

The Restoration of Flood Damaged Structures and Contents

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April 1988

THE RESTORATION OF FLOOD DAMAGED STRUCTURES AND CONTENTS

The restoration of flood damaged structures and contents is a complex service to perform because of the variation of jobs associated with it. The restoration contractor, hereafter occasionally referred to as you, will be required to be knowledgeable in many fields. You will be involved in on-site inspection to determine emergency preservation measures, layout of the order in which to proceed so as to minimize permanent damage, oversee work in progress and advise accordingly, and see that the job is done in a workmanlike manner.

We will discuss items of interest on the following pages that deal primarily with flood damage but also apply in many cases to your regular water damage situations. Of course, regular water damage is associated with homeowner insurance claims. Whereas, flood damage is covered under the National Flood Insurance Program if that community is participating in the program. We will be discussing precautions to take before entering a flood area, emergency measures, and cleaning and repairing damaged structure and contents.

Before entering a flood area wait until authorities have declared the area safe. Wear high leak-proof rubber boots (or at least rubber-soled shoes), thick rubber or dry leather gloves, and a hard hat when you are in a flood zone. When you are going into an isolated area tell someone who will notify the proper authorities if you do not report back. Check with the electric power and gas companies to determine whether the power and gas were shut off and whether they are still off.

After entering the flood area, indoors or out, under flooded or damaged conditions, treat every electrical item with the greatest respect. Every source of electricity can be extremely dangerous under flood conditions.

If traveling on foot through a flood zone, observe overhead electrical lines for broken wires or evidence of arcing. Avoid the vicinity of power lines if possible, and cross under them only at midlength between supporting poles, if you must cross them. An energized electrical utility wire or a utility pole partially or totally submerged in water - whether metal or wet wood - can create an electrical field in the water that will cause a serious electrical shock hazard. If water remains on the ground, heed the following safety precautions.

If utility wires are underwater, maintain a maximum distance from both utility poles and wires. In no case approach closer than 20 feet; and for high-voltage transmission or feeder lines, no closer than 50 feet. If the utility wires are not broken or under water, stay at least 10 feet away from the poles. Utility wires laying in the water will normally be dead, due to blown circuit breakers. It is safer, however, to consider any grounded wire as being dangerous.

Do not smoke. Flammable liquids may have contaminated the water.

If you must enter the structure before it is inspected for safety by either local or Federal authorities, walk around its perimeter and, starting from the bottom, inspect it for signs of undermining, cave-ins, shifting, or collapse. If the building appears sound, enter it carefully. If there is evidence of significant undermining or settling, do not enter the structure until it has been inspected by local or Federal authorities.

If the house or porch rests on exposed foundations with accumulated debris underneath, be careful upon removal of the debris that the foundation's support is not thereby undermined. If material supporting the foundation is washed away but the foundation is not damaged, the underlying material can be replaced with well compacted crushed rock or gravel, a concrete footing, and a masonry or concrete wall to support the foundation. If parts of the footing or foundation have settled or cracked, those parts may have to be reinforced or replaced. Foundation settling or cracking may result in uneven floors or misalignment of door and window frames. Use only concrete, masonry, or both to reinforce or replace settled or cracked foundations, never earth, gravel, or crushed rock.

If part of the foundation has collapsed, it can be temporarily supported with timber shoring and jacks as shown in Figure 4-1 and 4-2(a) and (b).

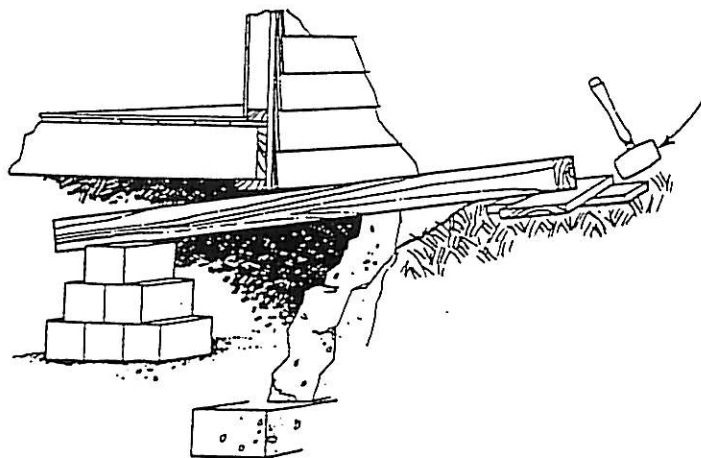


Figure 4-1
Temporary Support

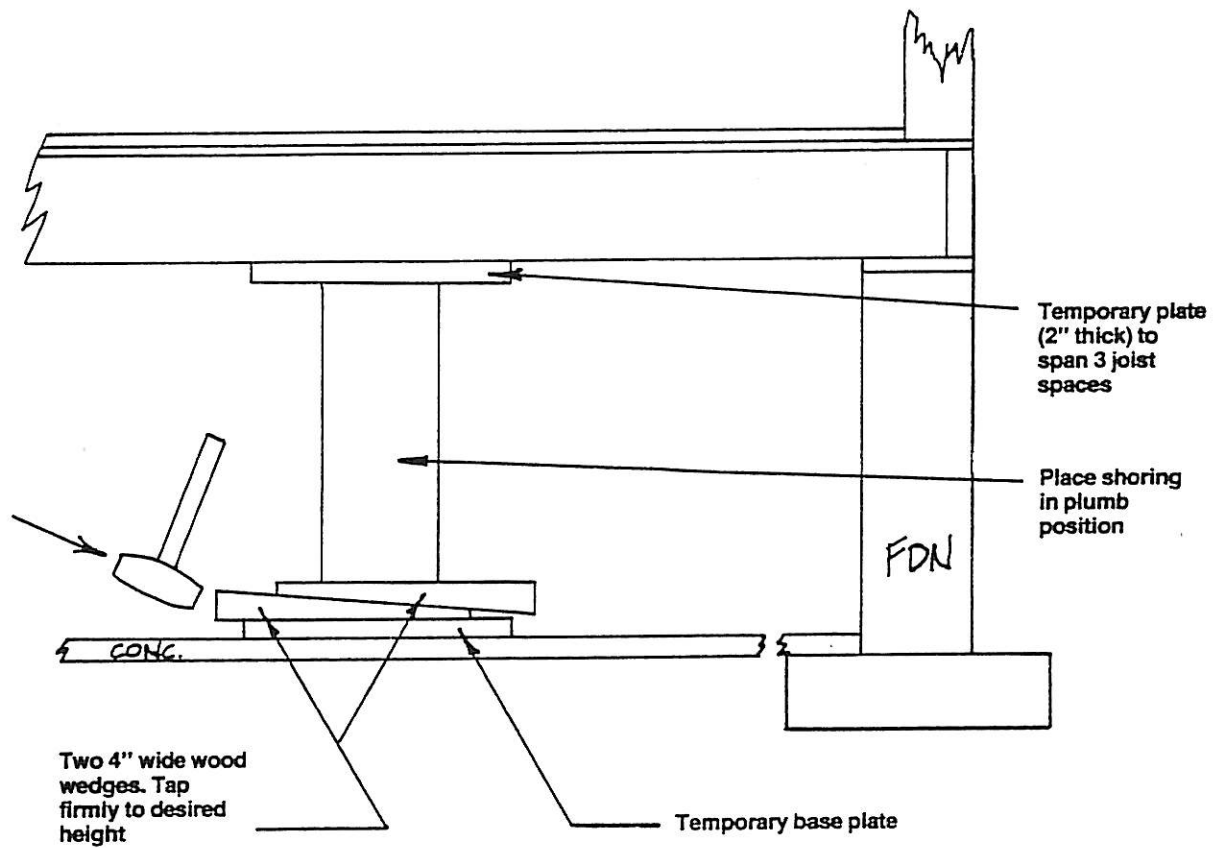


Figure 4-2(a)
Temporary Support

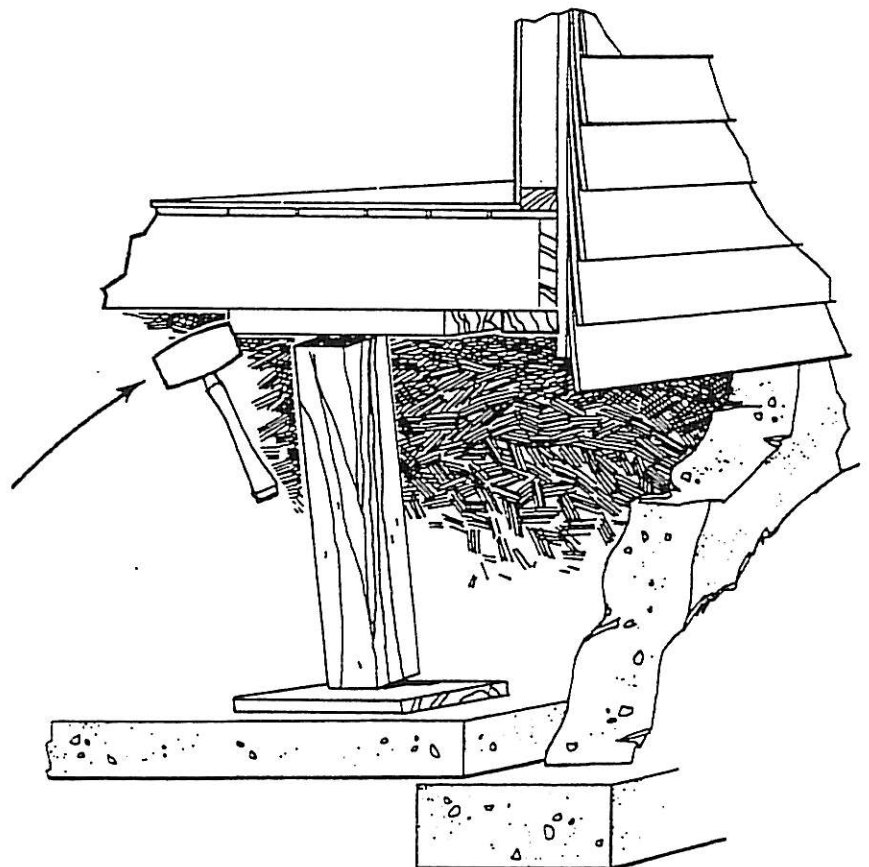


Figure 4-2(b)
Temporary Support

Immediately after entering the structure move around slowly and carry a flashlight as you inspect for structural damage. Flooring and stairways should get particular attention. Watch for loose floor boards, holes in the floor, protruding nails, and sagging ceiling areas that may be ready to fall. Wet plaster and drywall are heavy and dangerous; if loose, use a broom stick or any other long handled device to break it down before doing any work. But watch out - a sagging ceiling may contain a surprising quantity of water. Do not smoke or use open flames as escaping gas may have collected in pockets of the building.

There is a very real prospect of death within a flooded home containing energized wiring. Do not turn on any lights or appliances until a qualified electrician has checked the entire electrical distribution system. If the main electrical switch was not turned off before the flood, have an electrical service man turn it off now. The electrical company may have turned off electrical power in the home, but they could turn it on again without your knowledge.

Do not enter a room where water is covering an electrical outlet or where a loose wire is hanging in water, even if fuses were removed from the panelboard or switched off the circuit breaker before the flood. Water impurities and mud can cause circuits to be energized. It is possible for an electrical field to exist in the water.

Do not touch a wet wall or baseboard near electric outlets. They might conduct an electric current even if the fuses were removed or the circuit breaker switched off if a circuit has been completed due to impurities in the water or mud deposits.

If the area has been flooded, stay away from appliances such as clothes washers, dryers, electric stoves, and sump pumps unless their plugs were pulled prior to the flood. Do not pull appliance plugs in a flooded area unless the house's main disconnect switch is known to be turned off and dry.

The following information about food is for reference in the event your client asks about the care of or safety involved in their food stuff. Advise them to discard all foods exposed to flood water except those in hermetically sealed (airtight) metal cans. Permanently mark the cans to keep their contents identifiable, remove paper labels, and wash the cans in soap and warm water. Then immerse in a solution of 3/4 cup of 5.25 percent sodium hypochlorite household laundry bleach per gallon of water for 2 minutes to disinfect the outside of cans. Rinse immediately in clear water. The chlorine solution may discolor some metal cans. Do not treat aluminum cans, such as soft drink cans, with chlorine solution.

If flood water did not enter the freezer and it is fairly full, the food may have survived a 2- or 3-day period (given the lack of electrical power) without much loss of quality and flavor. Discard meat, poultry, and fish if there is any sign of spoilage. Refreeze partially thawed meat at once. Cook completely thawed meat - large quantities then can be refrozen. Refreeze fruits and vegetables that are still firm.

The hands should be washed thoroughly (with a disinfectant soap if possible) after handling contaminated articles. To be on the safe side, consider all items exposed to flood waters contaminated.

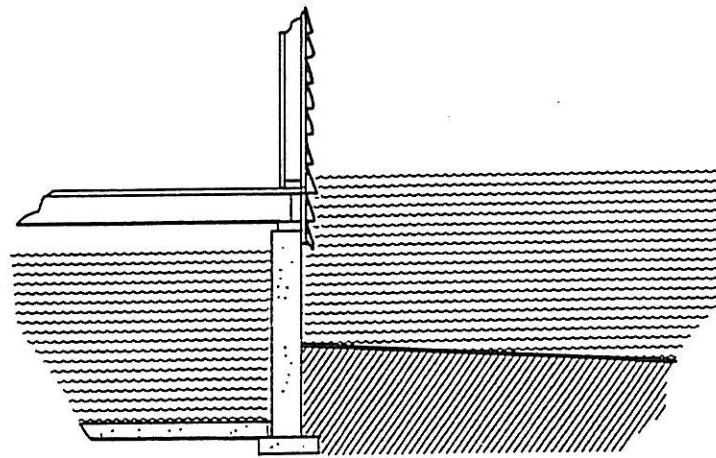
Advise them to wait until the home and belongings have been thoroughly cleaned and dried before deciding whether to discard or tear out. They may return to "as good as new" condition or at least be repairable. Much can be salvaged if immediate, proper restoration steps are taken as described hereafter.

Clean up and repair actions described in this section account for flood levels ranging from some water in the basement to water up to the roof. Skilled workers are required. Immediate action following a flood will lessen damages to certain items. Drying out the home, for instance, will lessen chances of delamination, warp, rust, etc. Water damage to household appliances may be less than major. A great deal depends on weather conditions, temperature, and relative humidity after the flood.

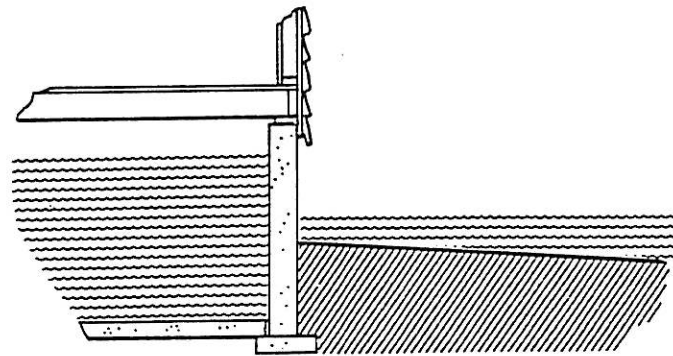
The first step is to inspect the house exterior for damage. Temporary repairs to roof damaged by wind and water should be done immediately. Use materials at hand, such as asphalt coated roofing paper, 4- or 6-mil polyethylene sheeting, tarpaulins, etc., to minimize rain damage and provide weather-resistant quarters for your client.

Getting water out of the basement, if local or Federal authorities have not had the basement drained, proceed according to the following instructions. Remember, however, you should be wearing high rubber boots free to leaks and pinholes, and thick rubber or dry leather gloves. If the electrical panel-board is located in an area that was flooded, you will have to use a gasoline driven pump.

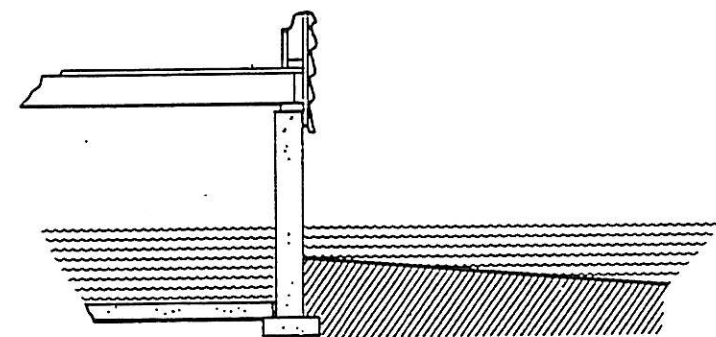
Basements flooded with surface water, seepage through walls, or backflow from sewer lines often suffer little or no structural damage from in-flowing water. This is true because the water inside braces the walls against the pressure of outside water and waterlogged soil. Do not remove the water in the basement until most of the water pressure on the outside of the walls has been relieved to prevent the walls from being pushed in or the floors from heaving. Figure 4-3 and the following paragraphs discuss the amount of relative pressure upon the basement walls and floor under various conditions.



Outside Pressure



Inside Pressure



Balance

Figure 4-3
Water Pressures on Basement Walls
(Soil Pressures Not Shown)

Do not remove water above ground level in the basement until the subsiding flood water outside is equal to the basement water level or a bit less. Start pumping water out of the basement immediately if it is above ground level and higher than the flood-water level on the outside. Stop pumping when the two levels become equal.

Once flood-water and basement water levels are equal, pump the basement water out at approximately the same rate at which the flood waters are receding.

When water in the basement is level with the ground level and all flood waters have receded, continue to pump very slowly, as seepage, a little at a time, through the walls may help relieve the pressure on the outside of the wall. And, for the same reasons, if water in the basement is below ground level (which would be the case of basements built entirely underground), do not begin pumping until the flood waters have entirely receded, and then pump slowly.

To clean and repair the basement, remove mud as soon as all water has drained or has been pumped out to allow basement floors and walls to dry. To remove silt or dirt stains from the face of concrete or masonry foundation walls and salt from the pores, if the flood water was seawater, rinse thoroughly with a high pressure hose and clear water. If the stains still remain, soak the wall with clear water, then scrub the wall using detergent solution and stiff bristle brushes. The wall should be wet to prevent the detergent from absorbing into the pores of the wall. Begin at the top and work down. Rinse often.

If, after cleaning, ventilation does not remove remaining odors from the basement, mop concrete floor and walls with a solution of 3/4 cup of 5½% sodium hypo-chloride bleach to each gallon of water. Rinse and dry after

five minutes. Open basement windows for maximum ventilation when applying the bleach solution. Additional deodorizing and disinfecting may be accomplished by applying an anti-microbial spray to all surfaces not adversely affected by water. Quaternary and phenolic disinfectants are the best choices.

Start drying out the structure as quickly as you can to lessen or stop further damage and deterioration from corrosion, wood decay, and mold. Try to maintain the inside temperature at 70 degrees F or at least 15 degrees F above the outside temperature to increase the drying rate. Maintaining a higher interior temperature may not be practical during summer months. Open doors and windows to allow moist air to flow out of the house during the drying process. Open closet and cupboard doors and drawers.

If outside temperature drops to the point where inside temperature cannot be kept high enough for reasonable comfort, close doors and windows almost completely. Electric fans may be used to improve air circulation for drying. Drying can be hastened by operating a dehumidifier.

If wood framed walls are waterlogged, weep holes can be drilled to the exterior or the interior. It is frequently less damaging to remove the baseboard and punch large drainage holes from inside the house through drywall or plaster. This, of course, soaks the floor, but if walls are water filled, the floor has already been soaked. CAUTION: Look out for pipes and wires that may be behind the area being punched through. After draining and drying are completed, patch the drain holes and replace the baseboard. See Figure 4-4. Note: If exterior walls have been filled with water, remove sections of drywall to determine whether batt or pour-type insulation inside the wall has

been damaged. These inspection ports can be replaced after drying is complete. Some batt or poured insulations compact and become virtually useless; others dry out to nearly their original form and effectiveness. Board type and foamed-in-place insulations should not be adversely affected by temporary soaking.

Wood paneling may be temporarily removed or loosened to permit wall cavities to dry out. This helps to protect paneling from splitting, delaminating, and fungus growth. See figure 4-5.

Make certain that weep holes are open across the lower exterior of brick walls. Moss and mildew can be removed from brick, stucco, or stone by scrubbing with a stiff bristle brush and water. Then wet the surface for 10 minutes with a solution of 3/4 cup 5.25 percent sodium hypochlorite bleach per gallon of water, and rinse thoroughly. Repeat if necessary. See Figure 4-6.

Oozing water and wet spots on hollow-core masonry block walls are evidence of water inside. You can drill a 3/8-inch weep hole half way through the wall from the exterior face below the water filled section and just above floor level. If a large area appears to be water filled, drill weep holes above floor level at the lowest points. Water will be likely to migrate within the cores of the block wall to the drain. It will not migrate past a doorway. If any salts appear on the surface of masonry or concrete, brush them off. If more appear, it is a sign that the structure is still drying.

Before redecorating the walls - inside and out - should be thoroughly dry. If rust spots from metal lath have bled through plaster, wash them from the surface and apply a primer compatible with both the base and the new coating; for example, plaster primer-sealer for use under latex paint.

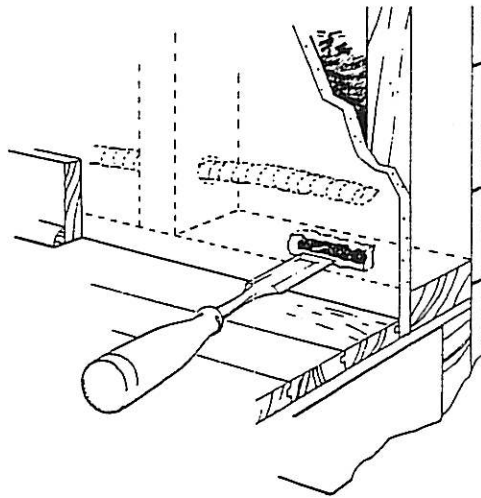


Figure 4-4
Penetrating Drywall

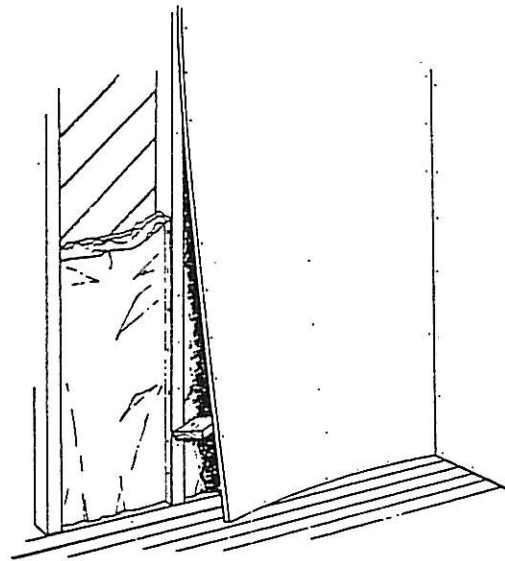


Figure 4-5
Opening Wood Paneling

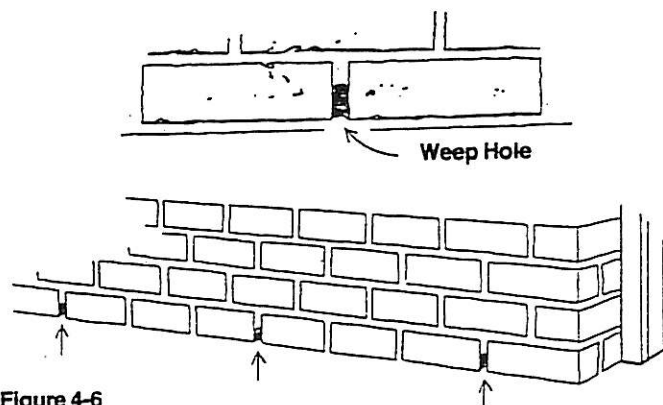


Figure 4-6

Wash surfaces that have been inundated with flood waters in order to reduce the danger of flood-carried infections. Pay particular attention to surfaces that children can reach.

If walls are out of plumb or ceilings are not level, investigate the underlying foundations for movement or undermining. Make certain that you are not attempting to correct a misalignment that was built into the original structure.

Hose down flooded plaster* or drywall** walls and ceilings to dislodge mud and grit. Drywall should not be touched until it is completely dry. If necessary, plaster walls and ceilings may be wiped gently with a slightly damp cloth. Stains can be painted over or covered with wallpaper once the wall is completely dry. The reason for this gentle treatment is that plaster and drywall lose a substantial amount of strength when wet and are vulnerable to physical damage. They may regain strength and hardness when dry. Even hosing them down can cause damage, but the mud and grit must be washed out so that drying can be completed as soon as possible to prevent wood decay.

The degree of damage that gypsum plaster has suffered from fire, water, or other perils can best be determined only by careful inspection. To assume that plaster must be removed and replaced simply because it has been wet is an unsound approach. Much will depend on the type of lath or plaster base, whether it is sidewall or ceiling plaster, the age of the plaster, its composition and its physical condition at the time the damage took place.

* Plaster walls are constructed by trowelling or spraying several coats of plaster over metal, rock, wood, or gypsum lath.

** In drywall construction, large semirigid sheets of gypsumboard (plaster-board) are attached to the structural members. Gypsumboard has a hardened plaster core or center layer covered with strong paper, fiberboard or felt.

One of the characteristics of gypsum is that it can be wet down to the point of being plastic, but upon drying out, it returns to its original hardness. It is the reason it makes such an excellent cementitious material for plaster.

Plaster that has been wet by water from a leaky roof, a fire hose, or even inundation will show no harmful effects, provided it is not continuously or periodically exposed to water and is allowed to dry out. Probably there is no better example of the ability of gypsum plaster to withstand water effects than that contained in the Gypsum Association's report on the Topeka flood of 1951. Two motels were submerged under 8 feet of water for five days. Less than six weeks after the waters receded, they both were back in business with no repairs being needed to the walls.

There are innumerable instances of sidewall plaster being so saturated with water used to extinguish a fire that has occurred above, that a lead pencil could be pushed through the plaster. After several days the plaster returns to its original hardness with no evidence of damage. The drying out process should, however, be controlled. Usually a moderate amount of heat, with the windows opened to permit air circulation, will be satisfactory. It is important, of course, in winter months, to protect the wet plaster from freezing.

When ceilings have been seriously wet down and the plaster is on a wood lath base, there is always a strong possibility that the wood has swelled and this, together with the added weight, will break the key. This same thing may also happen in the case of certain types of metal lath. The adhesive bond of gypsum lath will generally hold, but frequently the weight of the wet plaster and gypsum board may pull the nails through.

It is always better, if possible, to allow wet plaster to dry out for several days before estimating. At that time appropriate tests may be made to ascertain its true condition.

Parts of damaged drywall partitions can be cut out and replace with new material. The undamaged drywall is left intact. Vertical edge cuts must be made at the centers of wood studs so each end of the repair sheet is nailed directly to a stud. Taping and spackling will cover the cut line. See Figure 4-8 below.

While wood will shrink as it loses moisture, it also swells when it absorbs moisture. Air dried lumber normally contains 12 to 15 per cent moisture by weight. Kiln dried lumber, intended for interior millwork, has approximately a 7 per cent moisture content. Unprotected wood that is exposed to water or heavily moisture-laden air in a building, expands across the grain. The manner in which the wood is attached or held in place will determine to some extent the amount of deformation. Window and door casings, baseboard, shelving, stair treads and risers may show no signs of warping or

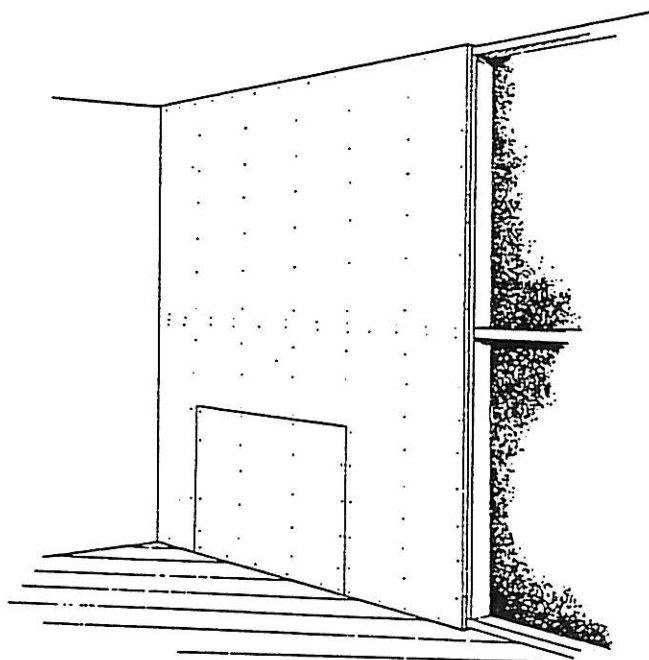


Figure 4-8
Drywall Repair

or twisting when wet. Much will depend on the amount of water and the duration of exposure or submersion. Finish floors, particularly edge-grain, having little or no room to expand sideways, will frequently ridge along the edges of each piece producing a washboard effect. In some instances the expanding can result in large areas of the finish floor being thrust upward in great mounds or waves. A floor that is highly finished with paint, varnish, or oil, has less tendency to deform because the water cannot penetrate to the raw wood. If the water comes in contact with the raw wood flooring from the underside, however, there is little to prevent it from soaking into the cells. Because of the susceptibility of finish floors to water damage, prompt measures should always be taken immediately to remove excess surface water by extraction. The circulation of air by opening windows or using fans, and also furnishing a moderate amount of heat, generally speeds up the drying out process in order to reduce damage.

The deformation of wood by swelling begins to show up within a matter of hours after exposure, and the ultimate damage may take a few days to disclose itself. For this reason it is well not to attempt to write the specifications for repair until a sufficient period of time has elapsed. If no damage is visible within a week after the water has been removed, it is unlikely that any will occur after that.

Plywoods made for interiors do not have waterproof glue between the plies and the veneer and frequently separates if it is permitted to remain directly in water very long, or if it is wet down continuously. Plywoods designed for exterior application are not so affected.

Interior plywood doors are especially susceptible to damage at the bottoms or tops where the water penetrates the unfinished edges.

Exterior woodwork and trim are not usually damaged by water unless submerged, as might be the case during flooding. Damage is then mainly the result of water coming in contact with the unfinished back of the wood.

Wood that is constantly submerged or is continuously kept away from water or moisture will not be attacked by decay or rot. However, intermittent wetting and drying as often occurs to wood near the ground, or to framing members of a roof or to flooring exposed to periodic leaks, will eventually cause rot.

Water in contact with wood may also cause staining which affects the appearance of paneling, trim, and other millwork that has a light or natural finish. The staining may be caused by clean water, or water which carries with it colors or dirt from contents or other parts of the building.

Scrub wood paneling and other woodwork including painted surfaces with a stiff bristle brush, plenty of water, and a detergent to remove mud and silt from corners, cracks, and crevices. To remove mildew, scrub with a mild alkali solution, such as 4 to 6 tablespoons of washing soda or trisodium phosphate to 1 gallon of water. If mold has grown into the wood under paint or varnish, use 4 to 6 tablespoons of trisodium phosphate and 3/4 cup of 5.25 percent sodium hypochlorite bleach to 1 gallon of water. Rinse well with clear water. Allow wood to dry thoroughly.

Remove nail or other stains from woodwork by bleaching with one part oxalic acid and five parts water. If this is unsuccessful, try staining the woodwork a darker shade. WARNING: Oxalic acid is poisonous. It must be handled carefully, be kept away from children, and be rinsed off treated surfaces.

Badly soaked wallpaper is not salvageable, generally, and should be removed. If it is salvageable (not badly discolored or brittle), repaste any loosened edges with wallpaper paste.

Clean unwashable wall paper with putty-like wallpaper cleaner. Use a mild soap or detergent and two sponges and two buckets to clean washable wallpaper. One sponge is for the cleaning solution, and the other is for clear rinse water. Test wash a small, inconspicuous spot first. If the results are favorable (paper does not fade or tear), wash the paper beginning at the bottom and work up so water will not run down and streak a soiled area. Water running down over a clean area can be wiped off without damage. Squeeze as much water as possible out of the cleaning and rinsing sponges and work quickly so the paper does not become soaked.

Remove grease spots from wallpaper by applying a paste of drycleaning fluid with diatomaceous earth (filter powder). Allow to dry and brush off; repeat as necessary. CAUTION: Fumes from all drycleaning solvents are toxic and some are flammable. Use only with adequate ventilation and read and heed precautions on the label.

Do not attempt to straighten warped or buckled wood floors until they have dried out. Wood and plywood expand when wet, then return to near original dimensions when dry. Flooring may require replacing, refastening, or refinishing, but if there is any question, wait until after drying is complete to make the decision. Remove floor coverings, if practical, to allow the flooring to dry.

After completely drying, renail the floor if necessary. Some surface roughness may be removed by planing or sanding. Wood flooring planed heavily may never look well enough to be used uncovered, but smoothed old floor can serve as a base for either a new wood floor or floor covering such as resilient tile or vinyl sheet. If damage is too severe, the flooring may have to be removed and relaid. If only the surface finish of wood flooring is damaged, it may be refinished.

Remove ceramic or terrazzo tile if installed on water vulnerable underlayment or subflooring such as wood. Clean and reinstall, using a moisture-proof sealant or adhesive after the underlaying material has dried thoroughly or has been replaced.

If long submersion has loosened adhesives and warped wooden underlayment or subflooring, tiles (asphalt, plastic) may loosen. Remove loose pieces of tile until the underlayment has completely dried. The floor covering may then be re-cemented in place. If sheet linoleum has bulged, water may have seeped under a large section. If so, carefully remove the entire sheet; otherwise, water may be contained underneath, causing the wood to rot. Be sure to let the underfloor dry thoroughly before laying any type of floor covering.

If you have a gas- or oil-fired forced air furnace, flooded components of the heating system, i.e., the air intake, combustion chamber, heat exchanger, blower smoke or vent pipes, chimney, air ducts, and pumps, should be inspected by a heating serviceman and cleaned of any debris, mud or silt deposited by the flood. Such material lodged in pipes, ducts, or air or fuel passages could make operation inefficient or dangerous. As a result, the house could be filled with smoke, excessive carbon dioxide, or highly poisonous carbon monoxide gas.

Do not attempt to operate or apply power to any household appliance that was in flood water until it has been cleaned and dried thoroughly and, preferably, examined by a repairman to be sure it is safe to use. Competent repair service of flood-damaged appliances will include cleaning, drying, recoating, and backing of electrical windings; cleaning and servicing contacts and moving parts; disassembling, cleaning, and lubricating gear boxes and bearings.

Silicone solvents and other water displacement chemicals can be used to restore and protect electrical appliances and devices.

Clean small or portable non-immersible appliances such as toasters and mixers. Appliances contaminated by flood water may be partially disassembled, wiped clean, or even washed with clean water. They must be dried thoroughly. You can hasten drying by placing them in a drying chamber with air movers and dehumidifiers. Now, test them. If they fail to operate, send them to a repair shop for reconditioning. It may be impractical economically to recondition older appliances in some cases.

As soon as possible, hose and wash washers and dryers with clear, clean water. Open the entire cabinet and control panel to allow thorough access to the interior and thoroughly clean interior sections of all mud, silt, and other debris. Open the gear housings and clean shafts and gears with solvent. Wipe all parts with a clean cloth, but do not force any dirt into the bearings. Unseen grit can cause wear of moving parts. Wipe metal surfaces with a rag moistened with solvent to remove rust and dirt stains and coat them thinly with petroleum or machine oil to prevent further rusting. Oil the bearings and, using a soft cloth, dry surfaces exposed to hands or clothing. Afterwards, allow all parts to thoroughly dry, particularly all wiring and electrical components. Before using these appliances, have them checked by a qualified service person. At the time of start up, exercise care that they are grounded and properly fused in the event any short circuiting might occur.

Most modern refrigerators have permanently sealed cooling systems and should not be affected by flood, but in old refrigerators, the cooling unit is accessible and should be examined and cleaned. Have refrigerator wiring, switches, and controls cleaned, dried and checked. Check insulation for absorption of moisture.

Thoroughly clean the interior and exterior of refrigerators and freezers. To disinfect refrigerators and freezers, wash inside surfaces with a solution of 3/4 cup of 5.25 percent sodium hypochlorite bleach to each gallon of warm water. Rinse and dry, then, air.

Disassemble, as far as possible, gas surface units and drain and clean all components of ranges. Disassemble, clean, and dry electrical control panels and have them checked for safety by an electrical repair person. Completely disassemble, clean, and thoroughly dry electrical cook tops. The electrical elements, particularly, must be checked by a qualified individual or repair person to be sure that moisture is baked out and that no electrical leakage can occur.

Ovens, both gas and electric, usually are insulated with mineral fiber material that absorbs moisture. Ovens must be disassembled completely and the insulation usually must be replaced. For oven gas burners and electric units, follow the same procedure as for cook tops. Deodorize by washing with 1 teaspoon baking soda to 1 quart warm water.

Sufficiently disassemble dishwasher to assure that all components can be cleaned and dried. Remove motors, unless they are the totally enclosed types (most are not), and send to a motor repair shop for reconditioning. Replace any insulation around the tub that has become saturated if it cannot be dried adequately. Have all wiring and switches thoroughly cleaned, dried, and carefully checked for electrical safety. Complex and unsealed control switches probably will require replacement.

Small electric motors must be dried, cleaned, and lubricated by a person accustomed to working with them. Otherwise, there is the risk of electrical shock by short circuits and improper ground. Small electric motors may be

dried in an oven at not more than 150 degrees F. Test them after 6 or 8 hours of drying. If there is still evidence of grounding or shortcircuiting, return the motor to the oven for another 2 to 4 hours before testing again.

To inspect and recondition a motor, proceed as follows:

Remove and thoroughly wash all bearings that are not sealed; then replace them after oiling or greasing. Clean the oil wells supplying the bearings and fill them with fresh motor oil.

Clean centrifugal switches, slip rings, and commutators of grit and dirt particles and examine brushes to see whether they move freely in holders.

Take out the armature, or rotating member, and clean it well with water from a hose under low pressure or with pails of water. High pressure water or air may cause even fine grit to damage surfaces or insulation. Treat the stationary coils similarly. After washing with water, wash with kerosene, not gasoline. CAUTION: There should be no smoking; and no exposed flame near the place where kerosene is being handled.

Dry the motor coils, either rotor or stator, by heating to a temperature of about 150 degrees F for 10 or 15 hours. Then paint the windings with a light insulating varnish. Apply the first coat and bake for a period of 4 or 5 hours at a temperature of 200 degrees F to 250 degrees F, then apply a second coat and bake for 3 or 4 hours at the same temperature to ensure a good job.

Before assembling the motor or generator, check starting contacts for corrosion and lubricate lightly all moving parts. Replace oil wicks and renew oil in reservoirs. If sealed-type ball bearings have leaked - allowing grit to enter - soak them in gasoline or oil and blow out any loose dirt with kerosene and replace old wicks with new material. If the capacitor overheats,

remove it and bake it in mild heat for several hours. If it continues to over-heat, get a new one.

To dry and lubricate flood soaked firearms, typewriters, and sewing machine heads, proceed as follows:

Mechanical surfaces of these mechanisms are extremely vulnerable to rust. A delay of even two or three days may rust them beyond economical repair. For this reason, speed in getting the mechanisms dried and lubricated is important. An emergency rust inhibiting treatment is as follows (See Figure 4-11.)

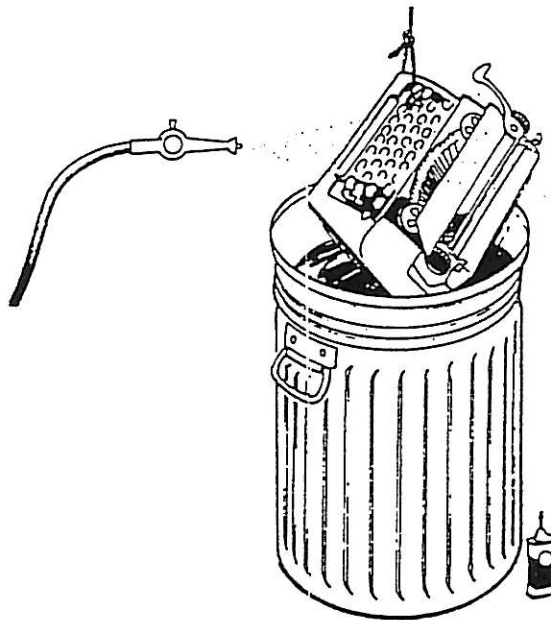


Figure 4-11
Air Blowing A Typewriter After Dipping

1. Remove cover plates and disassemble as far as practical.
2. Dip the mechanism into a container of perchlorethylene. (The local cleaner uses it to dry-clean clothing.) Slosh it around to force water out of close fitting surfaces. WARNING: Do not soak for a long period. Long term soaking may unduly damage rubber or plastic parts.

3. Blow dry with an air hose to remove the perchlorethylene. Air pressure 60 psi is preferred to avoid blowing small springs and friction-fit parts loose.

4. Replace protected oil film that was removed by the perchlorethylene. A light No. 6 clear oil should be used, preferably applied from a spray can. Spray the oil onto all rust vulnerable surfaces. Give particular attention to close fitting surfaces where direct spray will not reach.

5. Blow off excess oil with the air hose. During the blowing, try to blow oil into hard-to-reach surfaces.

6. Store in a dry place until the mechanism can be careully disassembled and repaired.

Perchlorethylene is preferred to hydrocarbons such as kerosene because it is non-toxic, nonflammable, and less damaging to plastic parts.

Television and radio sets usually function satisfactorily after floodings if they have been cleaned and dried. It is unnecessary, usually, to discard such equipment. A competent repair person can tell you if it is repairable.

To treat furniture, promptly place pieces of wood or aluminum foil under furniture that has casters or metal caps on the legs to avoid staining carpeting. Remove as many drawers, slides, or other moving parts as possible. If the furniture is made of wood, these will probably be stuck tight. Do not force drawers with a screwdriver or chisel from the front. Remove the back of the furniture - cutting it out if necessary - and push out the drawers.

If kitchen cabinet doors or drawers are stuck, do not force them open. Once they have dried they should be easier to open.

To remove mildew from wood furniture, scrub with a mild alkali, such as 4 to 6 tablespoons of baking soda or trisodium phosphate to 1 gallon of water. However, if mold has grown into the wood under paint or varnish, use 4 to 6 tablespoons of trisodium phosphate and 1 cup of 5.25 percent sodium hypochlorite bleach to 1 gallon of water. Rinse well with clear water and allow to dry thoroughly. After cleaning, store the wood furniture where it will dry slowly.

To remove mildew from upholstered furniture, first remove loose mold from outer coverings by brushing. Do this outdoors if possible to prevent scattering mildew spores in the house. Avoid inhaling spores. Vacuum the surface to draw out more of the mold. Dry the article as quickly as possible with dryers and dehumidifiers. Put furniture in an ozone chamber to stop the growth.

If mildew remains on upholstered articles, sponge lightly with thick suds of soap or synthetic detergent and wipe with a clean, damp cloth. Use as little water on the fabric as possible to avoid soaking the padding. Another way to remove mildew is to wipe the article with a cloth wrung out of dilute alcohol (1 cup denatured or rubbing alcohol to 1 cup water) and then dry thoroughly. If molds have grown into the inner part of an article, send it for drying and fumigation. Fumigation in the ozone chamber will kill molds present at the time but will not protect the article against future attacks.

Wood furniture that has not been submerged may have developed white spots or a whitish film or cloudiness from dampness. Water marks will be encountered on a high percentage of water damage or flood damage jobs. A water mark appears as a white area on wood surfaces with a natural or transparent finish.

It may be encountered on furniture, paneling, cabinets and hardwood floors. The white area is caused by the water which penetrates the finish and separates the various layers of finish. When the water evaporates, the separation remains as a chalky or white mark. To remedy this involves rebonding the layers of finish. There are several degrees of damage that call for different techniques of restoration. The first is very shallow marks affecting only the top layers. Sometimes these can be removed by merely wiping isopropyl alcohol on the mark with a towel. It may disappear before your eyes in a matter of 20 to 30 seconds. Some shallow marks can be treated with a petroleum-based furniture cleaner and 0000 steelwool. You should work lightly in the direction of the grain. Allow several hours drying time and finish with a good polish.

The treatment of sub-surface water marks involves partially dissolving or softening the finish slightly with a penetrating solution. This causes the layers to bond with each other and the wood surface. Proceed by first cleaning in the normal manner. Use a cheese cloth and moisten slightly but not saturated with cleaner. Using a very light touch in a circular motion clean 8 to 10 inch areas. Keep the pad moving and you can sometimes see the mark disappear very quickly. Allow surface to dry 8 to 12 hours and then polish. Several light treatments are preferable to prolonged applications because you are softening the finish in stages.

Badly damaged upholstered furniture that has been submerged may need restuffing. Springs may need to be cleaned and oiled and the frame may need cleaning. If you are not skilled in this work, consult a cabinetmaker or upholsterer. Some furniture especially that made of wood, may be salvaged by regluing component parts. If you find the work too difficult to attempt consult a cabinetmaker.

Rugs and carpets subjected to flood and water damage should have the value of them considered before restoration procedures begin. Obviously, Oriental rugs and high quality carpets should be restored if at all possible. Carpets (hereafter, rugs will be referred to as carpets) should be extracted of excess water and debris. Use a weighted roller to remove water from the pad. In the case of contaminated flood waters, it is probably in the best interest to replace pad. However, this is not the case with regular water damage. The exception to that is sewage back-up. Dryers or air movers are placed under carpet to dry the backing first, especially if it is a jute back. The pad will dry in the same process. Deodorizing and disinfecting solutions can be fogged under and up through carpets while they are being dried. After re-installing the carpet and in some cases new pad, cleaning with a good truck mount or direct drive carpet cleaner is essential.

Mattresses soaked with flood water generally are damaged beyond use and should be discarded.

Large quantities of paper, such as in file cabinets, subjected to floods can be placed in a freezer to stop mold and deterioration. Separate into small bundles. When time allows, bundles can be removed, allowed to thaw, and individual sheets separated and dried. Do not try to unfold wet paper because it tears very easily. Many stains can be removed from water damaged paper with ammonia. Use it in a well-ventilated place to avoid fumes.

Place books on end to dry and keep the leaves apart. If books are very damp, sprinkle cornstarch or talcum powder between the leaves to take up the moisture; leave for several hours, and then brush off. After exposing books to the air for a time, pile and press them to keep the leaves from crumpling. Continue this alternate drying and pressing until they are dry to prevent mildew. Just before they are completely dry, apply a little heat between the pages to

prevent musty odors. Use a mildew inhibitor - paradichlorobenzene or paraformaldehyde - to stop mold growth.

"Flood Emergency and Residential Repair Handbook." Federal Emergency Management Agency. March 1986.

Thomas, Paul I. "How to Estimate Building Losses & Construction Costs." Prentice-Hall, Inc., 1960.