised by mouldings, cornices, baseboards and other linear features. Conceal them as well as possible, painting them to match adjacent interior colours where it is not possible to mask them otherwise.
- New radiators and other service elements should stand clear of historic surfaces and be relocatable or replaceable without damaging those surfaces.
- Where interiors retain their historic formality of space and finish, install smoke detectors, alarms and sprinkler heads using concealed hardware. Use recessed ceiling detectors and pop-down sprinkler heads. Alarm panels should be clearly visible and located near principal access points but should not impinge upon or damage historical elements and finishes.

When the occasional stroke of good fortune leaves mantels, fireplaces, ceramic fixtures and the like intact and in place, utmost effort should go into retaining them (top, middle).

Distinctive modern lighting in a formal classical interior lights the space well, follows the shape of the room, and does not confuse old and new — but this solution may be too bold for other situations (bottom).

Building services and equipment

Principles

1.3 Balance of use and preservation (cautious conversion)
2.1 Co-ordinated work
2.2 Co-operation among specialties
2.3 Work in order
5.2 Fitting use of existing spaces
5.3 Minimal alteration, minimal intrusiveness
5.7 Reconstruction for wholeness
6.2 Maximum retention
7.3 Reversible repair
7.4 Cautious high-tech repair
8.1 Distinctive new work
8.2 Added value (high quality) in new work
8.3 Complementary additions
8.4 Independent additions
8.6 Aided access

References

The best checklist for maintenance of mechanical and electrical systems is CHAM76. For guidance on general domestic repair and maintenance, see BLAC81, BLAC86, CENT86 and MCCA85.

Few sources look directly at both mechanical systems and heritage conservation to reconcile their potential conflicts; see HERI86a, HCPC94 and HERZ97. Domestic retrofits and upgrading are covered in COE84, FINE86, HUNT85, KAPL78/86, KNIG87, MELV73, NATC83, OLDH85, POOR83, SEDW83, VILA81 and WING83. Larger-scale examples are included in ELEY84, REID84, SHOP86 and STAH84.

Maintaining and upgrading "hidden" systems

Few historic buildings survive with their original wiring, plumbing or ductwork intact. Those services did not exist when most "historic" buildings were erected, and mechanical and electrical services have tended to wear out long before structures and finishes. Even in new construction, services have a much shorter life expectancy than the structure; in calculating the costs of a new building over its predicted lifetime, most estimators include major mechanical repairs as frequently as every eight years.

Apart from the specialized mechanical and electrical services required for industries and office towers, many different things and connections snake through even a small building's hidden spaces:

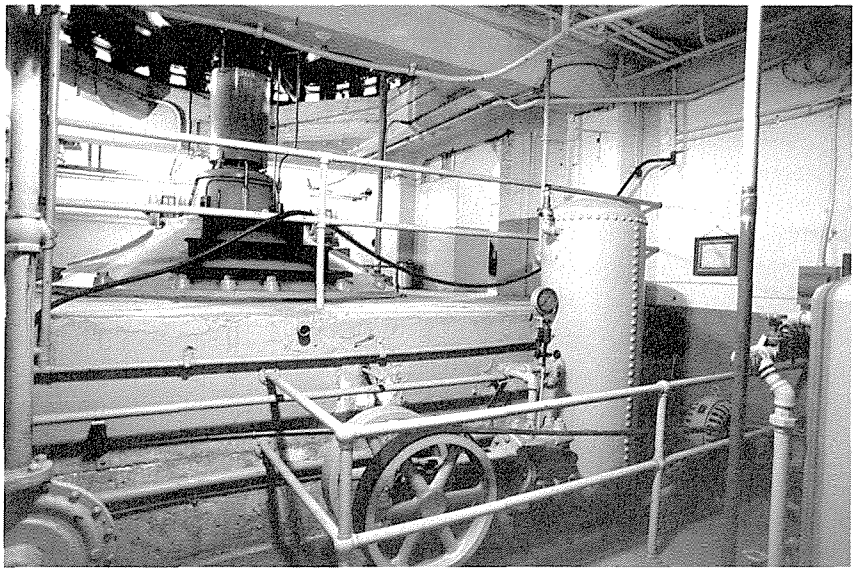
- ❒ Heating and ventilating — ducts, furnaces, pipes, controls, grilles, vents, boilers, compressors, heat pumps, central vacuum systems, air conditioners
- ❒ Plumbing — pipes, radiators, vents, valves, boilers
- ❒ Electricity — conduits, wires, junction and switch boxes, light switches, fixtures, outlets, alarms, sensors, transformers, generators, telephone cables, computer cables, switches, terminals, controls

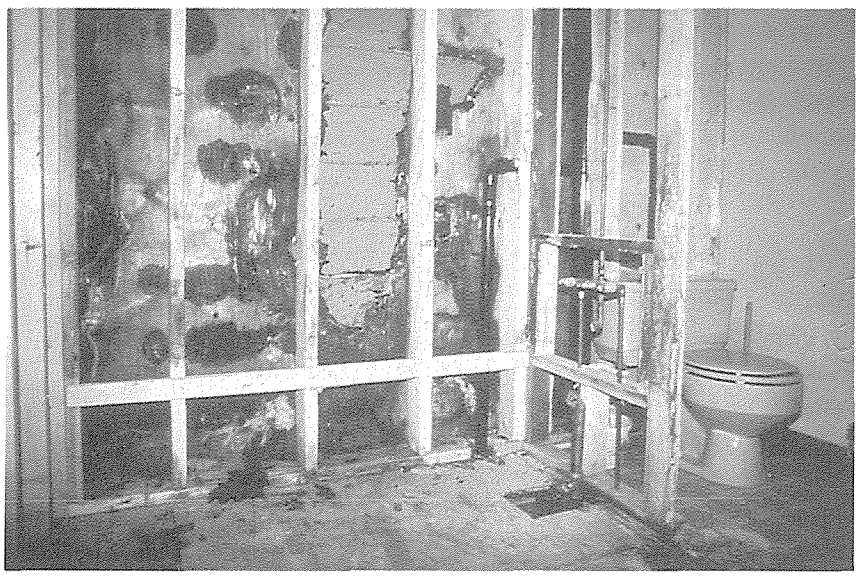
Most of these change far more rapidly than the architecture and structure of any building, sometimes more rapidly than interior layouts. Their importance for architectural conservation is indirect but profound. Leaks and condensation from heating and plumbing systems can create damp conditions that may damage structure and finishes; faulty wiring can cause the fire that burns the building down.

Repairs and replacements

- ❖ Whenever possible, retain and upgrade existing mechanical systems rather than replace them — not so much because of any intrinsic heritage value as because of potential damage to interior spaces and finishes in the course of replacements. Nevertheless, if the life of a mechanical system cannot be usefully extended because of its age or poor condition, replace hidden components with the most durable possible substitutes, and maintain the appearance and finish of the system's visible features.
- ❖ Ensure sufficient structural capacity to hold new mechanical equipment. Though an ideal location for some equipment may be in the attic or roof space, do not install any large heavy equipment that would disfigure the building's profile, transmit excessive vibration to the structure, or greatly increase the chance of leakage or condensation within the structure. As much as possible, locate new equipment in basement areas, existing service wings or areas or in new additions designed to support and conceal them properly. Ensure sufficient ventilation and access space in all equipment rooms and shafts.
- ❖ Do not replace a hot-water or steam heating system with a new forced-air system unless air ducts can be incorporated without impinging on or cutting through important historic spaces and finishes. Piping is much easier to conceal than ductwork. It may be possible to incorporate ducts in risers in a new addition, but ensure that horizontal ductwork can be accommodated without undue damage to the existing building.
- ❖ Do not cut through structural supports to install services. Repair or reinforce previously damaged supports. Wherever possible use existing gaps, shafts, chases and service spaces for new or replacement pipes and conduits.
- ❖ Insert louvres, grilles and vents as discreetly as possible.
- ❖ Ensure that all new pipes and conduits can be reached for repairs without damage to historic finishes and materials. Use existing openings as access hatches where possible or locate service shafts in modern additions.

See FIXTURES, INTERIOR FINISHES.





Internal environment

The new or rehabilitated internal environment must not hasten deterioration of the building that contains it. Upgrading of some systems and aggressive energy conservation measures can cause condensation that may lead quickly to far worse deterioration from trapped moisture in the structure and finishes. Fumes or decay products from new materials can attack the existing fabric or even create problems for occupants (urea formaldehyde insulation being the best known example).

- Maintain a stable equilibrium of temperature and humidity. Humidify the interior in winter only when there are requisite air and vapour seals properly installed and do not make it so humid as to trap condensation within exterior walls or spaces, where moisture may freeze and cause structural or material deterioration.
- Use vapour barriers wherever necessary to keep warm humid interior air from condensing against cold exterior surfaces, but also ensure that areas where moisture may be trapped are ventilated to permit evaporation. In general, because they have usually established an equilibrium already, let old buildings "breathe" to the outside.
- Only where sufficient precautions against condensation have been taken in the fabric of a historic building should its environment be joined with that of an air-conditioned addition. Do not permit air and vapour pressure from a new addition to drive moist air *into* the fabric of the old building. As much as possible keep their environments separate, especially their humidities.

See BALANCING HERITAGE, COMFORT AND ENERGY EFFICIENCY.

In some buildings the mechanical equipment is the major inhabitant, deserving of special attention in its own right for how it looks as well as what it does (top).

In residences, regular attention must be given to heating and plumbing (middle), and to the damage that humidity and condensation can cause in inadequately ventilated areas (bottom).

Balancing heritage, comfort, and energy efficiency

Principles

1.3 Balance of use and preservation (cautious conversion)
2.6 Second opinions when in doubt
5.3 Minimal alteration, minimal intrusiveness
7.3 Reversible repair
7.4 Cautious high-tech repair
7.5 Recipes tested before application
7.6 Maintainable repairs
8.5 Energy conservation

References

For more technical detail on the problems of overly enthusiastic energy conservation retrofits, and on some satisfactory alternatives to the conventional approaches, see HERI86, HERI86a, and HERI87a/87b. Good additional background information is available in POOR83 and SEDW83. Mechanical retrofits are covered in COE84, KNIG87 and WING83.

Other useful sources include CENT86, ENER84, HUGH86, KAPL78/86, NATC83, SHOP86, STAH84, TECH82, THUR83 and VILA81.

Environmental equilibrium in old buildings

Though energy conservation has become a watchword of the past decade, the struggle to keep warm in Ontario winters (and cool during parts of its summers) is not a new phenomenon. Every building has been constructed both to keep out the elements as much as possible and to offer a comfortable interior environment. But whereas traditional approaches to wintertime comfort involved fireplaces, stoves, doors, windows, heavy sweaters and heavy curtains, modern standards demand that the entire building be comfortably warm, despite fuel costs. Modern energy-conserving strategies are correspondingly more technical and comprehensive, and that means trying to adjust the building itself to retain its heat in winter far more than its builders could have anticipated.

Much of the adjustment is still in the hands of occupants, whether or not the building is inherently energy-efficient. Consider windows. Curtains, windowshades, shutters and operable windows help keep warm air from leaking through cold windows in winter and yet cool and ventilate the same area in the heat of summer. Winter performance will improve with better weatherstripping and perhaps double-glazing; summer performance with better shading and the free air flow of natural ventilation (or with double glass and air conditioner — cooler but less efficient).

But radical differences in temperature create the risk of condensation in the height of both seasons. Condensation — with consequent frost damage and salt crystallization in masonry walls, rot and disintegration in mouldy woodwork, peeling and disintegration in plaster and paint — is the major evil lurking inside too-heavily sealed and insulated historic buildings. The visual damage wrought by slapping new-building parts onto structures of architectural and historical distinction may not bring imminent collapse, but wood rot and spalling brick will.

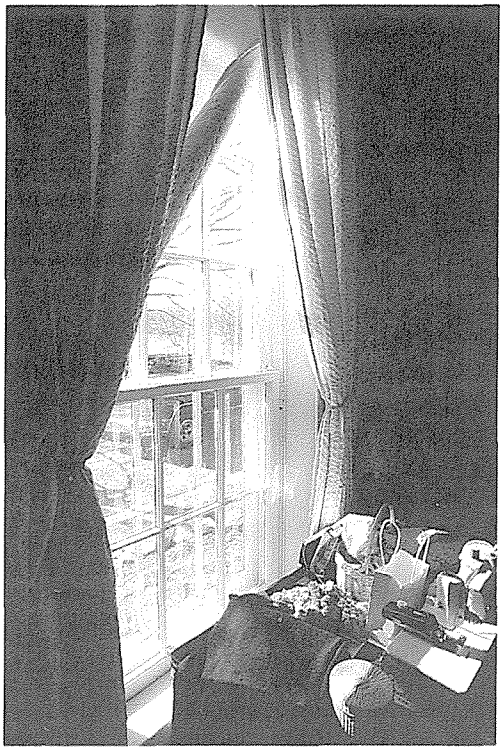
- ❖ Maintain, and use, the inherently energy-conserving and comfort-enhancing architectural features of historic buildings:
  - ❒ Vestibules as winter air locks, porches to cut winter winds and protect entrances
  - ❒ Porches for summer shade
  - ❒ Gable vents to help keep attics dry
  - ❒ Thermal mass of masonry walls to even out daily temperature extremes
  - ❒ Operable windows for flow-through summer ventilation
  - ❒ Operable interior shutters for winter window insulation and draft-proofing
  - ❒ Drapes, curtains and blinds for winter window insulation and draft-proofing
  - ❒ Operable exterior shutters for wind-proofing and summer shading
  - ❒ Exterior awnings, interior windowshades for summer shading
- ❖ Keep interior humidity within a range that will not lead to damage by condensation. Ventilate all areas tending to dampness — kitchens, baths, basements, laundry areas, potentially leaky attics. Do not dry laundry inside without direct exterior ventilation (this is often the major source of household humidity).
- ❖ Turn the thermostat down (manually or automatically) at night during winter. Close doors to seldom-used rooms to reduce the area needing full heating.
- ❖ Keep heating and ventilating mechanisms — furnace, vents, water heater, plumbing, ductwork, etc. — well maintained.

The hazards of enthusiastic energy conservation

Most manuals on energy-conserving retrofits ignore the architectural character of the existing building. Much of their advice is worthwhile as far as it goes — it simply goes too far. Keep in mind the following hazards and constraints.

- ❖ Inspect thoroughly for energy-conserving potential in a historic building and incorporate appropriate measures as part of the larger conservation project. But beware — energy savings alone will not pay back much more than the costs of modest caulking and weatherstripping and updating the efficiency of mechanical equipment.
- ❖ Air-sealing — tightening up the flow of air through exterior walls by weather-

Traditional and effective energy-conserving measures: winter vestibule, often removable in summer (below); double-glazing — a standard window inside, a complementing storm window outside, and an insulating air-space between — together with heavy drapery that makes another air-space inside (right).



The deep, wide porch is a traditional architectural feature that provides shade in summertime heat and shelter against winter winds (above).

Energy conservation taken far too far, hiding almost all traces of the building in a cocoon of insulation and vinyl siding that is likely to cause decay far more expensive to repair than any possible savings in heating bills (right).

stripping, caulking and repairing cracks — is the most generally useful and least problematic energy-conserving strategy for historic buildings. But ensure that there will be sufficient air changes to ventilate living spaces and prevent build-up of harmful exhausts (most notably carbon monoxide and other furnace-combustion by-products) — don't "tighten" a building without providing enough ventilation for the health of the occupants.

- Generally, do not insulate without using vapour barriers and air barriers *on the warm side of the insulation*, but select and install these barriers very carefully. The wrong material — or even inadvertent gaps or tears in the right material — may well concentrate accumulations of moisture and drastically increase the risk of condensation and its attendant damage.
- Ensure as much as possible that moisture does not condense where it will lead to damage in the form of wood rot, corrosion or freezing. Be especially careful about relative locations of insulation and air and vapour barriers. Be especially watchful for signs of paint deterioration that may betray moisture build-up or rot. Vent high-moisture areas (baths, laundries, etc.) directly to the outside.
- Make sure that reused fireplaces and chimneys have been brought up to modern safety standards and that there are no exposed wood members in chimneys. Be wary of automatic flue dampers and similar modern combustion devices in a partly recycled system; they may not function properly.
- Provide sufficient air space around insulated features — especially electrical devices — to prevent overheating that may lead to fire.
- When installing new insulation, do not inadvertently leave water pipes in uninsulated conditions.

See FOUNDATIONS, ROOFING and WINDOWS.

Visual harmony and good fit

Principles

1.3 Balance of use and preservation (cautious conversion)
1.4 Viable use
3.5 Specifics of uniqueness (pattern, ensemble, detail)
4.4 Respect for uniqueness (pattern, ensemble, detail)
5.2 Fitting use of existing spaces
5.3 Minimal alteration, minimal intrusiveness
5.7 Reconstruction for wholeness
5.8 Moving as last resort
5.9 Façadism as last resort
8.1 Distinctive new work
8.3 Complementary additions
8.4 Independent additions
8.6 Aided access

References

For aspects of the visual relations of old and new, see BENT85, CHIT85, EDWA46, GOON80, HIST78, ICOM86, LANG78, LYNC72, MADS76, NATI80, PYE78 and RENY86. For guides to historic styles and features see, for instance, BLUM77, CHIT85, LONG87 and POPP83, as well as other sources noted in "Elements and styles" (page 20).

Functional aspects of planning and structure are discussed in BALL83, BAXT86, BUIL86, FEIL82, FERG86, NIBS80 and REID84.

Both visual and functional aspects of building additions are treated in ALEX77, BAKE83, BINN82, DIBN85, HOW86, PYKE80, SHOP86, STEP72 and TECH82.

See also the references in "Visual approaches and results" (page 84).

Old and new/context and contrast

Though it may not be recognizable in many modern projects, a central tenet of architectural design has always been respect for context, for the visual fit of the new work to its existing surroundings. Traditionally — at least until some Victorian styles — this respect for context has meant "fitting in" rather than "standing out", being a good neighbour to existing buildings and spaces, at least in towns and cities. The isolated building in suburb or countryside also "fitted in", but according to a different set of rules involving landscape and historical references to isolated "model" buildings of the past.

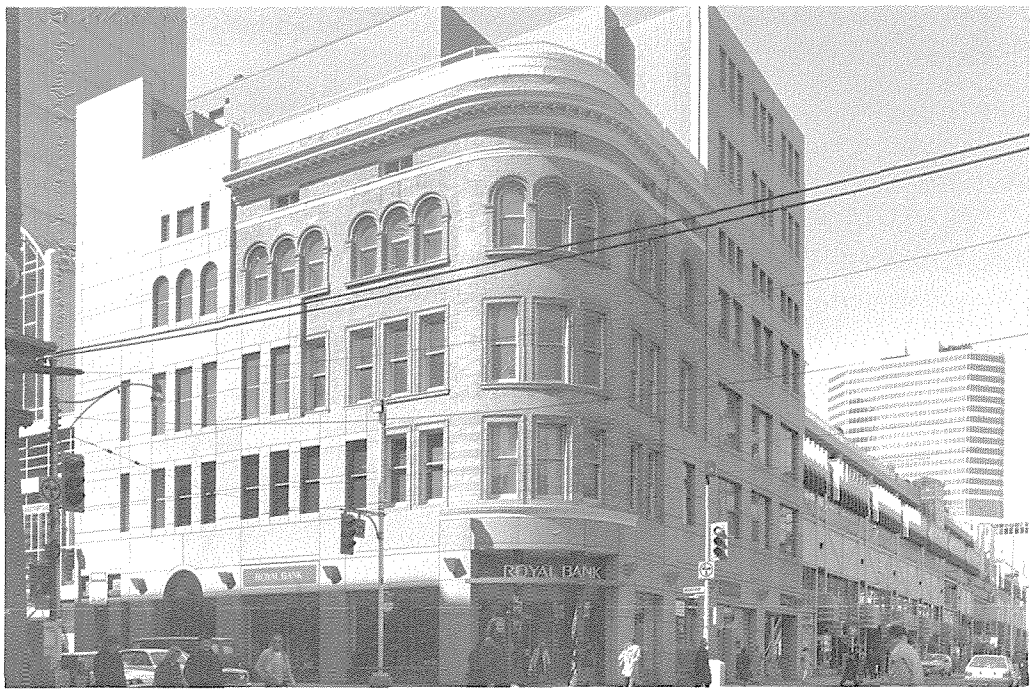
Victorian eclecticism added *contrast* to the architect's repertoire of respecting context. Though new buildings could be as wild as they liked, their extravagances were still within a definite context. Though battles to catch the Victorian eye were fierce, the more pragmatic considerations of property ownership and building cost, material and height still gave most streets overall consistency of form and character.

The modern "non-historical" styles of the 20th century furthered these contrasts to the extreme. So long as they were isolated examples in a larger backdrop of 19th-century buildings, they merely added variety and interest to the generally consistent mix.

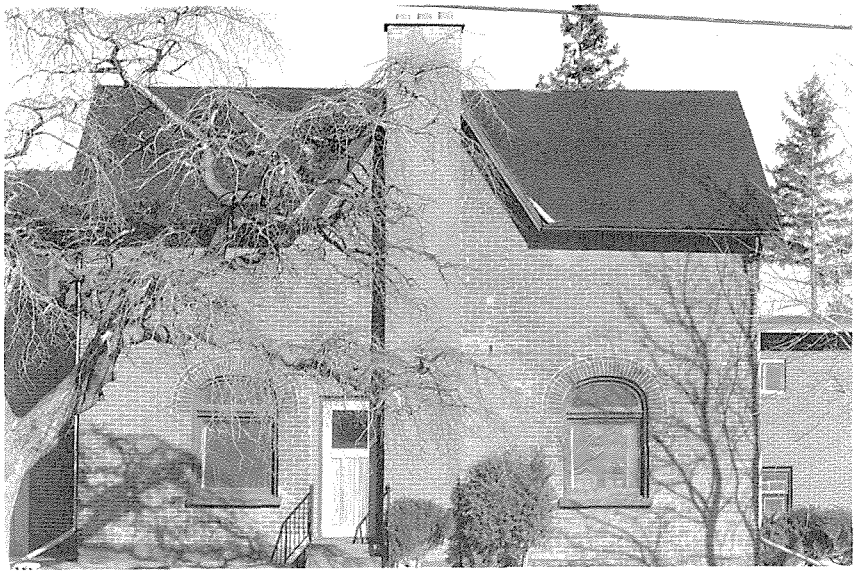
Indeed, the modern styles seemed to *require* this backdrop of "the old", to stand out in that much sharper relief by contrast.

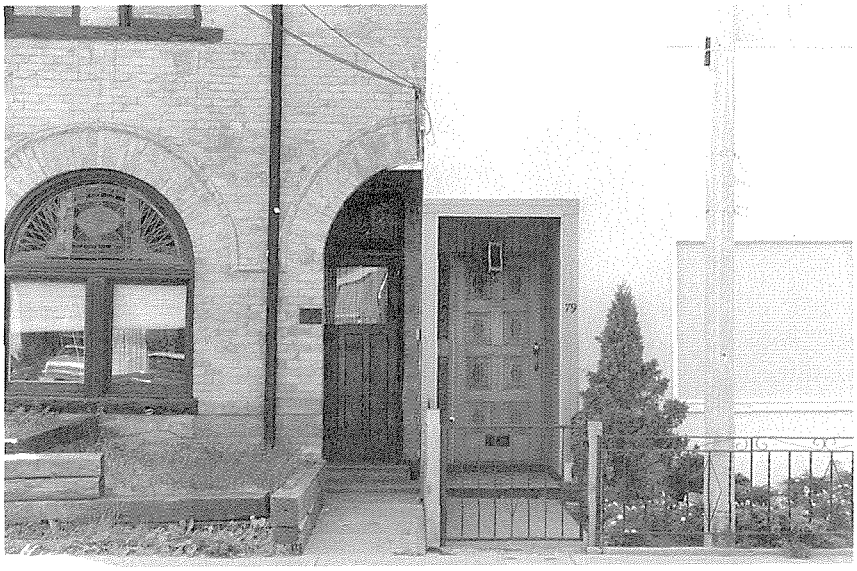
The modern styles themselves succeeded too well; they have not served to establish their *own* kind of context. Few modern buildings are good neighbours. Technology has permitted new buildings vastly out of scale and form with its surroundings. Historic architecture (whatever the merits of individual buildings) establishes a comfortable sense of continuity, but cannot tolerate unlimited contrast. Where the limit lies is difficult to say. How many per cent new to how many per cent old — or how many per cent *fitting* to how many per cent *rude*?

Not just for the sake of the building next door must new designs be fitting rather than rude. There is no longer enough historic context to tolerate the back-handed slap anywhere. New buildings must regain the amenity value offered by historic patterns of space, dimension and detail. Where they adjoin historic architecture, new buildings must strive to be good neighbours by helping to extend the context established by the old. An addition or neighbour to a historic building should stand on its own as a historic building of its own time — it must add to history, not take history away.

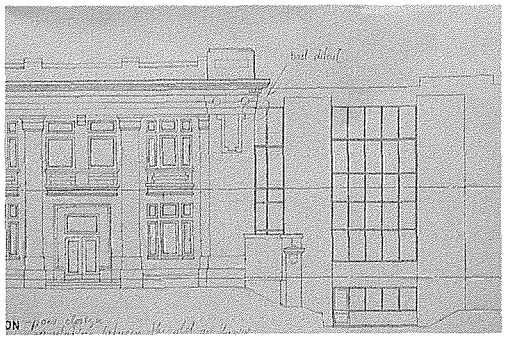


Though controversy may result from attempts to treat historic façades with less than complete reverence, there may be good reasons for it. Here, the historic façade had been covered by a 1950s metal screen whose fasteners had damaged much of the original masonry beneath. Architect, client and municipality agreed to respect what was salvageable rather than restore or recreate the original throughout. The new openings echo the proportions and rhythm of the historic windows, and the overall effect distinguishes old and new very clearly.





The opposites of good fit: new work that devalues the old, from the use of the front door as a fireplace and chimney (top); to the burial of half of the original brick façade, still visible on the left, inside a casing of stucco (above); to the mismatching of windows and walls in a new addition to an old building (right).



Four strategies of recognition and accommodation of new to old were elaborated in VISUAL APPROACHES AND RESULTS:

Reconstitution/period reproduction
Approximation/complement
Cautious contrast/self-effacement
Distinct contrast

The application of one of these strategies (or those that may lie in between) will vary with each case. But there are general correspondences between new and old that should apply to all new work in historic buildings, whether as exterior additions, interior additions, or the spaces between the two. VISUAL APPROACHES AND RESULTS dealt with the ensemble of old *and* new; the following remarks emphasize the new.

Making new harmonize with old

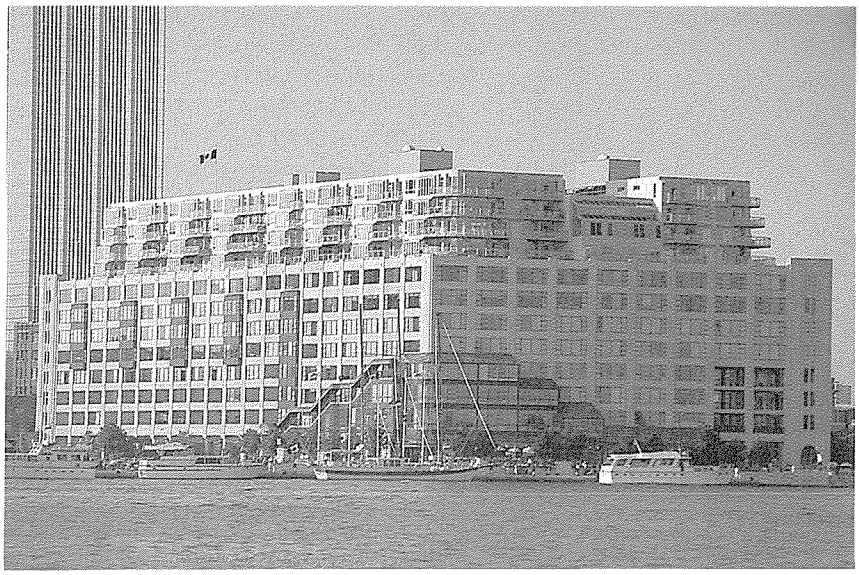
- New elements should relate clearly to one or more of the distinguishing characteristics of historic buildings. The profile and exterior materials of historic architecture are its most readily perceived character-defining aspects — ensure that the profile and exterior materials of the new harmonize with the old. Harmony is a complex relationship in music, and in architecture. A close match may not be harmonious at all if it attracts attention to clashing details. Use the criteria and features set out in "Identifying architectural character" (see INSPECTION).
- New work should stand on its own merits visually. Additions to the plan of a historic building should be demarcated in elevations by a clearly recognizable junction between old and new. Such a vertical line or feature need not be conspicuous but it should reveal the change from one period of building to another, regardless of the styles of each.
- Use new construction to provide services, accessibility and other modern requirements that cannot fit comfortably in the historic building.
- Design elevations for new additions based on features, materials, proportions, scales or symmetries of the adajcent existing elevations. Fronts should correspond and harmonize with fronts, rears with rears. Again, use the criteria and features set out

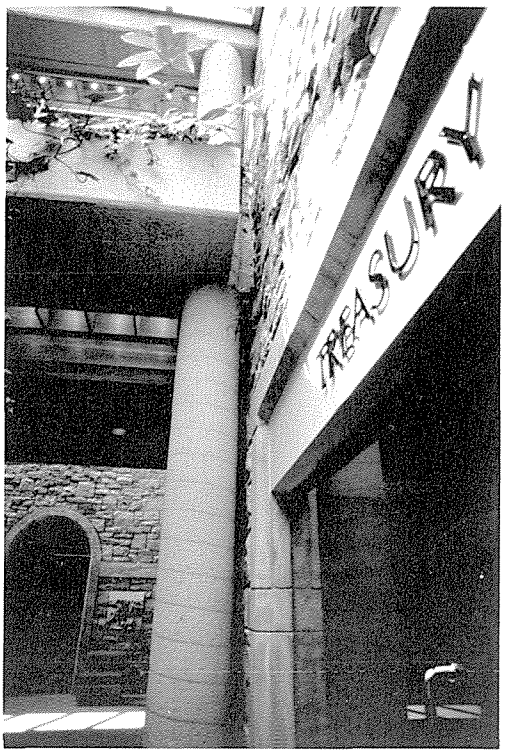
in "Identifying architectural character" (see INSPECTION).

- As far as possible, do not add to the height or roof of a historic building. Even the smallest change to a roofline alters the overall character of a building tremendously, and the larger the addition, the greater the damage, until at some point (depending on the scale and style of the original) the whole will appear to be a large new building with a small old façade tacked onto the front. At that point, the heritage value of the original may be reduced to that of a moved or disembodied façade.
- As far as possible, keep the height and bulk of new additions smaller than the existing building. When downtown conditions demand a much larger building than the historic building, the "addition" should be made to appear independent and *be* independent, excepting any smaller additions for services (see above).
- Make any bridges or independent connections appear to be light in visual terms and harmonious in material and detail to the historic building. Such connectors should join the existing building as far as possible at existing openings, preferably doorways or windows sufficiently large to enable their surrounds to be retained.
- Make vents, skylights and other new elements on the roof fit as discreetly as possible, both visually and materially. There are many traditional ways to conceal or incorporate such elements, as part of the roofing itself, or in conjunction with gables, dormers or chimneys.
- Keep satellite dishes, aerials, air conditioners and other "servant" features to the side or rear, the traditional places for such add-ons.

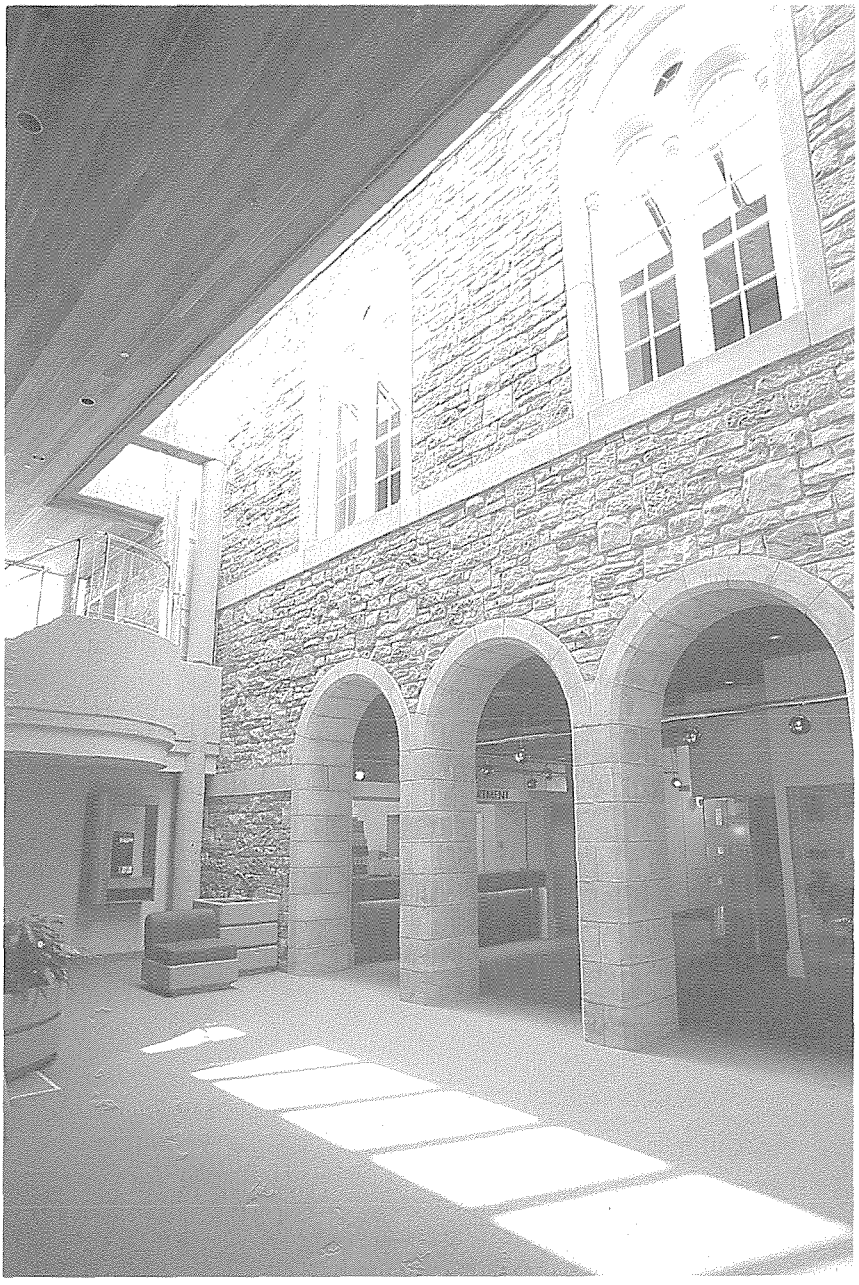
See INSPECTION and VISUAL APPROACHES AND RESULTS.

The tradition of new residential additions is an old one — here (below) it may not be immediately obvious whether the larger elements were added to the smaller ones, or vice versa (though closer inspection will tell), but the whole is a harmonious blend of profile and detail that can serve as a model for even the most contemporary treatment. For industrial buildings, robustness and size of an original may permit a robust modern addition, here set back on the roof (bottom left).





In making an exterior wall into part of an interior space, it is important to make the connection without demeaning the old. Here, on one hand, the actual physical connection has not been done well, butting the concrete to the stone with caulking, obscuring the texture of the older material and erasing some of the historic traces in the arched openings for the sake of neatness — but the overall character of the new space permits appreciation of the former exterior as an important historic element, daylit from above as it was before (opposite, bottom right, and below).



Connections — access and use

- Use new construction to provide services, improved access and other modern requirements that cannot fit comfortably in the historic building.
- Design new spaces and entrances to correspond with the historic spaces and entrances, using new access to satisfy building and other code requirements instead of altering historic spaces and finishes.
- Make floor levels of new construction correspond to existing floor levels of the historic building as far as possible. But try to incorporate necessary level changes and ramps within new construction in providing for handicapped access.
- Where a required elevator cannot be installed in the historic building, use a new addition to provide both elevator and links to floor levels of the existing building. Where floor levels cannot be made to correspond between old and new, use a double-sided elevator to permit connections between them.
- Keep new additions well fire-separated so as not to force the existing building to meet potentially damaging new-building requirements.

See PROGRAMMING AND USING SPACE and INTERIOR SPACES AND CIRCULATION.

Good neighbours: fitting new work to the old

- Use mouldings, flashings and expansion covers for their traditional purposes — to conceal junctions or gaps yet allow access to them if necessary — rather than make butt joints with sealants that will deteriorate in a few years. Covers and mouldings should appear to go from the new to the old, to make clear that the new is making gestures (snuggling up?) to the old, not vice versa.
- Always drain water from new additions *away* from the existing building.
- Keep the structures of new and old independent from one another, unless the new is designed deliberately to reinforce or stabilize the old (for instance, a new stair or service shaft to provide lateral stability to the older structure).
- Keep the foundations of the new independent from those of the old unless part of a purposeful underpinning of the old; do not compromise the existing foundation in new excavations.
- Ensure that adjacent materials do not have adverse chemical or physical reactions to one another. For example, be particularly careful about galvanic action where the same metal flashings cover both old and new.

Taking care: building operation and preventive maintenance

Principles

1.1 Planned conservation
1.3 Balance of use and preservation (cautious conversion)
1.4 Viable use
3.3 Informed reconnaissance/ inspection
3.6 Maximum information content/conservation of complexity
4.1 Respect for (natural) aging process
4.2 Respect for period/historic continuity, sequence
4.3 Respect for accumulations
5.2 Fitting use of existing spaces
5.3 Minimal alteration, minimal intrusiveness
5.5 Minimal emergency action/ stabilization to buy time
6.3 Patina preserved
6.4 Respect for craft
7.2 Replacement in kind/ recycled materials
7.6 Maintainable repairs
7.7 Gentle cleaning
9.1 Record of altered state
9.2 Faithful maintenance
9.3 Emergency plan
9.5 Records maintained and accessible

References

For periodic maintenance procedures and checklists, and for cleaning materials and techniques, see CHAM76, MCCA85, MILL80, MONC83, POOR83, STAH84 and SAND84.

Exterior maintenance is also treated in ASHU77, BLAC81, DAVE80/86, HOLL86, HOLM75, JOHN84, MEAD86 and SIMP78. For interior features, see also BLAC81, DAVE80/86 and STAG76.

Periodic inspections

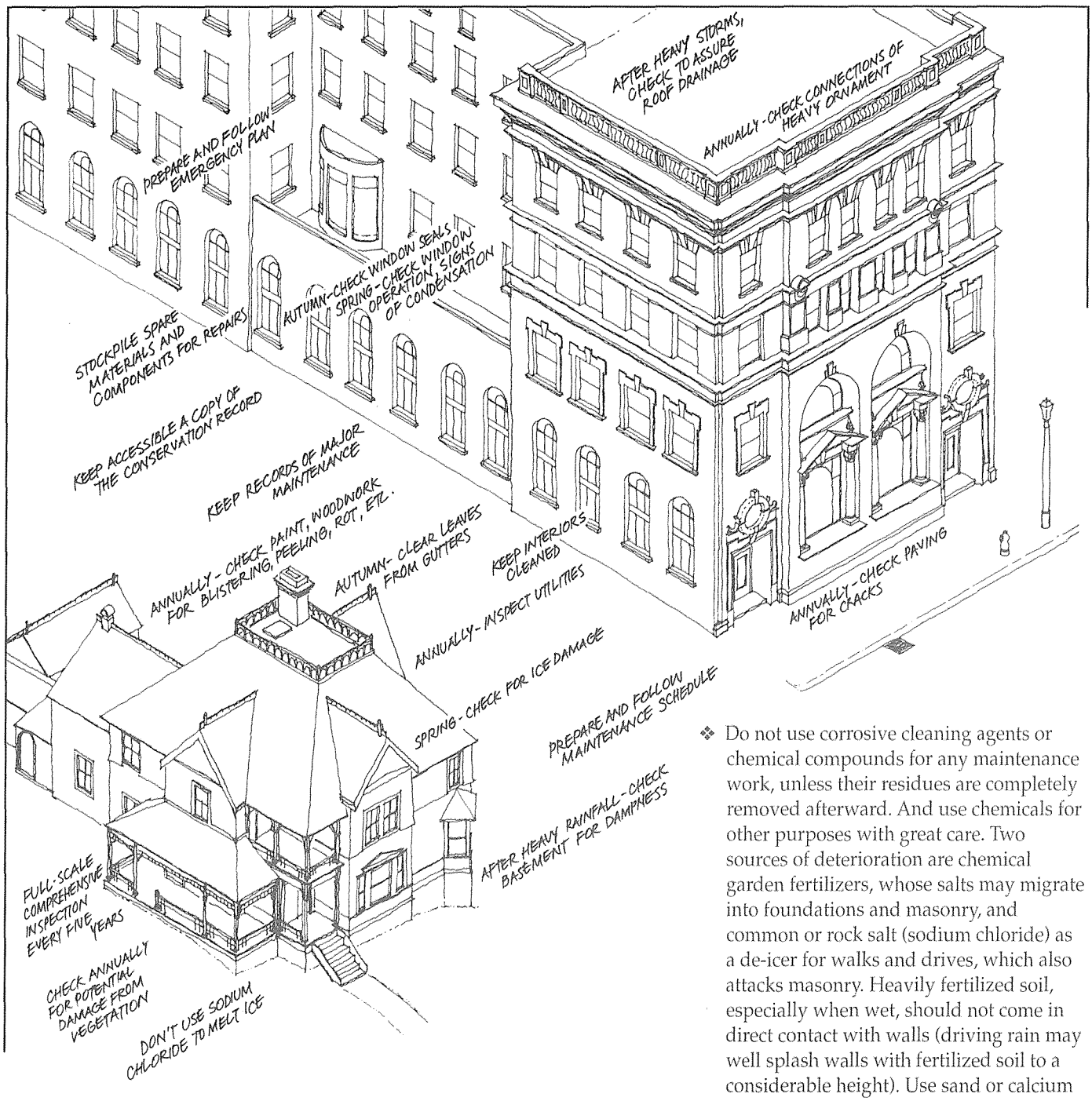
Daily, weekly and seasonal cycles of weathering and human use will take their toll on any building. The common assumption is that new or renovated buildings become "immune" to deterioration by virtue of the effort and expenditure involved in durable finishes, careful weatherproofing and new structure or utilities. This is very far from the truth. Even the newest building — *especially* the newest building — requires vigilance to spot errors in construction or sloppy installations where one of the many causes of deterioration might gain a foothold. No conservation project is truly finished. Each job must be inspected and maintained in the succeeding months and years to sustain the value and integrity of the conservation work and to slow deterioration as much as possible.

- Develop a schedule for periodic inspection suitable for the size and complexity of the building or site. Follow the general sequence of features laid out in INSPECTION. Pay special attention to the items listed under FAULT DIAGNOSIS.
- Give every building a thorough visual once-over, both inside and out, after major storms to check for leaks, water stains, blistered paint or other signs of water penetration that does not immediately dry out. Be sure to include quick looks into attics, basements and crawl spaces.
- Undertake a regular inspection, both inside and outside, at half-year intervals to deal specifically with moisture penetration and related problems. Ideally, such inspections take place in spring and fall. In the spring, pay special attention to problems hidden by winter snows, as well as more insidious decay from condensation. In the fall, pay attention to maintenance items, especially to cleaning out blocked drainage.
- Perform a more thorough inspection every year to check for faults in weather-seals; plant, insect or animal infestations; paint deterioration; cracks in plaster or woodwork; and human wear and tear on interior and exterior finishes. This sort of inspection is best done in late spring or late summer to leave time for any corrective work to be done in reasonable weather.
- Undertake a full and comprehensive inspection of the entire building and site at least every five years, with complete records kept for comparison to records of previous inspections as well as the original work. This inspection should be at least as attentive as the full-scale investigation needed for the original conservation work (though it will obviously take much less time). Pay special attention to any possible structural movements and to the operation and durability of utilities, particularly where these have been maintained through earlier modifications.
- Compile complete and clear records of all periodic inspections and attach these to the archive of information gathered for the project in the first place. This will be especially important in determining if errors in the project may be to blame for any general or localized deterioration.

Maintenance manuals and procedures

It is absolutely essential to have procedures and cautions for ongoing maintenance and repairs spelled out for every conservation project, though many procedures are commonsense and uniform from building to building. Most procedures will be tied to periodic inspections; for instance, blocked gutters and drains identified in an autumn inspection should be cleaned out then and there. This may mean, for this particular example, that in climbing the ladder to inspect the eavestrough, you should have a bag ready to carry the things pulled out of the trough or downspout.

- Prepare a comprehensive maintenance manual, to include: a basic checklist of work items and their priorities; how often they should be carried out; the time, people and tools required for the work; names and telephone numbers of consultants, suppliers and emergency contacts; and copies of the relevant drawings and specifications from the conservation work. Keep one copy of the manual readily available at the building itself; file a second copy securely in another place. In the case of a public building, or one of particular importance that may have received financial assistance



for its conservation, file an additional copy with the municipality or LACAC, or with the granting agency, to facilitate its availability in emergencies.

- Keep on hand a stock of spare materials for use in repairs — items like bricks, tiles, castings, fixtures and pre-cut lumber. Keep records and colour samples of all paints and finishes that will have to be renewed periodically.
- Do not use corrosive cleaning agents or chemical compounds for any maintenance work, unless their residues are completely removed afterward. And use chemicals for other purposes with great care. Two sources of deterioration are chemical garden fertilizers, whose salts may migrate into foundations and masonry, and common or rock salt (sodium chloride) as a de-icer for walks and drives, which also attacks masonry. Heavily fertilized soil, especially when wet, should not come in direct contact with walls (driving rain may well splash walls with fertilized soil to a considerable height). Use sand or calcium chloride on snow and ice as alternatives to common salt.
- Maintain environmental controls and procedures within specified limits to obviate condensation or material deterioration. Keep records of any changes made to those procedures, and their effects. Take special care to ensure that all ventilation elements are operating and maintained throughout the year.