DIVISION 6
CARPENTRY

SECTIONS:

6.1 ROUGH CARPENTRY
6.2 FINISH CARPENTRY

SECTION 6.1 ROUGH CARPENTRY

6.1 A General:

1. Related Sections –

   a. Air Sealing 7.10

2. Quality Assurance –

   a. Lumber Grading Rules and Wood Species to be in conformance with Voluntary Product Standard PS 20 – latest edition: Grading rules of the following associations apply to materials furnished under this section:

      1) Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
      2) Southern Pine Inspection Bureau (SPIB).
      3) West Coast Lumber Inspection Bureau (WCLIB).
      4) Western Wood Products Association (WWPA).

   b. Plywood Grading Rules: Softwood Plywood – Construction and Industrial: Product Standard PS 1.

   c. Grade Marks: Identify all lumber and plywood by official mark.

      1) Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.

         a) S-dry: Maximum 19% moisture content.

      2) Softwood Plywood: Appropriate grade trademark of the American Plywood Association.

         a) Type, grade, class, and Identification Index.

         b) Inspection and testing agency mark.

   d. Requirements of Regulatory Agencies:

      1) Pressure treated material: American Wood Preservers Bureau Standards.

      2) Span tables: National Forest Products Association.

      3) Working stresses: Softwood Lumber, National Design Specification, National Forest Products Association.

3. Product Delivery, Storage, and Handling –

   a. Immediately upon delivery to job site, place materials in area protected from weather.

   b. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.

   c. Do not store seasoned materials in wet or damp portions of building.

   d. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

6.1 B Reference:

Joseph Lstiburek, Builder's Guide – Moderate Climates, © 1998 Building Science Corp., EEBA and Shelter Source, Chapter 5 – Framing.

6.1 C Products:

1. Framing Lumber –

   a. Surfacing: Surface four sides (S4S), unless specified otherwise.

   b. Light framing:

      1) General framing: Standard and Better or Stud Grade.
      2) Plates, blocking, bracing, and nailers: Utility Grade
      3) Bracing, blocking, bulk headings, and general utility purposes: Economy grade.

   c. Studs:

      1) Loadbearing & Non-Loadbearing: Stud or Standard Grade.
      2) Typical partition framing shall be of 2 x 3 lumber. Fire-rated partitions shall be framed with 2 x 4 lumber.

   d. Structural light framing, nom. 2 inches to 4 inches thick and 4 inches wide:

      1) Allowable extreme fiber stress in bending: 1250 psi
      2) Modulus of elasticity (E): 1,300,000.
      3) Species: Hem-Fir

   e. Structural joists and planks, nom. 2 inches to 4 inches thick, 6 inches and wider:

      1) Allowable extreme stress in bending: 1250 psi
      2) Modulus of elasticity (E): 1,400,000

3) Species: Hem-Fir

2. Plywood –

a. Roof sheathing: 5/8 inch.

1) Grade: CC-EXT-APA

2) Identification Index: 24/0

b. Wall sheathing: ½ inch.

1) Grade: CC-EXT-APA
2) Identification Index: 32/16 and 24/0

c. Subflooring: 3/4 in tongue and groove.

1) Grade: CD-INT-APA
2) Identification Index: 36/16

d. Underlayment: Minimum 3/8 inch in kitchen, 1/2 inch in baths if resilient flooring is employed; 1/4 inch in areas to be carpeted.

1) Grade: Underlayment – INT-APA, group 1
2) Grade at Kitchens and Bath: CC Plugged- EXT-APA

3. Construction Adhesive – Suitable for adhering subfloor to joists and underlayment to subfloor.

Acceptable adhesives: Contech PL-200, PL-400
Franklin International "Tite Bond"

3. Building Paper – Asphalt-saturated felt: ASTM D226, 15 lb. nonperforated.

4. Preservation Treated Wood Products –

a. Waterborne salt preservatives for painted, stained, or exposed natural wood product:
1) AWPB LP-22, above ground application, waterborne preservatives.
2) AWPB LP-22, ground contact, waterborne preservatives.

5. Rough Hardware –

a. Expansion shields: FS FF-B-561

b. Lag screws and bolts: FS FF-B-561

c. Toggle bolts: FS FF-B-588

d. Wood screws: FS FF-S-111

e. Nails and staples: FS FF-N-105

f. Metal nailing discs:

1) Flat caps, minimum 1 inch diameter
2) Minimum 30 ga. sheet metal
3) Formed to prevent dishing
4) Bell or cup shapes not acceptable.

g. Joist hangers: various types providing adequate structural support – MIN. 18 ga. zinc coated steel.

h. Bar or strap anchors: ASTM A525 zinc-coated steel, 18 ga. minimum.

i. Plyclips: Extruded 6063-T6 aluminum alloy.

6. Gypsum Sheathing – ASTM C79, nominal size 2 ft. x 4 ft., T & G edge, 1/2 inch thick.

6.1 D Execution:

1. Conditions of Surfaces – Verify that surfaces to receive rough carpentry materials are prepared to exact grades and dimensions.

2. Workmanship – Rough carpentry shall be installed plumb, straight and true, properly and tightly cut, fitted and nailed or anchored. Assembled work shall be rechecked and made plumb, level, straight and true after installation. New work shall correct misalignments and defects of existing substrates, walls, floor and ceilings. Lumber with defects which would prevent proper nailing or attachment and which would impede the proper alignment and fit of finish surfaces shall be rejected. Reject improperly cut, fit and nailed lumber as well as lumber with excessive knots, warp, wane, mildew, checks and bow.

3. Installation: New Framing –

a. Sills: Set level to 1/16 inch in 6 ft., in mortar bed. Secure sills with 1/2 inch x 16 inch anchor bolts embedded in the structure and spaced a maximum of 8 ft. o.c. and within 1 ft. of the ends of each piece of sill. There shall be a minimum of two anchor bolts per section of sill.

b. Posts or columns: Provide two surfaces on posts at right angles to each other for installation of interior finish materials. Built-up posts shall be arranged and nailed together to accommodate type of construction. Erect posts straight, plumb with straight edge and level, and brace with tack boards at plate and sill.

c. Stud Framing:

1) Studs shall be spaced 16 inches on center.

2) Where a heating or return duct must be run on an exterior wall, a chase shall be studded out of sufficient depth to allow for continuous, un-compressed insulation of required R-value on the cold side of the duct.

3) Provide single bottom plate and double top plates for loadbearing partitions, 2 inches thick by width of studs.

4) Provide single bottom plates and single top plates for non-loadbearing partitions, 2 inches thick by width of studs.

5) Provide studs in continuous lengths without splices.

6) Overlap double top plate minimum of 6 inches at corners and intersections.

7) Face nail upper top plate to lower top plate.

8) Nail bottom plate to wood construction.

9) Studs at corners and partition intersections of perimeter walls shall be so installed as to permit continuous insulation. Gypsum board may be attached to a single stud with drywall clips, or to a 1x4 support nailed to the back of the stud. See Section 7.2, Execution: Walls. This detail is illustrated in the Builder's Guide, Figures 5.3 and 5.4.

d. Headers:

1) Headers shall be continuous, same width as studs, with no joints and of depth required to span widest opening.

2) Lap headers at intersections with bearing partitions or tie with metal straps.

3) Maximum span:

a) Spans to 3 ft.-6 in. – Two 2 x 4's
b) Spans to 4 ft.-6 in. – Two 2 x 6's
c) Spans to 6 ft.-0 in. – Two 2 x 8's
d) Spans to 8 ft.-0 in. – Two 2 x 10's braced.

4) Install 1/2-inch plywood plate between header members and spike assembly together. Plywood plate to be full length of header but may be in several pieces.

4. Blocking – Locate blocking to facilitate installation of finishing materials, fixtures, specialty items, and trim. Provide 2 x 8 backing at lavatories, 2 x 4 at shower curtain rod, 2 x 4 at any other surface mounted device designed to carry a load, and 1 x 4 backing at all other surface mounted items. Six inch by 1/2 inch wood backing shall be used for all wall cabinets, top and bottom.

5. Joist Framing –

a. Install with crown edge up.

b. Support ends of each member a minimum 1-1/2 inches of bearing on wood, and 3 inches on masonry.

c. Joists supported on masonry walls shall have fire cuts. Shim joists fully with sound masonry materials of flat configuration set solidly in the wall. Place capillary break of nonferrous metal between masonry and first floor joists.

d. Lap members framing from opposite sides of beams, girders, or partitions a minimum of 4 inches or tie opposing members together by toenailing or metal connectors.

e. Provide and install joist hangers as required to avoid unnecessary or unacceptable ceiling drops and headroom clearance problems.

g. Bored holes: Maximum 1/3 depth of member, 2 inches minimum distance to top or bottom of joists. No bored holes shall be closer to bearing point that 1/4 of the span.

6. Bridging – Install rows of bridging at 8 ft. intervals, or at midspan for spans less than 16 ft. Install 1 x 3 wood cross bridging, manufactured metal straps, or solid wood blocking. Nail bottom end of all cross bridging after sheathing is installed.

7. Rafters – Notch to fit exterior wall plates and toenail to plates. Double rafters at openings in roof framing to support headers and trimmers, and support with metal hangers. At valleys, bevel ends of rafters for bearing against valley rafters. At hips, bevel ends of rafters for bearing against hip rafters.

8. Beams and Girders – Install with crown edge up. Provide bearing at ends of each member: Minimum 4 inch. Nail built-up beams or girders with 2 rows of 20d nails spaced maximum of 2 ft. o.c., locating 1 row near top edge and other near bottom edge of member.

9. Ceiling Framing – In ceiling areas where the short dimension is less than 6 ft., install 2 x 3 framing members at 16 inches spacing set with 3 inches dimension vertical. In ceilings with short dimensions over 6 ft., 2 x 4 framing shall be used in a similar fashion. Where spans exceed 8 ft., intermediate 2 x 4 stringers at maximum 8 ft. spacing shall be laid flat perpendicular to and across top of 2 x 4 spanning members and nailed to each member and shall be full length of ceiling. In addition, 2 x 4 vertical struts at every other ceiling joist shall be nailed to existing joists above stringer and nailed to both stringer and spanning member of ceiling at each location to provide a rigid framework for the ceiling.

10. Miscellaneous Framing –

a. Firestops: Provide firestops as necessary to comply with all provisions of the BOCA Code and Philadelphia Fire Code, as amended.

b. Provision for Air-Sealing: Sect. 7.10 sets forth the requirement for a continuous air barrier at the thermal boundary of the house. Air-sealing requirements affect certain framing details. Construct all framing in such a way that the air-sealing requirements of Sect. 7.10 can be met. Examples –

1) When a lowered ceiling is built on the top floor, any new partition walls on the top floor shall be built with their top plates below the ceiling framing.

2) If the ceiling is at different heights on either side of a partition wall, the wall should be framed to provide an air barrier between the stud pockets of the wall and the space above the lower ceiling.

b. Framing for mechanical work:

1) Frame members for passage of pipes and ducts to avoid cutting structural members.
2) Do not cut, notch, or bore framing members for passage of pipes or conduits without concurrence of Inspector.
3) Reinforce framing members where damaged by cutting.

11. Roof Sheathing –

a. Plywood Sheathing: Install sheathing with face grain perpendicular to supports. Allow minimum 1/16-inch space between end joints and 1/8-inch space at edge joints for expansion of panels. Support edge joints by use of Ply Clips. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports.

12. Wall Sheathing –

a. Plywood Sheathing: Allow minimum 1/16-inch space at end joints and 1/8-inch space at edge joints, doubling these spacings in wet or humid conditions. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports with 6d common nails.

b. Gypsum Sheathing:

1) Apply t & g gypsum sheathing with long dimension horizontal.
2) Abut ends at center of supports.
3) Stagger end joints.
4) Attach sheathing using 1-3/4 inch, 11d, 7/16 inch dia. flathead galv. roofing nails spaced 6 inches on all supports.

13. Subflooring –

a. Install with face grain perpendicular to supports, allowing 1/16-inch space at end joint and 1/8 inch at edge joints. Glue to floor joists. Nail every 6 inches along panel edges and every 10 inches at intermediate supports using 8d common nails.

b. Repairs to existing board subflooring – as required to provide uniform and complete surface, in plane with existing subfloor. Contractor may use plywood of matching thickness or t & g board to match existing subfloor, provide repairs to subflooring so as to create a substrate suitable for hardwood floor installation. Replace at cracked boards and replace all boards where necessary to eliminate gaps more than 1/4-inch wide at joints.

14. Underlayment –

a. Apply underlayment just prior to laying finish floor. Stagger panel end joints with respect to each other and all joints with respect to the joints in the subfloor. Space panel ends and edges 1/32 inch. Glue to subfloor with construction adhesive. Underlayment

for ceramic tile must be screwed; elsewhere may be nailed or stapled. Countersink nail heads 1/16 inch, and screw heads and staples 1/32 inch. Fill damaged or open areas with latex compound floor filler paste. Do not fill nail or staple holes. Lightly sand any surface roughness, particularly at joints and around nails.

b. Nailing / screwing / stapling –

1) 1/4 inch underlayment: 3d ring-shank nails or 1-1/4 inch drywall screws at 6 inches o.c. at panel edges and 8 inches o.c. each way intermediate; or 18 ga. staples at 3 inches o.c. at panel edges and 6 inches o.c. each way intermediate. Staples must provide min. 5/8 inch penetration.

2) 3/8 inch and ½ inch underlayment: 4d ring-shank nails or 1-5/8 inch drywall screws at 6 inch o.c. at panel edges and 8 inch o.c. each way intermediate; or 16 ga. 3/8 inch crown width staples at 3 inch o.c. at panel edges and 6 inches o.c. each way intermediate.

15. Clean-Up – On any rehab job (where prior demolition/replacement steps may have left a residue of lead dust), precautions must be taken to assure that the surface of the underlayment is not lead-contaminated.

a. Before installing underlayment, clean the surface of the subfloor using a High Efficiency Particulate Accumulator (HEPA) vacuum.

b. After nailing and sanding underlayment, damp-mop its surface with an industrial detergent containing phosphate. Follow detergent manufacturer's directions. Approved brand of phosphate detergent: Alconox

16. Board-Up – At completion of project and immediately following installation of high value items including fixtures, appliances and carpeting. Use 1/2 inch plywood. At windows, bolt through open windows to 2 x 4 boards across window opening located to provide both security and minimum window opening requirement (taking care not to damage interior finishes). As soon as board-up is called for, the property should be secured daily during construction; only those apertures needed for light and ventilation should be reopened.

SECTION 6.2 FINISH CARPENTRY

6.2 A General:

1. Quality Assurance –

a. Lumber grading rules and Wood Special to be in conformance with Voluntary Product Standard PS 20-70. Grading rules of the following associations apply to materials furnished under this section:

1) Northeastern Lumber Manufacturer's Association, Inc.
2) Southern Pine Inspection Bureau (SPIB).
3) West Coast Lumber Inspection Bureau (WCLIB).
4) Western Wood Products Association (WWPA).
5) Western Red Cedar Lumber Association (WRCLA).
6) Northern Hardwood and Pine Manufacturer's Association (NHPMA).
7) The American Plywood Association (APA).

b. Grade Marks: Identify all lumber and plywood by official grade mark – on finish trim pieces, grade marking to be on backs or ends.

2. Product Delivery, Storage and Handling –

a. Immediately upon delivery to job site, place materials in areas protected from weather, moisture, debris or damage.

b. Store trim and plywood panels flat, covered and raised off the ground or floor.

6.2 B Products:

1. Molding or shaped trim, if a Western Wood Product shall be "C Select" or better in Ponderosa Pine. Unshaped pieces shall be S4S – Eastern White Pine, Sugar Pine, Idaho Pine or Ponderosa Pine. No trim lumber shall be less than No. 1 common grade. Small tight knots without surface blemish, and red streaks are acceptable. Finger jointing is acceptable when painting is anticipated. Moisture content of finish lumber shall be 12% maximum.

2. Plywood used in finish carpentry shall have a sanded paint grade face veneer, and shall be exterior grade at exterior or wet locations.

3. Nails and fasteners – bright finishing nails of appropriate size to provide adequate penetration of backing material. Use galvanized finishing nails at exterior trim.

4. Where wrought iron handrails are impractical or otherwise undesirable, bracketed handrail shall be permitted at stairwalls other than basement stair and shall be 1-5/8 inch standard milled handrail section in red or white oak mounted on a minimum of 3 finished brass variable pitch brackets for each run. All wall-bracketed handrails shall be a single piece for each run without splices or joints. Round off all ends of rails.

6.2 C Execution:

1. Trim –

a. Install running trim in long lengths with joints scarfed at locations having solid backing.

b. Cope molded work at returns and interior angles. Miter all corners.

c. Scribe, miter, and join accurately and neatly to detail.

d. Set all nails and leave work free of tool marks.

2. All base, door and window trim shall be "Clamshell"design or as noted on approved plans. Selected design shall be used uniformly throughout the structure. Base trim shall be nominal 4 inch. Door and window trim shall be nominal 3 inch. Shoe moldings where required shall be 3/4 inch. quarter round. Provide stools and aprons at windows.

3. Drywall openings without doors are not required to be cased.

4. Install 1/2-inch plywood access panels with frame and trim at tubs, crawl spaces, and attic spaces, secured with screws.

5. Install milled round white pine handrail at basement stairs with 4 x 4 starting post and 2 x 3 intermediate rail. Support rails at mid-span, attaching support rails to stringer with 1/4 inch lag or through-bolt.

6. Closet shelving – Closet shelving shall be 1 x 12 shelving boards, 3/4 inch plywood nosed with pine, or nosed 3/4 inch particle board edged for painting. Clothes closet shall have 1 shelf and 1 galvanized 1 inch dia. pipe rod. Linen closets shall have a minimum of 5 shelves at 12-inch vertical spacing. Shelving longer than 5 ft. span shall be supported at midspan with suitable finished bracket or other support. Closet shelves require 1 x 4 continuous cleat or pin rail at back and sides. Linen-closet shelves shall be the full closet depth.

7. New Stairs –

   a. Site-Built Stairs: All site-built stairs shall have no fewer than 3 stringers. At all stairs, anchor stringers to wall at mid-span. At basement stairs, install 4 x 4 P.T. vertical brace to floor at mid-span. All stringers shall be cut from 2 x 12's and reinforced with 2 x 4's when throat dimension is less than 4-1/2 inches.

   b. Shop-Built Stairs: Prefabrication using a housed 5/4 inch (min.) pine stringer, with wedged and glued treads and risers, is the preferred method of stair building. Use 5/4 inch yellow pine treads and 3/4 inch risers.