

Town of Merrimac, Ma

Typical Finished Basement Details

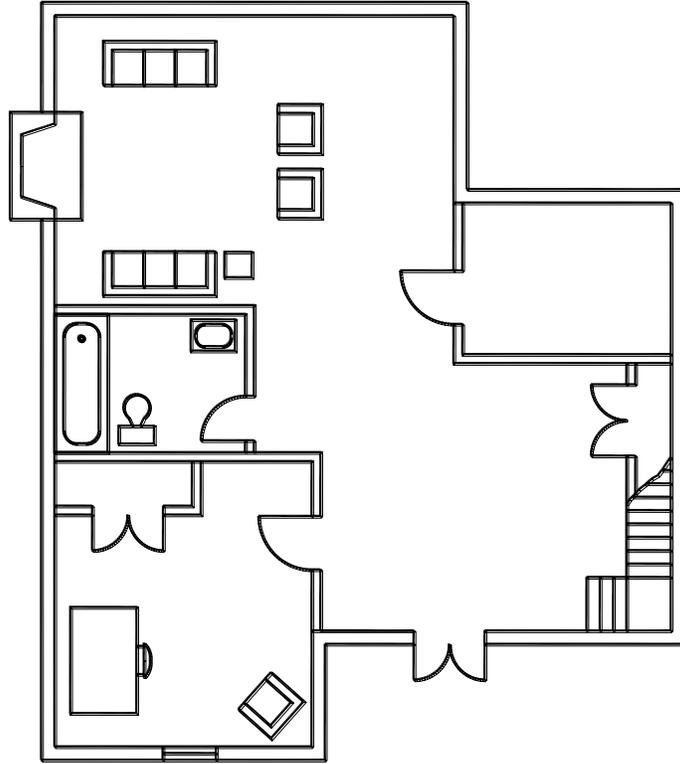
Based on the 2009 International Residential Code



Finished basements must be constructed in conformance with this document. For requirements, details and information not contained herein, you must consult the ICC 2009 Residential Code with Massachusetts Amendments. Code books may be viewed [online](#) or purchased from the International Code Council at iccsafe.org. A copy of this document is required to be on the job site and available to the building inspector during each required inspection.

Town of Middleton, Ma
Typical Finished Basement Details

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The Middleton Building Department can be reached at 978-777-2850 Monday through Friday 7am to 3pm

SECTION 1: GENERAL NOTES

1. Habitable rooms (excluding closets, hallways, laundry rooms, storage spaces and bathrooms) shall have an area of not less than 70 square feet and shall not be less than 7 feet in any direction.
2. Hallways shall not be less than 36 inches in width.
3. Basement ceiling height shall not be less than 7 feet above the finished floor. Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 8 inches of the finished floor..
4. Bathrooms shall be equipped with a fan vented directly to the outside.
5. Space under stairs shall be protected with ½-inch drywall on the underside or with a non-accessible enclosure clad in ½-inch drywall.
6. A smoke alarm shall be installed in the basement and in each basement bedroom. New smoke alarms shall be interconnected so that when one is activated all will sound. Smoke alarms must be hardwired with a battery backup. Carbon Monoxide alarms shall be installed on each story of the building per the building code.
7. If adding a bedroom and the house is equipped with a gas-fired appliance, a carbon monoxide alarm shall be installed in the basement.
8. All basement stairs shall meet code and have a light source to illuminate all treads and landings. Lights shall be operated by a switch located at the top and bottom of the stairs.
9. A minimum of R-15/19 battened insulation (with a vapor barrier on the warm side of the wall) shall be installed for the full height and length of the basement wall per code.
10. When finishing a basement, the habitable room calculation sheet that is within the building permit application packet must be filled out. This will allow the health department determine that the septic system is sized accordingly for design flow for the room and bedroom count. **If the system is not designed to handle the added room count a deed restriction will be required to be filed at the Salem Registry of Deeds with a copy given to the Health Department.**

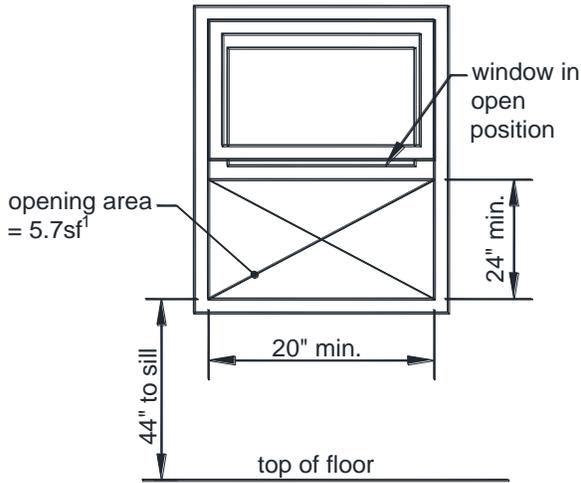
SECTION 2: EMERGENCY ESCAPE AND RESCUE

Where required. An emergency escape and rescue opening in the form of a window or door to the outside is required for all finished basements and in all bedrooms regardless of the house's age. However, openings in the bedroom may serve the entire basement.

If your basement does not currently have one of the emergency escape and rescue options below, then you must provide one. **Cutting openings in existing basement walls is outside the scope of these details. Therefore, a plan submission is required for the new openings only.** All other conditions of the finished basement may be taken from these details.

Emergency escape and rescue options. The following openings can be used for emergency escape and rescue.

- Window opening in a walk-out basement condition.
- Window opening into a window well or areaway.
- Door in a walk-out basement condition.
- Door opening to an areaway.
- Door to bulkhead enclosure (Bilco door or similar).
- **Opening requirements.** The emergency escape and rescue opening shall meet the requirements below.
- See FIGURE 1 for typical window opening requirements.
- All doors and windows must be operable from the inside without the need of a key or tool.
- The opening must be a minimum of 5.7 square feet.
- Windows must have a sill 44 inches or less above the finished floor.



windows shall have a minimum net clear opening of 3.3 square feet. The minimum net clear opening dimensions shall be 20 inches by 24 inches in either direction.

FIGURE 1: EMERGENCY ESCAPE AND RESCUE OPENING REQUIREMENTS

Exception Windows opening directly to outside in a walk-out condition are permitted to have an opening area equal to 5.0 square feet. Double hung **Window well requirements.** When grade conditions require the sill of the window to be below the outside grade elevation, then a window well must be constructed. The required horizontal area of a window well is a minimum of 9 square feet minimum as measured when the window is in the open position (this is important when the window is a crank-out type). See FIGURE 2.

Window well construction. A plan submission to the Town is required for the construction of a new window well. You may use the Town of Middleton Typical Retaining Wall Details for guidance. If you choose to use a prefabricated window well, you must submit the manufacturer's specification during the permit application process.

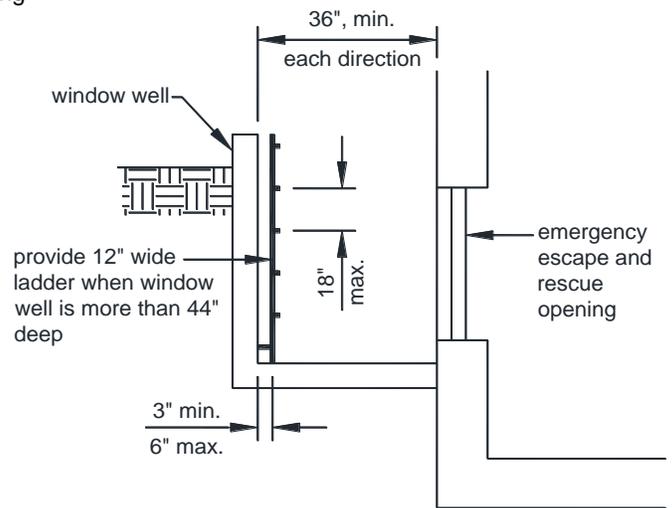


FIGURE 2: WINDOW WELL REQUIREMENTS

Ladder requirements. When a window well is deeper than 44 inches, a permanent, attached ladder or steps must be provided per FIGURE 2. If the ladder projects more than 6 inches into the required horizontal area, the size of the window well must be increased to compensate.

SECTION 3: WALL CONSTRUCTION

Studs. Studs may be utility grade or better or metal studs. Walls constructed of wood studs shall have a single pressure treated bottom plate and can have a single or double top plate. Studs shall be placed at 16 inches on center, but may be increased to a 24 inches on center when applied finish material is drywall.

Attachment requirements. Wall construction shall be fastened in accordance with TABLE 1.

TABLE 1: FASTENING SCHEDULE

CONNECTION	NAILING METHOD	FASTENER
Top plate to stud	End nail	2-16d (3½" x 0.135")
Stud to bottom plate	Toe nail or	2-16d (3½" x 0.135") ¹ or 3-8d (2½" x 0.113") ¹
	End nail	2-16d (3½" x 0.135") ¹

CONNECTION	NAILING METHOD	FASTENER
Bottom plate to floor	Face nail	16d concrete nail (3½" x 0.135") @ 16"o.c.
Header to jack stud (see FIGURE 3)	Toe nail	4-8d (2½" x 0.113") each side of header at each end

¹Fasteners are required to be hot-dipped galvanized.

Headers. A single flat 2x4 may be used as a header in interior nonbearing walls for openings. If the opening does not meet these conditions. The load bearing header shall be framed per FIGURE 3 and sized per TABLE R502.5 (2) of the IRC. Two-ply headers shall be fastened together using 16d (3½" x 0.135") face nails at 16 inches on center staggered along the top and bottom edges

Fireblocking. Fireblocking shall be provided to seal off concealed spaces and to form an effective fire barrier between stories. Fireblocking shall be provided in the following locations.

- In concealed spaces of stud walls and partitions, including furred spaces at the ceiling and floor level where the top plate is attached to the underside of the floor joists. See FIGURE 4.
- At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, bulkheads, drop ceilings, etc. See FIGURE 5.
- basement wall. See FIGURE 6
- In concealed spaces between stair stringers at the top and bottom of the stair run.
- At gaps and openings around vents, pipes and ducts at the ceiling and floor level.

Fireblocking material. Fireblocking shall consist of one of the materials listed below.

- ½-inch gypsum board.
- 2x lumber (2x4, 2x6, etc.).
- Two thicknesses of 1x lumber (1x4, 1x6, etc.) with staggered joints.
- ¾-inch plywood, OSB or particleboard with joints backed by 6 inches of the same material.
- ¼-inch cement, cement/fiber board (e.g., Durock).

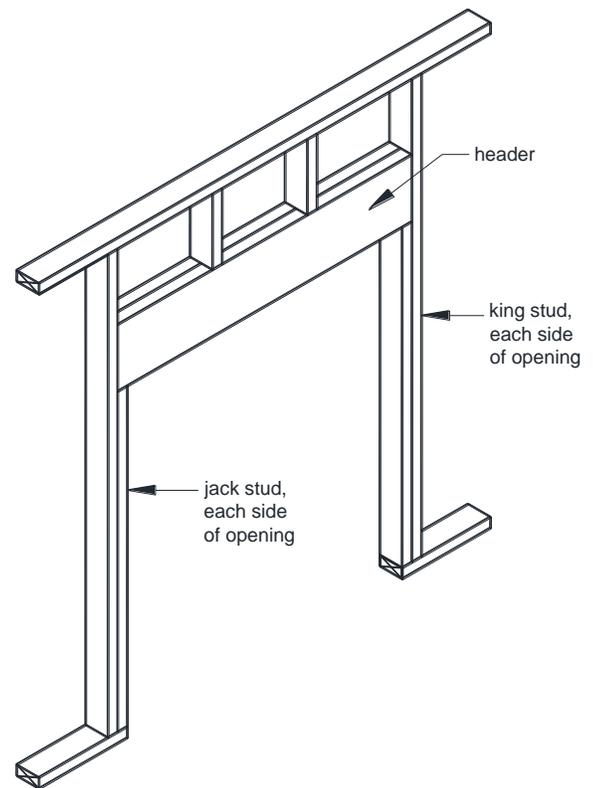
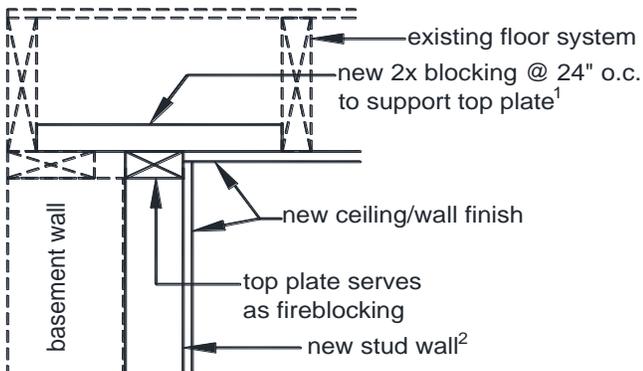


FIGURE 3: FRAMING AT HEADERS

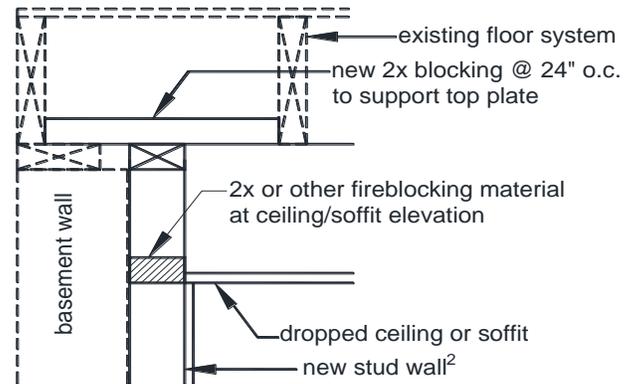
- Batts or blankets of mineral wool or glass fiber or other *approved* materials installed in such a manner as to be securely retained in place..



¹ Attach top plate to underside of joists where floor framing is perpendicular to stud wall.

² R-13 insulation should be provided between studs.

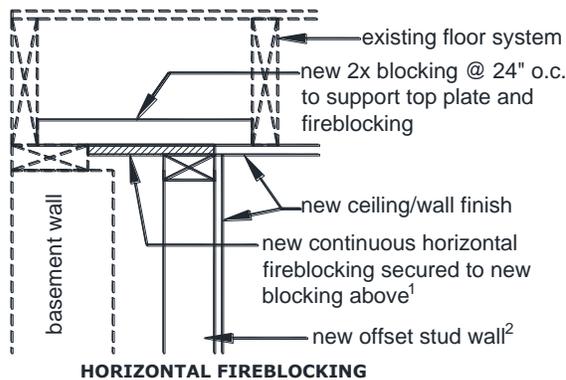
FIGURE 4: FIREBLOCKING WITH STUD WALL AGAINST BASEMENT WALL



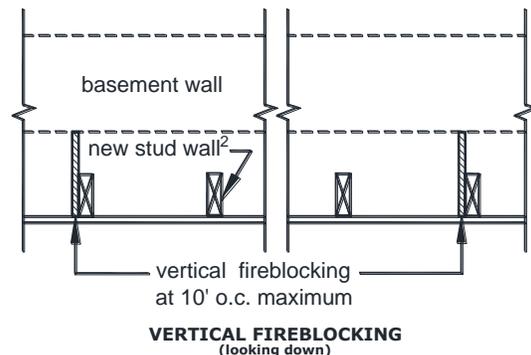
¹ Attach top plate to underside of joists where floor framing is perpendicular to stud wall.

² R-13 insulation should be provided between studs.

FIGURE 5: FIREBLOCKING AT DROP CEILING



HORIZONTAL FIREBLOCKING



VERTICAL FIREBLOCKING (looking down)

¹ Attach top plate and fireblocking to underside of joists where floor framing is perpendicular to stud wall.

² If cavity between basement wall and new stud wall does not contain existing insulation, then R-13 insulation should be installed.

FIGURE 6: FIREBLOCKING WITH OFFSET STUD WALL

Interior finishes. Wall and ceiling finish materials must meet the requirements listed below.

- Materials must have a flame spread classification no greater than 200 and a smoke density classification no greater than 450. This does not apply to trim, molding, handrails and doors.
- Cement or fiber-cement board (e.g., Durock) must be installed on walls of bathtub and shower spaces and finished with a non-absorbent surface.
- Wood veneer or hardboard paneling less than 1/4-inch shall not be permitted.
- Gypsum board must be 1/2-inch minimum.

SECTION 4: DRILLING AND NOTCHING

Studs. Studs in non-load bearing walls may be notched or drilled in accordance with FIGURE 7.

Joists and/or beams. Drilling and notching of existing wood joists or beams shall meet the requirements below.

- Drilling and notching 2x lumber shall be in conformance with FIGURE 8. Cantilevered (overhanging) joists cannot be notched.
- Drilling and notching of manufactured wood I-joists, LVL or other engineered wood product shall be per the manufacturers' instructions or registered design professional.

- Drilling and notching of open web floor trusse is prohibited without submitted calculations performed by a registered design professional..

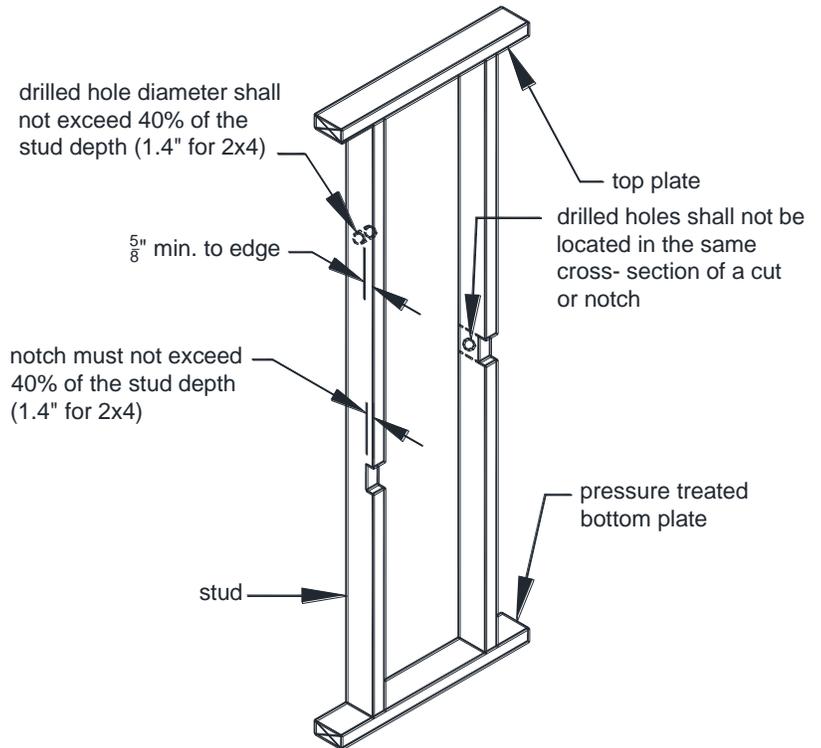


FIGURE 7: DRILLING AND NOTCHING STUDS

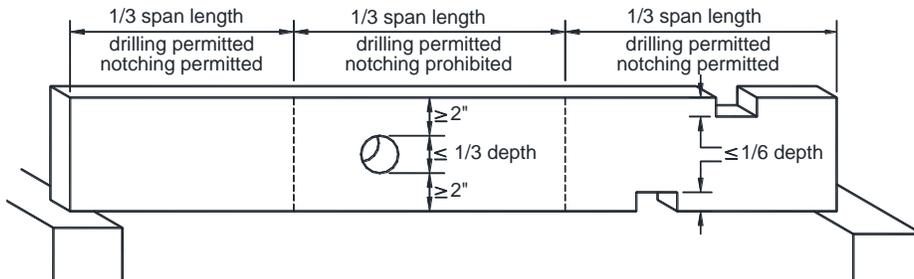


FIGURE 8: DRILLING AND NOTCHING JOISTS

SECTION 5: FLOOR/CEILING CONSTRUCTION

Draftstopping. When a ceiling is not directly attached to the underside of the floor joists above or when the floor joists are comprised of open web trusses, draftstopping must be provided. Install draftstopping to create equal-sized concealed areas not exceeding 1,000 square feet. Draftstopping shall be installed parallel to the floor framing members. See FIGURE 9 and FIGURE 10.

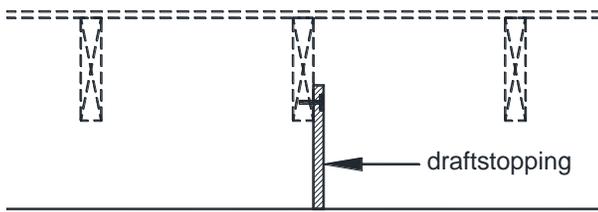


FIGURE 9: DRAFTSTOPPING AT DROP CEILING

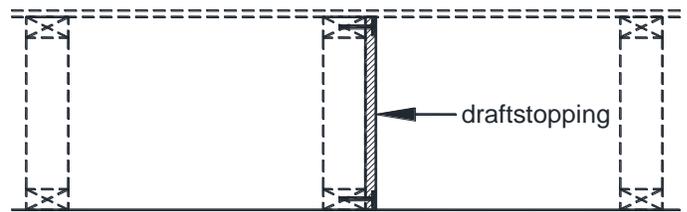


FIGURE 10: DRAFTSTOPPING AT OPEN WEB TRUSSES

Draftstopping material. Draftstopping shall consist of 1/2-inch minimum gypsum board, 3/8-inch minimum wood plywood/OSB or 3/8-inch minimum particleboard, Type 2-M-W.

SECTION 6: MECHANICAL

Mechanical. All Mechanical work shall comply with the 2009 IMC (International Mechanical Code) and the 2009 IRC (International Residential Code)

Appliance access. Furnaces, water heaters and other appliances must be accessible without removing permanent construction and shall meet the following minimum criteria.

- 30 inches x 30 inches clear floor space at front/control side.
- Doors to furnace rooms shall be 24 inches minimum and be of sufficient size to remove the largest appliance.

Combustion air. Furnace rooms with fuel-fired appliances must be provided with combustion air that complies with the Massachusetts Fuel Gas and Plumbing Code or be installed to the manufactures installation instructions.

Mechanical and Sheet Metal. Any added Mechanical or Sheet Metal work will need a permit and installed by a licensed installer.

Plumbing Work. All Plumbing and Gas work shall comply with the Massachusetts Fuel Gas and Plumbing Code (248 CMR) **All Plumbing work shall be performed by a licensed plumber.**

Showers. Showers and shower compartments must meet the following requirements.

- Shower compartments must have a minimum total area of 900 square inches and a minimum dimension of 30 inches in any direction.
- Shower compartments may have a minimum dimension of 25 inches provided it maintains a cross sectional area of 1,300 square inches.
- Hinged shower doors must open outward.
- All glass which encloses as shower must be safety glazed.
- Shower control valves must be scald resistant (in accordance with ASSE/ANSI 1016) with a hot water limit of 112 degree F.

Fixture clearances. Toilets, sinks and showers shall have the minimum clearances listed below.

- 21 inches in front of sinks and toilets.
- 24 inches in front of shower stall opening.
- 4 inches between two adjacent sinks.
- 4 inches between a sink and a toilet.
- 4 inches between a sink and a wall.
- 2 inches between a sink and a bathtub.
- 15 inches clearance from a toilet's centerline to an adjacent fixture or wall on each side.

Drain size. Fixture drain size must meet the dimensions below and must be equipped with a strainer and stopper.

TABLE 2: MINIMUM DRAIN SIZE

FIXTURE	DIAMETER
Bathroom sink	1¼"
Bathtubs	1½"
Sinks (other than bathroom)	1½"
Laundry tubs	1½"
Shower	2"

Clothes washer discharge. The discharge of a clothes washer must be through an air break as shown in **FIGURE 11.**

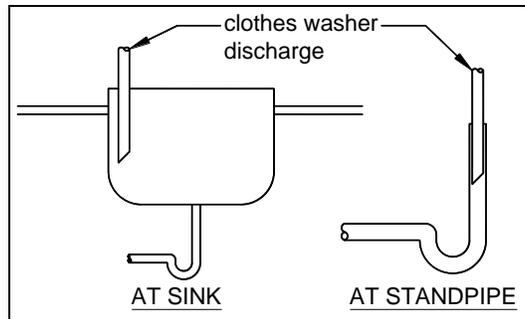


FIGURE 11: AIRBREAK AT CLOTHES WASHER DISCHARGE

Sewage ejector pump. If a sewage ejector pump is required to pump waste, the pump and its plumbing must be connected to the interior plumbing (Building Sewer Line). The ejector pump must be a non-grinder solids ejector that is capable of passing a two-inch solid to a septic with a minimum tank volume size of 1,500 gallons; or if a grinder pump is used, the septic tank shall be either a multi compartment tank or two tanks in series.

SECTION 8: ELECTRICAL

Electrical Work. All Electrical work shall comply with the Massachusetts Electrical Code (527 CMR 12.00). Board of Fire Prevention Regulations shall be the 2014 National Electrical Code, (National Fire Prevention Association) NFPA -70 (2014 Edition) with Massachusetts Amendments. **All Electrical is to be performed by a licensed electrician.**

Panelboard (circuit breaker box). Panel boards must meet the requirements listed below.

- A workspace 30 inches wide and 36 inches deep from floor to the ceiling with a minimum height of 6.5 feet shall be provided in front of the panel boards.
- Panel board workspace must not be used for storage at any time.
- Panel boards must not be located in clothes closets or bathrooms.
- A light shall be provided for the panel board workspace.
- Pipes or ducts cannot be located above the panelboard.

Branch circuits. Branch circuits must meet the requirements listed below. See TABLE 3 for more information.

- Use a 15- to 20-ampere rated branch circuit for general use purposes such as lighting and outlets.
- One “plugged-in” electrical device shall not exceed 80 percent of the circuit rating.
- Hardwired appliances or equipment may be included in a general use circuit provided its rating does not exceed 50 percent of the circuit rating.
- A dedicated 20-ampere minimum branch circuit must be provided to serve laundry room outlets only.
- A dedicated 20-ampere branch circuit must be provided to serve the bathroom receptacles.
- Branch circuits which serve devices in finished rooms other than bathrooms\ must have circuit breakers equipped as combination arc-fault/over current circuit interrupters.

TABLE 3: BRANCH CIRCUIT REQUIREMENTS

Circuit Element	Circuit Rating		
	15 amp	20 amp	30 amp
Minimum conductor size	14	12	10
Maximum breaker size	15	20	30
Outlets rating	15	15 or 20	30
Maximum load	15	20	30

Lighting requirements. Lights must meet the requirements listed below.

- At least one switched light shall be provided in each room and hallway. A switched outlet may be substituted except in bathrooms and hallways. A switched outlet cannot count towards a required outlet, see “Outlets” on page 11.
- At least one switched or pull chain light must be provided in each storage area and at or near heating and air conditioning appliances and equipment.

- Lighting fixtures must not be installed within 3 feet horizontally and 8 feet vertically of a bathtub rim or shower stall threshold. A light fixture may be installed above a shower area if it is constructed so that water cannot enter or accumulate in wiring areas and the lighting fixture is marked “suitable for wet locations.”

Outlets. Outlets must meet the requirements listed below.

- Outlets shall be tamper resistant.
- Outlets shall be placed in accordance with FIGURE 12.
- The minimum wall length which requires an outlet is 2 feet.
- Kneewalls, built-in bars and other fixed room dividers must be included for outlet spacing.
- Hallways more than 10 feet long must have a minimum of one outlet.
- Outlets installed for specific appliances must be within 6 feet of the appliance location.
- Bathrooms must have at least one outlet located on a wall adjacent to each basin and within 36 inches of the bathroom sink. All bathroom outlets must have ground fault circuit interrupter (GFCI) protection.
- At least one outlet must be provided to serve laundry appliances and sinks.
- Each unfinished portion of the basement is required to have at least one outlet that is GFCI protected.
- An outlet must be provided within 25 feet of heating and air conditioning appliances and equipment.

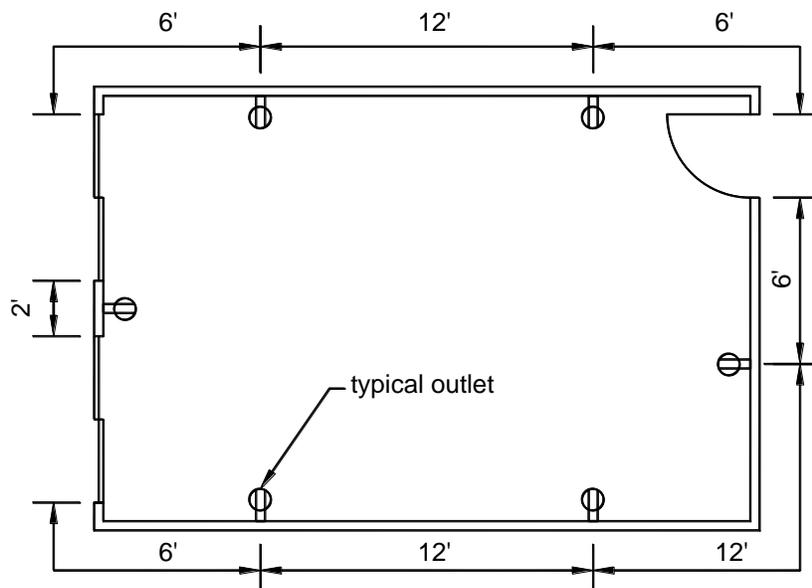


FIGURE 12: TYPICAL OUTLET DISTRIBUTION

Light fixtures in closets. Fixtures installed in clothes closets shall be limited to surface mounted or recessed incandescent fixtures with completely enclosed lamps and surface mounted or recessed fluorescent fixtures. See TABLE 4 for clearance requirements.

TABLE 4: CLOSET LIGHT FIXTURE CLEARANCES¹

Fixture Type	Fluorescent Bulb ²	LED Bulb ²
Surface mounted	6"	12"
Recessed	6"	6"

¹ Incandescent bulbs are prohibited.

² Fluorescent and LED bulbs are permitted in storage areas when identified for this use.