U.S. Department of Housing and Urban Development
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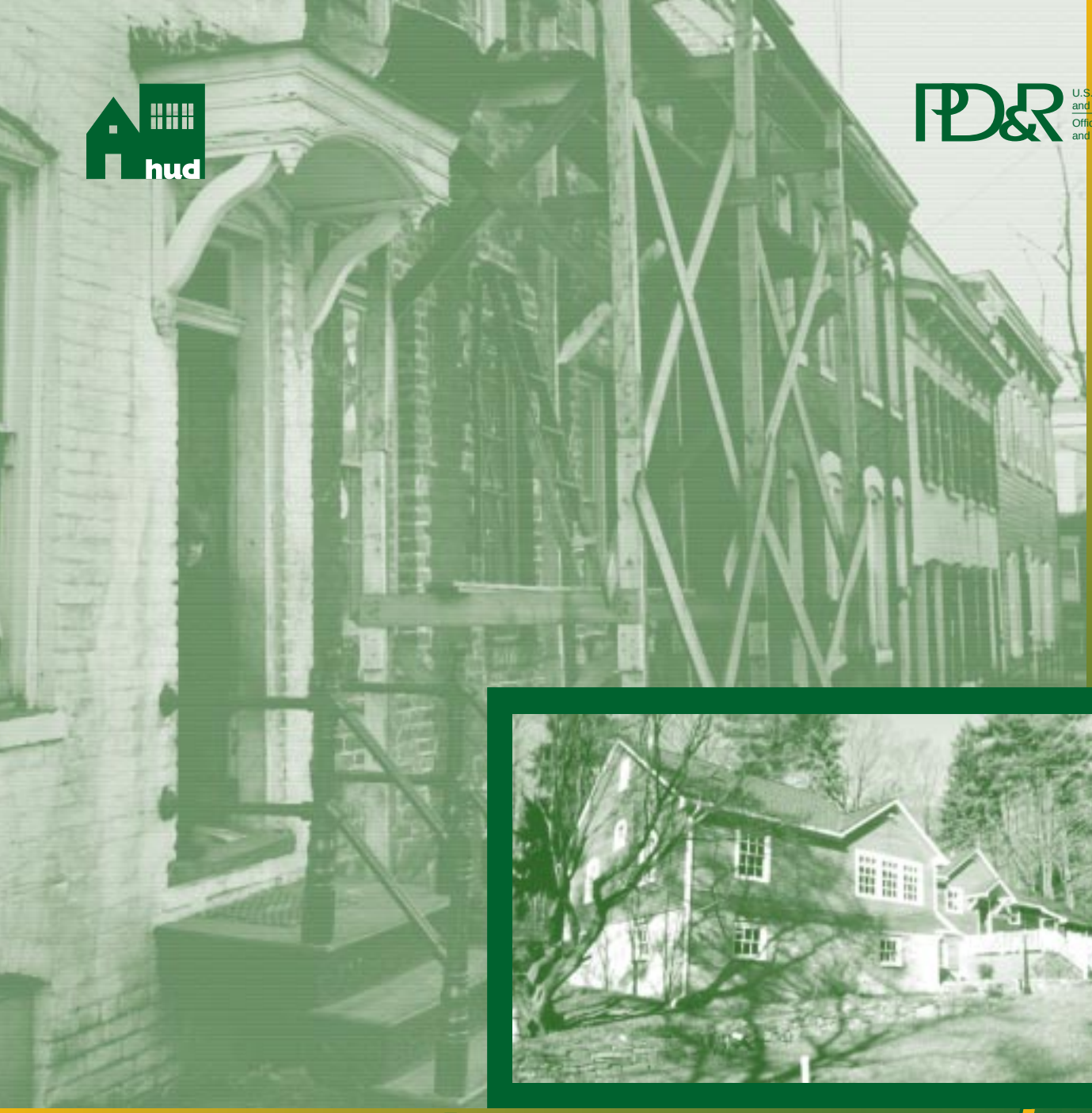

# Innovative Rehabilitation Provisions

*A Demonstration of the Nationally Applicable Recommended Rehabilitation Provisions*

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**A Demonstration of the Nationally Applicable Recommended Rehabilitation Provisions**

**Prepared for**

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

**Prepared by**

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# Introduction

Frequently, local building codes governing the rehabilitation of existing structures are vague and subject to interpretation of local building officials. The result is unpredictability and sometimes the imposition of unrealistic requirements on rehabilitation projects. Given the nation's growing supply of vacant and deteriorating structures, it is important that we create and adopt code provisions that do not render these structures uneconomical to rehabilitate. For these reasons, state and local jurisdictions have seen fit to amend extensively or even delete the rehabilitation provisions of the model building codes and subsequently adopt their own requirements.

The U.S. Department of Housing and Urban Development (HUD) recognized the need for a new and predictable approach to rehabilitation regulation. In 1995, HUD contracted with the NAHB Research Center, Inc., to develop the *Nationally Applicable Recommended Rehabilitation Provisions* (NARRP). Many parts of the *New Jersey Uniform Construction Code—Rehabilitation Subcode* were used in the development of the broader NARRP, which is intended as a model for national application.

As follow-up to publication of the NARRP, HUD requested that the NAHB Research Center work with a remodeler, Asdal Builders, LLC, to apply the NARRP to a 200-year-old home in Chester, New Jersey. *Professional Remodeler* Magazine also selected the home as the first of a group of national Model ReModel demonstration projects focusing on the remodeling industry.

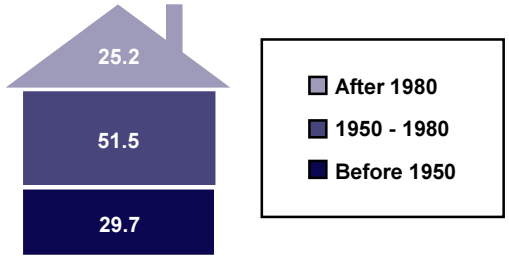
Although the home was remodeled in accordance with the New Jersey code, the similarities in the New Jersey code and the NARRP offered an excellent opportunity to:

- provide a real-life application of the NARRP in a residential rehabilitation project;
- document the differences between the NARRP and the earlier rehabilitation provisions; and
- test the cost-effectiveness of the NARRP with respect to the specific differences between the codes.

# Current State of Rehabilitation Provisions

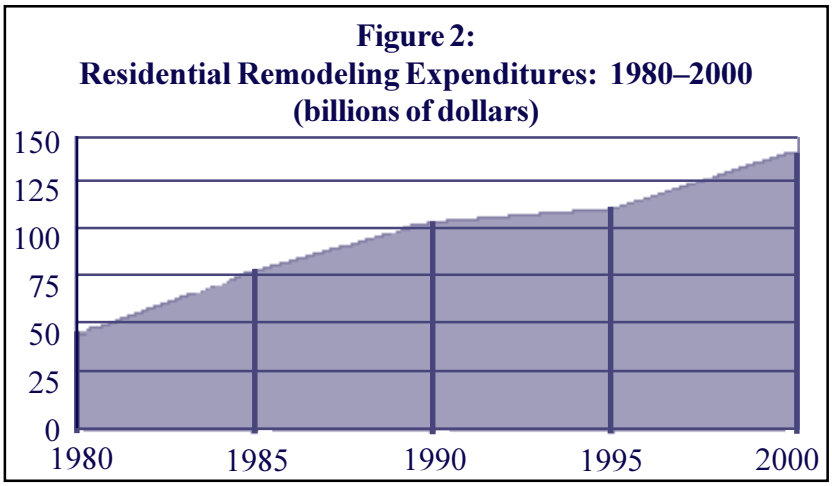
The housing stock in the United States is an enormous asset to this country and illustrates the success we have achieved as a nation in making homeownership a reality for nearly two-thirds of our population. However, as our country has aged so has the housing stock. In 1995, the median age of the over 109 million housing units in the

**Figure 1:**
**Age of U. S. Housing Stock: 1995**
**(in millions)**




*Source: American Housing Survey for the United States, U.S. Department of Commerce / U.S. Department of Housing and Urban Development, 1997.*

United States was nearly 30 years. Almost 30 percent of housing units were constructed before 1950. Figure 1 provides a breakdown of the U.S. housing stock by date of construction. The durability of our homes testifies to the craftsmanship of the men and women who built them, but over time many factors have increased our need to rehabilitate our homes. Factors include changing homeowner preferences, deterioration due to lack of maintenance or abandonment, and changing demographics that dictate the amount of space and amenities demanded in homes. For example, in 1975, the median square footage of a new home was 1,525 square feet; by 1997, the median square footage of a new home had risen to 1,975 square feet. In the past, people typically preferred to move when a house no longer served their needs. Today, people are more likely than ever to improve or renovate their homes. For this reason, remodeling expenditures have steadily increased and are projected to grow into the next century (see Figure 2).




*Source: National Association of Home Builders, 1998.*

It is only logical that residential communities improve their ability to address the regulatory aspects of rehabilitation. Given the difficulties in interpreting current provisions, inconsistent and unrealistic requirements discourage renovation and contribute to the growing supply of deteriorating structures rendered uneconomical to rehabilitate.

Rehabilitation provisions contained in the model building codes are difficult not only for builders to interpret, but also for code officials. Figure 3 presents the results of a survey of code officials and builders on rehabilitation provisions.

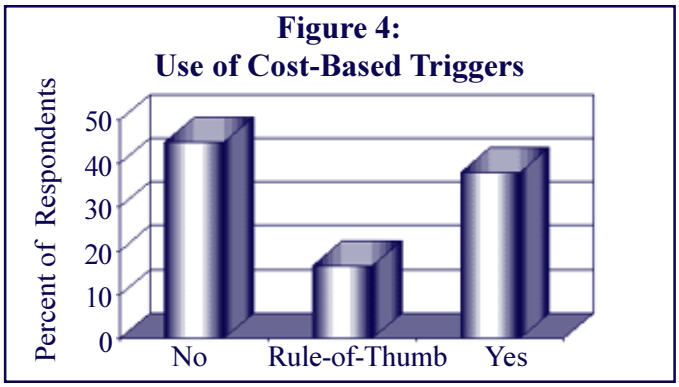
**Figure 3: Survey Results: Ease of Use of Rehabilitation Provisions**

| | Code Administrator's View | | | | | Builder's View | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Code | Easy to Use | ⇒ | ⇒ | ⇒ | Difficult to Use | Easy to Use | ⇒ | ⇒ | ⇒ | Difficult to Use |
| BOCA | 17.1% | 11.4% | 42.9% | 14.3% | 14.3% | 8.6% | 5.7% | 28.6% | 22.9% | 34.3% |
| SBCCI | 26.3% | 21.1% | 39.5% | 5.3% | 7.9% | 13.5% | 8.1% | 37.8% | 21.6% | 18.9% |
| ICBO | 11.1% | 44.4% | 35.2% | 5.6% | 3.7% | 16.7% | 35.2% | 40.7% | 5.6% | 1.9% |

*Source: A National Survey of Rehabilitation Enforcement Provisions, U.S Department of Housing and Urban Development, 1998.*

Many states and local jurisdictions still use cost-based rehabilitation provisions such as the 25/50 rule, which were removed from the model building codes in the late 1970s (see Figure 4). The cost-based triggers were developed over 75 years ago to discourage rather than promote the rehabilitation of existing structures. Page 10 contains a complete discussion of cost-based triggers.

The triggers require the owners of existing structures to bring their structures into some degree of compliance with the requirements for newly built structures based on the cost of the rehabilitation. As a result, many older buildings remained in their original state because of the unknowns in the regulatory system.




*Source: A National Survey of Rehabilitation Enforcement Provisions, U.S Department of Housing and Urban Development, 1998.*

## What Is the NARRP?

While existing structures may have been built in accordance with an earlier building code or even in the absence of a code, most of these structures are safe and sound and continue to function properly. In recognizing the continuing serviceability of existing structures, the NARRP provides a model for addressing the regulatory needs for the rehabilitation of existing structures. The NARRP is a set of provisions designed to provide reasonable, cost-sensitive requirements for regulating work in all types of existing buildings. The provisions were developed in a format that permits state and local jurisdictions or the model code groups to adopt them with little additional language.

## What Is the Philosophy?

The NARRP reflects a commonsense philosophy toward rehabilitation. The philosophy is simple.

- Encourage the improvement of buildings through a realistic and predictable set of requirements.
- Clarify the applicable requirements for work performed within existing buildings.
- Minimize and clearly state any additional requirements that go beyond the voluntary work proposed.

In contrast to current rehabilitation provisions, the NARRP does not discourage improvement. That is, it does not require existing buildings undergoing rehabilitation to meet the full requirements for new structures. It recognizes the commonsense fact that a little improvement is better than no improvement.

## Benefits of the NARRP

The adoption of realistic, cost-sensitive rehabilitation provisions such as those contained in the NARRP offers many potential benefits. The NARRP is intended to promote the beneficial reuse of existing buildings while correcting potentially hazardous conditions that might otherwise continue unabated due to the high cost of rehabilitation. Rather than requiring existing structures to be brought into some degree of compliance with requirements for new structures (often impractical and costly to apply to existing structures), the NARRP specifically addresses the unique situations that often characterize rehabilitation work.

In addition to providing realistic, cost-sensitive provisions, NARRP's requirements are more predictable than those embodied in most existing codes. Provisions in existing codes often require a building official's interpretation, which can result in variability in requirements between jurisdictions and even among similar projects within the same jurisdiction. Indeed, two building officials can arrive at different interpretations of the same provision even after exercising professional discretion. The result is that investors and homeowners experience great difficulty in determining what will be required for the rehabilitation of a building unless they commission a substantial investigation. If investors cannot determine the necessary level of rehabilitation, they cannot accurately estimate a building's value. Typically, both homeowners and investors assume the worst-case (high-cost) scenario, which results in a much lower building value, and often renders revitalization uneconomical. The NARRP offers a means of avoiding such scenarios by specifying rehabilitation provisions that are not subject to a high degree of interpretation. Appendix A provides a summary of the provisions contained in the NARRP.

## How Does the NARRP Relate to the New Jersey Rehabilitation Subcode?

New Jersey, one of the oldest states in the country, has one of the oldest housing stocks. Over one-half of the state's 3.1 million houses were built before 1959. In 1997, rehabilitation expenditures accounted for 47 percent of New Jersey's total construction expenditures, based on building permits. In the older cities such as Newark, three out of every four construction dollars spent on residential dwellings went to rehabilitation. New Jersey realized, however, that an aging housing stock did not necessarily mean a dilapidated housing inventory.

In 1996, the state of New Jersey began to develop its own rehabilitation provisions, and in January, 1998, adopted the *New Jersey Uniform Construction Code—Rehabilitation Subcode.* At about the same time, HUD funded development of the NARRP. The New Jersey code served as the model for the NARRP. For this reason, the New Jersey site was ideal for a case study to document implementation of the Nationally Applicable Recommended Rehabilitation Provisions.

# The Project

The site selected for the study is located in northwestern New Jersey in the township of Chester. *Professional Remodeler* Magazine designated the same site for its first featured Model ReModel project. Information on the latter effort can be found on the magazine's web site at *www.proremodeler.com*.

The NARRP project called for rehabilitation of a structure known as the Stone Lodge (see Figure 5). The original stone structure was built in 1747, and has a long history of additions and alterations.

*Figure 5. The Stone Lodge circa 1747.*

A carriage house and porch were added to the structure in the 1800s (see Figure 6). In 1985, the structure's electrical and plumbing systems underwent extensive repair. At the same time, the windows were replaced and the rear porch was enclosed. In 1990, a master bedroom and den were added to the east side of the structure (see Figure 7). The Stone Lodge and its long history of alterations is a perfect example of how rehabilitation is necessary to allow a structure to maintain its functionality over time.

*Figure 6. Carriage House and Porch.*

*Figure 7. Master Bedroom and Den Addition.*

## The Remodeler

The remodeling contractor for the project was Asdal Builders, LLC. Asdal Builders was the winner of the NAHB Remodeling Quality Award—1994 Remodeler of the Year for New Jersey.

Asdal Builders is a relatively small, owner-operated remodeling company with usually only five to six employees in the field. The employees perform most of the company's work, little work is subcontracted. In addition to contract remodeling, Asdal Builders is a speculative remodeler. That is, the firm purchases buildings in need of rehabilitation, and then remodels and sells them. The *New Jersey Rehabilitation Subcode* has enhanced Asdal's ability to estimate with greater accuracy the rehabilitation costs for potential investments and thus eliminate a large portion of the risk associated with speculative remodeling ventures.

## Code Officials' Perspective

Officials with the New Jersey State Department of Community Affairs reported that the response to the rehabilitation subcode has been largely positive, especially among builders and designers. The only resistance has come from building officials who have not fully grasped the code. Recognizing the likelihood of resistance among some officials, the New Jersey State Department of Community Affairs (NJDCA) informed and trained over 1,200 New Jersey code officials on use of the rehabilitation subcode. Since completion of the training, the majority of building officials are pleased with the provisions. Representatives of the NJDCA encourage code officials to contact the agency for advice when they encounter new situations in the field. The NJDCA has found that training and technical support are necessary to ensure the consistent application of regulations in the field. The code official for the township of Chester, who has undergone the NJDCA training, was cooperative and receptive to the New Jersey Rehabilitation Subcode. Training on application of the rehabilitation subcode continues on a regular basis.

## Scope of the Current Project

The current project included a 28- x 28-foot two-story addition and reconstruction of the existing kitchen. The addition accounted for approximately 1,250 square feet of living area and included two bedrooms, a bathroom, dining room, home office, and work/utility room. Figure 8 is a view of the front elevation of the Stone Lodge with the completed addition; Figure 9 is a view of the rear elevation.

*Figure 8. Front Elevation of Completed Project.*

*Figure 9. Rear Elevation of Completed Project.*

The shaded portions of Figures 10, 11, and 12 illustrate the areas affected by the rehabilitation and addition. The addition is incorporated in such a way as to provide a smooth and open transition between the existing and new spaces (see Figures 10, 11, and 12). The addition also blends well into the exterior facade of the existing structure (see Figures 8 and 9).

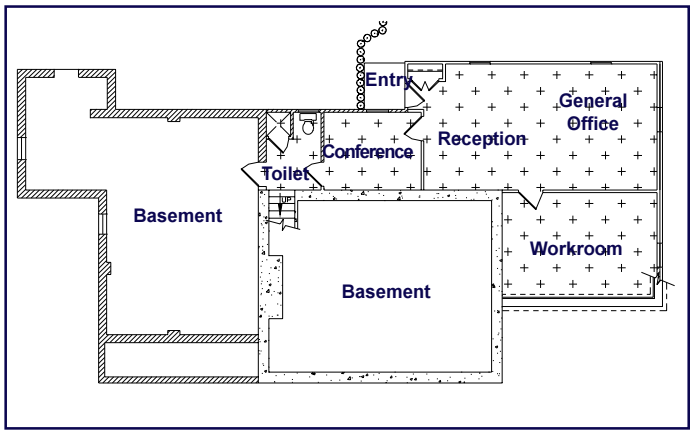



*Figure 10. Foundation Plan.*

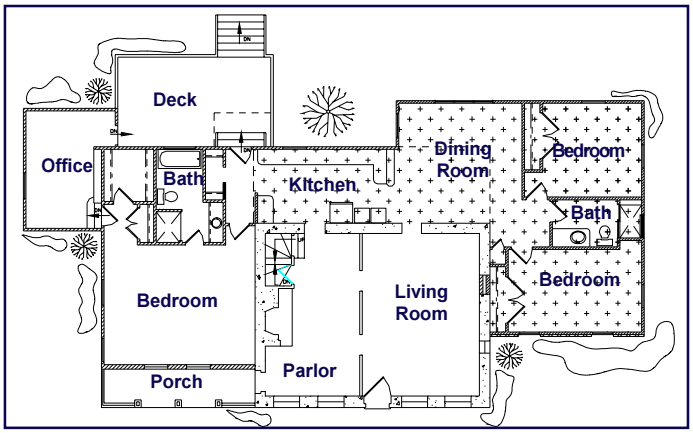



*Figure 11. First-Story Plan.*

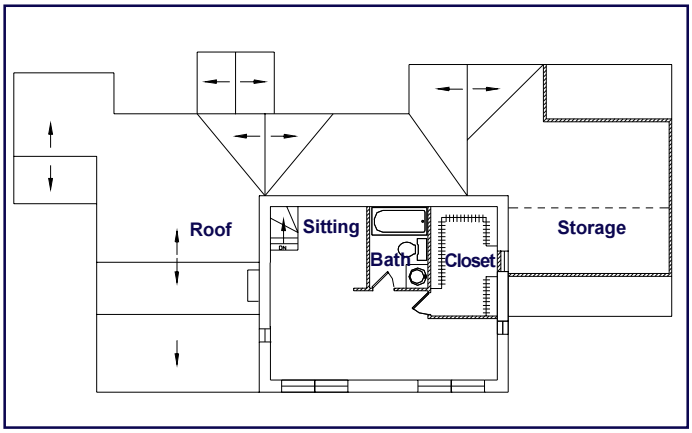



*Figure 12. Second-Story Plan.*

## Project Budget and Schedule

The project budget totaled $133,691. The construction was scheduled for completion over a 16-week period. Appendix B presents a rough breakdown of the budget and schedule.

## The Old Code

Before adoption of the New Jersey rehabilitation subcode, the state of New Jersey used the 25/50 percent rule for rehabilitation requirements. The rule was a cost-based trigger: as the cost of work increased, the requirements for renovation increased. It divided rehabilitation work into three cost-based categories: under 25 percent of the physical value of the existing structure, 25 to 50 percent, and over 50 percent. When rehabilitation costs fell below 25 percent of the physical value of the existing structure, the code official was to determine the degree to which the existing structure had to comply with the requirements for new structures. When renovation costs exceeded 25 percent of the value of the structure, all areas of the existing structure slated for rehabilitation had to comply fully with the requirements for new structures. When costs exceeded 50 percent, the entire structure, even areas unaffected by rehabilitation, had to be brought into full compliance with the current provisions for new structures.

In addition to the 25/50 rule, New Jersey rehabilitation provisions relating to additions were governed by a percentage rule. When additions exceeded 5 percent of the floor area of the existing structure, the existing structure was required to be brought into compliance with the light, ventilation, egress, and fire safety provisions of the building code. This provision was applicable regardless of project costs.

Provisions governing the construction of new structures are provided by the *New Jersey Uniform Construction Code (NJUCC).* At the time of the project, the NJUCC referenced the BOCA National Building Code/1993. It should be noted that New Jersey adopted the 1996 version of the BOCA code with amendments in July of 1998, after construction on the project began.

## Differences between the Old Rehabilitation Provisions and the NAARP/New Jersey Subcode

Under the old New Jersey rehabilitation provisions, the value of the existing structure had to be calculated to determine which of the rehabilitation provisions applied. The original purpose of this calculation was to determine permit fees; in New Jersey, however, the calculation served a dual purpose. It not only established fee schedules, but also provided a means of establishing an existing structure's value. New Jersey used the most recent BOCA Valuation Data Report in determining the value of the existing structure.

Table 1 presents the calculations for the Stone Lodge. The budgeted costs for the planned additions and renovations far exceeded 50 percent of the physical value of the existing structure while the additions exceeded 5 percent of the existing floor area (see Table 1). Under the old rehabilitation provisions, the entire structure would have had to comply with the 1993 BOCA Code requirements for new structures. Considering that the existing structure was constructed in the 1700s and thus predates building codes, compliance with the 1993 provisions would have triggered extensive alterations to the existing structure. Yet, the structure had been functioning as a home for well over 200 years. The New Jersey rehabilitation subcode and the NARRP recognized the home's age and uninterrupted use as a dwelling and required no alterations to the structure beyond the scope of the project.

**Table 1:**
**BOCA Valuation Data Report:**
**Valuation Calculations for the Stone Lodge (existing structure)**

| | |
|---|---|
| Type V Construction | Load-Bearing Masonry Exterior Walls, Unprotected Interior Walls |
| Existing Square Footage | |
| First Story | 1,775 |
| Second Story | 720 |
| Total | 2,495 |
| R-3 Value per Square Foot | $37.18 |
| Total Value | $92,764 |
| N.J. State Cost factor | 1.12 |
| Adjusted Value | $103,896 |
| Project Cost | $133,691 |
| **Cost Ratio** | **129%** |
| Addition Square Footage | 1,250 |
| **Percentage Square Footage Increase** | **50.1%** |

## Cost and Scheduling Impacts of Rehabilitation Provisions

A detailed analysis revealed the differences in the requirements among the *1993 BOCA Code,* the *Nationally Applicable Recommended Rehabilitation Provisions*, and the *1998 Uniform Construction Code Rehabilitation Subcode (New Jersey).* Officials from the New Jersey State Department of Community Affairs provided an interpretation of the previous rehabilitation provisions under the 25/50 rule. The officials identified potential requirements under the old code and estimated the likelihood that the requirements would have been enforced under the former rehabilitation provisions. A thorough review of the project revealed that the old provisions could and probably would have required a significant amount of additional work to the existing structure. The analysis identified five areas that would have required significant modification:

- Foundation
- Egress Windows
- Corridor Width
- Stair Geometry
- Ceiling Heights

It is important to note that these areas would require modification under a strict interpretation of the old code. Building officials often exercise discretion when interpreting the code. Thus, it is difficult to determine which issues would be relevant to any given project, clearly illustrating the benefits of predictable provisions that are not subject to individual interpretation.

The NAHB Research Center, Inc., working with Asdal Builders, developed cost estimates for each of the areas where additional work would have been required under the old New Jersey Uniform Construction Code. Tables 2 through 8 present estimated costs that could have been incurred in complying with the old rehabilitation provisions. Due to the unique stone construction techniques in the stone lodge, cost estimates for items where the stone walls had to be altered were extremely high. Therefore, to provide a broader view of the regulatory impacts of a rehabilitation project, additional estimates were developed in accordance with the *1998 RS Means Repair and Remodeling Cost Data* to reflect the same alterations to a more typical wood framed structure. Tables 2 through 8 also note the applicable sections of the NARRP, the New Jersey Subcode, and the BOCA Code, 1993.

## *Foundation*

Officials with the New Jersey State Department of Community Affairs indicated that a structural analysis would likely have to be performed to determine the load-bearing capacity of the existing rubble stone foundation (see Figure 13). Both the NARRP and the New Jersey Subcode contain provisions that allow the existing structural systems in single-family residential dwellings to remain in place if no additional loads are applied and no visible signs of structural failure are apparent. Table 2 provides an estimate of the costs for such a structural analysis. It should be noted that the costs include those for excavation of the exterior of the foundation for a visual inspection. Such costs would not be incurred in all cases.

*Figure 13. Rubble Stone Foundation.*

**Table 2:**
**Cost of Compliance with Old New Jersey Rehabilitation Provisions: Foundation Structural Analysis—Cost Estimate**

| Item | | Total Cost |
|---|---|---|
| Excavation* | | $600 |
| Inspection of Foundation | | $250 |
| Landscaping* | | $200 |
| Structural Report | | $200 |
| **Subtotal** | | **$1,250** |
| **Referenced Sections** | **Overhead and Profit** | **$325** |
| **NARRP:** 602 | **Total** | **$1,575** |
| **NJ Subcode:** 5:23-6.27 | | |
| **1993 BOCA:** 1812.3.4 | | |

**Not all engineers would require a visual inspection of the exterior foundation unless visible signs of failure were apparent.*

## *Egress Windows*

The home's existing second story is currently used as a bedroom area. None of the five existing windows in the bedroom area meets the requirements for egress windows in new structures. Three of the windows are 19- x 30-inch casements (see Figure 14*)*; the other two are 14- x 36-inch sliders (see Figure 15). Compliance with the old rehabilitation provisions would have likely required widening one of the windows in this area to comply with the egress requirements for new structures. (Widening is not required under the NARRP or the New Jersey Subcode.)

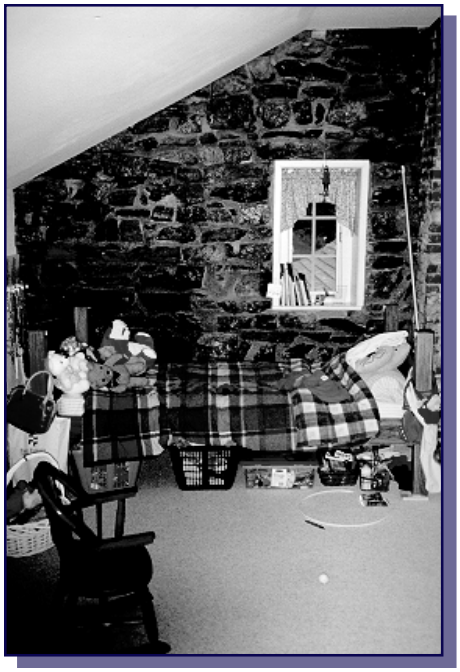


*Figure 14. Existing 19- x 30- Inch Casement Window.*

*Figure 15. Existing 14- x 36- Inch Sliding Windows.*

Widening even one window opening would be extremely difficult because of the 14-inch-thick stone exterior walls. Sufficient temporary support would have to be provided with needle beams. Further, given that the existing openings do not have structural headers, a header or lintel would have to be designed and installed to support the wider opening.

Table 3 provides an estimate of the cost of widening a window to meet current egress requirements. The estimate assumes that only one of the casement windows would be widened because any modification to the sliders in the front of the house would have been aesthetically unacceptable. Table 4 provides a similar estimate for a structure with wood-framed exterior walls and wood siding.

| Table 3: Cost of Compliance with Old New Jersey Rehabilitation Provisions: Enlarge Egress Window—Cost Estimate | | | |
|---|---|---|---|
| **Item** | **Labor hours (x$35/hr)** | **Material Cost/ Equipment Rental** | **Total Cost** |
| Structural Analysis | --- | ---- | $230 |
| Temporary Support | 16 | $400 | $960 |
| Demolition of Stone | 16 | $200 | $760 |
| Frame New Opening | 4 | $125 | $265 |
| Installation of New 36- x 48- Inch Window | 8 | $500 | $780 |
| Reset Stone | 20 | $100 | $800 |
| Install Trim and Paint | 8 | $125 | $405 |
| **Subtotal** | 80 | $1,500 | **$4,200** |
| **Referenced Sections** | **Overhead and Profit** | | **$1,092** |
| **NARRP:** 602 | **Total** | | **$5,292** |
| **NJ Subcode:** 5:23-6.27 | | | |
| **1993 BOCA:** 1010.4 | | | |

| Table 4: Cost of Compliance with Old New Jersey Rehabilitation Provisions: Enlarge Egress Window—Cost Estimate for a Typical Wood-Framed Structure | | | |
|---|---|---|---|
| **Item** | **Material** | **Labor** | **Total Cost** |
| Temporary Support | $17 | $30 | $47 |
| Demolition | ---- | $42 | $ 42 |
| Frame New Opening | $46 | $42 | $88 |
| Installation of New 36- x 48- Inch Window | $145 | $27 | $172 |
| Install 1/2- Inch Gypsum Board | $12 | $33 | $45 |
| Install Trim / Siding and Paint | $89 | $152 | $241 |
| **Subtotal** | **$309** | **$326** | **$635** |
| | **Cost Factor** | | **1.117** |
| | **Subtotal** | | **$710** |
| | **Overhead and Profit** | | **$188** |
| | **Total** | | **$894** |

## *Ceiling Height*

The bathroom located in the existing lower level has ceiling heights of approximately 6'8" (see Figure 16). The minimum ceiling height required for new buildings is 7-feet in living areas. Accordingly, the concrete slab would have to be demolished and excavated to accommodate the required ceiling height, thereby requiring alteration of the existing plumbing in the bathroom to accommodate the lower floor level. Table 5 presents estimated costs for performing this work. The remainder of the lower level is used as storage and would not require alteration.

Although most code officials would not require the ceiling height to be modified, officials with the New Jersey State Department of Community Affairs indicated that they would require the minimum height under a strict interpretation of the code and would be well within their rights to do so.

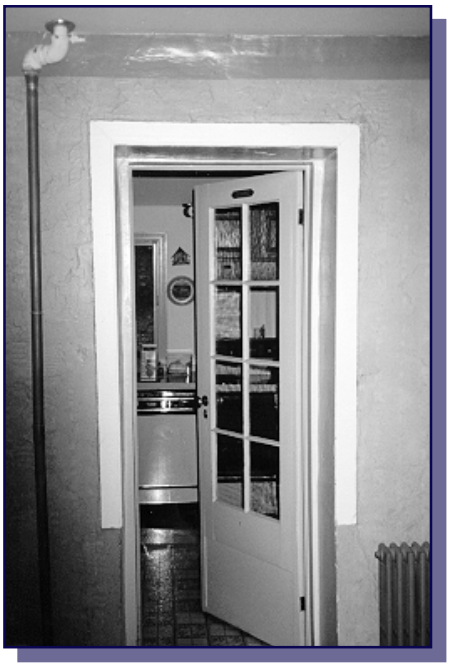


*Figure 16. Low Ceiling Height.*

**Table 5:**
**Cost of Compliance with Old New Jersey Rehabilitation Provisions: Raise Ceiling Height in Lower Bathroom—Cost Estimate**

| Item | Labor hours (x$35/hr) | Material Cost | Total Cost |
|---|---|---|---|
| Remove Plumbing Fixtures<br>Demolish Existing Slab<br>Excavate to Accommodate Adequate Ceiling Height | 32 | $100 | $1,220 |
| Reroute Plumbing to Accommodate Lower Floor Level* | 6 | $200 | $530 |
| Pour New Concrete Floor | 8 | $350 | $630 |
| Reinstall Plumbing Fixtures* | 6 | $250 | $580 |
| Install New Floor Coverings | 8 | $350 | $630 |
| **Subtotal** | **60** | **$1,250** | **$3,590** |
| **Referenced Sections** | **Overhead and Profit** | | **$933** |
| **NARRP:** 502.1 | **Total** | | **$4,523** |
| **NJ Subcode:** 5:23-6.27 | | | |
| **1993 BOCA:** 1204.1 | | | |

**$55/hour plumber labor.*

## *Corridor Width*

The doorway connecting the existing kitchen area to the living area of the existing structure is 24-inches wide (see Figure 17). During the revitalization, the door was removed, leaving the opening to remain as a corridor. Building officials with the New Jersey State Department of Codes indicated that the old rehabilitation provisions would likely have required the widening of one of the two corridors leading from the family room to the new additions. The procedure would have been extremely difficult because the corridor openings are located in load bearing stone walls that are approximately 14-inches thick. The current openings do not have a header or lintel to carry the load. In addition, a structural analysis would be required to determine the appropriate size for a concrete beam or steel lintel to reinforce the larger opening. Table 6 provides an estimate of the cost to widen a corridor to meet current requirements; Table 7 provides a similar estimate for a structure with wood framed exterior walls and wood siding.

*Figure 17. Existing Corridor.*

**Table 6:**
**Cost of Compliance with Old New Jersey Rehabilitation Provisions: Widen Corridor—Cost Estimate**

| Item | Labor hours (x$35/hr) | Material Cost | Total Cost |
|---|---|---|---|
| Structural Analysis | --- | ---- | $230 |
| Install Temporary Support | 16 | $200 | $960 |
| Demolish Existing Frame and Widen Opening | 16 | $200 | $760 |
| Install Concrete Lintel | 6 | $125 | $335 |
| Install New Frame | 8 | $100 | $380 |
| Reset Stone | 20 | $100 | $800 |
| Install Trim and Paint | 5 | $125 | $300 |
| Subtotal | 71 | $850 | $3,765 |
| **Referenced Code Sections** | **Overhead and Profit** | | **$979** |
| **NARRP:** 602 | **Total** | | **$4,744** |
| **NJ Subcode:** 5:23-6.27 | | | |
| **1993 BOCA:** 1011.3 | | | |

| Table 7: Cost of Compliance with Old New Jersey Rehabilitation Provisions: Widen Corridor—Cost Estimate for a Typical Wood-Framed Structure | | | |
|---|---|---|---|
| **Item** | **Material Cost** | **Labor Cost** | **Total Cost** |
| Install Temporary Support | $23 | $33 | $56 |
| Demolish Existing Door and Framing | ---- | $42 | $42 |
| Install New Framing | $25 | $30 | $55 |
| Install New Door—3' x 6'8- Inch 6-Panel Pine Prehung | $244 | $23 | $267 |
| Gypsum Board | $87 | $132 | $219 |
| Install Trim and Paint | $19 | $107 | $126 |
| **Subtotal** | **$398** | **$367** | **$765** |
| | **Cost Factor** | | **1.117** |
| | **Subtotal** | | **$855** |
| | **Overhead and Profit** | | **$222** |
| | **Total** | | **$1,077** |

## *Stair Geometry*

The existing structure has two original pocket or closet-type stairways located in the central part of the original structure (see Figure 18). While structurally sound, the stairways fall significantly short of the requirements for new structures. They are only 32 inches wide with treads only 8 inches wide. The winders in the "L" portion of the stairways are 10 inches at the widest point. The stairway leading to the basement is equipped with the original rope handrail, which is functional but does not meet code requirements.

The 1993 BOCA code contains a provision that allows existing stairways to remain; the 25/50 rule, however, required structures to comply fully with the requirements for new structures. Building officials with the New Jersey State Department of Codes stated that under the old code, stairways would have to be brought into compliance with requirements for new structures. Under the 1993 BOCA code, stairways must be 36 inches wide with a minimum tread width of 10 ¾ inches. Winders in an "L" stairway must be a minimum of 6 inches wide at the narrowest point. They must also be a minimum of 9 inches wide at a distance of 12 inches from the narrowest point.

It would be impossible to alter the existing stairways to bring them into compliance with the requirements for new structures. Instead, the stairways would have to be demolished and replaced with new stairways, thus necessitating extensive design work and the alteration of existing space. Mr. Asdal indicated that demolition and reconstruction of the stairways would have rendered the project infeasible not only because of the associated high costs (see Table 8), but also because of the negative impact on the architectural appeal of the existing structure. Neither NARRP nor the New Jersey Subcode requires work in areas outside the work area.

*Figure 18. Existing Pocket Stairway.*

**Table 8:**
**Cost of Compliance with Old New Jersey Rehabilitation Provisions: Stairway Reconfiguration—Cost Estimate for Both Sets of Stairs**

| Item | Labor hours (x$35/hr) | Material Cost | Total Cost |
|---|---|---|---|
| Design Costs | --- | ---- | $500 |
| Demolish Existing Stairways | 10 | $100 | $450 |
| Reframe to Accommodate New Stairways | 20 | $350 | $1,050 |
| Install New Stairways | 40 | $500 | $1,900 |
| Install / Finish Drywall | 20 | $300 | $1,000 |
| Install Trim | 20 | $200 | $900 |
| Paint | 16 | $150 | $710 |
| Carpet | 16 | $2,000 | $2,560 |
| Subtotal | 142 | $3,600 | $9,070 |
| **Referenced Sections** | **Overhead and Profit** | | **$2,358** |
| **NARRP:** None | **Total** | | **$11,428** |
| **NJ Subcode:** None | | | |
| **1993 BOCA:** 1014.0 | | | |

## Summary of Cost and Scheduling Impacts

Table 9 summarizes the estimated costs for the additional work beyond the desired scope. It also presents the impact of these costs on the total cost of the additions and renovations. Given that all of the modifications would have been required, the total cost of the project under the old code could have come in as much as 20 percent over the total project cost. Even when the cost of the stone exterior walls is ignored, the cost of addressing the modifications still would have added over 14 percent to the project cost.

In view of the planned scope of work, the 16-week schedule for the project was ambitious. Under the old rehabilitation provisions, the schedule would have been impossible. Mr. Asdal estimated that the additional work would have added a minimum of two weeks to the construction time. Moreover, the extra design work would have added substantial time to the project planning phases. Any requests for variances from the local building code for any of the modifications for the purpose of reducing construction costs would have further extended the planning phases.

It is important to recognize, however, that there is no certainty as to which of these modifications code officials would have required the remodeler to address. Any given building official could have required any or all of the modifications to be addressed. This uncertainty highlights perhaps the most important benefit of the NARRP and the New Jersey Subcode: improved predictability.

**Table 9:**
**Cost Estimates for Work in Excess of Desired Scope**

| Issue | Required Work under the Old 25/50 Rule | NARRP / New Jersey Rehabilitation Subcode | Labor Hours | Cost Stone Lodge | Wood-Framed Structure | Percent of Budgeted Cost |
|---|---|---|---|---|---|---|
| Foundation | Structural Analysis | $0 | 1 week | $1,575 | ---- | 1.2% |
| Egress Windows | Enlarge | $0 | 80 | $5,292 | $894 | 4%/(.7%)* |
| Corridor Width | Widen | $0 | 71 | $4,744 | $1,077 | 3.5%/(.8%)* |
| Ceiling Heights | Raise | $0 | 77 | $4,523 | ---- | 3.4% |
| Stairways | Reconfigure | $0 | 142 | $11,428 | ---- | 8.5% |
| | **Total** | **$0** | **370+** | **$27,562** | **$19,497** | **20.6%/(14.6%)*** |

** Percentage in parentheses is for the wood structure*

# Conclusions

The demonstration has proved useful and instructive. From our research, we were able to draw several conclusions:

- Rehabilitation provisions contained in the New Jersey Rehabilitation Subcode and the NARRP allow more cost-effective residential rehabilitation than the older existing codes. The Stone Lodge is a relatively high-end home located in a relatively wealthy area of the country. Impacts on cost-effectiveness may be even more beneficial in lower-income areas where budgets are particularly crucial to project feasibility. The New Jersey Rehabilitation Subcode and NARRP provisions could provide an effective tool in providing quality affordable housing.
- New Jersey has illustrated that, with proper training of code officials, codes based on the NARRP philosophy can be administered with consistency. Predictable regulations will enable both investors and homeowners to make more fully informed decisions on whether or not to rehabilitate.
- The reduced need for variances from unrealistic regulations translates into substantial time savings as well as predictability in the planning phases of rehabilitation.
- The New Jersey Rehabilitation Subcode and the NARRP provisions promote the continued use not only of single-family dwellings, but also of all types of buildings, helping to preserve the character of the past.

# Recommendations

Results of our study suggest the following actions to further the adoption of codes that mirror the philosophy underpinning the NARRP:

- Expand similar demonstrations into other areas of the country.
- Conduct demonstrations on multi-family residential structures to test the feasibility of the NARRP for other than single-family detached homes.
- Promote the NARRP and similar rehabilitation provisions to industry professionals and code officials through educational programs, symposiums, and similar events. The NAHB Research Center, Inc., is currently planning a national symposium in concert with the 1999 Remodelers Show in Philadelphia.
- Develop a simplified NARRP code containing only the provisions applicable to single-family homes (no change of use).
- Promote the NARRP to the International Code Council and state and local jurisdictions. Encourage the adoption of rehabilitation provisions with a similar philosophy.

# Useful References

Note all of the resources detailed below were used in the development of this document and are recommended for those seeking follow-up information.


- Nationally Applicable Recommended Rehabilitation Provisions, prepared by the NAHB Research Center for the U.S. Department of Housing and Urban Development, May, 1997.
- Uniform Construction Code Rehabilitation Subcode, New Jersey Department of Community Affairs, 1997.
- The BOCA National Building Code/1993, Building Officials and Code Administrators International, Inc., 1993.
- A National Survey of Rehabilitation Enforcement Practices, U.S. Department of Housing and Urban Development, June, 1998.


# Contacts

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# APPENDIX A
## Overview of the
## Nationally Applicable Recommended Rehabilitation Provisions

### What is the difference between the NARRP and the model building codes?

The model building codes typically divide work on existing buildings into four categories:

1. Repair
2. Alteration
3. Change of Occupancy
4. Addition

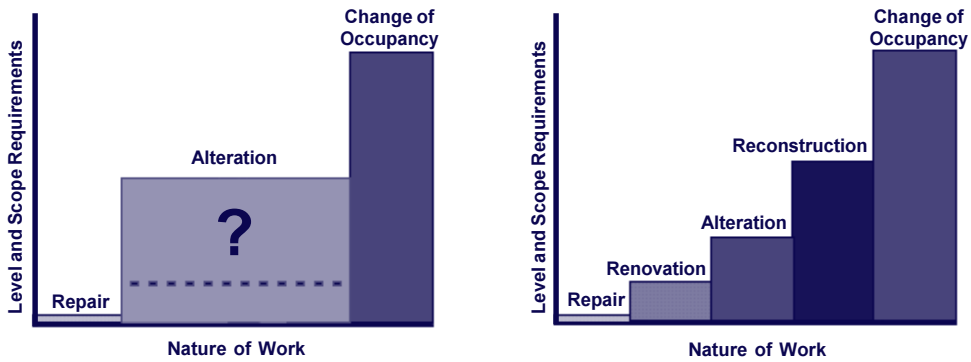
The level of requirements increases as the scope of work increases. The problem lies with the "Alteration" category, which is extremely broad and covers most rehabilitation work. Figure A-1 provides a breakdown of 1997 residential remodeling expenditures. Improvements (similar to alterations) accounted for over 60 percent of remodeling expenditures.

**Figure A-1: 1997 Residential Rehabilitation Expenditures**

*Source: National Association of Home Builders, 1998.*

In most cases, the alteration section of the model codes' rehabilitation provisions that is particularly unclear and requires the discretion and interpretation of the local building official. Figure A-2 illustrates the categories of work under both the NARRP and the model building codes. Notice how the alteration category of the model building codes covers a large segment of the work spectrum and level of requirements. The NARRP separates "Alteration", as defined by the model building codes, into three categories: Renovation, Alteration, and Reconstruction, for a total of six categories of work. In Figure A-2, notice the more lineal relationship between the Nature of the Renovation Work and the Level of Requirements.

**Figure A-2: Differences in Regulations (Model Building Codes vs. NARRP)**




*Source: Nationally Applicable Recommended Rehabilitation Provisions, U.S. Department of Housing and Urban Development, 1997.*

### Work Triggered By the NARRP as Applied to Single-Family Homes

Although the NARRP and the New Jersey code address all types of residential and commercial structures, this case study concentrates on the provisions applicable to single-family detached homes. Provisions for single-family homes are less stringent than those for multi-family residential and commercial structures. Considerable effort was made during development of the NARRP not to include provisions that would require work to areas of the existing structure not undergoing rehabilitation. The following table presents a summary of the requirements pertaining to single-family homes. It is important to recognize that the requirements presented under each category are cumulative, i.e., requirements for repairs also apply to alterations.

| Table A-1: Overview of NARRP for Repair, Renovation, Alteration, and Reconstruction | | |
|---|---|---|
| **Section of NARRP** | **Scope of Work** | **Requirements** |
| Chapter 3<br>Repair | The patching, restoration, and/or minor replacement of materials, elements, components, equipment, and/or fixtures for the purposes of maintaining such materials, elements, components, equipment, and/or fixtures in good or sound condition. | Replace with like materials with the exception of lead-based paint , asbestos, miscellaneous plumbing materials, electrical receptacles, and electrical fuses. Work cannot reduce structural strength or make the building less conforming with the building, plumbing, mechanical, and electrical codes. |
| Chapter 4<br>Renovation | The change, strengthening, or addition of load-bearing elements and the refinishing, replacement, bracing, strengthening, upgrading, or extensive repair of existing materials, elements, components, equipment, and/or fixtures. Renovation involves no reconfiguration of spaces. Interior and exterior painting are not considered refinishing for purposes of the definition and are not renovation. | Unreinforced masonry buildings in seismic zones, where A > .25, must have parapet bracing and wall anchors installed at the roof line. |
| Chapter 5<br>Alteration | The reconfiguration of any space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment. | Minimum of 100 ampere three-wire electrical service shall be provided except if an existing 60 ampere three-wire service is adequate for the load served. Clearance from electrical service equipment must meet the requirements of the electrical code. Rooms included in the renovation are required to have a certain number of receptacles and lighting outlets. Where alterations affect more than 20 percent of the floor area and the occupant load increases, plumbing fixtures shall be installed in quantities specified by the plumbing code. All reconfigured spaces intended for occupancy shall have either natural or mechanical ventilation. |
| Chapter 6<br>Reconstruction | The reconfiguration of a space, which affects an exit, or element of the egress access shared by more than a single tenant; or renovation and/or alteration when the work area is not permitted to be occupied because existing means of egress and fire protection systems, or their equivalent, are not in place or continuously maintained; and/or extensive alterations. | Battery-powered smoke detectors shall be provided at each level and outside each sleeping area. |
| Chapter 7<br>Additions | An increase in building area, aggregate floor area, height, or number of stories of a structure. | All additions must comply with the current model building, plumbing, mechanical, and electrical codes for new structures. Additions cannot increase the size of the building beyond that allowed by the building code. Additions cannot impose on the existing structure, new structural loads that exceed those allowed in the building code. Additions must comply with the accessibility requirements of the building code. Hard-wired smoke detectors must be installed in the addition and battery operated smoke detectors in the existing structure. |

*Note: The requirements contained in this table are summary information. For specific requirements, please refer to the referenced sections of the NARRP.*

# APPENDIX B
## Detailed Project Budget and Schedule

The following table presents a detailed final budget for the rehabilitation and addition to the Stone Lodge. Figures were obtained from the remodeler, Asdal Builders, LLC.

**Table B-1:**
**Budget / Schedule for the Stone Lodge**

| Activity | Cost | Estimated Duration (days) |
|---|---|---|
| Permits / Fees | $350 | 45 |
| Architectural / Engineering | $1,000 | 10 |
| Site Work / Walkway | $2,560 | 6 |
| Demolition | $2,680 | 6 |
| Utility Connection | $500 | 2 |
| Footings / Foundation | $5,170 | 10 |
| Framing | $11,942 | 16 |
| Plumbing | $4,230 | 10 |
| Electrical | $2,575 | 8 |
| HVAC | $2,625 | 5 |
| Roofing | $1,770 | 10 |
| Windows / Doors | $16,015 | 6 |
| Insulation | $1,569 | 3 |
| Siding | $10,733 | 30 |
| Drywall / Trim | $9,527 | 21 |
| Flooring / Ceramic Tile | $6,732 | 10 |
| Cabinets | $19,125 | 22 |
| Appliances | $2,050 | 1 |
| Miscellaneous Punch Out | $1,450 | 5 |
| Supervision | $3,500 | - |
| Hard Costs | $106,104 | 226 days of activity **16 Weeks** |
| Profit and Over Head | $27,587 | |
| **Budget** | **$133,691** | |

# Acknowledgments

This report was prepared by the NAHB Research Center, Inc., Upper Marlboro, Maryland, for the U. S. Department of Housing and Urban Development (HUD). The principal investigator for the project was Chad Garner. Mark Nowak, NAHB Research Center, and William Freeborne and David Engel, HUD, provided technical review. Mary Ellen Howard created the design and layout of the report. Special thanks go to Bill Asdal of Asdal Builders, LLC, Rod Sutton of *Professional Remodeler Magazine,* William Connolly, Amy Frank, and John Terry of the New Jersey Department of Community Affairs, and John Heyrich, of Heyrich Architects.

The NAHB Research Center, Inc., was established in 1964 as a separately incorporated, wholly owned, not-for-profit subsidiary of the National Association of Home Builders (NAHB), whose 197,000 members are involved in the construction of over 80 percent of U.S. homes. The Research Center studies all aspects of remodeling and home building, tests and certifies building products in a fully equipped laboratory, and conducts a wide range of dissemination and training activities for builders, remodelers, and other members of the housing industry. NAHB, public agencies, and private sector clients sponsor research conducted by the Research Center.

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The U.S. government does not endorse products or manufacturers. Trade or manufacturer names appear herein solely because they are considered essential to the objective of this report.

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# Foreword

State and local codes to regulate building construction became commonplace in the early 20th century. Generally, communities adopted the codes with the goal of regulating new construction. When the codes addressed existing buildings, their purpose was usually to discourage rehabilitation of substandard wood-framed buildings within cities. The early provisions served their purpose 75 years ago when most existing structures were not built to any building code at all and many posed a significant risk of fire.

Today, most existing buildings in the United States represent an important national asset that must be preserved. As these buildings age, a large share require rehabilitation to maintain their functionality. Many localities however still rely on rehabilitation provisions enacted into law decades ago. Consensus points to the need for new, clear, cost-sensitive rehabilitation provisions that specifically address the unique condition of existing structures while promoting the continued use of such structures.

In an attempt to bring order and clarity to the process of regulating the rehabilitation of existing buildings, HUD sponsored the development and publication of a new regulatory framework that would address all types of work in all types of buildings. Released in 1997, the ***Nationally Applicable Recommended Rehabilitation Provisions*** (NARRP) represent an effort to develop regulatory tools that ensure life safety and encourage cost-effective rehabilitation.

This report provides one example of the application of the provisions. It is a case study that documents the rehabilitation of a 200-year-old single-family home in rural New Jersey. It provides a side-by-side comparison of traditional rehabilitation provisions with the ***Nationally Applicable Recommended Rehabilitation Provisions*** and the code from which the provisions were developed, the ***New Jersey Uniform Construction Code—Rehabilitation Subcode.***

By documenting the use and cost-effectiveness of the new rehabilitation provisions, the U.S. Department of Housing and Urban Development hopes to encourage more widespread adoption of similar provisions throughout the country. This publication was developed under HUD sponsorship and prepared by the NAHB Research Center, Inc.

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