



Finishing Your Own Basement

Homeowner's Information Guide

Permit and Construction Guidelines based on the 2009 International Residential Code

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The purpose of this document is to provide homeowners and contractors with basement construction guidelines. The guide provides construction principles and practices that will satisfy the general requirements of the 2009 International Residential Code. This guide does not discuss fees or procedures for inspection. The guide also does not prevent the City of Maryland Heights from asking for additional information or making more stringent requirements based on a state or county requirement.

This guide is limited to residential basements and is not intended to provide information for other residential construction projects.

This guide will provide the homeowner or contractor basic permit requirements and examples of the submittals necessary to apply for a building permit from the City of Maryland Heights. The homeowner should not misconstrue this guide as a basement construction manual.



This handout was developed by the City of Maryland Heights as a basic guide for plan submittal under the 2009 International Residential Code. It is not intended to cover all circumstances. Check with the City of Maryland Heights Building Division staff for additional requirements.



- ① Review this Information Guide
- ② Provide three sets of plans
- ③ Fill out a Building Permit Application

Summary of single-family residential basement finish construction plan requirements:

1. Submit three complete sets of the required information.
2. Draw a floor plan with dimensions drawn to scale, showing the layout of the entire basement. Label the intended use of all rooms.
3. Show electrical outlets, smoke detectors, lighting, fans, plumbing modifications, furnace, water heater and the electrical panel.
4. List window sizes and types; identify emergency escape and rescue windows, and egress window wells with ladder and clear dimensions of window well. Habitable spaces within basements require an egress window. If one or more sleeping room is provided in the basement, the egress window must be located in every sleeping room. Provide information and location of the egress window for the basement. Indicate the size of the window and the distance from the floor.
 - a. *If the egress window is not an existing window, provide framing details describing the construction and specify the size of the header supporting the floor system.*
 - b. *Provide information from the manufacturer for the installation of the window well.*
5. Identify modifications to the existing structure such as posts, beams and floor joists.
6. Indicate the clear ceiling height in the basement in all rooms. Include locations of protruding objects, such as beams and ductwork, and provide dimensions from the floor to the underside of the obstructions.
7. All furred walls shall be fire blocked at the top and at horizontal intervals not to exceed ten feet. Provide a drawing of a wall section and include this information on the detail.
8. Treated plates are required for walls constructed on concrete or in contact with soil. Include a note on the wall section.
9. Furred walls must be attached to the slab with hot dipped galvanized fasteners. Include a note on the wall section.
10. Furred walls in basements must be insulated with minimum R-13 insulation. Include this information on the wall section.

FLOOR PLAN

What are the ceiling height requirements?

Habitable spaces, including hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of 7 feet. Beams, girders, ducts or other obstructions may project to within 6'-4" of the finished floor.

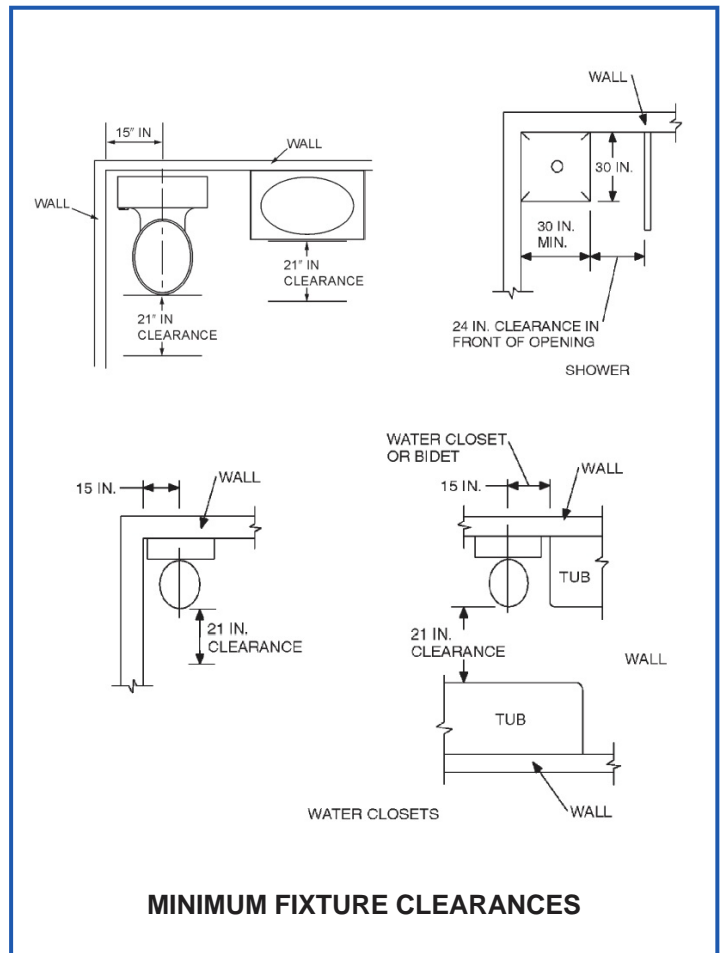
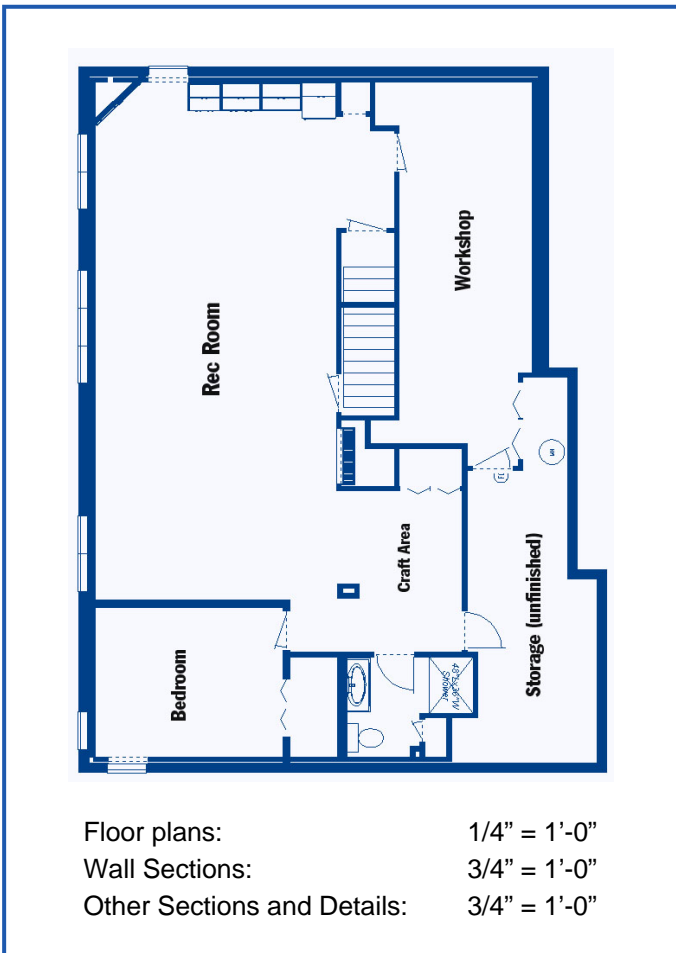
What are the space requirements?

The floor area of habitable rooms may not be less than 70 sq. feet. Habitable rooms shall not be less than 7 feet in any horizontal dimension.

What are the requirements of a basement bathroom?

Basement bathroom requirements include:

- Minimum ceiling heights of 6'-8" in the center of the front clearance for fixtures shown in the figure below.
- A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6'-8" above a minimum area of 30" by 30" at the showerhead.
- All fixtures shall be spaced in accordance with the figure below.
- Bathtub and shower floors and walls above bathtubs with installed shower heads and in-shower compartments shall be finished with a nonabsorbent surface.



What is an egress window?

An egress window is a window that is required in all habitable spaces within a dwelling and is intended to provide an emergency means of exiting. Windows must meet specific size requirements to qualify as an egress window.

Where are egress windows required?

When homes are constructed with unfinished basements the space is considered a non-habitable space. When the basement level is to be used for purposes other than housing furnace water heater and storage the basement area becomes a habitable space. Habitable spaces within basements require an egress window. Egress windows are required in every room used for sleeping purposes (bedrooms) on any floor and in basements with habitable space. If you are constructing a new home, the code requires that you put an egress window in each bedroom. It also requires an egress window in the basement if habitable rooms will be in the basement. If you install a basement bedroom or bedrooms, an egress window is required in each bedroom, but you need not provide another egress window if there are other habitable rooms in the basement. The bedroom window(s) suffices for the habitable rooms.

If you have an existing home and you add a sleeping room in an unfinished basement, the code requires that you install an egress window in the sleeping room or rooms. Likewise, if you create habitable space in your basement other than a bedroom and you currently do not have an egress window, the code would require that you install one as part of the installation of the habitable room.



What are the size requirements for an egress window?

An egress window must satisfy four International Residential Code (IRC) criteria:

- Minimum width of opening: 20 inches
- Minimum heights of opening: 24 inches
- Minimum net clear opening: 5.7 sq. feet
- Maximum sill heights above floor: 44 inches

The window must have a minimum net clear opening of 5.7 sq. feet. Net clear opening refers to the actual free and clear space that exists when the window is open. It is not the rough opening size or the glass panel size, but the actual opening a person can crawl through. The window must be operational from the inside without keys or tools. Bars, grilles, and grates may be installed over windows but must be operational without tools or keys and still allow the minimum clear opening. Removal of the sash does NOT meet the requirement.



PLANNING AND CONSTRUCTING AN EGRESS WINDOW OPENING

What are the requirements for window wells?

Emergency escape and rescue window wells must provide a minimum area of 9 sq. feet with a minimum dimension of 36" and shall enable the window to open fully. If the depth of the window well exceeds 44 inches, a permanently affixed ladder must be provided. The ladder must not interfere with the operation of the window.

Cutting an egress window into an existing foundation may prove to be a project too large for most homeowners. Removing a portion of the foundation is not only a huge project but can also be unsafe if the proper precautions are not taken. Include details in your plans outlining the construction of such opening.

Must I use a special type of window?

A wide variety of window designs can be used for egress windows. You should select a window design that meets your architectural, aesthetic, space, and budget needs.



Casement windows with hinged sashes that swing free and clear of the opening can be relatively small and still meet egress requirements. This makes them ideal for basement egress and for other areas where space is limited. Some manufacturers can install a special operator arm that allows the window to open wider than the standard operating arm to meet egress requirements.



Glider or slider windows have sashes that fill nearly half the possible window opening. They may require a window nearly twice the size of a casement window.



Even when fully open, more than half of a single or double-hung window (depending on the operation of one or both of the sashes) overall area is blocked by glass. This means that to meet egress window height requirements, a window must be nearly 4'-9" in overall height. This height requirement makes it undesirable for most basement egress situations.

REMEMBER: Removable sash units do NOT satisfy the egress requirement.



Awning or hopper windows (depending on opening swing) are problematic. Since the opened sash prevents escape from most window wells, they are unsuitable for basement egress. And with most awning windows, the center opening hardware and height do not meet egress requirements. Some manufacturers offer window models with special detachable operators that meet requirements.

ADDITIONAL REQUIREMENTS

The Building Division staff can help you determine what is necessary to meet minimum safety requirements.

General Plan Preparation Information:

On basement renovation projects, it is very important within the building construction plans to identify either graphically or by notation both existing and new construction. Show the basement area room layout and identify the use of each room/space by name. Also indicate both new and existing walls/partitions, as well as furred and insulated concrete foundation walls. Rooms shown with clothes closets or other spaces that resemble a bedroom or that could easily be converted to a bedroom in the future will be reviewed for bedroom requirements regardless of the room name presented on the drawing.

Partitions and Walls:

Indicate size and spacing of new partition studs and finish wall material. Approved water-resistant gypsum backer board is required in bathtub and shower areas. Interior finish materials shall not have a flame spread rating exceeding 200.

Room Sizes and Ceiling Heights:

The following requirements exist for rooms:

- Habitable rooms shall have an area of not less than 70 sq. feet and shall not be less than 7'-0" in any dimension.
- Habitable rooms, bathrooms, hallways and laundry rooms shall have a minimum ceiling height of 7'-0".
- Beams, girders, ducts , and other obstructions may project to within 6 feet 4 inches of the finished floor.
- Hallways require a minimum 36" wide finished width. If using 1/2" drywall, the rough opening width should be at least 37" wide.



Smoke Detectors:

An AC powered, U.L. (Underwriters Laboratories, a safety organization) listed smoke detector with battery backup shall be located in the vicinity of all bedroom entrance doors and inside each bedroom. Provide a minimum of one AC powered, U.L. listed smoke detector with battery back-up at the bottom of the stair for basements without bedrooms. All detectors within the house shall be interconnected so that the activation of any alarm will sound all alarms throughout the house.

Smoke detectors are required in all basements. If the finished basement contains a sleeping room, a device must be installed on the ceiling in the sleeping room and in the hallway immediately outside of the sleeping room. **Smoke detectors are also required to be hardwired and interconnected in new and existing bedrooms, halls and on each level unless removal of interior wall or ceiling finish would be required.** In this case, battery operated devices may be acceptable. Contact your Plan Reviewer or the Building Commissioner.

Fire blocking:

Fire blocking must be installed in concealed spaces of wood-furred walls at the ceiling level, at 10-foot intervals along the length of the wall and at all interconnections of concealed vertical and horizontal spaces such as the intersection of stud walls and soffits or dropped ceilings. Fire blocking may be constructed of 1-1/2" lumber, 3/4" plywood or particle board, 1/2" gypsum board or 16" of fiberglass insulation. See the detail of typical fire blocking to the right.

Firestopping:

Firestopping consisting of 2" lumber, minimum 23/32" structural panel, or approved non-combustible materials shall be provided at the ceiling line in concealed spaces of stud walls/partitions, including furred or studded-off spaces of concrete foundation walls and soffits, dropped ceilings and similar spaces.



Lighting and Ventilation:

The following requirements pertain to lighting and ventilation:

- Glass area in habitable rooms shall not be less than 8 percent of the floor area served. One-half of this area must be available for unobstructed ventilation with screens included.
- Artificial lights and/or mechanical ventilation may be used as an alternative if the existing windows are of inadequate size. The mechanical ventilation system must produce 0.35 air changes per hour or be capable of supplying outside ventilation air at the capacity of 15 cubic feet per minute per occupant.
- A ventilation fan is required in toilet rooms and bathrooms. The fan must be vented to the exterior of the building and must not terminate within 3 feet of any opening.

Fuel Burning Appliances:

Furnaces and water heaters cannot be located in or accessed through a bedroom or bathroom. If the furnace and water heater are being enclosed, adequate combustion air must be provided for these appliances to operate properly.

For maintenance purposes, a minimum of 30" clear working space must be provided in front of furnaces and water heaters. Maintenance or removal of each appliance must be possible without removing the other or disturbing walls, piping, valves, wiring and junction boxes. This section does not apply to replacement appliances installed in existing compartments and alcoves where working space clearance adheres to the equipment or appliance manufacturer's installation instructions.

Insulation:

Concrete exterior walls in finished rooms and areas shall be furred out and insulated with a minimum of R-13 insulation. Continuous insulation systems can reduce the requirement to R-10.

Ceiling/Floor Draftstopping:

Dropped ceilings below wood joists or attached directly to wood floor trusses shall be draftstopped with 1/2" drywall or 3/8" plywood so the concealed area does not exceed 1000 square feet.

Safety Glazing:

Glazing in doors intended for human passage, patio doors, windows within 24" of a door, and shower and bathtub enclosures walls, panels or doors, shall be fully tempered, laminated safety, or approved shatter-resistant plastic.



Stairways:

Existing stairways are not required to:

1. Satisfy the rise and run requirements for new stairs unless the stairs are modified or altered.
2. Comply with the headroom requirements unless the stairs are modified or altered.

The following requirements apply to new stairways (and existing stairways if modified, altered, or are integral to a construction project):

- Minimum headroom in all parts of the stairway shall not be less than 6'-8" measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing on that portion of the stairway.
- Risers must be solid or have a toe board which limits the riser opening to less than 4 inches. Open risers without a toe board are prohibited.
- The minimum tread depth shall be 10 inches plus a 1 inch nosing for stairs with solid risers. The minimum 10 inch tread depth is measured from the leading edge (nosing) of one tread to the leading edge (nosing) of the next adjacent tread. Maximum rise shall be 7-3/4", the difference between the highest and the lowest riser cannot vary more than 3/8".
- If access to the space under the basement stairs is provided for storage or other uses, the walls and ceiling of this enclosed space must be protected on the inside with 1/2" gypsum.

Exception: Existing stairs may be allowed, under certain circumstances, to be replaced meeting the existing rise and run. See your plan reviewer for more information.



Handrails:

A continuous, graspable handrail shall be provided along one side of the stair located 30" to 38" above the nosing of the tread. Handrails that form part of a guard on open-sided stairs shall also meet the following criteria:

- Handrails shall be provided on at least one side of each continuous run of treads or flight with 4 or more rises.
- Handrail heights, measured vertically from the sloped plan adjoining the tread nosing shall not be less than 34" and no more than 38".
- Handrails must be continuous from right above the top riser of the flight to a point directly above the lowest riser of the flight.
- Handrails shall either meet:
 - a. circular cross section with minimum diameter of 1-1/4" but no more than 2", or
 - b. other approved shapes having a maximum allowable horizontal width of 2-1/4", maximum graspable perimeter dimension of 6-1/4", and a minimum 4" graspable perimeter dimension.
- Handrails (and other projections below the handrail) shall not project more than 3-1/2" into the required 36" stairway width.

Guardrails:

Guards along open-sided stairs shall be a minimum of 34" in height above the leading edge of the tread and minimum of 36" in height at the stair landings. Open guards shall have intermediate vertical balusters spaced less than 4 3/8" apart. Horizontal rails, rails parallel to stair treads, and ornamental patterns that provide a ladder effect are prohibited on stairs from finished basement areas.

Plumbing, Electrical, and Mechanical:

The City of Maryland Heights contracts with St. Louis County to perform plumbing, electrical, and mechanical plan review and inspections. This work must be performed in accordance with St. Louis County regulation by licensed master plumbers, licensed electrical contractors, or a pre-authorized homeowner who by examination has demonstrated the knowledge and ability to perform the work. You can only qualify if you own and occupy your home.

All mechanical work must be performed by a registered financial responsible (bonded and insured) or licensed contractor authorized to do mechanical work. Homeowners may perform their own mechanical work within their own dwelling with no requirement to be registered or licensed.

The following electrical requirements apply:

Ground fault circuit interrupters are required for receptacles and/or circuits installed in the following locations:

- Bathrooms
- Unfinished basement spaces
- Laundry rooms and sump pumps (unless you use a simplex receptacle)
- Receptacles serving counter top surfaces more than 12 inches wide so that no space on the counter is more than 24 inches from a receptacle

Receptacles are required to be installed in the following areas:

- In all habitable rooms except bathrooms so that no space along a wall is more than 6 feet from a receptacle
- All wall areas more than 2 feet wide
- In hallways more than 10 feet long
- In bathrooms installed within 36 inches of the lavatory
- At least one receptacle in laundry area and at least one receptacle in basement unfinished area in addition to the laundry receptacle
- In the utility area within 25 feet of the furnace

Lighting is required in the following areas:

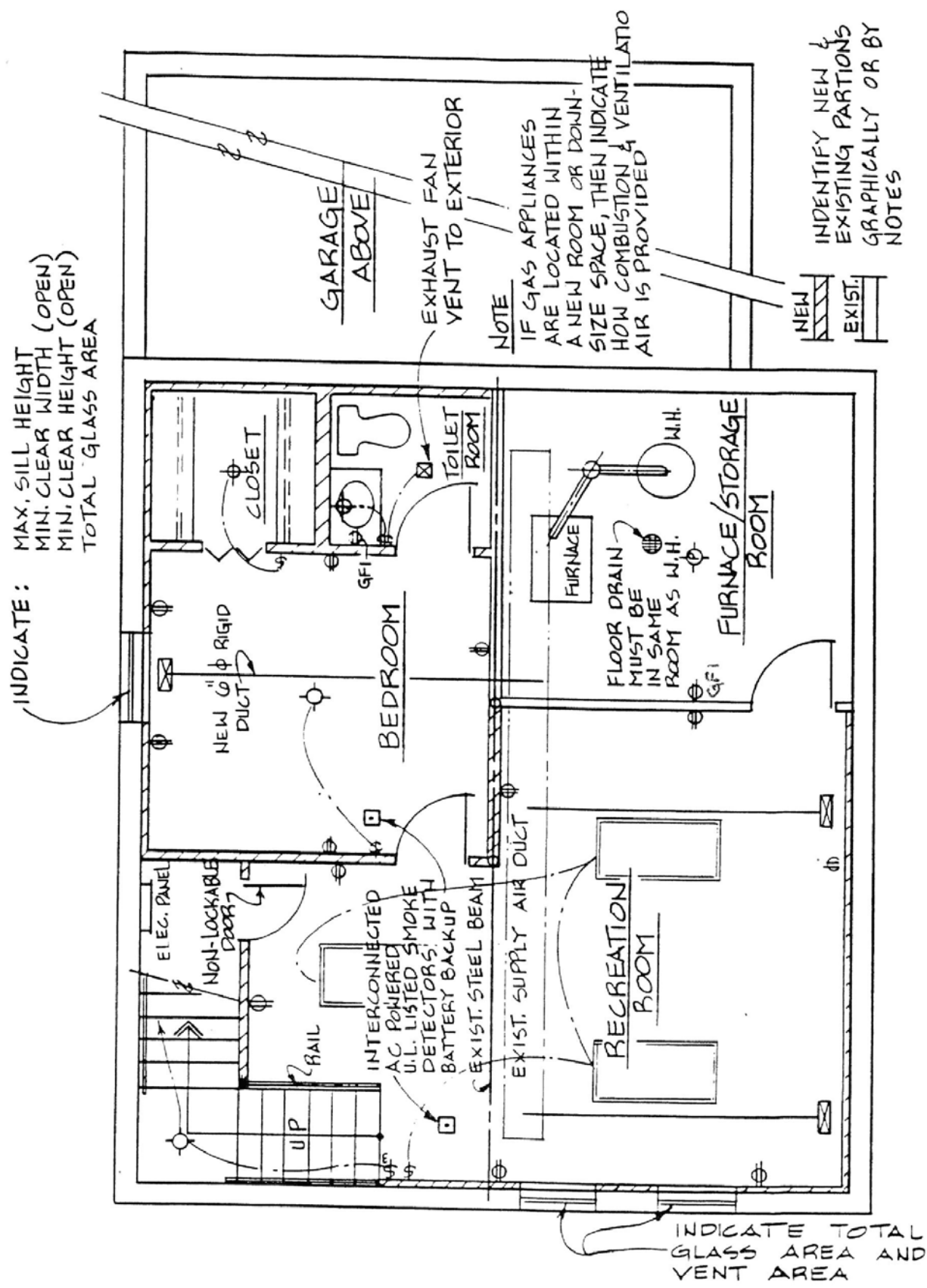
- At least one wall switched lighting outlet shall be installed in every habitable room, bathroom, hallway, stairway and at exterior doors.
- Lighting installed at interior stairways shall have an illuminated wall switch at each floor level separated by six steps or more.
- At least one lighting outlet is required in each unfinished basement space or utility room that is used for storage or contains heating, air-conditioning or other equipment requiring servicing. The light switch shall be located at the point of entry.

Incandescent light bulbs are being phased out by the federal government. LED and fluorescent fixtures are the most common types in use. The use of incandescent fixtures with open or only partially enclosed lamps and the use of pendant fixtures are prohibited in clothes closets. Fixtures may be located only where there are the following minimum clearance to the nearest point of storage space.

- 12" minimum for surface mounted incandescent fixtures
- 6" minimum for surface mounted fluorescent fixtures and recessed fixtures

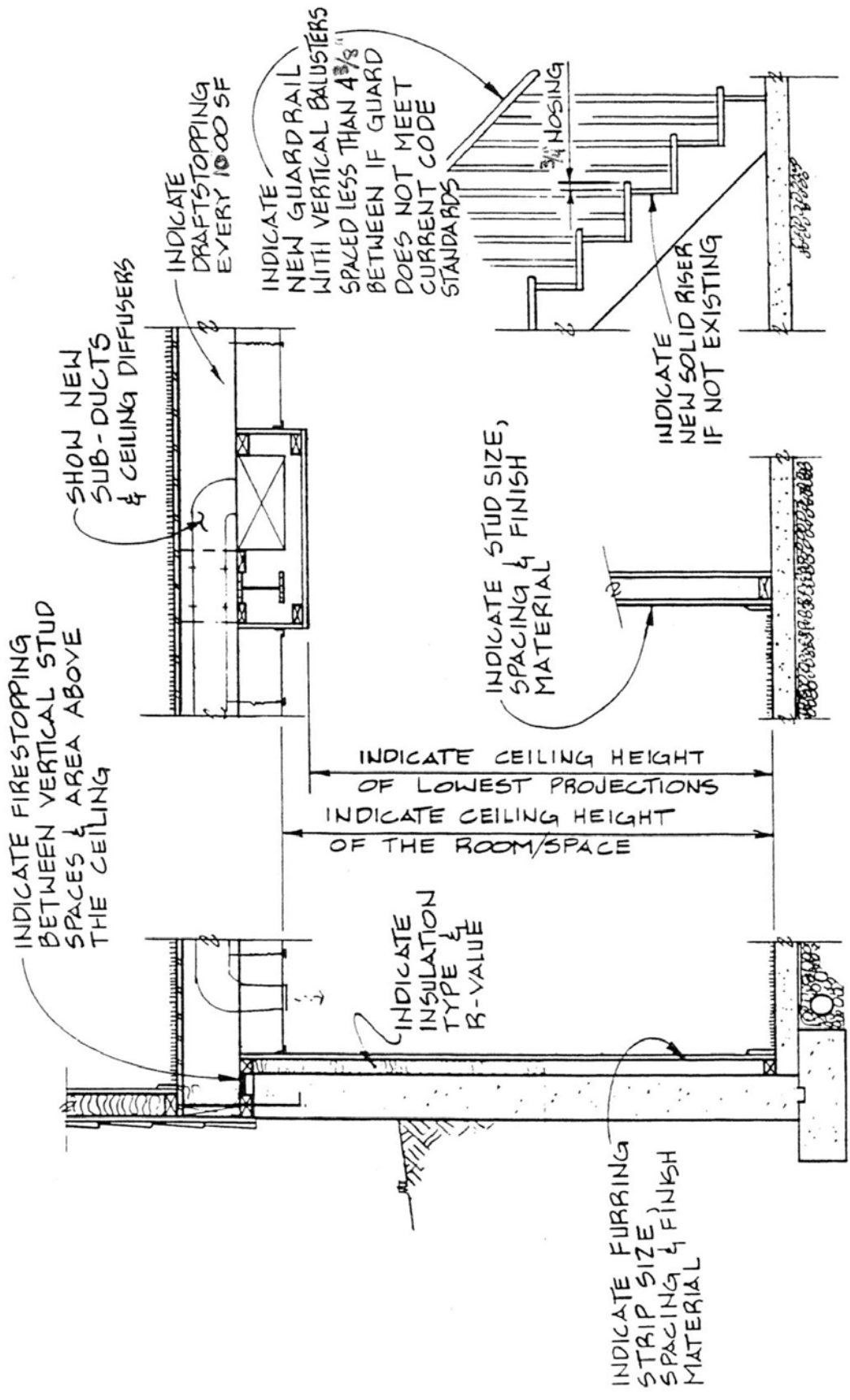
Circuit breaker panels shall not be concealed and are not permitted in bathrooms or clothes closets. Lighting is required in the vicinity of the electrical panel. A minimum of 3 feet clearance is required in front of existing electrical panels. Arc-fault circuit interruption protection shall also be provided for all circuits supplying power to bedrooms.

EXAMPLE: Residential Finished Basement Plan



RESIDENTIAL FINISHED BASEMENT PLAN

EXAMPLE: Residential Finished Basement Details



RESIDENTIAL FINISHED BASEMENT DETAILS

INSPECTIONS

Inspections are an important part of the process. These inspections are performed as a service to the homeowner and are required for basement finishing projects. Inspections take place as various phases of construction progress. REMEMBER: Never cover anything without an inspection.

When an inspection is needed, call 24 hours in advance to schedule a time for the inspector to inspect the project. Someone is required to be present for the inspection. You can call the Building Division if you have additional questions. The contact information follows:

City of Maryland Heights
11911 Dorsett Road
Maryland Heights, MO 63043
Telephone: 314.291.6550

CONCLUSION

Best wishes in your project endeavors. As always, if you have any questions or concerns, please contact the City of Maryland Heights Building Division staff.