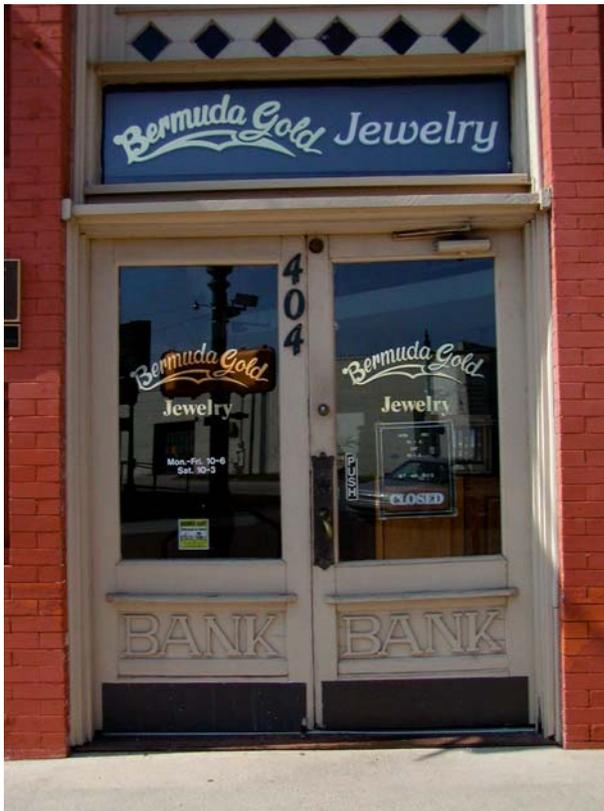


5.1 Door Technical Guidelines



5.1.1 INTRODUCTION

Whether commercial or residential, building doors and entrances express the character of the building and its' use, and are an important aspect of the architectural character of those buildings. In pre-World War II buildings and homes the importance of the front door was recognized by the care given to the design of the door. The front door was always a paneled door, constructed of top quality materials and styled to match the architecture of the commercial building or residence. Their design, craftsmanship, or other qualities make them worthy of preservation. The Secretary of the Interior's *Standards for Rehabilitation* and accompanying guidelines call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary,

replacing them in kind – this is particularly important for exterior doors to a residence or commercial structure.

Historic doors and sidelights should not alter the character of the building entrance by the removal of historic elements or through the addition of elements for which there is no historic precedent.

The retention and repair of original doors is encouraged whenever possible. Wooden doors, which are repaired and properly maintained, will have greatly extended service lives while contributing to the historic character of the building. Thus, an important element of a building's significance will have been preserved for the future.

Refer to ‘Door Design Guidelines, section 4.1 for design information regarding doors in historic properties.

5.1.2 PHYSICAL EVALUATION

The key to successful planning for door treatments is a careful evaluation of its’ existing physical condition. The condition of each door and sidelight should be recorded – this may be accomplished by graphic, photo-documentation or schedule methods (refer to the *Window Design Guidelines* chapter for more information on these methods). In any evaluation, one should note at a minimum, the following:

- 1) door location
- 2) condition of the paint
- 3) condition of the door, jamb, head and sill and sidelights (if any)
- 4) glazing type and condition
- 5) hardware, and
- 6) the overall condition of the door (excellent, fair, poor, and so forth).

Many factors such as location, poor design, moisture, vandalism, insect attack, and lack of maintenance can contribute to door deterioration. In north Texas, direct exposure to the harsh summer sun (particularly on the south and west facades) and moisture are the most common contributing factors in decay of wood doors. All components of the door openings should be inspected for evidence of deterioration: door jambs, sill, head, hardware and glazing within the door or sidelights.

The door sill should be examined to insure that it slopes downward away from the building and allows water to drain off. Any conditions, including poor original design, which permit water to come in contact with the sill or bottom of the door or jamb or to puddle on the sill must be corrected as they contribute to deterioration of the door.

Since excessive moisture is detrimental to the paint bond, areas of paint blistering, cracking, flaking, and peeling usually identify points of water penetration,

moisture saturation, and potential deterioration. Failure of the paint should not, however, be mistakenly interpreted as a sign that the wood is in poor condition and hence, irreparable. Wood is frequently in sound physical condition beneath unsightly paint. After noting areas of paint failure, the next step is to inspect the condition of the wood, particularly at the points identified during the paint examination.

Each door should be examined for operational soundness beginning with the lower portions of the door and jamb; these are typical points where water collects and deterioration begins. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick or awl to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small section of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

Another method of testing for soundness consists of pushing a sharp object into the wood, perpendicular to the surface. If deterioration has begun from the hidden side of a member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on the probe can force it through an apparently sound skin to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

At glass panes within a door, the glazing putty should be checked for cracked, loose, or missing sections which allow water to saturate the wood, especially at the joints. The back putty on the interior side of the pane should also be inspected, because it creates a seal, which prevents condensation from running down into the interior of the door.

Original hardware contributes to the character and design of the door, and should be retained if at all possible. Common factors in the maintenance of original hardware are the damage to the operation due to numerous layers of paint on hinges, door plates and sometimes door handles or knobs, and missing components.



**ORIGINAL DOOR
HARDWARE.**

Hardware may be removed from the door, and stripped of paint and re-finished, and then re-installed on the door. If missing components or pieces have made hardware non-operational, replacements may be found at restoration shops; there are several in the Dallas and Fort Worth areas and several mail-order restoration catalogs have a good selection of hardware and components.

5.1.3 REHABILITATION OF DOORS

Following an inspection of doors and sidelights, the scope of the necessary repairs will be evident and a plan for the rehabilitation can be formulated. Generally the actions necessary to return a door to "like new" condition will fall into three broad categories:

- 1) routine maintenance procedures
- 2) stabilization, and
- 3) parts replacement.

Please note these categories are based on similar categories established by the National Park Service for windows, although corresponding categories have not

been established for doors. Refer to the 'Window Design Guidelines' chapter for detailed information on these window rehabilitation categories.

Before undertaking any of the repairs all sources of moisture penetration should be identified and eliminated, and all existing decay fungi destroyed in order to arrest the deterioration process. Many commercially available fungicides and wood preservatives are toxic, so it is extremely important to follow the manufacturer's recommendations for application, and store all chemical materials away from children and animals. After fungicidal and preservative treatment the doors may be stabilized, retained, and restored with every expectation for a long service life.

5.1.4 ROUTINE MAINTENANCE

Repairs to wooden doors are usually somewhat labor intensive and relatively uncomplicated. The routine maintenance required to upgrade a door to "like new" condition typically includes the following steps:

- 1) some degree of interior and exterior paint removal,
- 2) weather-stripping and repainting.
- 3) repair or replacement of glazing

Historic doors have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the door and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed: scraping, chemical stripping, and the use of a hot air gun.

Paint removal should begin on the interior side of the door and door frames, being

careful to remove the paint from the interior stop where this meets the jamb. This can be accomplished by running a utility knife along the length of the stop, breaking the paint bond. It will then be much easier to remove the stop. The door itself can be stripped of paint using appropriate techniques, but if any heat treatment is used, any adjacent glass should be removed or protected from the sudden temperature change which can cause breakage. An overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change.

Deteriorated putty at glazing should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points, which hold the glass in place, can be extracted. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane. The final glazing compound or putty is applied and beveled to complete the seal. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weather-tight seal.

The condition of the wood in the jambs and sill should be evaluated. Repair and refinishing of the door frame may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

5.1.5 STABILIZATION

Many doors show some additional degree of physical deterioration, but even badly damaged doors can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a

sound condition, good appearance, and greatly extended life.

Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

One established technique for repairing wood, which is split, checked or shows signs of rot, is to:

- 1) dry the wood,
- 2) treat decayed areas with a fungicide (note that care should be taken with the use of fungicide which is toxic).
- 3) waterproof with two or three applications of boiled linseed oil (applications every 24 hours),
- 4) fill cracks and holes with putty, and
- 5) after a "skin" forms on the putty, paint the surface.

When door sills, sidelight sills or other horizontal members exhibit surface weathering they may also be built-up using wood putties or homemade mixtures such as sawdust and resorcinol glue, or whiting and varnish when minor areas of replacement exist. These mixtures can be built up in successive layers, then sanded, primed, and painted. The finish surface should be sloped slightly to carry water away from the door and building, and not allow it to puddle.

Wood may also be strengthened and stabilized by consolidation (the third technique), using semi-rigid epoxies, which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy patching compound, sanded and painted. Epoxy patching compounds can be used to build up missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done.

Any of the three techniques discussed can stabilize and restore the appearance of the door and frame. There are times, however, when the degree of deterioration is so advanced that stabilization is impractical, and the only way to retain some of the original fabric is to replace damaged parts.

5.1.6 DOOR REPLACEMENT

Although the retention of an original or existing door and sidelight is always desirable and these guidelines encourage that goal, there is a point when the condition of a door may clearly indicate replacement. Doors which have been previously replaced with inappropriate doors are encouraged to be replaced with those that are appropriate.

The decision process for selecting replacement doors should not begin with a survey of contemporary door products, available at home centers which are available as replacements, but should begin with a look at the doors that are being replaced. Attempt to understand the contribution of the door(s) to the appearance of the facade including:

- 1) the pattern of the door openings and their size;
- 2) proportions of the door, frame and sidelights if occur;
- 3) configuration of glass panes within the door;
- 4) type of wood;
- 5) paint color;
- 6) characteristics of the glass; and
- 7) associated details such as arched tops, hoods, or other decorative elements.

Develop an understanding of how the door reflects the period, style, or regional characteristics of the building, or represents technological development.

Armed with an awareness of the significance of the existing door, begin to search for a replacement which retains as much of the character of the historic door as possible; replacement doors should duplicate the design, proportion and arrangement of

paneling and glazing of the original door. Replacement doors should reflect the historic door opening and this should not be modified; for example, do not replace historic double-leaf (paired) doors with a single door and sidelights, and do not alter original opening to accommodate stock doors .

There are many sources of suitable new doors; continue looking until an acceptable replacement can be found. Check building supply firms, salvage yards in the Dallas Fort-Worth area, local woodworking mills, carpenters, preservation oriented magazines, or catalogs or suppliers of old building materials, for product information. The City of Grapevine Historic Preservation staff, local historical associations and state historic preservation offices may be good sources of information on products which have been used successfully in preservation projects.

5.1.7 WOOD DOOR SILL REPLACEMENT

Like doors, the retention of original wood door sills (or thresholds) is always desirable but it is sometimes necessary to replace this due excessive deterioration. If replacement of a sill is necessary, it should be removed when the door is fully opened. Start by prying the door stop completely off the frame, then try to pry up the sill intact for use as a pattern. If necessary, split it into large pieces with a wood chisel. Trace the outline of this on a board of equal thickness and cut a new sill to match this size or take the sill to a carpentry shop for cutting a replacement. New sills should be constructed of a hardwood (such as redwood) or southern yellow pine.



WOOD DOOR SILL

To install the new sill, drill pilot holes slightly smaller than the diameter of the nail or screw to be used to avoid splitting the wood. Countersink nails and fill holes with putty then stain or paint to match the original.

5.1.8 DOOR VENEER REPAIR

The framework of the door is often a solid piece of soft-wood with a thin veneer of oak, walnut or mahogany on either side. When moisture seeps in between the softwood and the veneer, they separate and the veneer begins to fray at the lower edge. To repair this condition, make the repair all of the way across the bottom of the door to avoid the appearance of an obvious patch. Cut off the ragged piece back to the sound wood, using a straight blade set to a shallow depth. Glue a new piece of veneer of the right size, color, and texture into place, and clamp together until glue sets. The new veneer may then be stained or painted to match the remainder of the door, although usually the entire door is repainted or stained.

To ward off future damage from scuffing, a kick plate may be considered for doors at commercial buildings, if appropriate. Kick plates may be installed quite simply with a drill and screws. Try salvage yards for interesting brass plates that match the other, original features of the door; copper and brass are good choices because they usually

match the finish of original hardware, and acquire a patina and can be shined. The plate should be at least 2” narrower than the door width to allow for door stops.

5.1.9 PARTS REPLACEMENT AND SPLICES

When parts of the door or frame are so badly deteriorated that they cannot be stabilized, replacement of the deteriorated parts with new matching pieces or splicing new wood into existing members may be necessary. The techniques require more skill and are more expensive than any of the previously discussed alternatives.

It is necessary to remove the door or frame and have a carpenter or woodworking mill reproduce the damaged or missing parts; many millwork firms can duplicate parts which can then be incorporated into the existing door, but it may be necessary to shop around because there are several factors controlling the practicality of this approach. Some woodworking mills do not like to repair old materials because nails or other foreign objects in the door can damage expensive knives (which cost far more than their profits on small repair jobs); others do not have cutting knives to duplicate panel profiles. Some firms prefer to concentrate on larger jobs with more profit potential, and some may not have a craftsman who can duplicate the parts.

A little searching should locate a firm which will do the job, and at a reasonable price. If such a firm does not exist locally, there are firms which undertake this kind of repair and ship nationwide. It is possible, however, for the advanced do-it-yourselfer or craftsman with a table saw to duplicate molding profiles using techniques discussed by Gordie Whittington in *"Simplified Methods for Reproducing Wood Mouldings,"* Bulletin of the Association for Preservation Technology, Vol. III, No. 4, 1971, or illustrated more recently in *The Old House,* TimeLife Books, Alexandria, Virginia, 1979.

The repairs discussed involve doors and frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of door frames is not complicated. Nailed or pegged mortise and tenon units can be disassembled easily if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and in some rare instances, may even require dismantling of the wall.

It may be useful, therefore, to take the following approach to door and frame repair:

- 1) conduct regular maintenance of sound frames to achieve the longest life possible,
- 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and
- 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

Most doors should not require the extensive repairs discussed in this section. The ones which do are usually in buildings which have been abandoned for long periods or have lacked maintenance for years. It is necessary to thoroughly investigate the alternatives for doors which do require extensive repairs to arrive at a solution which retains historic significance and is also economically feasible.

5.1.10 WEATHERIZATION

A door which is repaired should be made as energy efficient as possible by the use of appropriate weather-stripping to reduce air infiltration. Weather-stripping is a historic treatment, but old weather-stripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weather-stripping should be considered an integral part of the repair process for doors, and a wide variety

of products are available to assist in this task.

5.1.11 STORM DOORS

Many styles of storm doors are available to improve the thermal performance of existing doors; these are most appropriate on residential buildings.

Storm doors should not be used on commercial buildings as they hide and otherwise adversely affect the appearance of the historic door, storefront and façade.



INAPPROPRIATE STORM DOOR



APPROPRIATE STORM DOOR
(DARK FRAME AND DOOR BLENDS IN WITH DARK WOOD DOOR)

The use of exterior storm doors at residences are allowed because they are thermally efficient, cost-effective, reversible, and allow the retention of original. Storm door frames may be made of wood, aluminum, vinyl, or plastic; however, the use of unfinished aluminum storms should be avoided. Storm door frames should be simple in design and should have a narrow frame design that allows the historic door to be seen in its' entirety. The visual impact of storm doors may be minimized by selecting colors which match the existing door color. Arched top storms are available for doors with special shapes.