Dane County

CDBG and HOME Program Rehabilitation Standards

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1. Introduction

1.1 Purpose and Intent

These general guidelines for the rehabilitation of existing residential properties have been developed to provide minimum criteria for HOME funded rehabilitation. These standards are intended to assure that improved housing is livable, healthful, safe and physically sound. Each chapter additionally includes a section that provides options for minimizing energy consumption and lessening the impact of the project and the home on the environment.

These guidelines are intended to provide an acceptable minimum level for rehabilitation with sufficient flexibility to meet varied local conditions and codes. It should be noted that if other public funding sources are being used, additional criteria may be applicable.

1.2 Applicable Codes, Rules and Ordinances

- All work must be completed in accordance with state and local building codes.
- Manufacturer specifications prevail; all materials shall be installed in full accordance with the manufacturer's specifications for working conditions, installation preparation, methods, protection and testing.
- All work must have a building permit when required by local codes.

1. Other Codes that May Apply

- Environmental Review
- Historic Properties
- Flood Plain Management
- Wild and Scenic Rivers
- Coastal Zone Management
- Noise Abatement and Control
- Airport Clear Zones and Accident Potential Areas
- Federal Fire Alarm and Sprinkler Requirements
- Accessibility Requirements
- Neighborhood Standards

2. Helpful Guides for Rehab Standards

- International Building Code (IBC) is a model code developed by the International Code Council (ICCI) that covers rehab as well as new construction activities. The IBC is updated every three years, with the next update scheduled to take place in 2009.

- Wisconsin Uniform Dwelling Code (UDC) applies to new construction only but may help direct you toward the most recent standards for health and safety.

2. Lead Hazard Reduction

2.1 Applicable State and Federal Laws

Contractors must comply with the provisions of the Lead-Based Paint Poisoning Prevention Act, 42 U.S.C. 3535 (d), 4821 and 4851, and its implementing regulations in 24 C.F.R. 35 as well as State and local laws regarding

lead paint. There are cases where the Wisconsin State Statute and Administrative Rule are more stringent than the Federal Regulations. In those cases, follow the stricter standard.

- Federal Lead Paint Regulation 24 CFR, Part 35: Applies to any HUD-CPD funded activity with requirements as listed below (Section A) based on type of activity.

- State of Wisconsin Code HFS 163: Applies to any person performing, supervising, or offering to perform or supervise a lead-based paint activity involving housing or a child-occupied facility constructed prior to 1978 (unless the property is occupied by elderly or the disabled or is a zero-bedroom dwelling unit). The Code requires certification of all inspectors, supervisors and workers, and established work practice standards.

1. Summary of Federal Lead Paint Regulations

Rehabilitation of any property built prior to 1978 requires some action to address concerns about the presence of lead-based paint. In general there are four considerations when working on pre-1978 homes, these include:

1) testing of surfaces,
2) rehab work practices,
3) Required follow-up, and
4) notification of people living in the home.

These differ depending on the amount of federal funding provided for rehab. The following table summarizes these requirements.

Level of Activity: Less than or equal to $5,000 investment per unit.			
Testing Requirements	**Work Requirements**	**Post Work Activity Requirements**	**Notification Requirements**
• Paint testing performed on surfaces to be disturbed by a certified lead paint tester. -OR- • May also presume lead paint exists.	• Repair surfaces disturbed during work. -AND- • Use safe work practices when working on areas identified as lead based paint. -AND- • Clearance of work site, or entire home if the site was not contained. (Clearance is not required if the rehab did not disturb painted surfaces of greater than 20 ft^2 on the exterior, 2 ft^2 in any interior room, or greater than 10% of the surface area in any interior or exterior component.)	• For HOME Rental Housing only.	• Provision of pamphlet "*Protect Your Family from Lead in Your Home*". -AND- • Disclosure of available information or knowledge regarding the presence of lead paint. -AND- • Disclosure of test results within 15 days of receiving report or a disclosure of presumption of lead.
Level of Activity: Between $5,000 and $25,000 investment per unit.			
• Full risk assessment on unit receiving assistance, related common areas and exterior painted	• Perform interim controls on identified hazards. -AND-	For HOME Rental Housing only.	• Provision of pamphlet "*Protect Your Family from Lead in Your Home*". -AND-

surfaces by a certified risk assessor. -OR- • May also assume lead paint and perform standard treatments.	• Safe work practices unless rehab did not disturb painted surfaces of greater than 20 ft^2 on the exterior, 2 ft^2 in any interior room, or greater than 10% of the surface area in any interior or exterior component. -AND- • Clearance on unit, related common areas and exterior painted surfaces.		• Disclosure of available information or knowledge regarding the presence of lead paint. -AND- • Disclosure of test results within 15 days of receiving report or a disclosure of presumption of lead. -AND- • Notice of hazard reduction activities within 15 days after completed, including clearance results.
Level of Activity: More than $25,000 investment per unit.			
• Risk assessment on assisted unit, related common areas and exterior painted surfaces using a certified assessor. -OR- • May also presume lead and abate all applicable surfaces.	• Abate all interior and exterior identified hazards that have been disturbed. -AND- • Interim controls performed on identified hazards on exterior that are not disturbed by rehab. -AND- • Safe work practices unless rehab did not disturb painted surfaces of greater than 20 ft^2 on the exterior, 2 ft^2 in any interior room, or greater than 10% of the surface area in any interior or exterior component. -AND- • Clearance on unit, related common areas and exterior painted surfaces	For HOME Rental Housing only	• Provision of pamphlet "*Protect Your Family from Lead in Your Home*". -AND- • Disclosure of available information or knowledge regarding the presence of lead paint. -AND- • Disclosure of test results within 15 days of receiving report or a disclosure of presumption of lead. -AND- • Notice of hazard reduction activities within 15 days after completed, including clearance results.

2. State Worker Requirements

a. Lead Safe Work
- Safe work practices *must be completed by a trained lead safe worker*.
- A "lead safe worker" is someone who has completed and passed at least one day of training from an accredited source, and must be able to present a certificate of completion.

b. Lead Abatement
- *A person performing lead abatement activities must be certified by DHFS in the State of Wisconsin*.
- All workers must have their certification cards on the premises.

- The supervisor of the abatement work must notify DHFS a minimum of 10 days prior to commencing the work.

2.2 Standards for Exterior Painting

1. Scope

Owners of buildings and structures built before 1978 shall paint or cause to be painted any painted exterior surface of such buildings or structures in conformity with the standards set forth in this section. These standards also apply if the age of the building or structure cannot be established by the owner to the satisfaction of the Department of Public Health.

a. Painting includes but is not limited to work involving construction, alteration, repair, painting, paint removal or decorating.

b. A painted exterior surface means an exterior surface covered with paint or other surface coating material (including, but not limited to stains and varnishes).

c. An exterior surface may include but is not limited to walls; windows, window assemblies and trim; soffit; fascia; doors, door assemblies and trim; porch and balcony floors and ceilings; column, handrails, and guardrails; and foundations.

2. Standards for Paint Removal Methods

The following methods shall not be used to remove paint or other surface coating materials without the use of adequate engineering controls to reduce public exposure to lead:

- Open flame burning
- Power tool cleaning including but not limited to machine sanding or machined grinding
- Open-air abrasive blasting or stripping using sand, steel grit, steel shot, aluminum oxide, water or other abrasive media

Adequate engineering controls include but are not limited to vacuum attachments equipped with high efficiency particulate accumulator (HEPA) filters, partial containment structures, total containment structures under negative pressure or other method approved by the Director or Department of Public Health.

3. Safety Procedures

a. All windows, doors, HVAC intake vents and other entry ways into the building or structure shall be kept closed, or sealed if necessary, while work is being performed.

b. Plastic sheeting shall be used to prevent accumulation of dust and debris on the soil, vegetation or other surfaces adjacent to the work area. At a minimum, plastic sheeting shall be securely attached to the building or structure and extend the length of the work area.

c. All visible dust and debris in and around the work area and all waste work materials such as tape, plastic sheeting, mop heads, cleaning cloths, sponges, disposable clothing, filters and other disposable work materials must be cleaned up at the end of each work day during the entire painting or remodeling project. The dust, debris and disposable work materials must be placed in double 4 mil or single 6 mil plastic bags.

d. Waste generated during the project shall be disposed of in conformance with all applicable local, state and federal laws and regulations. Waste shall be transported and disposed of in such a manner as to prevent lead from becoming airborne.

4. Warning Notices

At least two warning signs shall be conspicuously posted adjacent to the work area. The signs shall be posted at the beginning of the project and remain posted until the project has been completed. The signs shall measure at least eleven (11) inches by eight (8) inches and display the following wording:

Caution – Paint Removal Work Area
Danger to Children and Pregnant Women

5. Exemption

Persons are exempt from this ordinance if there is no lead-based paint present on the surfaces to be painted or remodeled or if there is no lead-based paint disturbed by the painting or remodeling process. Lead-based paint means any paint or other surface coating material containing more than 0.06% lead by weight, or showing a lead concentration of more than 0.7 milligrams of lead per square centimeter (0.7 mg/cm^2) of surface area. This determination must be made prior to removing or disturbing the paint by a laboratory certified to do lead analysis through the Environmental Lead Laboratory Accreditation Program. Paint chip samples must be collected according to instructions provided by the accredited laboratory. Acceptable paint chip samples must include all layers of paint and omit any surface material such as wood, masonry, etc. A Finding of no lead-based paint must be supported with written documentation showing who performed the testing (specifying the company or lab name and address and technician name), the date of testing, the test method used, the location and type of surface tested and the test result for each sample.

2.3 Additional Resources

- *Lead Paint Safety: A field Guide for Painting, Home Maintenance, and Renovation Work*, U.S. Department of Housing and Urban Development Office of Healthy Homes and Lead Hazard Control, http://www.hud.gov/offices/lead/training/LBPguide.pdf

- Nation Center for Health Housing, http://www.centerforhealthyhousing.org/

3. Asbestos Removal

3.1 Definitions

- Category I nonfriable Asbestos Containing Material (ACM) – packing, gaskets, resilient floor covering and asphalt roofing containing asbestos that cannot be crumbled to powder by hand pressure. The material is pliable and breaks by tearing. It does not easily release asbestos fibers upon breaking.

- Category II nonfriable ACM – any material containing asbestos that cannot be crumbled by hand pressure, but which is not pliable and breaks by fracturing. It does release asbestos fibers upon breaking. Exterior siding boards are included in this category.

- Friable ACM – any asbestos containing material that can be crumbled to a powder with hand pressure. Common materials include pipe insulation and sprayed on or tiled sound insulation material. Asbestos fibers are readily released upon breaking. Some nonfriable materials may become friable during activities such as grinding, cutting, and the like.

3.2 Applicable State and Federal Laws

Work shall be done in compliance with:

- State of Wisconsin Department of Natural Resources (DNR), Chapter NR 447 Asbestos Removal Regulations,
- Federal Environmental Protection Agency (EPA) Clean Air Act, and
- Occupational Safety and Health Administration (OSHA) worker safety codes and regulations.

3.3 Work Standards

Asbestos removal requirements shall be followed if work includes the removal of asbestos and asbestos containing materials in excess of 160 square feet or 260 linear feet. In such cases a *certified asbestos abatement supervisor and a certified asbestos worker are required* to complete the work.

As a program manager, it is useful to be aware of the practices that will be used by a certified asbestos worker, they are as follows:

A. Approved Practices

- Follow standard site maintenance procedures (Section 4).
- ACM must be removed prior to demolition, with the exception of Category II materials in some cases.
- Provide all necessary containment measure necessary to protect occupants, workers, and property.
- Containment measures shall be in place prior to the commencement of asbestos removal.
- Use only wet methods when disturbing asbestos and asbestos containing material.
- Containment areas shall be constructed using 6 mil polyethylene and duct tape in a manner to prevent the dispersion of asbestos dust particles.
- Cover ground or floor areas with two layers of 6 mil polyethylene.
- Shut down forced air heating systems and seal all hot and cold air returns with 6 mil polyethylene and duct tape.
- Cover and seal all surfaces not to be worked on in the containment area.
- Entrances to containment areas used by workers shall have two layers of 6 mil polyethylene attached to the top edges of the doorway and at opposite sides of the doorway to form a z-door.

B. Prohibited Practices

- Use of non-HEPA approved vacuum.
- Dry removal methods such as scraping, sanding, or sweeping.
- Asbestos debris shall not be stored on-site unless it is properly protected in approved containment devices.

C. Clean-up
- Dispose of materials in properly labeled double 6 mil polyethylene bags sealed with duct tape.
- Friable ACM must be wetted prior to bagging and Category II ACM should be wetted as needed to control dust.
- Line dumpsters with 6 mil polyethylene to prevent asbestos dispersion during transportation.
- Do not store debris outside of building while awaiting disposal.
- Clean work areas daily throughout asbestos removal process.

4. Site Maintenance

1. Site Preparation
- Close windows and doors adjacent to demolition work area.
- Prevent dust and debris from contaminating interior areas of the building or adjacent property.
- Locate any hidden utilities, electric, water, sewer, heat, etc. and disconnect or cap off utilities prior to start of demolition.
- Arrange and verify shut off of appropriate utilities, and protect utilities indicated to remain in services from damage during demolition.
- Provide sturdy barriers and covers as necessary for safety and to protect remaining work.
- Provide braces or shores wherever structural elements will be removed in partial demolition.
- Provide tree and shrub protectors.
- Store and handle materials in a manner to prevent loss from weather or other damage, and according to manufacturer specifications.

2. Site Work
- Start demolition at top most level, and proceed downward.
- Provide water supply and hoses for spray to control dust.

3. Site Clean-up

A. At the End of Each Day
- Secure equipment.
- Secure site if occupant has been temporarily relocated.
- Leave property in a safe and reasonable condition.
- If the occupant remains on site, there must be running water and an operable bathroom at the close of each work day.

B. When the Work is Completed
- Clean transparent materials and remove glazing compounds.
- Clean exposed hard-surfaced finishes to a dust-free condition free of stains, films, and other foreign substances. Sweep hard surface flooring and vacuum carpeting.
- Wipe surfaces of mechanical and electrical equipment. Clean light and plumbing fixtures.
- Remove labels that are not permanent.
- Completely control and remove all demolition debris, scraps and dust.
- Remove temporary protection and facilities.

4. Optional Energy Conservation and Environmental Protection Measures
- Create a job site recycling plan and recycle or reuse job site waste as much as possible.

5. Site Improvements

5.1 Concrete Walkways

All deteriorated essential paving shall be repaired.

1. **Materials and Products**
   - Comply with American Concrete Institute 301 Specifications for Concrete (ACI 301).
   - Create exterior slabs with a minimum of a 6 bag mix or design strength of 4,000 pounds per square inch of Portland Cement to prevent freeze/thaw damage and maximize performance.

2. **Construction and Installation**
   - Comply with ACI 304 for measuring, mixing, transporting and placing concrete.
   - Provide protection to ensure nearby walls, buildings, porches, doors, windows, etc. are not sprayed or splashed with concrete during pour or subsequent concrete finishing work.
   - If pouring concrete on disturbed soil, provide 3 inches of compacted sand or gravel aggregate.
   - Provide movement and relief joints in locations, depths, and widths as detailed: at contact of pavement with other work, for thermal expansion/contraction, to control movement and settlement cracks, at breaks in the construction sequence.
   - All control joints shall be a minimum of ¼ the thickness of the slab.
   - Make joint lines straight and uniform.
   - Footings shall be excavated to a depth of 4 feet below finished ground elevation and shall be uniform in direction and width.
   - Steps shall be uniform in rise and run with rounded nosings. Maximum riser height is 8 inches and minimum tread size is 9 inches. Standard is total of two should be 17 inches.
   - Comply with ACI 302 for screening, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
   - To start the curing process, cover the slab with plastic sheets or apply a liquid curing compound.
   - Finished concrete flat work shall be free of depressions or low spots to prevent the pooling of water. Concrete shall be pitched 1/8 inch per foot to shed water.
   - Use a light broom or wood trowel finish.
   - Exterior sidewalks shall be a minimum thickness of 4 inches.

3. **Completion**
   - Back fill and landscape disturbed areas.
   - Walkways shall be of safe level surface.

4. **Optional Energy Conservation and Environmental Protection Measures**
   - Opportunities may exist to use asphalt with recycled content.
   - The use of permeable materials is encouraged where possible.

5.2 Excavation, Grading and Backfill

1. **Materials and Products**
   - Fill material shall be uniform and free from debris or organic matter.
   - Avoid silt heavy clay or expansive clay backfill, use granular soils instead.

2. **Construction and Installation**
   - Contact Diggers Hotline at least three business days prior to starting excavation work.
   - Protect overhead lines from damage by trucks and cranes.
   - Provide shoring and bracing as necessary, as well as temporary drains and/or pumps to remove ground and rain water.
   - Grading for slabs shall be level.
   - Backfilling shall not occur until exterior waterproofing has bee completed, inspected, and approved; exterior foundation insulation has been installed, and formwork and any trash and debris are removed.
   - Protect foundation and retaining walls during backfilling by bracing.

3. Completion

- The ground around the dwelling shall be sloped away from foundation walls to divert water away from the structure. Sloping should be a minimum of 3 inches for every 5 feet for at least 10 feet outward from building foundation.

4. Optional Energy Conservation and Environmental Protection Measures

- Identify potentially harmful substances that may be uncovered during excavation and handle them according to governing regulations.
- Strip and stockpile topsoil that will be reused in the work for final grading and landscaping.

5.3 Erosion Control

1. Materials and Products

- Use redundant straw bale, silt fencing and/or equivalent measures to prevent erosion in areas with slopes.
- Use straw bales, filter fabric fences and/or equivalent barriers to protect on-site sewer inlets.

2. Construction and Installation

- Check local requirements and use appropriate site erosion control per local code.
- Limit runoff to adjacent properties, including the street and public access roads.
- Inspect and repair erosion control measures once a week and after every ¼ inch of rain.

3. Completion

- At the end of each day sweep or scrape up any soil or sediment on the roadway.
- Remove all temporary erosion control barriers when work is completed.

4. Optional Energy Conservation and Environmental Protection Measures

- Guarding against erosion protects the soil on site and limits runoff that can carry pollutants that can contaminate the water.
- Preserve existing trees and grass where possible.
- Revegitate the site a soon as possible.

6. Roofing

6.1 Shingles

1. Materials and Products

A. Underlayment and Decking

- Install waterproof roofing membrane per manufacturer's instructions on roofs pitched between 3 inches through 4 inches of rise per foot of run.
- Use 15 pound asphalt-saturated roofing felt beneath shingles, and 30 pound roofing felt beneath metal roofing materials.
- Eave protection membrane underlayment shall be self-adhesive rubberized asphalt sheet from the same manufacturer as the shingles.
- Wood underlayment shall be an exterior grade plywood, waferboard, with a minimum thickness of 3/8 inch. OSB with a thickness of 7/16 inch would be acceptable.

B. Shingles

- Fiberglass or asphalt shingles may be used. Fiberglass shingles are a type of asphalt shingle made out of fiberglass mats as an alternative to the felt mats that are usually used.
- Asphalt shingles shall not be installed on roofs with less than a 2 inch rise per foot of run.

- Shingles must have an Underwriters Laboratory (UL) “Class A” rating.
- Shingles must meet the UL 997 Wind Resistance of Prepared Roof Covering Materials standard.
- Shingles must meet the American Society for Testing and Materials (ASTM) D3462 Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules standard.
- Shingles must meet the ASTM D3018 “Class A” Asphalt Shingles Surfaced with Mineral Granules standard.
- Shingles that have a self-sealing adhesive strip shall include a sealant which has average bond strength of at least 1.5 pounds per 3.75 inches of shingle width, at 32° F.
- Shingles must meet minimum weight standard of 240-245 lbs/square.
- Shingles shall have at least 4 fasteners per strip shingle or 2 fasteners per interlocking shingle.
- Shingle head lap shall be at least 2 inches.
- Shingles must have a minimum 25-year manufacturer warranty.

C. Metal Roofing
- Metal roofing systems shall be tested in accordance with the Underwriting Laboratories, Inc. (UL) Test Method 580 “Tests for Uplift Resistance of Roof Assemblies,” or have a Factory Mutual Research Corporation (FMRC) classification. In addition, roofing shall be tested in accordance with American Society for Testing and Materials (ASTM) E1592-95 for negative loading.

D. Nails
- Use nails of sufficient length to penetrate roof sheathing.
- Nails or other fasteners must be corrosion resistant.

2. Construction and Installation
- When work involves removal or disturbance of painted or otherwise coated surfaces, work shall comply with Lead Dust Hazard (see Section 2 “Lead Hazard Reduction”)

A. Preconstruction and Preparation
- The placing of new covering over existing covering shall not take place if two or more layers exist. Tear off underlayers in order to place new roofing material.
- Store materials to avoid weather or other damage – comply with manufacturers recommendations for storage and protection.
- Install plastic tarps around exterior of building and in attic or other interior areas to collect falling debris from roof. Need to make sure insulation is back to original condition.
- Have on hand and ready for installation in coordination with roofing, all flashing, roof vents, drip edging, sheet metal, roof cement, underlayment, water shield, and fasteners.
- Have on hand adequately sized waterproof tarps or covers to protect exposed roof in the event of inclement weather.
- Securely attach tarps or covers to prevent wind, rain, snow or other weather related condition from dislodging coverings.
- Proceed with shingle installation only after all penetrations have been made, substrate is dry, and weather conditions are acceptable.
- In the case of tear-off, remove existing materials down to roof deck; ensure deck is dry, clean and smooth before proceeding; replace and/or repair defective decking as necessary to provide a structurally sound deck surface.

B. Installation
- Install all items according to manufacturer’s recommendations.
- Provide lifts, cranes, ladders or scaffolding to assist high-level roofing work.

a. Underlayment and Decking
- Install one layer of roofing felt over entire roof deck area not protected by eave or valley membrane.
- Run sheets horizontally lapped so water sheds.

- On roofs sloped greater than 4 inches per foot, lap horizontal edges at least 2 inches and at least 2 inches over eave protection membrane.
- On roofs sloped between 3 inches per foot and 4 inches per foot, lap horizontal edges at least 19 inches and at least 19 inches over eave protection membrane.
- Lap ends at least 4 inches; stagger end laps of each layer at least 36 inches.
- Lap underlayment over valley protection at least 6 inches.
- At vent pipes, seal asphalt roofing felt tightly to pipe.
- At vertical walls, install asphalt roofing felt extending at least 6 inches up the wall.
- At chimneys, install asphalt roofing felt around entire chimney extending at least 6 inches up the chimney face.
- At skylights and roof hatches, install asphalt roofing felt from under the built-in counterflashing and on to the roof surface.

b. Shingles
- Space each joint a minimum of 1 ½ inches from adjacent course.
- Double shingles at first course to form a 1-inch drip edge.
- Install sheet metal or equivalent ice dam protection if roof extends over a heated area of a dwelling, attached garage and has a slope of 4:12 or less. Ice dams shall extend at least 30 inches up the roof slope from the edge and ate least 12 inches beyond the inner face of the exterior wall.

c. Techniques: Choose one of the following
- Open Valley Technique:
  - Snap diverging chalk lines on metal flashing, starting at 3 inches each side of top of valley, spreading at 1/8 inch per foot to eave.
  - Run shingles to chalk line.
  - Trim last shingle in each course to match chalk line; do not trim shingles to less than 12 inches width.
  - Apply 2-inch wide strip of plastic cement under ends of shingles, sealing them to metal flashing.
- Closed Valley Technique:
  - Run the first, and only the first, course of shingles from the higher roof slope across the valley at least 12 inches.
  - Run all courses from lower roof slope across the valley at least 12 inches and nail not closer than 6 inches to center of valley.
  - Run shingles from the upper roof slope into valley and trim 2 inches from center of valley.
- Woven Valley Technique:
  - Do not make woven valley with laminated type shingles or when not allowed by manufacturer's instructions.
  - Run shingles from both roof slopes at least 12 inches across center of valley, lapping alternate sides in a woven pattern.
  - Nail not closer than 6 inches to center of valley.

d. Metal Roofing
- Install metal panel system plumb, level and straight.
- Make no face penetrations or perforations in metal panels by fasteners except as indicated.
- Install all panels continuous from ridge to eaves with no horizontal laps.
- Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.

3. Completion
- Remove installation debris from site.
- Provide manufacturer's warranty.
- Touch up and abrasions or scratches on metal roofing

4. Optional Energy Conservation and Environmental Protection Measures

- Use recycled content shingles or metal roofing materials when possible.

6.2 Flashing

1. Materials and Products

- Steel flashing shall be of 28 gauge galvanized steel.
- Aluminum flashing shall be of 20 gauge aluminum.
- PVC flashing shall be a 30 mil sheet.
- Copper flashing shall be of 16oz./sq.ft. cold rolled copper.
- Fasteners shall be of a compatible non-corrosive material consistent with the type of flashing being installed.
- Use at least No. 28 galvanized, corrosion-resistant sheet metal, 16 inches wide, or a layer of at least 50 pound roll roofing 16 inches wide over a layer of 15 pound roofing underlayment for flashing over "open valleys."
- For "closed valleys" use flashing with at least one layer of 50 pound roofing at least 20 inches wide over the layer of 15 pound roofing underlayment.

2. Construction and Insulation

- Install roof flashing as needed to guarantee a finished and watertight roof system.
- Lap and lock seams; solder seam joints where necessary to guarantee a watertight seal.
- Lap edge metal at least 4 inches.
- Install flashing high enough at walls to ensure a watertight seal.
- Caulk hip, ridge and other flashing, as well as reglets.
- Cover all edges of metal flashing with roofing cement or adhesive.
- Fill all joints between flashing and edges of shingles with roof cement or adhesive.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

6.3 Gutters and Downspouts

1. Materials and Products

A. Gutters

- Aluminum gutters shall be "K-Type" (also called Ogee), 5 or 6 inch, and shall be seamless with a minimum gauge of 24.
- Galvanized gutters shall be "K-Type" or "Half Round", 5 or 6 inch, and shall be seamless with a minimum gauge of 26.
- Gutter flashing shall be non-corrosive sheet metal with a minimum of 24 gauge hot-dipped galvanized steel sheet, or aluminum with a minimum 0.032 inch thick sheet.

B. Downspouts

- Aluminum downspouts shall be 3 or 4 inch round or square corrugated aluminum with a minimum gauge of 24.
- Galvanized downspouts shall be 3 or 4 inch round or square corrugated with a minimum of galvanized steel gauge of 26.

2. Construction and Installation

- When necessary provide a certified lead abatement supervisor and certified lead abatement workers to perform gutter and downspout demolition, including clean up and debris removal as per Section 2 "Lead Hazard Reduction."
- Seal all gutter joints, screws, rivets, etc. with approved sealant.
- Support every separate section with hangars and straps adequate in size to support loads.
- Do not mount gutter straps over top of shingles.

- Construct gutters with positive slopes to prevent accumulation of standing water.
- Lap joints to match drainage flow.
- Provide movement slip joints on downspouts.
- Provide downspout extensions as necessary to adequately divert water away from building.
- Keep downspouts and gutters separated from wall surfaces to avoid staining and corrosion.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

7. Openings

7.1 Windows

1. Materials and Products

- Windows shall be weathertight and allow no air infiltration.
- Storm windows shall be provided if windows are single glazed.
- Windows must be capable of being maintained in a clean and sanitary condition.
- Closures shall be uniform and secure when units are closed and locked.
- Windows on the ground level must be equipped with locks.
- Windows that are used for ventilation and are openable must be equipped with screens.

2. Construction and Installation

- When work involves removal or disturbance of painted or otherwise coated surfaces, work shall comply with Lead Dust Hazard (see Section 2 “Lead Hazard Reduction”).

A. Preconstruction and Preparation

- Store materials to avoid weather or other damage – comply with manufacturers recommendations for storage and protection.
- Ensure containment measures are in place and debris (old windows and trim) is disposed in a lead safe manner.
- Check rough opening to ensure it is sized property and is square and level.

B. Installation

- Install all items according to manufacturer’s recommendations.
- Install proper flashing under and around window opening.
- Anchor windows securely in place, level and plumb.
- Seal entire perimeter of each unit with a continuous bead of sealant.
- Install insulation in openings and cavities around window.
- Install all necessary window jambs, stops, casings or other trim materials as necessary for a finished installation.
- Adjust operating sash for proper operation and closure, and lubricate hardware.
- Install proper weatherstripping.

3. Completion

- Clean glass promptly after installation.
- Repair or replace any materials, such as trim, damaged during installation.
- Provide manufacturer’s warranty.
- Any raw wood (windows and trim) is to be stained, sealed, varnished, coated with polyurethane or painted.

4. Optional Energy Conservation and Environmental Protection Measures

- Whenever possible Energy Star rated windows shall be used, or windows with a U value </=0.35 (National Fenestration Rating Council label).
- Aluminum is highly conductive and not energy efficient, if using aluminum windows specify thermally broken frames only.
- If using insulating glass specify glazing with low-E films and argon or other inert gas between the panes.

7.2 Doorways

1. Materials and Products
- Underwriting Laboratory (UL) label is required on fire rated doors.
- Fire rated doors must comply with all building and fire code requirements.
- Entry door locksets and deadbolts serving an individual unit shall be keyed alike.
- Deadbolts shall be openable without a key from the inside of the dwelling unit.
- Standard thickness for exterior doors is 1-3/4 inches.
- Standard thickness for interior doors is 1-3/8 inches.

2. Construction and Installation
- Bottom clearance on mounted doors shall be ½ inch maximum; clearance must allow for thresholds, weather stripping, gasketing, carpet and other types of flooring.
- Top clearance on mounted doors shall be 1/8 inch maximum.
- Lock and hinge edge should be beveled at 1/8 inch in 2 inches maximum.
- Install hinges so that mortise-type hinges are flush, distances on door are correct, heights are correct and intermediate hinges are equidistant from others.
- Install fiberglass insulation in openings and cavities around exterior door frame.
- Apply high quality sealant under door threshold prior to installing pre-hung exterior doors.
- Seal doors at tops and bottoms after installation.
- Install proper weather stripping.

3. Completion
- Install all finishing hardware such as door jambs, stops, and casings or other trim materials.
- Seal, stain or paint exterior doors before or immediately after installation.

4. Optional Energy Conservation and Environmental Protection Measures

8. Exterior Finishing

8.1 Siding

1. Materials and Products
- Materials shall be weather and water tight.
- Fasteners shall be of sufficient length to adequately penetrate the wall.
- Use galvanized steel, or corrosion-resistant nails, staples, or screws.
- Minimum of 5 year warranty.

2. Construction and Installation
- When work involves removal or disturbance of painted or otherwise coated surfaces, work shall comply with Lead Dust Hazard (see Section 2 “Lead Hazard Reduction”).

A. Preconstruction and Preparation
   - Remove any wet and/or rotted siding and patch wall with ½ inch particle board.
   - Before beginning work verify dimensions of building.
   - Nail down loose boards, remove architectural components and protrusions, and remove loose caulking around windows to ensure flat surface for siding installation.
   - Check all walls for evenness and install furring strips when necessary (Note: In cases where the lower portion of a horizontal siding panel must be trimmed so that it may be installed over steps, porches, etc., the panel shall be built out – "furred" – for proper angle and rigidity.
   - Proceed with siding work only when substrate is completely dry.

B. Installation
   - Install according to manufacturer's specifications.
   - Install all aluminum materials to properly divert water away from vulnerable locations.
   - Caulk fully behind all trim pieces to seal openings.

   a. Vinyl Siding
      - Stagger the siding end laps so that no two courses (rows of panels) are aligned vertically, unless separated by at least three courses (rows of panels).
      - When panels overlap, make sure they overlap by one half the length of the notch at the end of the panel, or approximately 1inch.
      - Since vinyl siding moves as the temperature changes, make certain that the vinyl panels can move freely in a side-to-side direction once fastened.
      - Fasten the panels in the center of the nailing slots. Allowance should be made for expansion and contraction by leaving a ¼ inch gap between the siding and all corner posts and channels (increase to 3/8 inch when installing in temperatures below 40 degrees Farenheit. If the panels are 20 feet or longer, increase the gap to 3/8 inch, unless the manufacturer's instructions specify otherwise).
      - Allow 1/32 inch clearance (the thickness of a dime) between the fastener head and the vinyl. Tight nailing, screwing, or stapling will cause the vinyl siding to buckle with changes in temperature.

   b. Aluminum Siding
      - If underlayment is required per manufacturer's instructions but if a product is not listed, either:
        - Install one layer of 15 pound asphalt-saturated roofing felt or house wrap over entire wall area. Run sheets horizontally lapped so water sheds.
        - Install building wrap horizontally by nailing and lapping edges a minimum of 6 inches.
      - Install siding in such a way as to minimize the number of joints, seams, and edges. Use full length panels wherever possible.
      - Do not force the panels up or down when fastening in position. Allow each panel to hang without strain.
      - Do not drive the head of the nail tightly against the siding nail hem. Allow 1/32 inch (about the thickness of a dime) clearance between the fastener head and the siding panel. Drive nails straight and level to prevent distortion and buckling of the panel.
      - Leave a minimum of ¼ inch clearance at all openings and stops to allow for normal expansion and contraction. When installing in temperatures below 40 degrees Fahrenheit, increase minimum clearance to 3/8 inch.
      - Do not caulk the panels where they meet the receiver of inside corners, outside corners, or J-channel trim. Do not caulk the overlap joints.

   c. Wood Siding
      - Install underlayment of 15 pound asphalt saturated roofing felt – one layer over entire wall area. Run sheets horizontally lapped so water sheds.
      - All joints between lap siding pieces and sheet siding shall be over studs.
      - Nails shall be set and puttied.
      - Siding overlap shall be a minimum of 1-inch.

3. Completion

- Extend all utility and other penetrations through siding as needed.
- Use trim channels around all vents, windows, doors, and other openings.
- Provide manufacturer's warranty.

4. Optional Energy Conservation and Environmental Protection Measures

- Use recycled content siding when possible.

8.2 Trim Wrapping

4. Materials and Products

- Vinyl or aluminum trim wrap may be used to cap and weather seal old wood trim.

4. Construction and Installation

- Exterior trim shall be tight, free of gaps at time of installation, uniform in appearance and properly flashed or sealed.
- Be sure to caulk edging with a durable outdoor sealant.

4. Completion

4. Optional Energy Conservation and Environmental Protection Measures

9. Foundation and Structure

9.1 Structure

1. Materials and Products

A. Walls and Flooring

- Comply with Plywood Specification and Grade Guide of the American Plywood Association and the Manual for Wood Frame Construction, American Forest and Paper Association (NFPA), © 2001.
- Moisture content of framing lumber shall be 19% or less by weight.
- Reject any framing lumber that is not grade-stamped by a bona fide grading agency.
- Pressure treated lumber shall be labeled to show conformance with American Wood Preservers' Association (AWPA) C22-03 "Lumber and Plywood for Permanent Wood Foundations – Preservative Treatment by Pressure Processes" and labeled by an inspection accredited by the American Lumber Standards Committee.
- Subflooring shall be APA rated plywood sheathing, exterior grade, or Oriented Strand Board (OSB).
- Roof sheathing shall be APA rated plywood sheathing, exterior grade, OSB, or Waferboard with waterproof resin binder.
- Underlayment shall be APA rated underlayment, approved for use under asphalt, vinyl, and resilient tile or sheet flooring.

B. Fasteners

- Use hot-dipped galvanized steel or stainless steel nails for exterior, high humidity, and treated wood locations.
- Electro-galvanized nails shall not be used on exteriors, or where corrosive staining might mar wood surfaces.
- Nails used in redwood or cedar shall be of stainless steel.
- Subfloor glue shall be APA solvent based, waterproof construction grade adhesive.

2. Construction and Installation

A. Walls
- Vertical framing shall be plumb within ¼ inch per 10 linear feet.
- Horizontal framing shall be level within ¼ inch per 10 linear feet.
- Nails or screws shall be at least twice as long as the thickness of the wood, with spiral shanks to maximize hold.
- Construct stud framing and blocking to support wall-mounted fixtures, cabinets, railings, and equipment.
- Stud framing shall be substantially braced, secured with correct sizes and types of fasteners, and installed with fire stops to provide snug blocking between studs.
- Position studs at corners to provide ample nailing backing for exterior and interior panels.
- Provide blocking and double top plate headers for wall openings.
- Lap top plates and set butt joints so as not to occur over openings.
- Install top plates to provide uninterrupted, ample nailing backing for exterior and interior panels.
- Install headers and lintels with ample baring, secure connection to supports, complete bracing, nailing and stop plates at floors and slabs, double-sided prop bracing at walls, and diagonal horizontal cross bracing at plates of intersecting walls.
- Provide joints and connectors for non-wood construction to allow for movement such as lumber shrinkage and normal thermal expansion and contraction of building components.
- Provide clearance between framing and other construction subject to fire hazard such as chimneys and appliance vent piping.

B. Flooring
- Floor framing members shall be set with crowns upward and with full bearing plates.
- Joist hangers shall be set straight, aligned, substantially braced and secured with correct size and type fastenings.
- Stagger subflooring butt joints.
- Completed subflooring shall be level within ¼ inch per 10 linear feet, free of depressions or humps, and free from holes, splits or other construction damage.

C. Fasteners
- When using bolts, drill holes 1/16 inch larger than bolt diameter.
- Use washers under all nuts.
- Glue and secure subflooring to joists with screws or screw type nails. Subfloor to joist connections must be sufficient to prevent any squeaking of flooring.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

9.2 Foundation

1. Materials and Products
- Unless otherwise noted, all concrete foundation walls and slabs on grade shall be 3,000 p.s.i.
- All slabs under interior finished and heated living spaces shall be placed on 6-mil polyethylene vapor barriers with a minimum of 6 inch lapped joints.

2. Construction and Installation
- Foundations should have a footing.
- Foundation walls shall prevent the entrance of water or moisture into a basement or crawl space area.
- Crawl spaces shall have a minimum access opening of no less than 22 by 30 inches with a clear height of over 30 inches, unless the space contains mechanical equipment, in which case the opening shall be of sufficient size to permit the removal and replacement of equipment.
- Cracks in walls shall be effectively sealed and loose or defective mortar joints replaced.

- Provide ½ inch expansion joint material between all concrete slabs and abutting concrete or masonry walls occurring in exterior or unheated spaces or areas.
- Where necessary, interior or exterior face of walls shall be damp proofed by bituminous coating or cement parging.
- Foundation fasteners shall not be located underneath any studs.
- Shims for mudsills shall be of preservative treated lumber.
- When foundation is to be insulated excavate 1 foot below grate, install 2 inch Styrofoam board to cover area between ground level and bottom siding, cover with aluminum or pressure treated plywood, pebble board or fiberglass board.
- Provide ventilation space for girders that will be set in foundation wall pockets or directly above earth.

3. Completion

- Ground around the dwelling shall be sloped away from foundation walls to divert water away from the structure.
- Provide termite protection as required and remove all wood construction materials from the excavation near the structure.

4. Optional Energy Conservation and Environmental Protection Measures

10. Heating, Insulation and Ventilation

10.1Heating

- Heating facilities shall be provided for each living unit and other spaces assuring for interior comfort, safety and convenience in operations, and economical performance.

1. Materials and Products

- Furnaces and boilers shall be provided with ducted combustion air ducted directly from outdoors to the burner or to an airtight mechanical room.
- Each heating system or device shall have a recognized approval for safety and shall be capable of maintaining a temperature of at least 68 degrees Fahrenheit within the living units, corridors, public spaces, and utility spaces where the outside temperature is at 15 degrees below zero. (If there is air conditioning, it should maintain a temperature of at least 68 degrees Fahrenheit when the outside temperature is 95 degrees.).
- Gas supply piping shall be steel, Schedule 40 black, malleable iron or forged steel fittings, screwed or welded.

A. Forced Air

- New gas fired forced air furnaces shall have a 90% minimum fuel efficiency rating.
- The combustion air requirements of the furnace are separate from the building to eliminate backdrafting.
- Sheet metal ducts shall be galvanized as per ASHRAE and SMACNA standards.
- Flexible ductwork shall have a seamless vapor barrier and a minimum of 1 inch fiberglass insulation.

B. Hydronic Heating

- New boilers shall be designed and tested for a minimum of 82% (gas fired) and 84% (oil fired) combustion efficiency based on I=B=R testing procedures.

2. Construction and Installation

- Provide a concrete pad or bricks to raise installed furnaces or boilers above basement floors.
- Insulate all pipes and ductwork running through unconditioned spaces.

A. Forced Air

- Do not mount return air grilles in basements, attics, or other storage areas.
- Provide sheet metal outside mounted filter track with only one open end to install filter.
- Ensure that all ductwork is properly sealed.

B. Hydronic Heating
   - Ensure that chimney flue is properly sized to ensure adequate draft of other existing appliance such as water heaters.

3. Completion
- Upon completion secure all required inspections and approvals of the completed systems.

4. Optional Energy Conservation and Environmental Protection Measures
- Install Energy Star labeled boilers and furnaces.
- Programmable set-back thermostats shall be used in all new installations.
- To maximize efficiency, located furnace to minimize total length of duct runs.
- Minimize positioning of new ductwork in unconditioned spaces or exterior walls. If doing so, insulate with R-30 minimum insulation.

10.2 Insulation

1. Materials and Products
- For newly constructed spaces, use a minimum R-11 batt insulation in all exterior walls, minimum R-30 insulation in all attics and cathedral ceilings, and minimum R-19 batt insulation in all floors adjacent to the exterior or to unheated spaces.

2. Construction and Installation
- Insulation shall be installed where possible in any new walls, attics, crawl spaces when other work is performed.
- When using unfaced insulation, install minimum 6 mil polyethylene vapor barriers against warm side of all insulation.
- Weather stripping and/or weather-proof thresholds shall be installed around all doors.
- Caulk and seal at all windows, exterior doors, vents, pipe penetrations, bottom plates and around all electrical boxes mounted in exterior walls.
- Install sill sealer between foundation wall and wood sill plates.
- Install batts with tight contact of insulation with framing.
- Cleanly cut and tightly fit batts around electrical and plumbing components.
- Keep ventilation space unobstructed.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures
- In addition to basic sealing practices, advanced sealing practices can be used (sealing at top and bottom plates, at corners and between cavities at penetrations).
- Insulate new attics to R-50 for maximum energy efficiency.
- Insulate attack knee walls, rim joints, existing crawl spaces and floors over basements for added efficiency.
- Use recycled content insulation when possible.
- For energy conservation, recommended are values are R-19 for crawl spaces and band joists, R-38 for ceilings and R-11 for walls.

10.3 Ventilation

Ventilation requirements are described in AHRAE 62-1999, “Ventilation for Acceptable Indoor Air Quality.”

1. Materials and Products

- Natural ventilation of spaces such as attics and enclosed crawl spaces shall be provided by opening of sufficient size to overcome dampness and minimizing the effect of conditions conducive to decay and deterioration of the structure, and to prevent excessive heat in attics.
- Roof vents and/or gable vents shall be used in conjunction with soffit vents to provide adequate removal of summer heat as well as winter moisture.
- Exterior ventilation openings shall be effectively screened where needed.
- Bathrooms shall have an operable window or be provided with a mechanical means of ventilation capable of completely changing the air every 7 minutes.
- Range hoods and exhaust fans shall be exterior ducted.
- Attics will be ventilated with a minimum of 1 square foot of free vent for each 300 square feet of roof area if a ceiling vapor barrier is present; 1 square foot for each 150 square feet of roof area is no ceiling vapor barrier is present.

2. Construction and Installation

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

- To test the tightness of the home envelope, complete a blower door test in accordance with American Society for Testing and Materials (ASTM) Standard E779-87. To meet Energy Star qualifications, Natural Air Changes per Hour (ACH_{nat}) shall be less than or equal to 0.50 Air Changes Per Hour. Check with your local weatherization program for more information on how these test are done and possibilities for partnership.

11. Interior Standards

11.1 Flooring

1. Materials and Products

A. Asphalt, Vinyl, Resilient Sheeting and Resilient Tile Flooring

- All flooring and base adhesives shall be waterproof, non-toxic, and low-odor.
- Metal transition strips (thresholds) shall be not less than ¾ inch width, 1/8 inch thick; butt type, rounded or beveled on the exposed edge with lengths sufficient to minimize joints.
- Resilient floor sheeting shall be a minimum of 6’ wide.

B. Carpet

C. Ceramic Tile

- Comply with Tile Council of America Specifications 137.1.
- Floor tile shall have a coefficient of friction not less than 0.50 as per American Society for Testing and Materials (ASTM) F489, ASTM F609.
- Use Latex-portland cement mortar that conforms to American National Standards Institute (ANSI) A118.4.
- Use organic adhesive as per ANSI A136.1; Type I where subject to extended water exposure and Type II in all other locations.
- Provide non-corrosive lath: lapped, zinc-coated and tied with zinc-coated fasteners.

D. Wood Flooring

- Metal transition strips (thresholds) shall be not less than ¾ inch width, 1/8 inch thick; butt type, rounded or beveled on the exposed edge with lengths sufficient to minimize joints.

2. Construction and Installation

A. Asphalt, Vinyl, and Resilient Sheeting and Resilient Tile Flooring

- Remove existing shoe molding, nosings, transition strips, etc. to allow for complete and proper installation. Remove base molding only if necessary.
- Securely attach underlayment to existing floor using 1 inch or longer (as needed) ring shank flooring nails spaced 6 inches on center at edges and 8 inches on center in the field. Countersink all nail heads as necessary for a smooth finish.
- All joints nail heads, and other imperfections shall be filled with a material recommended by the manufacturer. Ridges, trowel marks, and other projections shall be sanded smooth.
- Broom clean or vacuum entire area prior to installation of flooring materials and adhesives.
- Fasten baseboards and/or shoe molding to walls only, not floors, to cover expansion space.
- Miter joints in shoe moldings and baseboards at outside corners, joints and at ends.
- Preformed rubber or vinyl baseboard corner shall be used at all inside and outside corners, do not bend rubber of vinyl base around corners.
- Install nosings at exposed edges of flooring, e.g., landings, stair treads, etc.
- For resilient sheeting flooring, start compression rolling over sheet flooring in middle and move outward to press out all bubbles. Use seam sealer at seams.

B. Carpet

- Remove existing carpet strips, nosings, transition strips (thresholds), etc. to allow for the complete and proper installation of carpeting.
- Prepare sub-floor by eliminating irregularities; removing grease, paints, varnish and other materials that might interfere with the adhesive; ensuring the sub-floor is secured; and cleaning the substructure of underlayment.
- Prepare concrete slab for installation by ensuring a smooth, dry, clean surface.
- Include padding underlayment where required.
- Install so that all portions are laid in the same direction and there are no fill strips less than 6 inches wide.
- Do not place seams in heavy traffic areas.
- Use thoroughly bedded and sealed butt joints.

C. Ceramic Tile

- Comply with Tile Council of America “Handbook for Ceramic Tile Installation”.
- Prepare floors for tiling so that the finished floor will be either perfectly level or slope properly to drains.
- Install waterproofing and backing that will absolutely block water leakage.

D. Wood Flooring

- Remove existing shoe molding, nosings, transition strips, etc. to allow for complete and proper installation. Remove base molding only if necessary.
- Inspect sub-floor for structural deficiencies and make any necessary repairs.
- Ring-shank flooring nails must be long enough to securely attach the flooring to substrate.
- Do not allow end joints to occur side by side, separate by at least two strips.
- Provide a minimum of ½” expansion joint space at walls.
- Fasten baseboards and/or shoe molding to walls only, not floors, to cover expansion space.
- Miter joints in shoe moldings and baseboards at outside corners, joints and at ends.

3. Completion

A. Asphalt, Vinyl, and Resilient Sheeting and Resilient Tile Flooring

- If necessary undercut doors to allow for proper clearance over new flooring.
- Remove excess adhesive and other marks from finished flooring.

B. Carpet
- If necessary undercut doors to allow for proper clearance over new flooring.
- Provide heavy duty non-staining paper, 6 mil plastic, or board walkways as necessary to protect carpeting during remainder of rehab project.
- Save large scraps for owner maintenance.

C. Ceramic Tile
- Wash tile surfaces with clean water before and after cleaning.
- Do not use acidic cleaners near finish metal or other vulnerable surfaces.
- Remove excess corrosive cleaning solutions from site; do not empty into building drains.
- Prevent foot traffic for at least 3 days, place flat boards in walkways for 7 days where use of newly tiled floors with cement type grout is unavoidable.

D. Wood Flooring
- If necessary undercut doors to allow for proper clearance over new flooring.
- Sand new wood flooring consistently smooth, without lumps, depressions, and burns. If using pre-finish, then no sanding is needed.
- Before applying finish, thoroughly cleanup and vacuum all sanding dust.
- Apply final finish as soon as possible.
- Allow at least 24 hours drying time between finish coats.
- Protect floor during and after installation with heavy Kraft paper or other suitable material.

4. Optional Energy Conservation and Environmental Protection Measures

A. Carpet
- Use recycled content carpeting when possible.

B. Ceramic Tile
- If air quality is a concern use grouts, grout sealers, and mortars without latex additives or fungicides.

C. Wood Flooring
- Use solvent-free, low V.O.C. finish if possible.

11.2 Wallboard

All work with gypsum wallboard shall comply with Gypsum Association, “Application and Finishing of Gypsum Board,” GA-216-2000, February 2000.

1. Materials and Products
- Metal trim shall be zinc-coated steel 26 gauge.
- When attaching gypsum to metal framing use 1-1/4 inch type W bugle-head screws or annular ring nails (drywall nails).
- Use moisture resistant wallboard in damp environments and seal edges and cuts.

2. Construction and Installation
- Install blocking and backups to support all edges of wallboard.
- Verify that wood framing to receive wallboard is dry and not subject to shrinkage.
- Verify that all-mechanical equipment (e.g., wiring, piping, ductwork, etc.) is properly protected from nail and screw penetration.
- Install wall panels horizontally 3/8 inch to ½ inch from floor.
- Stagger panel joints vertically.

- Stagger panel joints back-to-back if using double layered panels.
- Stagger short joints of ceiling panels at half the long dimensions of panels.
- Keep joints to a minimum.
- Install metal corners and other protective strips where finish wallboard edges might be damaged.
- Install gypsum wallboards at right angles to furring or studs.
- Install wallboard to ceilings with long dimension of board at right angles to joists.
- Attach with screws at 12 inches o.c. at ceilings and 16 inches o.c. at walls unless wall framing members are 24 inches apart, then space screws 12 inches o.c.
- Start nailing or screwing at center and proceed to outward edges.
- Do not proceed with nailing into wood framing that has over 19% moisture content.
- Thoroughly seal penetrations in fire-rated walls.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

11.3 Painting

1. Materials and Products

- Do not use alkyd primer on gypsum board.
- Add approved fungicide to paints in shower or toilet room and other damp rooms.

2. Construction and Installation

- Provide certified lead abatement supervisor and certified lead abatement workers to perform and surface preparation work, including but not limited to wet scraping, wet sanding, HEPA planning, heat gunning clean up and debris removal. See Section 2. Lead Hazard Reduction.
- Clean surface to be painted of dirt, oil, and any other materials that might interfere with painting.
- Fill nail holes and other irregularities to create a uniform surface.
- Do not apply paint when relative humidity exceeds 85% or on wet or damp surfaces, including wood with moisture content of 12% or higher.
- Do not paint over joints or seams that would prevent free movement of window sashes, storm windows, doors, cabinet doors or drawers, scuttle panels, etc.
- Use two coats of heat-resistant paint when covering radiators.

3. Completion

- Reinstall removed items using workers competent in the related trades.
- Test each painted item for free movement after finish is completely dry.
- Provide owners with extra stock of 10% or more of each color, type and gloss of paint used in the work.
- Inspect dry coats and make all necessary repairs and corrections.

4. Optional Energy Conservation and Environmental Protection Measures

- Use low or no V.O.C. paints when possible.

12. Electrical Equipment and Wiring

12.1 Lighting

1. Materials and Products

2. Construction and Installation

3. Completion

- Each room shall have adequate natural or artificial lighting to permit normal indoor activities and to support the health and safety of occupants.
- At least one wall switch controlled lighting outlet shall be installed in every habitable room, kitchen and bathroom.
- A ceiling or wall-type light fixture shall be present and working in the bathroom and kitchen areas.

4. Optional Energy Conservation and Environmental Protection Measures

- Use Compact Florescent Bulbs (CFLs) or LED technology when possible.

12.2 Electricity

1. Materials and Products

- Service entrance cable shall be of copper conductor with 600 volt insulation, type SE.
- Underground feeder and branch circuit cable shall be size 14 through 4 AWG, copper conductor 600 volt insulation, type UF.
- Circuit breakers shall be provided with surface cabinets with screw covers and hinged doors. Copper bus and ground bus 110/220 volts.
- Wiring shall be nonmetallic sheathed cable, size 14 through 4 AWG, copper conductor 600 volt insulation, type UF.
- Wall switches shall be quiet operating, rated 20 amperes and 110-220 volts AC.
- Outlets installed in a kitchen or bathroom in the general location of water shall be protected by ground fault interrupter.
- Exterior weatherproof cover plates shall be gasketed cast metal with hinged gasketed covers.
- Permanently installed stoves, refrigerators, freezers, dishwashers ands disposals, washers and dryers shall have separate circuits sized to NEC. Two separate 20-amp counter circuits are required with each kitchen area.

2. Construction and Installation

- All aboveground cables and flexible cords shall be enclosed to protect against physical damage.

3. Completion

- Sufficient electrical sources shall be provided to permit the use of essential electrical appliances while assuring safety from fire.
- At least two electric outlets (duplex wall-type outlets) shall be present and operable in the living area, kitchen, and each bedroom.
- Single main disconnecting means shall exist for each metered service, except services rated 300 amperes or more shall be permitted to have 2 service disconnecting means.

4. Optional Energy Conservation and Environmental Protection Measures

13. Plumbing Systems

All work shall comply with Wisconsin Plumbing Code. All piping which conveys water for human use or consumption or to plumbing fixtures and plumbing appliances shall be installed by a licensed plumber.

13.1 Sewer and Septic

1. Materials and Products

- Sanitary sewer piping within the building shall be PVS pipe as per American Society for Testing and Materials (ASTM) D2665, or F891 with solvent weld joints; ABS pipe as per ASTM D1527, D2661 or F628 with solvent weld joints; or case iron pipe as per ASTM A74, A888, or CISPI 301 service weight with neoprene gaskets.

- Sanitary sewer piping below grade and beyond the building line shall be vitrified clay pipe as per ASTM C700 standard with bell and spigot and neoprene gaskets; PVC pipe as per ASTM D1785, D2665, D3034, or F891 with elastometric gaskets; or cast iron piping as per ASTM A74, A888, or CISPI 301 service weight with neoprene gaskets.
- Every trap and trapped plumbing fixture shall be provided with an individual vent.

2. Construction and Installation

- Seal all openings at pipes and conduits in exterior walls with non-hardening, weather resistant caulk. Openings in masonry walls shall be sealed with concrete mortar materials.
- Any underground drain piping shall be a minimum of 2 inches in diameter, any portion that is 2 inches shall not exceed 20 feet. Drain piping shall be installed at the appropriate pitch for piping diameter.
- Drain fittings, connections, devices and methods of installation shall not obstruct or retard the flow of water, wastes, sewage or air in the drain system or venting system in an amount greater than the normal frictional resistance to flow.
- Drain piping located below the ceilings of areas where food, ice or potable liquids are prepared, handled or stored shall be installed with the least number of joints possible and ceilings must provide access to the piping.

3. Completion

- Secure all required pressure tests, inspections, and approvals for the completed systems.

4. Optional Energy Conservation and Environmental Protection Measures

13.2 Water Supply

1. Materials and Products

A. Potable Water

- Water supply piping within the building shall be copper piping type M as per ASTM B42 or B88, galvanized steel as per ASTM A53 or other materials as approved by the State of Wisconsin Plumbing Code.

B. Wells

a. Installation and Upgrade

- Use only code-complying well casing piping.

b. Abandonment

- Approved fill material includes cement grout, sand-cement grout and concrete or bentonite chips. Dug wells may also be filled with clean clay, silt, or concrete.

2. Construction and Installation

- Adequate measures should be taken to protect pipes from freezing.
- Seal all openings at pipes and conduits in exterior walls with non-hardening, weather resistant caulk. Openings in masonry walls shall be sealed with concrete mortar materials.

A. Potable Water

- All valves, except fixture stop valves, supplying potable water shall be identified potable by tags.

B. Wells

a. Installation and Upgrade

- Ensure that wells are located upslope and as far as possible from potential contamination, including:
  - 8 feet from approved gravity building sewer pipe or 25 feet from building sewers made of other non-approved materials or a pressurized building sewer.
  - 8 feet from a swimming pool.

- 100 feet from any buried petroleum tank, except that only 25 feet of separation is required for a buried fuel oil tank if the tank is used for private residential heating.
- 25 feet from a septic or holding take, or from a laundry or wastewater sump.
- 25 feet from the high water mark of a lake, pond or stream.
- 50 feet from a privy, dry well, soil absorption system or mound system.
- 50 feet from a municipal collector sewer.
- 50 feet from an animal yard or animal shelter.
- 250 feet from a sludge disposal area, a salvage yard or a salt storage area.
- 250 feet from an absorption, storage, retention or treatment pond; ridge and furrow system; or spray irrigation waste disposal.
- 1,200 feet from any existing, proposed or abandoned landfill site.

- Well casing piping must extend at least 12 inches above the finished ground surface and 2 feet above a floodplain.
- To prevent vermin and insects from entering the well, install a well cap and electrical conduit.
- Underground connections must be made with approved pitless adapters to ensure a water tight seal.
- Install an accessible downward-facing, non-threaded sampling faucet between the pump and the pressure tank at least 12 inches above the floor to allow for sampling.

b. Abandonment
- All debris, pump, piping, unsealed liners and any other obstructions which may interfere with ceiling operations shall be removed prior to abandonment.
- Fill material must be placed through a conductor pipe extending to the bottom of the well, except when bentonite chips are used.
- Completely fill and seal the abandoned well from the bottom to the top.

3. Completion
- Secure all required pressure tests, inspections, and approvals for the completed systems.
- Well water must be tested for coliform bacteria at least two times a minimum of two weeks apart, and for arsenic at least once for a new permit, and once each for a permit renewal.

4. Optional Energy Conservation and Environmental Protection Measures

13.3 Hot Water Supply

1. Materials and Products
- Al water heaters shall be equipped with a pressure/temperature relief valve possessing a full-sized (non-reduced) rigid copper or steel drop leg to within six inches of the floor.
- Hot water supply systems must be equipped with automatic temperature controls capable of adjustments from the lowest to the highest acceptable temperature settings.

2. Construction and Installation
- No water heater shall be located in any room used or designed for sleeping purposes, in a bathroom, clothes closet, under a stairway or in a confined space with access only to the above locations.
- All fuel burning water heaters shall be connected to a vent leading to the exterior.
- Seal all chimney breaches with concrete mortar materials.
- Provide and install metal flue liners where required.
- A control valve shall be installed in the water heater supply piping.
- If the length of hot water distribution piping from the source of the hot water supply to a plumbing fixture or appliance exceeds 100 feet, a circulation system or self-regulating electric heating cable shall be provided.

3. Completion

4. Optional Energy Conservation and Environmental Protection Measures

- Insulate all hot water lines to a minimum of R-4 where possible.

13.4 Kitchens and Bathrooms

- Arrangement of fixtures shall provide for the comfortable use of each fixture.
- A bathroom shall not be used as a passageway to/ or a habitable room or exit to the exterior.

2. Materials and Products

3. Construction and Installation

- All plumbing fixtures and appliances discharging wastes shall connect directly to a drain system.
- Each plumbing fixture, each compartment of a plumbing fixture and each floor drain shall be separately trapped by a water seal trap.
- Each plumbing fixture and appliance must have a control valve in the supply piping.

4. Completion

5. Optional Energy Conservation and Environmental Protection Measures

- Select faucets with GPM less than code or install low flow aerators where possible.

14. Safety Equipment

Be sure to check with local code for standards on installing smoke alarms and carbon monoxide detectors to ensure compliance.

1. Materials and Products

A. Smoke Alarms

- Install a UL approved, NFPA rated, ceiling mounted smoke detector with battery. Hard wired systems may be required.
- Location and number of the devices required shall meet the National Fire Protection Association's (NFPA) minimum requirements of one in each bed room and one on every level used for living including the basement.

B. Carbon Monoxide Detectors

- Where a heating system source, other solid fuel burning appliance (e.g. wood stoves), and/or water heater that burns solid, liquid or gaseous fuels is located horizontally adjacent to any habitable room, a back-up carbon monoxide detector is required. Hard wired systems may be required.
- If a garage is attached to an all electric home, then a carbon monoxide detector is required.

2. Construction and Installation

- Do not install smoke alarms in kitchens or bathrooms.

3. Completion

- Test smoke alarm to ensure proper operation.

4. Optional Energy Conservation and Environmental Protection measures