8 SAFETY & LEGAL

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SAFETY ON THE JOB SITE

Safety on the job site is important for both you and your employees. Since most retrofit work is done while the house is occupied, safety is also a concern for the people living in the house. Here are some important safety tips for protecting all of the people that could come into contact with the project:

Wear Protective Clothing

Always use respirators whenever you re working in a crawl space, performing demolition work, drilling holes in wood or concrete, or using adhesive anchors like epoxy. Dust masks are not a substitute for a good respirator. Everyone should wear one. You need to check with the manufacturer of the respirator and the manufacturer of any chemicals used to be sure that the respirator is rated for your job. (Fig. 8.1)

Fig. 8.1 Proper Respirator

Hard hats should be worn at ALL times, particularly in tight crawl spaces where it is easy to bump into a floor joist or a protruding nail. Gloves should be worn when working with adhesives like epoxy to avoid skin damage.

Read and Follow MSDS

Material Safety Data Sheets (MSDS) provide essential information on the safe use of chemicals on a job site. OSHA requires that the MSDS sheets be available for any chemicals that are present at the job site. MSDS sheets can be obtained from the manufacturer of the chemical.

Rope Off Dangerous Areas

Use caution tape to keep people from straying into areas that may be dangerous. Put barriers up at all times, particularly during breaks and at the end of the day.

Do Not Disturb Asbestos

Houses built before 1980 may have asbestos insulation, particularly on heating ducts. If it likely your will disturb the asbestos, notify the owner to hire a qualified professional to remove it before your begin the retrofit work. Otherwise you may be liable for a very expensive clean-up and the contractor s state license board may discipline you (Fig. 8.2).

Fig. 8.2 Asbestos Heating Duct in Seismic Retrofit Work Area

PART 1 SEISMIC RETROFIT LEGAL PERSPECTIVES

By now you have reviewed materials in this manual relating to the specific means and methods for conducting residential seismic retrofit projects. You should be aware that there are important legal considerations relating to how seismic retrofits are conducted. Contractors should be aware of the following legal principles in their day-to-day pursuit of seismic retrofit projects.

In the Appendix of this manual is a form contract, which can be used as a reference in preparing a seismic retrofit contract. The form must be adapted to satisfy the unique requirements of each contractor's practice. It is intended to be only a resource for contractors, and not a final contract form.

EARTHQUAKE LEGAL BASICS

It makes sense to perform your construction assignments in the best manner possible in order to maintain and promote business. It makes obvious sense from a legal perspective as well, as you'll see hereafter in this presentation. Contractors are responsible for performing their construction work correctly: A contractor is legally responsible for any damages resulting from his/her negligent or substandard performance of his/her work. There has been a profound liability revolution in California during the last 20 years arising from poor construction of homes and condominiums. Owners and their insurance companies have proven that they will pursue contractors to collect their repair costs, if contractors perform their work contrary to the plans, specifications and established industry standards.

The basic contractor standard of care includes the obligation to understand and comply with applicable law, code provisions, regulations and industry standards of care as well as with the contract, plans and specifications applicable to your project. That duty includes the obligation to understand the impact of earthquake forces upon homes, as well as the design and construction techniques to appropriately address the impact of earthquake forces upon homes.

- **Duty To Understand Earthquake Forces**

A contractor is legally responsible to understand earthquake caused failures, including:

a. Base shear;

b. Earthquake overturning forces;

c. The lack of stability imposed by earthquake forces; and

d. Earthquake caused torsional rotation upon homes.

A contractor has the duty to properly perform his/her seismic retrofit work as to both the gravity and horizontal resisting systems in homes.

A contractor has an obligation to understand the following methods to minimize earthquake failures:

a. Shear walls;

b. Brace frame methods of construction; and

c. Rigid frame construction methods.

- **Agencies Have No Liability For Inspections**

Contrast this basic contractor duty to the lack of any government legal duty to properly inspect the building process. California Government Code Section 818.6 provides a basic immunity for local inspection agencies as follows:

> *A public entity is not liable for injury caused by its failure to make an inspection, or by reason of making an inadequate or negligent inspection of any property, other than its property . . . for the purpose of determining whether the property complies with or violates any enactment or contains or constitutes a hazard to health or safety."* (Emphasis added.)

A frequent misconception of inexperienced contractors is to believe that government agencies are a source of responsibility concerning faulty construction. There is no claim for negligent inspection against public agencies or their employees. Public employees are equally liable with contractors for their negligent conduct, other than negligent inspection of construction (See California Government Code Section 820).

- **Prescriptive Standards**

There are two basic ways to design residential framing. The first method is to have an engineer or architect create the design. The second is to follow "conventional construction" provisions of the local building code. Similarly, there are the same two ways in which a seismic retrofit can be designed for light wood framed homes. An owner or contractor could hire an architect or engineer to design the retrofit. Many homes have complications that will require an engineer's retrofit design.

Often, what is needed for basic retrofit work are simple things like foundation bolting and plywood shear walls that don't necessarily require the expertise of an architect or engineer. Some communities offer classes for homeowners on how they can perform seismic retrofit work themselves. For these reasons, engineers and public agencies have developed general guidelines that can be followed to complete seismic retrofits. These guidelines are often called "prescriptive standards".

If a home satisfies certain clearly defined requirements, a contractor could use the prescriptive standards adopted by the relevant local agency instead of a plan specially prepared by an engineer or architect. ***HOWEVER, YOUR LOCAL BUILDING DEPARTMENT MAKES THAT DETERMINATION, and . . . not you.***

Therefore, before starting a seismic retrofit project, a contractor is well advised to check with the local building department to see if it has adopted a seismic retrofit prescriptive standard. If such a standard exists, find out if the building department is satisfied that the specific home in question meets the requirements of the standard. When in doubt, consult the appropriate design professional and/or building official to make the decision as to whether a seismic retrofit can proceed by prescriptive standards, or whether a special plan by a design professional is needed.

It is important to remember that the goal of a seismic retrofit program is not an "earthquake proof home". Rather: the contractor is obviously targeting improved safety and performance of the home in an earthquake. It should never be stated that the home will be "earthquake proof", following a seismic retrofit program.

California law at Business and Professions Code Section 5537 does not prohibit any person from preparing construction plans, drawings or specifications for a single family home or multiple dwelling (no more than four dwelling units), of wood frame construction. That is, if the structure does not deviate from "substantial compliance" with conventional framing requirements for wood frame construction found in the most recent additional of Title 24 of the California Code of Regulations, as defined by the applicable building code of the local jurisdiction where the structure is located. Otherwise, the local jurisdiction will require preparation of specific plans, drawings, specifications and/or calculations for construction of the home and/or seismic retrofit, under direct supervision of a licensed architect or registered engineer.

- **Preconstruction Conferences**

Preconstruction conferences can be a useful tool to avoid legal difficulties. Under California Health and Safety Code Section 19872, an enforcement agency may require that a contractor participate in a preconstruction conference. This conference may be held prior to completion of plan checking concerning submitted plans and specifications or receiving a building permit. The purpose of the preconstruction conference is to review the plans to insure consistency of building code interpretations, and the adequacy and sufficiency of plan details. It is generally a useful practice for all concerned that local agencies require preconstruction conferences.

- **Statutes Of Limitations**

A contractor should understand the applicable "statutes of limitations" that apply to their liability exposure for seismic retrofit and other construction work. There is a three year basic statute of limitations that applies to claims for damage to real property arising from construction defects, following the time that an owner knew or should have known that his/her property was damaged as a result of the contractor's work. There is a two-year statute of limitations applicable to recovery of damages arising from errors in design of construction projects. There is a four-year statute of limitations for actions based upon breach of a construction contract, whereby a lawsuit must be brought within four years of damages arising from breach of the contract.

The law provides a four year statute of limitations for recovery for "patent", or obvious, defects in construction, pursuant to which an action must be brought within four years after "substantial completion" of the home that has the so-called "patent defect". Likewise, an owner has ten years within which to file an action for "latent", or undiscoverable, defects (without the aid of an expert), arising from construction of the home following substantial completion.

- **Unlimited Exposure For Personal Injury**

It should be understood that a contractor has a virtually unlimited exposure period as to claims following completion of construction for personal injuries or death arising from faulty construction. If construction of a project causes injury or death, an action can be brought for personal injury more than ten years following substantial completion of the project, but within one year following the actual injury and/or death to the person.

There is an apartment building in Los Angeles that collapsed during the Northridge earthquake which had been substantially completed in the early 1970s. However, an action was permitted against the original developers, engineers and contractors who built the project, even though the project had been substantially completed almost 24 years before the events resulting in the 1994 collapse of the apartment building. The length of time during which a contractor is exposed to legal action should provide dramatic incentive for contractors to carefully monitor the quality of their work on any given project.

SHEAR WALLS

- **The Code Minimum Syndrome**

It should be understood that a contractor building a home to code requirements is sometimes not enough. The building code often follows changes in engineering knowledge and construction practice by a matter of months or years. Consequently, a local building code does not immediately track changes in the local community standards of care applicable to construction, as they evolve.

An example is the changing "values" allowed for drywall and stucco construction. Immediately after the 1994 earthquake, sound engineering practice required less strength value to be allocated for drywall and stucco shear wall construction than permitted under the then existing code. A contractor is responsible *to know, and follow,* the evolving standards of practice in all of the various areas of construction in which he/she is engaged, regardless of whether the local code has caught up.

- **Use Prescribed Wood And Shear Wall Dimensions**

It is important that a contractor use the type of wood specified in the plans for construction of framing, including shear walls. If the plans call for use of Douglas Fir, then a contractor should not use Hem Fir. If the plans call for one half inch or five ply plywood then that is the type of plywood that should be used by the contractor for the construction of shear walls.

By the same token, contractors should not change the shear wall length or locations from that specified in the plans without the approval of the engineer. Nor should a contractor change the nail sizes or spacing from that specified in the plans and specifications. Any such deviation, would constitute a violation of the standard of care established in the plans and specifications, and the local codes and established building practice, and would subject the contractor to liability exposure.

If a contractor cannot install the specified length of shear wall, then he/she should stop and call an engineer to design an appropriate resolution to the problem. If the contractor installs a shorter length of wall (or even splits the shear wall into two smaller components) the contractor will likely have reduced the shear capacity of the wall, and it may be too flexible and violate the applicable standard of care.

- **Coordination Is Important**

Coordination among the trades is essential to effective construction of a project. A contractor should not allow plumbing penetrations or electrical penetrations through shear walls without the approval of an engineer and/or the local building department. Contractors have a duty to be sure that the trades coordinate their work effectively as well as comply with the applicable plans, code and other standards of care

- **OSB**

Oriented strand board ("OSB") or other composite wood product panel may not be equivalent to plywood for a particular location (i.e., "wet" climates). While recent code changes have caused OSB to be deemed "equivalent" to plywood in most instances, OSB may not be appropriate in environments where there is substantial moisture in the air, such as locations near major bodies of water.

- **Plywood Strength**

The thickness and grade of plywood (as well as the size and number of fasteners securing the sheathing to the framing) will determine the strength of a plywood shear wall. It is prudent to always check with the local building department and/or engineer before substituting any sheathing material. If a contractor substitutes any material for the specified plywood, he/she may well be liable if that replacement material does not have the strength to resist earthquake forces possessed by the originally specified material.

- **Use Specified Nails**

A contractor should review the contract documents carefully and provide the proper nail size for each location specified in the plans. The contractor should not use nails other than those specified, without checking with an engineer and/or the local building department. If nails other than common nails are used, the connections will usually not satisfy strength requirements and will be considered to be below the applicable standard of care in many instances. The contractor should not use nails with clipped heads or apply coating to fasteners prior to installation, as those conditions can reduce the nail's ability to resist pull out.

Contractors should not substitute screws and staples for nails, unless an engineer has specified a screw or staple type fastener, or the substitution has been reviewed and approved by an engineer.

If the plans call for use of a ten-penny common nail, then contractor should put those in and not an eight-penny box nail. There is a substantial "strength" difference between ten-penny common and eight-penny box nails (63 lbs. vs. 94 lbs.). See the chart in the Appendix of this manual for different nail sizes.

- **Nailing Patterns**

If the contractor does not follow the nailing directions set forth in the plans, he/she will reduce the capacity of the wall and expose the contractor to future liability if the wall fails.

- **Economics Of Framing Affect Quality**

A note about the "economics" of framing: piecework is often the method of payment for those workers involved in the framing of homes. Such piecework payment could be dangerous. The "typical carpenter" will be more concerned with the speed of his/her work and that will often lead to loss of control of nailing and general framing quality. Likewise, poor training and supervision can substantially increase the risk of liability exposure to a contractor who pays his/her workers on a piecework basis. A good contractor must resist the economic temptation and tendency to downplay the quality of supervision, under such conditions of piecework compensation.

- **Nailing Patterns And The Liability Revolution**

It must be remembered that a substantial contributor to the liability revolution in California has been the failure of contractors to pay attention to the nailing pattern and size requirements set forth in the construction plans and local codes. Contractors are held to performing at least the code standard of care in their work, and must be sure that the framing pattern requirements stated in the local codes and the relevant project plans and specifications are followed in the construction of seismic retrofit projects.

A contractor should not substitute hardware from a manufacturer that has not been approved by the local building official and/or engineer.

CONNECTIONS

- **Holdowns**

A contractor should remember that for a hold down assembly to have the required strength, the stud bolt holds in the end stud or added post must not be oversized, and the stud bolts should not be counter sunk into the end stud or post. Also, the stud bolts should be fitted with washers and tightened. Lag screws should not be used as a substitute for through bolts, because the strength of lag screws may be less than the strength of through bolts. By engaging in such conduct, the contractor is again subjecting him/herself to liability exposure should the structure fail.

- **Beware Of Nonstandard Framing**

In evaluating a structure before undertaking a seismic retrofit, the contractor should contact an engineer when he/she sees a non-standard framing assembly in the existing structure, since standard details may not work in such a structure.

"Balloon framing" is one type of non-standard framing. Balloon framed structures were common in the Eastern United States between about 1850 until 1970. Some older buildings on the West Coast may have such balloon framing.

With balloon framing, the intermediate floor framing joists are face-nailed to the studs. When retrofitting balloon framed houses, the same principles for creating load paths apply. Blocking and connectors will be required at the roof and intermediate floor lines to connect the floor sheathing to the shear walls. For the connections to be effective, additional blocking must usually be added between the floor joists to provide shear transfer nailing at the top and bottom of the sheathing. A contractor will be held to this heightened standard of framing care in such circumstances.

- **Proper Anchor Bolt Assembly**

When contractors are installing anchor bolts, washers and nuts are required on all anchors. Some building departments and engineers may require the use of square cut plate washers instead of round malleable plate washers. The contractor should make sure he/she knows which type of washer is required.

If the hole in the foundation sill is oversized, it will allow the sill to slide before pushing against the bolt. This small amount of unwanted movement during an earthquake can be enough to cause damage, usually in the form of slipping to the sill, and will thereby expose the contractor to liability. A contractor should never counter sink the washer and nut if the bolt is too short. The anchor bolt will not be effective, and a contractor will be liable for installing it incorrectly.

A contractor should likewise not drive lag screws into the framing with a hammer. He/she should always screw them into place. There are many types of anchor bolts and plate connections available. Before installing such materials, the contractor should check with the building department and project engineer to verify that the hardware used has been approved.

- **Protection From Fumes**

The contractor should always protect him/herself and his/her workers from fumes when using chemical epoxy anchors. The contractor should check with the manufacturer and the building department to find out, if an epoxy is appropriate for use and as to what precautions should be used, such as which respirator filters, protective clothing and ventilation will be needed. The contractor should also check the manufacturer's literature for information on the flammability of the epoxy.

FOUNDATIONS

- **Need Effective Communication**

The most significant legal consideration concerning the foundation areas of homes during seismic retrofit projects is the need for effective communication by contractors with their customers. Frequently contractors will observe conditions other than those directly relating to their scope of work on the seismic retrofit when they work under a home. They will see in many instances water leak conditions, plumbing leaks, drainage problems, termite infestations, deterioration and other conditions not specifically relating to their scope of work on a seismic retrofit. Contractors must communicate to the owner such observed different site conditions. Otherwise, he/she may assume legal responsibility for such conditions.

- **Prejob Walk Through**

This heightens the importance of the prejob walk through which should be conducted by contractors before they bid on seismic retrofit projects. Contractors who fail to communicate the conditions that they observe risk liability as well as risk inability to get paid for extra work arising from such conditions that should have been observed and communicated.

- **Identify Differing Site Conditions**

Leaking plumbing, leaks in roof areas, running surface water, as well as hidden wood rot and split bottom framing members must be called out and excluded from a contractor's work on a seismic retrofit. Such areas should also be specifically included in the contract to set the scene for more compensation as a change order. Such work would be outside of the traditional seismic retrofit scope of work.

The bottom line is that notification to the owner of existing conditions is essential for the contractor to avoid liability, and for the contractor to get paid for extra work arising from such observed conditions.

- **Legal Standards And Manufacturers' Specs**

It is important to understand that standards of care applicable to contractors can be partially defined by manufacturers' instructions for installation of their products. Manufacturers will often attempt to shift the risk of installation of their products to the contractor by prescribing specific methods for installation of such materials. Courts will sometimes use such manufacturer's specifications as a guide in measuring the legal responsibility of the contractor, along with the applicable contract provisions, code and the project plans.

- **Continuity Of Foundation**

Foundations in the vicinity of all shear walls should be continuous. The contractor should check with an engineer or building department to determine whether any lack of continuity in the foundation will affect the ability of the foundation to resist earthquake loads. It may be necessary to install new footings under the outside walls of the house and connect them to the existing foundation. Again, a contractor should contact an engineer where such may appear to be required.

- **Shoring**

A contractor must provide adequate shoring for temporary construction access before removing cripple stud walls, so that the home is not damaged during construction. Again, the contractor will be held to the standard of not weakening the structure while attempting to improve it.

- **Concrete Quality And Owner Consultation**

The strength of the concrete in the foundation can also deteriorate due to reaction of the soil with the concrete over time. This usually can be seen if the surface of the concrete is rough and appears to have been eaten away . An engineer should check this before the contractor installs a retrofit.

It will be the obligation of the contractor to make certain that an engineer is consulted, or at least that the owner should be informed of the need for such consultation, and the contractor should document this communication to the owner. Frequently a contractor will encounter the desire of an owner to restrict his/her budget and to lower the cost of construction.

NONSTRUCTURAL ELEMENTS

- **Care In Specification Of Bracing**

The contractor should not take responsibility for recommending bracing that could be damaged during an earthquake. If an engineer or an architect specifies bracing, the contractor should make sure that his/her contract says that he/she is not responsible for future damage arising from such construction.

A contractor should not take responsibility for specifying the straps or braces for such things as carport covers and/or water heaters. An engineer should be consulted to design such installations. Likewise, a contractor should not take on potential liability by recommending any particular type of veneer construction. That should be the responsibility of an engineer and/or architect.

A contractor should not use a system or detail in his/her construction activities that has not been approved by the relevant local building official. A contractor should always check with the local building department to be sure as to whether a particular system or detail has been so approved. This is particularly applicable to bracing of water or propane tanks, water heaters, chimneys, and the like.

End of Part 1

PART 2 A CONTRACTOR'S LEGAL RELATIONSHIP WITH THE CUSTOMER

Seismic retrofit contractors need to understand certain basic legal concepts applicable to their relationship with their customers. First and foremost is the need for a contractor to be an expert at communications with his/her customer, subcontractors, the applicable local building department, his/her workers, the architect and/or engineer, and the suppliers who provide material for any seismic retrofit project.

The key is for the contractor to have an ability to talk with people and to coordinate his/her activities to maximize his/her legal position on any project. Also, the contractor should keep accurate records of what he/she is doing on any given project including what is in his/her contract, as well as what he/she has to do to perform that contract. All contractors should be aware of the standards applicable to his/her work on any given project including:

a. The contract and the specifications designed for the project;

b. The plans and other specific details applicable to the contractor's work on the project;

c. The applicable building code;

d. Applicable trade association standards and manufacturer's installation instructions;

d. Standards of care applicable to construction of such projects in the location of each project worked on by the contractor.

UNDERSTANDING THE OWNER'S CONCERNS

A contractor should be aware of the various concerns (sometimes conflicting) of the homeowner in regards to seismic retrofit work. Going into each job fully knowledgeable and prepared will help avoid any misunderstandings with clients. Owners will be seeking advice on hiring contractors from a number of sources, including local consumer organizations and the Contractor's State License Board. Each contractor should know what the owners will be expecting. He/she should also know what he/she must do to clearly set forth the scope of the work that he/she is performing, as well as the limitations on a contractor's responsibilities and liabilities. The contract documentation, particularly the scope of work, is essential, as we will see shortly.

- **Money Limitations**

Most owners do not have a lot of money to perform retrofits. Some owners will want to retrofit because it will make them feel safer. Others will be retrofitting to meet some obligation, like a homeowner who wants to sell a house for a better price, or to get earthquake insurance.

Whatever the reason, most homeowners will not want to spend any more than is necessary to get the job done. Most owners will be getting several bids for the retrofit work. A contractor should make a fair and reasonable bid based on a clear contract. The Appendix contains a suggested form contract that could be used as a basis for developing your own form contract. A contractor should not

try to low-ball a bid hoping to "make it up with change orders". This is frankly a dangerous fantasy. The owner may simply not have the money for change orders.

- **Disruption To The Occupants**

Most retrofit work will require some disruption to the occupants of the building, including noise, loss of services, and/or inconvenience.

A contractor should work out an arrangement in advance with the owner to let him know when the work may be disruptive. Owners do not like to suddenly find out that their water or power has been temporarily turned off.

- **Schedule**

The owner wants to know when his/her house will be back to normal. A contractor should clearly state the projected timeline for completion, and make sure that the owner is aware of it. Also, the contractor should let the owner know about anything that may cause a delay in the schedule.

- **Background Information**

Many homeowners will ask for information about their contractor's experience. A contractor should be ready to provide references from previous jobs, proof of bonding and insurance, as well as his/her contractor's license number.

LIMITING A CONTRACTOR'S LIABILITY

One way a contractor can protect him/herself is to have the necessary paperwork that explains what he/she will do and has done. Today many people seem to be very anxious to pursue litigation if anything goes wrong. One of the most important responsibilities of the contractor is to protect him/herself from potential lawsuits. One way that a contractor can do this is to have the necessary paperwork that explains what he/she has done.

- **Necessary Documentation For Each Project**

❑ **Liability Insurance**

The contractor should have an appropriate comprehensive general liability insurance policy, or similar form of insurance. This should provide coverage to the contractor, should he/she incur negligence and construction defect liability as to work that he/she has performed for his/her customer. The contractor should attempt to obtain an additional insured endorsement from each of the subcontractors, adding him/her as an additional insured. Also, to the extent possible, the contractor should make sure that each job site that he/she works on is specifically identified on his/her liability insurance. This will provide specific recognition by the contractor's carrier that it is providing liability coverage for each of the projects that a contractor is working on.

❑ **Project File and Documentation**

A contractor should be sure that he/she has an appropriate file including the contract, plans, correspondence and other relevant materials. He/she should make sure that he/she keeps his/her file and notes as to any unusual job circumstances so that his/her work is thoroughly documented. The better the contractor keeps his/her file, the more likely that he/she will be able to cope with any liability issues that come up after his/her work is completed.

- **Employee and Subcontractor Screens**

The contractor should make sure that he/she carefully screens his/her employees and subcontractors. He/she should be satisfied that they have the capability to consistently perform the project in a good workmanlike manner, which they have been hired to complete.

- **Applicable Local Codes**

The contractor should be sure that he/she understands the latest applicable code and code interpretations that apply to the work in the specific jurisdiction where he/she is working.

- **Preconstruction Walk Through**

It is very important that the contractor do a walk through of the project. If the drawings are available, he/she should review them before the walk through. Before bidding, each contractor must walk through the project area and be thoroughly familiar with the existing conditions. This is essential for the senior most executive with the retrofit company to be aware of these circumstances.

If an engineer designs the plans, he/she should be consulted by the contractor if there any questions about the design or existing conditions. It should be remembered that most engineers are not contractors and don't always know what can be done from a practical standpoint on a retrofit project. The contractor should use the walk through as an opportunity to identify any obvious problems with the proposed work.

A contractor should not wait until he/she starts work and hope for a change order. The engineer will say that he/she has seen the conditions before starting. it is important to raise questions regarding existing conditions before starting work.

• THE IMPORTANCE OF A CLEAR WRITTEN CONTRACT

The contractor should have a written contract stating exactly what work will be done and how much the owner will pay for the work. Without a clear contract it will be difficult to get paid extra for work that exceeds the scope of the original agreement.

- **Scope Of Work Is Important**

The most important part of the contract is the scope of work provision. The scope of work provision should carefully state what work the contractor is performing, including reference to plans, specifications and applicable codes, where appropriate. The scope of work section of the contract should just as clearly state what is not in the contract; that is, what work is excluded and will not be performed by the contractor. This provision particularly depends upon the effectiveness of the prejob walk through by the contractor, and should include all items which are noted, and which are not to be performed by the contractor. In many instances this is the most important part of the contract, i.e the exclusions.

- **Termination Options**

The contract should also have carefully stated termination provisions. The contract should state when, and under what circumstances, the contractor may terminate his/her contract; that is for failure to pay progress payments, undue interruption and interference by the owner, and similar such circumstances.

❑ **Exculpatory Provisions**

The contract should also have exculpatory provisions relieving the contractor from any liability for existing conditions on the site, which are not the specific focuses of the contract. Such conditions may increase the scope of required work on the part of the owner, once the contractor has identified them.

❑ **Liability Revolution**

The contractor should be aware that there has been an expansion of construction defect claims against contractors and developers in the last 20 years. These claims touch upon such things as inadequate framing, inadequate plumbing, poor soils work, inadequate roof work and other workmanship claims, including those claims involving window installation, waterproofing and the like. The contract should have provisions citing the potential for these conditions and that the owner understands that the contractor is not accepting responsibility for such existing conditions which are uncovered during the course of performing the actual work under the contract.

❑ **Additional Work**

The contractor should make it clear that if there are any such unforeseen circumstances, which may indeed increase the scope of work on the project, that the owner agrees to pay for any such additional work, which is requested by the owner, and which is necessitated by hidden preexisting.

All participants in the construction industry have been increasingly protecting themselves with appropriate insurance and contractual language to help limit, cover or control the scope of their liability under their construction contract. Retrofit work of this nature, often will involve conditions of poor previous or original construction and other circumstances for which the contractor does not want to be responsible. *He/she should make that clear in his/her contract!*

❑ **Get A Lawyer's Help With Your Contract**

It is a good idea to contact an attorney who can prepare a standard form contract for use. The contractor should work with the attorney to adapt the contract to each job and its specific requirements.

❑ **Key Contract Provisions**

The sample contract form in the appendix may be a starting point. The following is a listing of the key provisions that a retrofit contract should contain:

1. Scope of work, including plans and codes.
2. Time to complete project.
3. Price of work and payment schedule.
4. Subcontractor's names.
5. What's in and what's out of the contract, in terms of scope of work.
6. Change order provisions.
7. Termination provision.

- **GOOD SET OF PLANS**

The contract should make reference to and incorporate the set of plans that will be used on the project. All of the work (whether working from an engineer's design or using a prescriptive standard) must have a workable set of drawings showing the details of the building project with all retrofit work that is to be done under the contract.

If an engineer or architect will not be involved, the contractor will be responsible for obtaining a set of drawings. He/she can hire an engineer or prepare drawings him/herself, only if they comply with an approved prescriptive standard. If the contractor does prepare drawings, they obviously should be checked with the Building Department to make sure they comply with the existing prescriptive standards. Otherwise, an architect and/or engineer should always prepare an appropriate set of plans.

The plans should make clear that they are tied to and coordinated with the contract, and the contract should say so. The plans should be directed to specific code provisions where appropriate. The project plans should include by name, the design professionals who are responsible for them. The contractor should not take responsibility for the plans and, should, where possible, state in the contract that the design is separate and from the contractor's responsibility.

If there is no set of plans, then the contractor has no basis for bidding the job, and the owner probably doesn't know when the job will be completed for final payment. If there are any changes to the design that are needed because of changes in scope, those should be shown on amended drawings.

- **BUILDING PERMIT**

All retrofit work requires a building permit. Even if the work is done voluntarily, using a prescriptive standard, a building permit is necessary. Check with the building department before starting to make sure that all necessary permits are obtained.

KEEPING TRACK OF THE WORK

In addition to the above-referenced "starting documents" the contractor must keep records of everything that happens during work on the project. Following are some of the ways to document the course of the work,during the project:

- **Notification Of Existing Conditions**

The contractor is only responsible for retrofit work that he/she actually does. There may be other conditions in the home, as discussed above, that need repair, or are not up to current standard. The contractor is not a building inspector looking for problems. These areas should be specifically excluded from the work scope or included in writing by change order for more pay.

Normally, building departments will not require that the entire building be brought up to current code requirements. If there are obvious problems, such as damage or decay to the structural members, the contractor should point them out to the owner (especially if they present a potential danger). If the owner decides to do something about the condition, then the contractor should get a change order. Without that, the contractor should make clear that such conditions are outside the scope of work of the contract, as discussed above.

- **Change Orders**

The contractor should document in writing any changes that are requested by the owner or engineer. This will be important, if there is a question about any differences between the as built condition and the drawings. This is also obviously important for the contractor to be able to obtain payment for any extra work he/she performs. The contractor should be sure that he/she gives notice of a potential claim for any additional work to the owner, and that the contract supports the contractor's right to a change order, including increasing his/her compensation and extending the time allotted for completing the work.

- **Inspections**

Having a building permit almost always requires some items to be checked by the building inspector. The building inspector generally verifies (without liability on his/her part) that the work is being done according to the approved plans and according to the building code.

Inspections should be viewed as opportunities to learn what is being done wrong before the work is rejected, the building fails or a claim is made. If there are any errors that are not caught by the inspector, then the contractor alone is responsible for the consequences; as the inspector is protected by immunities built into the law. (See discussion above.)

Even if the inspection misses something, or passes it off as good enough, that does not necessarily keep the contractor from being sued if something does go wrong later. The contractor should keep a record of each day that the inspector is on the job and what he/she checks and what his/her comments were.

If an engineer designs the job, the engineer may also come out to the site and inspect the work. The contractor should also keep track of this information and use it as an opportunity to discuss any unusual conditions.

If the contractor finds a problem and doesn't show it to the engineer, then the contractor will be responsible for the consequences. It is in the basis best legal interest of the contractor to communicate problems in construction to the owner and his/her design professionals.

- **Photographs**

A picture is often "worth a thousand words". The contractor should take pictures of existing conditions before starting work. If there is ever a question about what a building looked like before retrofitting (or just to prove how bad the existing construction was), the contractor will have evidence to support his/her position regarding a potential change order.

Also, the contractor should take pictures of each part of the job as it is completed. The contractor can use that photographic material to prove that the work was completed and to show to potential future clients.

GETTING HELP

No one likes to admit that they do not know it all. Part of the contractor's responsibility, as a professional, is to know when he/she needs assistance from someone else. The contractor usually obtains during construction information about various conditions that should alert the contractor to get advice from an engineer or other professional, or at least the owner or relevant building department.

A WORD ABOUT WARRANTIES

There are no earthquake proof buildings. Even well designed buildings may have some damage during an earthquake. Seismic retrofit of wood frame buildings does not guarantee that the building won't be damaged during the next earthquake.

Indeed, the contractor should understand that earthquake repairs are made in order to effectuate safety measures. Sound engineering practice and code compliance should produce a building that will protect occupants in a life/safety situation, but the building and its contents may still be substantially damaged.

The contractor should also be aware that engineering practice is constantly evolving regarding earthquake safety issues. The work that the contractor does now may be obsolete in a few years when another earthquake occurs.

The contractor should not mislead the owner to believe that the house will be undamaged during an earthquake. The contractor should explain to the owner that seismic retrofits try to prevent severe damage to the homes by fixing obvious weaknesses.

If the work is done carefully and correctly, however, the contractor can tell the owner that the house should have less damage than a similar house that has not been retrofitted. Older houses may have many other problems that are not corrected by the retrofit (and aren't apparent at the time of the work). The contractor does not want to take responsibility for the entire building, particularly if the contractor only retrofitted a small part of the building, such as the cripple walls.

A typical warranty will be one year for workmanship, but will also be ten years (under law . . . even without an agreement) for latent defects. Whether the contractor gives a warranty or not, he/she is exposed to liability for up to ten years for property damage resulting from latent defects and four years for patent defects, as defined above. Also, the contractor is responsible for three years, at a minimum, for property damage resulting from negligent workmanship on the contractor's
part, after the time the owner knew, or should have known, of any damage resulting from a contractor's workmanship.

WHEN SHOULD A CONTRACTOR QUIT A PROJECT

The contractor should only quit a project when he/she has a right to quit. The contractor has a right to quit when he/she recommends engineer's input on safety issues and the owner refuses to obtain an engineer's input on the basis of cost. The contractor should put language in his/her contract to give him a right to quit, upon a fundamental unresolvable disagreement with the owner.

For a more thorough discussion of legal requirements, see the Supplement *titled "Legal Aspects of Construction and Administration"* in the Appendix.

GLOSSARY

GLOSSARY OF ENGINEERING TERMS

Engineering terms often used in discussions of seismic design and retrofit.

Acceleration -The rate of change (increase or decrease) in velocity. As seismic waves travel through the earth, the ground moves backward and forward changing its velocity; acceleration is related to velocity and displacement.

Anchor Bolt - A cast-in place bolt used to connect the foundation sill to the foundation.

Adhesive Anchor An assembly consisting of a threaded rod, washer, nut, and chemical adhesive for connections to existing concrete or brick elements. Chemical adhesives may be epoxy, esters or acrylics.

Compression -When a wood member resists a pushing force along its axis on each end towards its center, typical of columns, posts and holdown studs.

Connection - A point at which different structural members are joined to each other or to the ground.

Cripple Wall - A wood stud wall less than full story height; typically between the first floor and foundation wall.

Damage - Any economic loss or destruction caused by earthquakes.

Deflection - horizontal or vertical movement or displacement (See DRIFT)

Diaphragm - A horizontal or nearly horizontal structural element designed to transmit horizontal or earthquake forces to the vertical elements of the seismic resisting system.

Drift - Lateral deflection of a building caused by lateral forces.

Earthquake- A sudden motion or vibration in the earth caused by the abrupt release of energy in the earth s lithosphere. The wave motion may range from violent at some locations to imperceptible at others.

Elastic - Capable of recovering size and shape after deformation.

Epoxy Anchor – a type of adhesive anchor using epoxy as the chemical adhesive; SEE Adhesive Anchors

Expansion Anchor - An assembly containing a bolt, washer, and nut for connecting to existing concrete elements. The base of the bolt is designed to expand when properly set, wedging the bolt in a predrilled hole.

Fault - A fracture in the earth s crust accompanied by a displacement of one side of the fracture with respect to the other.

Floor Girder - A beam that supports floor joists.

Foundation – As commonly used in residential construction, refers to the masonry or concrete perimeter wall or slabs and footings that a house sits on. The more accurate definition is the ground (rock or soil) that supports these systems.

Holdown - An element connected at the ends of the framing of a wall to prevent uplift of the wall.

Horizontal - A direction parallel to the ground (sideways).

Inertia Force - A force generated by an object as it shakes. The force acts in the opposite direction of the shaking and is related to the weight of the object and its acceleration.

Intensity - The apparent effect that an earthquake produces at a given location. In the United States, intensity is frequently measured by the Modified Mercalli Index (MMI).

Joist –horizontal wood members that support floors or ceilings.

Lateral (Horizontal) Force Resisting System - The part of the structural system that has been considered in the design to provide the required resistance to the prescribed seismic forces: IE shear walls, braced or rigid frames, floor and roof diaphragms and foundations.

Lateral Load (Force) - Side-to-side force(s) acting on a structure.

Load (Dead) - The gravity load created by the weight of all permanent structural and nonstructural building components such as walls, floors, roofs, and the operating weight of fixed service equipment.

Load (Live) - Moving or movable external loading on a structure. It includes the weight of people, furnishings, equipment, and other things not related to the structure. It does not include wind load, earthquake load, or dead load.

Magnitude, Earthquake - A measurement of the relative strength of the earthquake shaking. Magnitude is often reported using the Richter Scale.

Mass - A quantity or aggregate of matter. It is the property of a body that is a measure of its inertia taken as a measure of the amount of material it contains that causes a body to have weight.

Mudsill / Foundation Sill / Sill Plate - The wood member that attaches to the foundation.

Perimeter - The outer sides of a building.

Pier - A masonry or concrete column used as a beam support structure.

Pier Block - A pre-formed block of concrete used as a footing to support a post.

Post / Column - A load-bearing vertical member.

Racking - A movement that can distort a framework.

Rafter - The roof support members.

Resonance - The amplification of a vibratory movement occurring when the rhythm of an impulse or periodic stimulus coincides with the rhythm of the oscillation (period). For example, when a child on a swing is pushed with the natural frequency of a swing or when an earthquake shakes a building at its own natural frequency.

Richter Scale - Named after its creator, the American seismologist Charles R. Richter, a logarithmic scale expressing the magnitude of a seismic (earthquake) disturbance in terms of its dissipated energy.

Seismic - Of, subject to, or caused by an earthquake or an earth vibration.

Seismic Forces - The assumed forces prescribed in the Uniform Building Code related to the response of the building to earthquake motions to be used in the design of a building and its components.

Seismic Hazard - Any physical phenomenon such as ground shaking or ground failure associated with an earthquake that may produce adverse effects on human activities.

Seismic Risk - The probability that social or economic consequences of an earthquake will equal or exceed specified values at a site, at several sites, or in an area during a specified exposure time.

Seismic Strengthening - Adding additional bracing, anchoring, or improvement to a structure after the original construction is completed.

Shear - A deformation in which parallel planes slide relative to each other and remain parallel.

Shear Wall - A wall, typically made of wood studs and wood structural panels, built to resist lateral forces from wind or earthquake, acting in the direction of the wall.

Sheathing - The material covering the surface of a wall.

Stiffness - Resistance to deformation of a structural element or system.

Strength - The capability of a material or structural member to resist or withstand applied forces.

Stud - The vertical members in the walls.

Tension - When a connector or wood member resists a pulling force along its axis such as a suspended ceiling or a holdown stud under uplift.

Top Plate - The horizontal members that fasten at the top of the studs and support the rafters or joists.

Torque - The action or force that tends to produce rotation. In a sense, it is the product of a force and a lever arm as in the action of a wrench twisting a bolt. IE 50 ft-lbs. is a force of 50 lbs. applied at the end of a 1 foot wrench to tighten a bolt.

Uplift - Force(s) acting to lift a structure or an element.

Velocity - the measure of speed and direction of an object

Vertical - A direction perpendicular to the ground.

Wall, Bearing - A wall providing support for vertical loads; it may be exterior or interior.

Wall, Nonbearing - A wall that does not provide support for vertical loads other than its own weight as permitted by the building code. It may be exterior or interior.

***

APPENDIX