

06/01/2001

Subject: Revisions to Specification Section 01440 for new and remodel projects on detached one- and two-family dwellings.

Item 1 of 2

Add new paragraph to the end of Section 3.6 **Control** in Specification Section 01440:

**New** 3.6.5 Housing Quality Verification Checklist

The Contractor shall verify the quality of all work during the Preparatory, Initial and Follow-up Phase. Verification of quality on housing shall include a checklist. A Quality Verification Checklist shall be prepared and submitted for review as part of the CQC Plan. Quality control checks shall be performed for each definable feature of work.

At the end of this Specification Section is a sample Housing Quality Verification Checklist. It includes a sample list of definable features of work. It is not meant to represent the minimum nor maximum features of work that will be on the accepted list for this project. Included under each definable feature of work are sample listings of quality control checks. These inspection item checks are samples only and are not intended to be all inclusive. The CQC Plan shall include quality control inspection checks related to each definable feature of work. For each building and each unit, the Contractor shall provide a completed checklist which certifies that the work complies with the drawings and specifications. The completed checklist shall be submitted with the QC report.

Item 2 of 2.

Add the following to the end of Specification Section 01440:

### **Housing Quality Verification Checklist**

Revised: 06/01/2001

#### **(Example of Definable Feature of Work):**

##### **Building Layout**

###### **(Examples of Quality Control Checks)**

Check building setback requirements.  
Verify building elevations.  
Verify benchmark.

##### **Strip Site**

Check for protection of existing utilities, vegetation, and structures before operations begin.  
Check segregation of topsoil from backfill.  
Check requirements for erosion control.

##### **Foundation Excavation**

Check for contractor's location, identification and necessary protection of existing site utilities, vegetation, and existing structures before operations begin.  
Digging permits.  
Building setback.  
Removal of unsatisfactory materials.  
Check excavation, dewatering.  
Erosion control.  
Use of satisfactory materials for backfill.  
Compliance with compaction requirements.  
Required testing of backfill.  
Condition of subgrade (compaction, moisture, finish).

##### **Underslab Plumbing**

###### **Water Supply and Distribution**

Check that piping materials comply with requirement for under slab location.  
Check that there are no pipe joints below building slab.  
Check size and depth of water line service.  
Check sleeve requirements.  
Check separation requirements of sewer and water line.  
Test piping prior to follow-on work.

###### **Sanitary Drainage**

Check that piping materials comply with requirement for under slab location.  
Check size of waste line.  
Check slope.  
Check separation requirements of sewer and water line.  
Check for drainage pattern type fittings.  
Check requirements for building sewer clean out.  
Check type, size, location, and elevation of floor drains.  
Test piping prior to follow-on work.

###### **Radon Piping**

Check for approved materials.  
Check layout.  
Check penetrations thru foundation.

###### **Soil Treatment**

Pesticide labels to bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)  
Check handling, mixing, application requirements of pesticide.  
Check disposal requirements of containers and residual pesticide.  
Check the requirement for soil poisoning under and around building structures.  
Check for approval of material to be used and watch specifically for required concentration.  
Check application for coverage and quantity of material used.  
Check EPA requirements.  
Check MSDA sheets.

###### **Slab-on-grade**

Check capillary water barrier, gradation, depth, consolidation.  
Is vapor barrier membrane of specified thickness?  
Check vapor barrier edges for specified lap. Check requirement for sealing the edges.  
Check that vapor barrier joints and penetrations are sealed with tape.  
Check reinforcing steel required by plans and/or shop drawings.

Check reinforcing supports.  
Check forms.  
Check footing depth and width.  
Clearance of steel from forms and subgrade, and support material.  
Location and construction of contraction and expansion joints.  
Concrete tests - slump, entrained air content, temperature, strength.  
Concrete placement - vibration/consolidation.  
Concrete finish.  
Check form removal. Check patching.  
Check protection and curing of concrete.  
Check materials, dimensions, and installation of perimeter insulation.

### **Wall Framing & Ext. Sheathing**

#### **Lumber Grading**

Species and grade for particular use comply with the specifications.  
Check for grade stamp.  
Defects in material do not exceed grading rules.

#### **Lumber Seasoning and Storage**

Check moisture content of wood.  
Check for proper storage of materials.

#### **Fasteners**

Nailing complies with the AFPA Manual for Wood Frame Construction.

#### **Protection Against Termites and Decay**

Check for pressure preservative treated wood where wood is resting on concrete which is in contact with the ground.  
Wood supports and nailers which support permanent structures and which are embedded in concrete in direct contact with earth or exposed to the weather, should be pressure preservative treated.  
Check that treated lumber in contact with concrete that contacts the ground is treated to a retention level of 0.40 pcf. Check grade stamp.

#### **Anchorage of Sills and Plates to Foundation**

Foundation plates or sills shall be bolted to the foundation or foundation wall with not less than 1/2-inch nominal diameter steel bolts embedded at least 7 inches into concrete and spaced not more than 6 feet apart. Check plans and

specifications for other requirements.

Check that there are a minimum of two bolts per piece with one bolt located within 12 inches of each end of each piece.

Check for a properly sized nut and washer tightened on each bolt to the plate.

Check special requirements for shear walls.

Check hold down anchors.

### **Wall and Partition Framing**

Check stud spacing.

Double top plates for bearing walls and bearing partitions.

Horizontal blocking.

All openings are framed.

Solid blocking provided for hanging of fixtures, handrails, cabinets, baseboard and similar items.

Headers are sized properly.

Top plate corners overlap.

Top plate end joints offset as specified (or 48 inches by UBC).

Check for defects in studs beyond allowable.

Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.

Notches in nonbearing partition do not exceed 40 percent of its width.

Borings in any stud do not exceed 40 percent of the stud width.

Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.

The edge of bored holes are no closer than 5/8-inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.

Check special requirements for shear walls.

Check hold down anchors.

### **Wood Framed Floor**

Notches or holes in joists are not cut in the middle one-third of the joist span.

Notches in the outer sections of the span are no greater than one-sixth the joist depth.

Notches at joist end for ledger support are no greater than one-fourth the joist depth.

Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.

Where bearing partitions are parallel to floor joists, double joist should be directly under the partition.

Where walls containing plumbing are parallel to floor joists, the joist underneath are doubled, spaced and blocked to permit the passage of pipes.

Joist hangers and nails are the correct size for supported member. Joists on wood plates bear a minimum of 1-1/2 inches.

Joists on concrete bear a minimum of 3 inches.

Floor systems having joists framing from opposite sides over a bearing support are tied together by lapping a minimum of 3 inches.

Ends of floor joists are blocked full depth.

#### **Exterior Wall Sheathing**

Check for required diagonal bracing.

Check for sheathing against specification requirements for type of material, thickness, width, and length.

Nails and spacing as specified? Proper orientation of sheathing. End joints over framing members.

Check requirements for air infiltration barrier.

#### **Roof Trusses & Sheathing**

##### **Roof Trusses**

Check requirements for storage, handling, and installation in accordance with TPI HIB-91.

Check moisture content of wood. Ensure trusses are not field altered.

Check shop drawings for bearing points of trusses. Trusses should not be nailed to interior partitions at non-load bearing locations.

Are provisions to allow the bottom chord to float at interior walls required? Check for truss clips.

Check shop drawings for tie straps and hangers.

Check shop drawings for bracing of top and bottom chords. Check bracing of web members.

##### **Roof Sheathing**

Check sheathing for type, grade, and thickness required.

Check for required space at plywood joints.

Check sizes, length, and spacing of fasteners.

Check that long dimension of structural panels are perpendicular to rafters with panel continuous over two or more spans.

Check that joints are staggered. Check requirement for panel clips.

#### **Roof Shingles**

Check for approved materials.

Shingles are labeled as UL approved.

Sheathing is smooth, firm, dry, and free from loose boards.

Pipe and other roof penetrations are properly flashed.

Flashing is installed or on hand to be installed concurrently with roofing.

Ensure compliance with roofing manufacturer's instructions regarding: underlayment, fasteners (type and location), drip edge, starter course, successive courses, hip and ridge shingles, flashing, valley construction.

Underlayment on top of metal drip edge at eaves.

Metal drip edge on top of underlayment at rake.

#### **Install HVAC Ducts**

##### **Fabrication and Erection**

Check that ductwork delivered to the site conforms with approved shop drawings.

Check sheet metal material type, thickness and shape.

Check flexible duct type and size.

Check workmanship of lock seams of sheet metal ducts.

Check gauge of dampers and splitters.

Check for framed openings or duct sleeves in wall penetrations where required.

Examine duct hangers for specified material, thickness, and spacing.

Check flexible connections where required.

Test ducts for air tightness prior to follow-on work as required.

##### **Insulation**

Check the type and thickness of insulation and requirements for vapor barrier.

Check the method of fastening insulation to exterior or interior of duct. Check fasteners or adhesives.

Check sealing requirements of insulation vapor retarder.

Check for continuity of insulation through walls and floor, if required.

Check materials for fire-retardant requirements.

## **Electrical and Communication Rough-In**

### **General Requirements**

Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.

Notches in nonbearing partition do not exceed 40 percent of its width.

Borings in any stud do not exceed 40 percent of the stud width.

Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.

The edge of bored holes are no closer than 5/8-inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.

Notches or holes in joists are not cut in the middle one-third of the joist span.

Notches in the outer sections of the span are no greater than one-sixth the joist depth.

Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.

Bored holes in wood wall framing: Check requirements for minimum distance of wire to edge of wood member (equal to or greater than 1-1/4 inches). Check requirements if minimum distance cannot be maintained.

Notches in wood wall framing: Check requirements for protection of wires thru notches in wood members.

Where a service raceway enters from an underground distribution system, check that it is sealed. (NEC 230-8)

### **General Purpose Circuits**

Check that outlet boxes comply with specifications for material.

Check duplex receptacles for location and spacing.

Check that hallways equal to or greater than 10 feet have a receptacle.

Check offset requirements of boxes on opposite sides of fire rated partitions and walls. Check fire sealing requirements on fire rated partitions and walls.

Check requirements for clearance of non-insulated cover recessed light

fixtures (3 inches from insulation, 1/2-inch to combustibles).

Check support requirements for ceiling boxes for mounting lighting fixtures.

Check mounting requirements of boxes in relation to finished surface of wall/ceiling.

Check height of receptacles, switches, and HVAC controls. Check special height requirements for accessibility in accordance with the Uniform Federal Accessibility Standards.

Check that boxes are not overcrowded with conductors.

### **Utility**

Check requirements for hot water heater, heat pump, washer and dryer. Check conductors and circuits.

Check that at least one 20-amp branch circuit is provided to the laundry. (NEC 220-4c and 210-52f)

### **Kitchen Circuits**

Check spacing of outlets.

Check requirement for 20-amp small appliance circuits.

### **Appliances**

Check electric range conductor.

Check garbage disposal and dishwasher wiring.

Outlet location for garbage disposal shall permit disposal cord to be less than 36 inches (minimum length of cord is 18 inches).

Outlet location for dishwasher shall permit dishwasher cord to be less than 4 feet (minimum length of cord is 3 feet).

Check that outlet locations for appliances are accessible.

### **Wiring**

Check type of insulation and jacket, conductor material, conductor size and stranding in each circuit.

Sheathing to extend no less than 1/2 inch into box.

Check that wire is clamped to box if required.

Protective cable plates required where wires are within 1-1/4 inch of edge of stud.

Check that wire is stapled within 12 inches of cabinets, boxes, and fittings and secured at intervals not to exceed 4'-6".

Check that wire installed in attics are protected within 6 feet of the attic entrance.

### **Grounding Electrode System**

Check requirements for size and type of grounding electrode conductor.  
Check for approved clamp to water service.  
Check for approved rod connection for contact with soil.  
Check size, length, and material of ground rods or electrodes against contract drawings and specifications.  
Check special requirements for grounding of equipment.  
Check grounding resistance.

### **Meter Main**

Check for approved materials.  
Check meter height.

### **Panelboard**

Check that circuits are labelled.  
Check that breakers are make and model per panel labeling.  
Check that unused openings are properly closed.  
Check for required clearances in front of panel.  
Check that maximum breaker height is does not exceed 6'-6".

### **Windows/Exterior Doors**

Check for approved products.  
Check that door hardware complies with specifications.  
Verify manufacturer's installation requirements. Fasteners, sealant, and shims as required.  
Check that exterior door jambs are rabbeted from a solid board to provide an integral stop.  
Check door clearance, top, sides, and bottom.  
Check operation of doors and windows.  
Check for approved garage door and hardware. Check operation of garage door and hardware.  
Check for accessible doors where required. Doors to comply with the Uniform Federal Accessibility Standards.  
Check fire rating requirement of door from garage to unit.

### **Plumbing Rough-In**

#### **General Requirements**

Notches in exterior wall studs or bearing partition do not exceed 25 percent of its width.  
Notches in nonbearing partitions do not exceed 40 percent of its width.  
Borings in any stud do not exceed 40 percent of the stud width.

Borings are not greater than 60 percent of the width of the stud in nonbearing partitions or in any wall where each bored stud is doubled, and no more than two such successive doubled studs are so bored.

The edge of bored holes are no closer than 5/8-inch to the edge of the stud and the hole is not located in the same section of stud as a cut or notch.

Notches or holes in joists are not cut in the middle one-third of the joist span.

Notches in the outer sections of the span are no greater than one-sixth the joist depth.

Holes in the outer joist sections are limited in diameter to one-third the joist depth and are cut with the edge of the hole no closer than 2 inches to the top or bottom edges.

Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the soles or plates, a metal tie not less than 0.058 inches (16 galvanized gage) and 1-1/2 inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails.

Check for fire sealing thru fire rated walls and partitions.

Check supports for tub enclosure.  
Check piping and fixture supports.  
Test piping prior to follow-on work.

### **Water Supply and Distribution**

Check that piping materials comply with requirements.  
In multi-unit buildings, check that separate water shut off is provided for each unit. These valves shall be accessible in the unit that they control.  
Check that valves are oriented with stems in horizontal position or above. Check flow orientation of globe valves.  
Check for drain fitting at service entrance if required.  
Check required locations for water hammer arrestors and air chambers. Check for access to water hammer arrestors.  
Check for required air gaps and vacuum breakers.  
Check pipe joints.  
Check pipe sizes.

### **Sanitary Drainage**

Check that piping materials comply with requirements.

Check for required cleanouts and traps.  
Check pipe joints.  
Check pipe and trap sizes.  
Check slope.

#### **Vents**

Check that piping materials comply with requirements.  
Check pipe sizes, joints, and slope.  
Check that vents rise vertically to a point not less than six (6) inches above the flood level rim of the fixture served before offsetting horizontally.  
Check that the plumbing fixture's maximum trap arm length will not be exceeded.  
Check minimum size of vent thru roof.  
Check height of vent above roof.  
Check location of vent thru roof in relation to windows and vertical surfaces.

#### **Traps and Trap Arms**

Check pipe size, joints, slope, and trap size.  
Ensure that the vent opening is at or above the level of the weir of the trap it serves.  
Check that the plumbing fixture's maximum trap arm length will not be exceeded.

#### **Ceiling & Wall Insulation**

Check that material has been submitted and approved.  
Check that other trades that might damage the insulation or vapor retarder are finished prior to installation of the insulation materials.  
Check for proper placement of vapor retarder.  
Lap and seal edges and ends of vapor retarder.  
Check loose fill insulation for required thickness.  
Where interior partitions abut exterior walls, check that insulation and vapor retarder is provided at intersection.

#### **Hang Drywall on Wood Framing**

##### **Delivery and Storage**

Check that materials meet the specification and are in good condition.  
Gypsum wallboard should be stored flat, off the floor and supported to prevent sagging. Protect from moisture and damage.

Framing members and wall assembly are to be protected from moisture. Check environmental pre-conditioning and installation requirements.

#### **Ceiling Framing**

Check alignment of members.  
Check for required backing. All edges of gypsum wallboard are to be supported.  
Where truss uplift is a concern, check for backing/fasteners for floating corners at non-bearing interior walls and ceiling. Provide truss clips on bottom chord of truss where required to allow for movement.  
At ceiling joists where wiring passes through borings in wood members less than 1-1/4 inches from the edge of the member, it shall be protected by a steel plate at least 1/16 inch thick. Holes are not allowed through truss members.

#### **Wall Framing**

Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the soles or plates, a metal tie not less than 0.058 inches (16 galvanized gage) and 1-1/2 inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails.  
Where wiring passes through borings in wood members less than 1-1/4 inches from the edge of the member, it shall be protected by a steel plate at least 1/16 inch thick.  
Check alignment of framing. Check that walls are straight and true.  
Check stud spacing and required blocking.  
Check for twisted studs, protruding blocking, soil pipes, and other items that would create an uneven surface.  
Check that moisture content of wood members does not exceed 15% at time of gypsum wallboard application.  
Check for drywall stops or corner blocking for fastening at interior corners.

#### **Ceiling Installation**

Check for vapor barrier if required.  
Where moisture resistant gypsum wallboard is required, omit vapor barrier.  
Verify that material being used complies with specifications and requirements of fire or sound rating.  
Check for high strength gypsum wallboard if required.

Make sure proper perpendicular or parallel application of board is used, and the end joints are staggered.

Check fasteners and spacing. Check adhesive if required.

Check for proper application of floating interior corners.

Where truss uplift is a concern, check for proper attachment of gypsum wallboard to bottom chord of truss. Allow for floating interior corners.

#### **Wall Installation**

Check for vapor barrier if required.

Where moisture resistant gypsum wallboard is required, omit vapor barrier.

Apply approved mastic to all cut or exposed panel edges at utility holes, joints, and intersections of moisture resistant gypsum wallboard.

Verify that material being used complies with specifications and requirements of fire or sound rating.

Make sure proper perpendicular or parallel application of board is used, and the end joints are staggered.

Check fasteners and spacing. Check adhesive if required.

Check that fasteners are at least 3/8 inch from edges and ends.

Ensure that fasteners are applied starting from the center of board and working to ends and edges.

Check for proper application of floating interior corners.

#### **Finish Drywall**

Check that materials meet the specification (taping and embedding compound, joint tape, finishing compound, drywall corner bead, control joints).

Check that corner beads are one piece.

Check that surfaces to receive joint compound are free of dirt, oil and other materials that would effect bond.

Check that joint tape is placed over sufficient joint compound to ensure bond.

Check that at least two coats of finishing compound are applied after taping and embedding compound.

#### **Install Heat Pump & HW Heater**

Check for approved equipment.

Check BTU ratings, capacity, recovery, etc.

Check for required locations of dielectric connections.

Check condensate requirements for size, trap, and air gap.

Check for required disconnect switch.

#### **Paint Interior Walls**

Test reports of submitted paints comply with specifications.

Check requirements for storage of paint.

Check for protection of unpainted adjacent surfaces.

Worker protection controls are in place.

Check surfaces prior to painting. Need to be clean and free of foreign matter.

Exposed ferrous metals are spot primed.

Check that new gypsum wallboard is primed.

Ensure gypsum wallboard compound has cured as required.

Check ambient temperature.

Check preparation of previously painted surfaces.

Check that required number of coats and thickness is obtained.

Ensure uniform coverage.

#### **Install and Paint Interior Doors and Trim**

Check for approved products.

check storage of products. Protect from extremes of temperature and humidity.

Wood door edges to be sealed prior to shipment.

Check that exterior door jambs are rabbeted from a solid board to provide an integral stop.

Check for required wedge blocking between frame and rough opening. Installation to comply with manufacturer's instructions and specifications.

Check door clearance, top, sides, and bottom.

Check that finishes are applied in accordance with the specifications.

Check that internal parts of electrical equipment are free from paint, plaster, or other materials. (NEC 110-12c)

#### **Cabinets & Trim**

Check storage of cabinets.

If required, check for KCMA Certification Seal.

Check construction details of cabinets.

Check finish of cabinets.

Check alignment for level and plumb installation.

Anchors and fasteners installed at required intervals and locations. Check counter laminate thickness. Check counter substrate thickness and material.

Countertops attached at required locations.

### **Install Plumbing Fixtures, HVAC Devices, Electrical Fixtures and Devices**

#### **Plumbing Fixtures**

Check for approved fixtures. Check condition of fixtures. Installation in accordance with specifications and installation instructions.

#### **Traps and Trap Arms**

Check pipe size, joints, slope, and trap size.

#### **Electrical Devices and Fixtures**

Check receptacles for compliance with the specifications. Check alignment of receptacles. Check for GFCI where required. Check for approved fixtures. Test fixtures.

#### **Diffusers, Registers and Grills**

Check for approved materials. Check for proper operation of registers and diffusers.

#### **HVAC Balancing and Testing**

Perform air balancing and sound tests of HVAC system. Perform test of heat pump system.

#### **Smoke Detectors**

Check for approved devices. Test operation of devices.

### **Resilient Floor and Carpet**

#### **Concrete Floor**

Check that concrete is smooth and level. Check that defects are repaired. Check for leveling compound where needed. Perform dryness test if required.

#### **Framed Floor**

Check for approved underlayment. Check material, grade, and thickness.

Check for approved fasteners and spacing.

Check that underlayment joints are offset from parallel subflooring joints.

Check that surfaces, including joints and fastener locations, are smooth for finish flooring.

#### **Resilient Flooring and Base**

Check storage area for required temperature and low humidity. Check that resilient flooring, edge strips, and adhesive is approved. Check thickness and width of flooring material. Ensure required temperature is maintained prior to and after installation of flooring materials. Ensure that newly installed flooring is cleaned in accordance with the specifications. Provide protection of flooring from damage.

#### **Carpet and Base**

Check for approved materials. Ensure required temperature is maintained prior to and after installation of flooring materials. Check thickness of carpet and carpet cushion. Check installation in accordance with manufacturer's instructions and CRI 104. Check orientation of seams. Ensure that newly installed carpet is cleaned in accordance with the specifications. Provide protection of carpet from damage.

#### **Siding & Soffit**

Check for approved siding and accessories. Check storage of siding. Installation of accessories, starter strip, corners, trim. Check siding thickness. Verify flashing. Approved fasteners. Check for approved sealant. Siding installed in accordance with approved erection instructions and drawings.

#### **Gutters & Downspouts**

Check materials against specification requirements for type of material, thickness, finish, size. Check slope of gutters to provide drainage to outlets. Check brackets and spacers for size, type, location, and spacing.

**Paving & Sidewalks**

Removal of unsatisfactory materials.  
Check excavation, dewatering.  
Erosion control.  
Use of satisfactory materials for backfill.  
Compliance with compaction requirements.  
Required testing of backfill.  
Condition of subgrade (compaction, moisture, finish).  
Compaction of aggregate base.  
Forms.  
Check reinforcing steel required by plans and/or shop drawings.  
Check footing thickness and width.  
Check thickness of sidewalks, porches and patios.  
Concrete mix - strength.  
Clearance of steel from forms and subgrade, and support material.  
Location and construction of contraction and expansion joints.  
Concrete placement - slump, vibration, and finish.  
Concrete finish.  
Concrete curing.  
Location and care of imbedded items.

**Exterior Paint**

Test reports of submitted paints comply with specifications.  
Check requirements for storage of paint.  
Check surfaces prior to painting. Need to be clean and free of foreign matter.  
Exposed ferrous metals are spot primed.  
Check that required number of coats and thickness is obtained.  
Ensure uniform coverage.  
Wood surfaces are prepared and finished in accordance with the specifications.