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a newsletter from Home Repair Resource Center

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Assessing and repairing your Garage Structure

During the summer repair season, we're often asked whether it's better to repair or replace an old garage. We suggest that you start by taking a good look at its overall condition.

In Cleveland Heights, many of our aging garages were built for smaller cars. They were certainly not built to the quality standards that our homes were – in fact, most were not designed to be permanent structures at all. As a result,



some of the areas that frequently fail are:

- the place the wall framing meets the foundation (if there even is a foundation!)
- · the rigidity of the side walls
- the structural framework of the roof (which is often undersized or improperly supported)
- · the framework around the doors and windows
- a rear wall that either rotted out because a gutter was never installed, or had an extension for a longer car cut into it, destroying what little structural integrity it had originally.

The framing system of a garage *(see illustrations on pages 3 and 9)* starts at the bottom with a *continued on page 3*

Your new garage is a major investment!

.... Make sure the design, construction methods, and materials you choose ensure that it will last.



If you plan to borrow tools . . .

Remember to bring someone with you to help load any heavy tools (and to help take them out of the car when you get home!) To transport a ladder atop your car, bring a blanket or rug to protect the roof. Some tools (like our 100' sewer snake) will not fit in a car trunk – you'll need a van or pick-up truck. Ask us when you reserve the tool.

Please be considerate, and arrive early enough that your transaction can be completed and your tools loaded up within our designated Tool Loan hours: 9 a.m. - noon Monday through Friday, plus Mondays 4 - 7 p.m., Wednesdays 4:30 - 7:30 p.m., and Saturdays 9 - 10 a.m. *(summers only.)* You can get tools during the evening/weekend times *only if prior arrangements have been made with Becky or Jim.* Call us at 381-9560.



Mark your calendars:

Home Repair Resource Center will be closed on July 3rd and 4th for Independence Day, and our Instructor, Jim Kunselman, will be on vacation from July 10 - 18.

Plan ahead to get any tools or advice you'll need.

Here's how you can support our work:

Home Repair Resource Center needs strong support from people who know what we do, to help with our operating expenses and to show that the local community appreciates our work. During our recent "Phonathon," HRRC volunteers tried to reach all Project Repair members to seek contributions to help run the organization and cover some of our program costs – such as tools and workshop materials – that are not fully funded by the allocation we receive from our city government.

We left lots of messages for people we were not able to talk with in person, and we were not able to reach some people at all. Donations are still welcome! You can send a check to the address on our back cover, or charge a donation through the link to *Network for Good* on our website.

Another way you can help:

If you are willing to get *Nuts & Bolts* via email, you can save HRRC the cost of printing and mailing your copy. Send your email address to rstager@hrrc-ch.org, with "newsletter address" as the subject.

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sill board, the piece of wood that sits on the foundation and upon which the wall is built.) This board is attached to the **wall studs**. At the top of the studs is a **top plate**, usually two 2 x 4's nailed together. **Roof rafters**, the boards that support the wood and shingles on the roof, usually rest on the top plate.

If any part of the framing system is damaged by water leaks or insects, it will weaken the whole structure. When enough damage accumulates, your garage will become little more than a pile of giant pick-up-sticks. This seldom happens quickly, (although if your teenager runs your car through the back wall of the garage, the process may occur more rapidly!) Usually, the first sign of deterioration is a garage door that doesn't quite close. Then, your garage starts leaning to one side or the other. These

problems don't go away by themselves; they will usually need some help and encouragement from you.

Where do you start in assessing you garage? You can begin by going inside your garage and taking a good look at the framing system:

1. Look at the base of the side and back walls, where the wall studs are fastened to the bottom sill. Is the wood solid or rotted? Ground dampness, snow, and standing water make this a good place for rot to start. (Dirt mounded against the outside of the garage can trap dampness in the wood, so keep the base of your garage – inside and out – clear of dirt and other debris.) If you can stick a nail more than 1/2" into the wood by hand, the wood needs to be replaced. Look carefully at the sill board, as these frequently rot out. Go around the entire garage like this with a piece of chalk and mark the pieces in need of replacement.

The stud that is closest to the opening is called a **jack stud**. When your car bumper hits the side of the door frame and knocks the jack stud loose, you weaken the support for the weight of the entire roof.

Wall studs are easily replaced. First, cut through the stud high enough away from the rotted end to where there is good solid wood, and remove the bad portion. Then, cut a new stud from 2 x 4 outdoor treated wood to fit in the opening and nail it in place. Next, take a full-length stud and nail it alongside the patched one, for strength.

Replacing the sill requires that you jack up the side of the garage that you are working on. By taking two hydraulic bottle jacks, one at each end, and using a *continued on page 5*

If you're replacing your garage:

It's never easy to decide to spend more money, but a new garage is a long-term investment. Unfortunately, many contractors believe that homeowners are looking only at cost, so they base their bid on coming in with the lowest price. Home Repair Resource Center strongly suggests that you look not only at price, but also at the quality and longevity of the design, materials, and construction methods that will be used. The areas where choices are most important are:



- **Overall design** we suggest that you select a design with a gabled roof, rather than a flat "shed-type" structure.
- Foundation the strongest design has a footer poured first. Later, a short wall is added above it, molded from concrete or built from concrete block. After this perimeter wall has cured, a separate concrete floor is poured inside it. The garage walls are built upon and bolted to the foundation wall after it has set. Although more expensive, this design is less likely to crack than a monolithic slab, where the floor and a short perimeter wall are poured all at the same time.
- **Siding** T1-11, O.S.B, and hardboard lap siding can quickly disintegrate if the surface is scuffed. Although the cost will be higher, you will be much better off if you choose wood siding or shingles, or fiber-cement, vinyl, or polypropylene siding – all of which will hold up better to the normal dings and dents that happen to garage walls.
- **Roofing** With gabled-roof garages, generally covered with roofing shingles, your primary concern (other than matching the color and appearance of your house roof) will be the number of years the shingles are warranteed. For shed-type garages, we recommend using modified bitumen roofing (cold process or hot process), a material that resembles traditional roll roofing but is MUCH longer-lasting. More rarely, you may want to consider single-ply EPDM (a pure-rubber product) or on an extremely large surface B.U.R. (built-up roof). *Don't* use asphalt roll roofing, as it will need to be replaced far sooner than the other materials.

When making your decisions, look to the future. Even if you are purchasing a garage "kit," talk to the supplier and see how much it would cost to upgrade their "standard" materials to ones that are longer-lasting. The extra money you spend might turn out to be a bargain five or ten years from now.

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 $2 \ge 4$ that runs from each jack to the top plate, you can raise the wall the couple of inches necessary for you to remove the rotted sill and replace it with outdoor treated wood of the same size (usually at least $2 \ge 6$.)

If you need to replace any parts of the foundation, use this same method to support the garage off the foundation while you rebuild it. Dig out the old, and pour a new concrete footer and foundation. (You'll need a permit for this work, and your new footer and foundation will need to meet code requirements.) Repair one wall at a time until you are finished.

2. Then, look up and assess the framework that supports the roof. First, look at how your roof rafters are supported. Ideally, they should be resting on a top plate; sometimes, however, they are attached to the sides of the wall studs instead. If they are, give them proper support by nailing another stud alongside the existing stud, directly beneath the rafter *(see illustration.)* This reinforcement is required by code in Cleveland Heights.



Before you support your existing rafters, however, look at their size and condition. If

they are 2 x 4's, they should be replaced with new 2 x 6 rafters, simply nailed alongside the existing ones. Each end of the new rafter should be supported where it meets the wall with a full-length 2 x 4 wall stud nailed beneath it, running down to the sill board.

Older garages may lean one way or another, or the rear wall may have come off the foundation. Repairing these problems is more of an art than a science. You'll probably need to jack up some areas to pull the walls in. To correct leans, use a hoist-type device called a "come-along" to pull the garage straight.

If these rafters, regardless of size, span a two-car or larger garage without a center beam supporting them, you need to add a **center beam**. A center beam is made from two or three 2 x 12's nailed together, spanning the entire depth of the garage. Raise it with jacks at either end of the garage until it touches all the rafters and takes out any sag. Then, nail it into the wall studs at either end. (Most often, posts will also be necessary for support.) Once installed, the center beam will promote good roof drainage and prolong the life of the garage. *continued on page 8*



Workshop Schedule

Our summer workshops will continue to focus on exterior repairs and will be held at the homes of Project Repair participants. As always, these workshops are free to Cleveland Heights residents. Call 381-9560 to save your spot and be notified where the class will be held!

July



Re-Roofing a Porch

Monday, July 6th, 6:30 - 8:30 p.m.

Learn how to re-roof a second-floor porch, using cold process **modified bitumen roofing,** a long-lasting material that can also be used on "flat" roofs over shed-type garages. We'll also show you how to replace rotted areas of the plywood roof deck.

Garage Structure Repair

Monday, July 20th, 6:30 - 8:30 p.m.

At this class, you'll learn how to lift the back wall of a frame garage and put it back onto its foundation. We'll also show you how to repair the section of the front wall that stands between the two doors.

Hardwood Floor Refinishing

Monday, July 27th, 6:30 - 8:30 p.m.

We'll use a flat plate sander (Squar Buff[®]), an alternative to the drum sander, on the floor of a small room. You'll then learn how to complete the process with stain and/or polyurethane. We'll discuss oil-based and water-based finishes and the advantages of each.

August

Snaking a Storm Sewer & Adding a Clean Out

Monday, August 3rd, 6:30 - 8:30 p.m.

We'll use an electric sewer snake to clear roots and other obstructions from a downspout drain and install a "clean out" that will give easy access for future snaking.

Asphalt Driveway Sealing

Saturday, August 8th, 10 a.m. - 1 p.m. We'll use HRRC's parking lot to show you how to use cold patch, crack filler, and sealer to repair and seal a drive. *(This class will be messy – wear old clothes!)*

Repairing Roof Decking

Monday, August 17th, 6:30 - 8:30 p.m.

We'll show you how to remove deteriorated roofing materials from a garage roof and replace some of the rotted plywood sheathing below it, in preparation for installing new shingles.

Replacing a Shingled Garage Roof

Monday, August 24th, 6:30 - 8:30 p.m. You'll learn how to install a shingled roof atop a gabled-style garage – roofing felt, shingles, and roof cap at the peak.

Garage Window Frame Repair

Monday, August 31st, 6:30 - 8:30 p.m. We'll show you how to replace a deteriorated window frame around a garage window.

HRRC's Financial Fitness Series

Home Repair Resource Center's interactive Financial Fitness series will help you develop your money skills, provide you with strategies for improving your credit, and teach you how to protect your home investment. Call **381-6100** for information or to reserve your spot. You can choose from these FREE classes (all 6 - 8 p.m. at our office/Teaching Center):

July	9	Thursday	Power of a Personal Budget
	16	Thursday	Creditworthy Equals Choices
	23	Thursday	Understanding Mortgages
	30	Thursday	Avoiding Mortgage Delinquency
August	5	Wednesday	Power of a Personal Budget
	12	Wednesday	Creditworthy Equals Choices
	19	Wednesday	Understanding Mortgages
	26	Wednesday	Avoiding Mortgage Delinquency
September	2	Wednesday	Home Maintenance for Home Buyers
	8	Tuesday	Power of a Personal Budget
	15	Tuesday	Creditworthy Equals Choices
	22	Tuesday	Understanding Mortgages
	29	Tuesday	Avoiding Mortgage Delinquency



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If your roof has puddles after a rain in areas where the rafters sag, then you need to remove that sag or you will constantly have roof leaks. To remove a sag, place a 2 x 4 on a hydraulic jack at the lowest point of the sagging rafter; then, slowly jack it up. When the rafter is bowed the other way, nail a new rafter along side it; after the jack is removed, the rafter should still have a slight upward bow.

Finally, look at what covers the rafters. If you have rotted **roof decking**, you need to replace at least the deteriorated area, or the damage caused to it by the rain will just multiply. Inside your garage, drive screwdrivers up from the underside of the decking to mark the corners of the area to be patched. Then, go up on the roof and cut away the roof covering to get to the decking. Make sure that the edges of the rotted area you cut out extend to the center of a rafter. (This will give you something to nail the new piece of decking into.) Replace the rotted piece with new wood of the same thickness, and patch the roof covering.

Look at the base of the side and back walls, where the wall studs are fastened to the bottom sill. Ground dampness, snow, and standing water make this a good place for rot to start. (Dirt mounded against the outside of the garage traps dampness in the wood, so keep the base of your garage, inside and out, clear of dirt and other debris.)

3. The various openings in the sides of your garage are also important parts of the framework. The garage door provides a way for your car to get in, and most garages also have a window to let in light. In some garages, you also have a service door, so you can get into the garage without opening the big door.

Each of these openings is really a hole in the side of your garage that weakens the whole wall. (You can imagine what that large opening for your garage door does for the front wall.) When garages – or houses – are built, special attention is paid to these openings to strengthen them and the rest of the wall.

Across the top of the garage door opening runs a beam called a **header** (or **lintel**). Because this beam supports the weight of the roof, it must be especially sturdy. The header is commonly made by bolting two 2 x 12's together; in some cases, a piece of steel is sandwiched between them for added strength. If you have a sagging door opening, this is the piece that you must replace.

To hold it up, the header must be supported by studs on each side. These supports are usually two $2 \ge 4$'s, nailed together. The stud that is closest to the opening is called a **jack stud**. When your car bumper hits the side of the door frame and knocks the jack stud loose, you weaken the support for the weight of *continued on page 9*

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the entire roof. Before long, that nice, straight garage door opening isn't so nice and straight. So, if you have a garage door that won't close properly, you'll need to look at these important areas to see where the problems are. Most garages aren't enclosed on the inside, so these framing details are easy to see.

The frames for your windows and service door are constructed in the same manner but, because they are much smaller in size, the lumber used to frame them is smaller – usually two 2 x 4's, nailed together, are used to form all four sides. If you have a service door or window that won't open or close properly, look first at the frame for any deterioration or damage, to determine how to solve the problem.

4. Finally, older garages may be leaning one way or another, or the rear wall may have come off the foundation, so check the outside of the structure for these conditions, as well. Repairing these problems is more of an art than a science. You'll probably need to jack up some areas to pull the walls in. To correct leans, use a hoist-type device called a **"come-along"** to pull the garage straight. Once you have straightened it, a 2 x 6 nailed diagonally from top to bottom along the offending wall will keep it aligned properly. (*A separate handout on "Straightening a Leaning Garage" is available in HRRC's Resource Library.*)

These are the most common repairs needed for older garages. In light of current replacement costs, it generally pays to keep your old garage in shape. However, if the cost to repair an old garage reaches 50% of the cost of a new one, you should start considering replacement.



typical garage framing (gable style)



I remember one summer when I was a kid in the mid-1950's, visiting my paternal grandparents in western Pennsylvania. Rural electrification had not yet made it to our family farm, so while the dining room table was being set for dinner, Grandfather Kunselman lit the glass kerosene table lamp. What I remember most is that I was stuck sitting right by that lamp – it was sooty, malodorous, and mighty damn hot. The next year, the farm was wired for electrical power, lights were instantly available by flipping a switch, and my grandmother got the refrigerator she had always wanted.

Fifty-some years later, about a billion and a half people worldwide still are without access to electricity and use kerosene and other fuels for lighting. An estimated \$40 billion will be spent on fuel-based lighting in developing countries each year – and this is in households that earn only a few hundred dollars annually. Burning fuel for light is not only extremely expensive for these folks, it's highly inefficient and contributes to the emission of greenhouse gases. More importantly, fuel-based lighting creates health risks due to increased indoor pollution and fire hazards.



While GoogleTM-searching for light-emitting diodes (LED) bulbs, I came across a website for the **Light Up The World Foundation** (LUTW.org). Their website describes how, during a visit to Nepal, Dr. David Irvine-Halliday was struck by how dim and dangerous the kerosene lanterns were that the rural

I have been using a small LED floodlight set for the past few years to illuminate my back door. Even on an overcast day there is enough power stored to give a few hours of light after dark. After charging on a sunny day, there will be light all night long.

villagers used to light their homes. Dave, a professor of electrical engineering at the University of Calgary in Canada, then founded the LUTW. The nonprofit organization has since begun to manufacture to pico-scale (very small) solar-powered white LED light sets and to distribute the low-power LEDs, at low cost or free, to thousands of people around the globe. According to a statement published by Evan Mills, a scientist at Lawrence Berkeley National Laboratory, *continued on page 11*

The Short Circuit

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if people switched from using fuel-based lamps to solar-powered LEDs, carbondioxide emissions could be reduced by up to 190 metric tons per year.



We, too, can participate in using pico-scale solar lighting. Intermatic-Malibu[™] produces a small LED floodlight set (in the \$30-40 price range) that I have been using for the past few years to illuminate my back door. Even on an overcast day, there is enough power stored to give a few hours of light after dark. After charging on a sunny day, there will be light all night long. But even if you don't wish to use solar lighting or LED lights, consider changing as many of your incandescent bulbs as

you can to compact fluorescent bulbs, to reduce your electric bill and the amount of pollution created by power plants. If we continue to reduce the power that we use, we can all breathe a little easier.

Rehab project nearing completion

Renovation of the first foreclosed, vacant home acquired by Home Repair Resource Center's new subsidiary, *Home in the Heights,* is progressing as planned. An Open House to allow the community to view the completed renovation, on Westover Road in the Forest Hill neighborhood, will be held sometime in early August.

The property has already been sold to new owners who loved the potential they saw in the home when they first visited, shortly after renovations began in March. They also liked the idea that they were buying from a community organization committed to doing a high-quality job, and one that would be consistent with the history of the house.

Home in the Heights plans to renovate several other properties over the next year – all houses that have been vacant for some time and need a lot of work. When completed, the homes will feature higher energy efficiency and lower maintenance costs, with new kitchen, bathrooms, and numerous other improvements. Construction by *Home in the Heights* will feature green technology, high quality materials, and superb finish detail to match neighborhood and community standards.

To complement the rehab effort, Home Repair Resource Center has developed a new Home Buyer Education Program to prepare home buyers for successful home ownership, and the City of Cleveland Heights offers a Down Payment Assistance Program for low- and moderate-income buyers, offering up to \$15,000 to qualified applicants. (For information, call 381-6100.)



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