

# Universal Design in Affordable Housing

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# Universal Design in Affordable Housing

- **Discussion Topics:**
  - Habitat for Humanity 101
  - Terminologies
  - Universal Design Principles
  - The Triple Bottom Line
  - Examples
  - Costs
  - Questions, comments, discussion

# Habitat for Humanity

- **International Christian Housing Ministry**
- **Qualified families partner with Habitat**
- **New, rehab, repair, weatherize, preserve**
- **Homes and services are sold at cost**
- **No-interest mortgages**
- **Volunteer Supported**



# In The United States:

California



Florida



**1 in 5 Americans have a disability**

**-Over 54 million people**

**- More than the populations  
of CA and FL combined**

# In The United States:

100

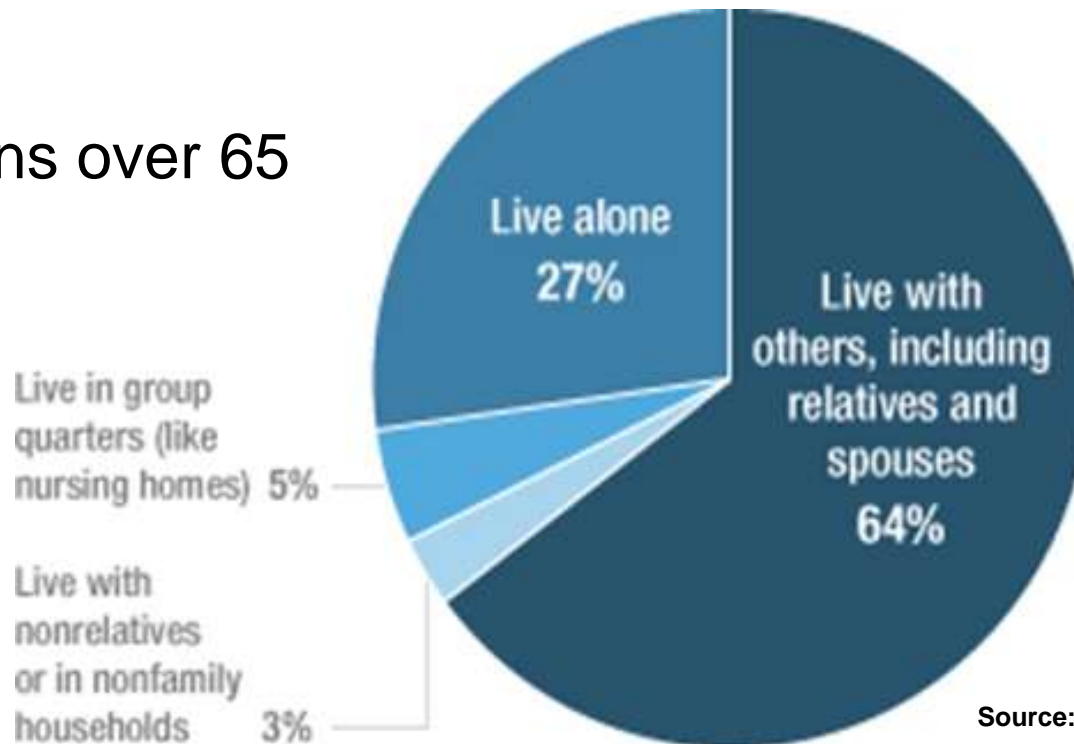
- **Centenarians** are the fastest-growing segment of our population doubling in the last two decades to 71,991 in the 2010 Census.
- **27%** of American adults live with a disability that impacts daily living
  - Only **58%** of these adults are 50 years of age or older
- Of 21 to 64 year olds, nearly **46 percent** are employed
- Over **700,000** children under the age of 6 are living with disabilities

# Where We Age

**“The overwhelming preference of older persons is to age in place; that is, to remain in their homes as they grow older.”**

– Cyril Brickfield, former ED, AARP

Americans over 65



Source: AARP/U.S. Census Bureau

# Accessible Visitable

Adaptable

INCLUSIVE DESIGN

Aging in Place

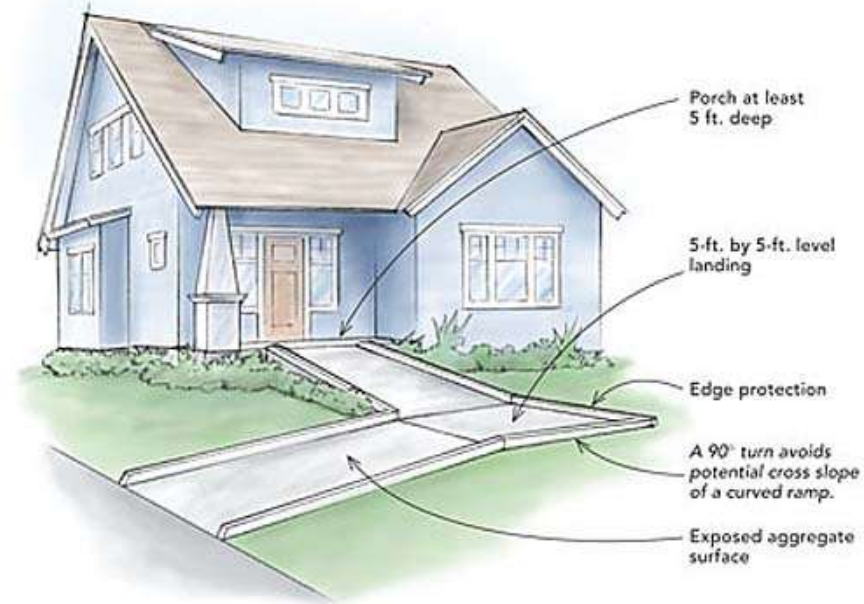
**Design for All**

# ADA

## Zero-Step

Barrier-Free Design

# Universal Design



- **Accessible**
  - Prescribed requirements in codes, mandates, laws, policies
- **Visitable**
  - Advocacy movement - “get in and pee”
- **Adaptable**
  - Integral design elements for future alterations
- **ADA**
  - Public facilities (not residential)
- **Universal Design**
  - An approach of *TOTAL SOCIAL INCLUSION*

# Universal Design:

- ***The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.***

**“Today’s architects address the life cycle of buildings. It is time that they began to address the life cycle of people as well. Universal design is considerate of the human lifespan and the continuum of abilities of all individuals.”**

- Ruth Hall Lusher, D. Arch. Candidate



# Principles of Universal Design

- 1) Equitable use**
- 2) Flexibility in use**
- 3) Simple and intuitive use**
- 4) Perceptible information**
- 5) Tolerance for error**
- 6) Low physical effort**
- 7) Size and space for approach and use**

# Benefits of Universal Design

- **Safety, security, independence, and justice for all**
- **Increasing numbers of people with special needs**
- **Homes that are not accessible are exclusive**
- **People can stay in their homes as they age**
- **Homes can be placed in any neighborhood**
- **UD homes are easier for everyone to use**
- **Families' needs may change at any time**
- **Less costly during initial construction**
- **Some funders may require many of these features**

# Fair Housing Rules May Apply

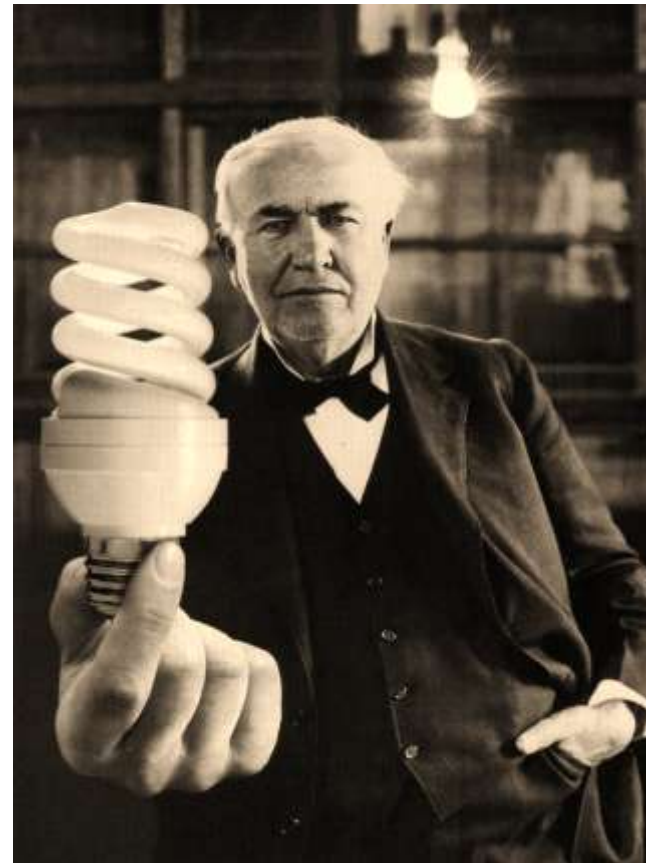
- Multi-family
- SHOP and other grants
- Local requirements



EQUAL HOUSING  
OPPORTUNITY

**FAIR HOUSING IS THE LAW!**

# Universal Design and Sustainability



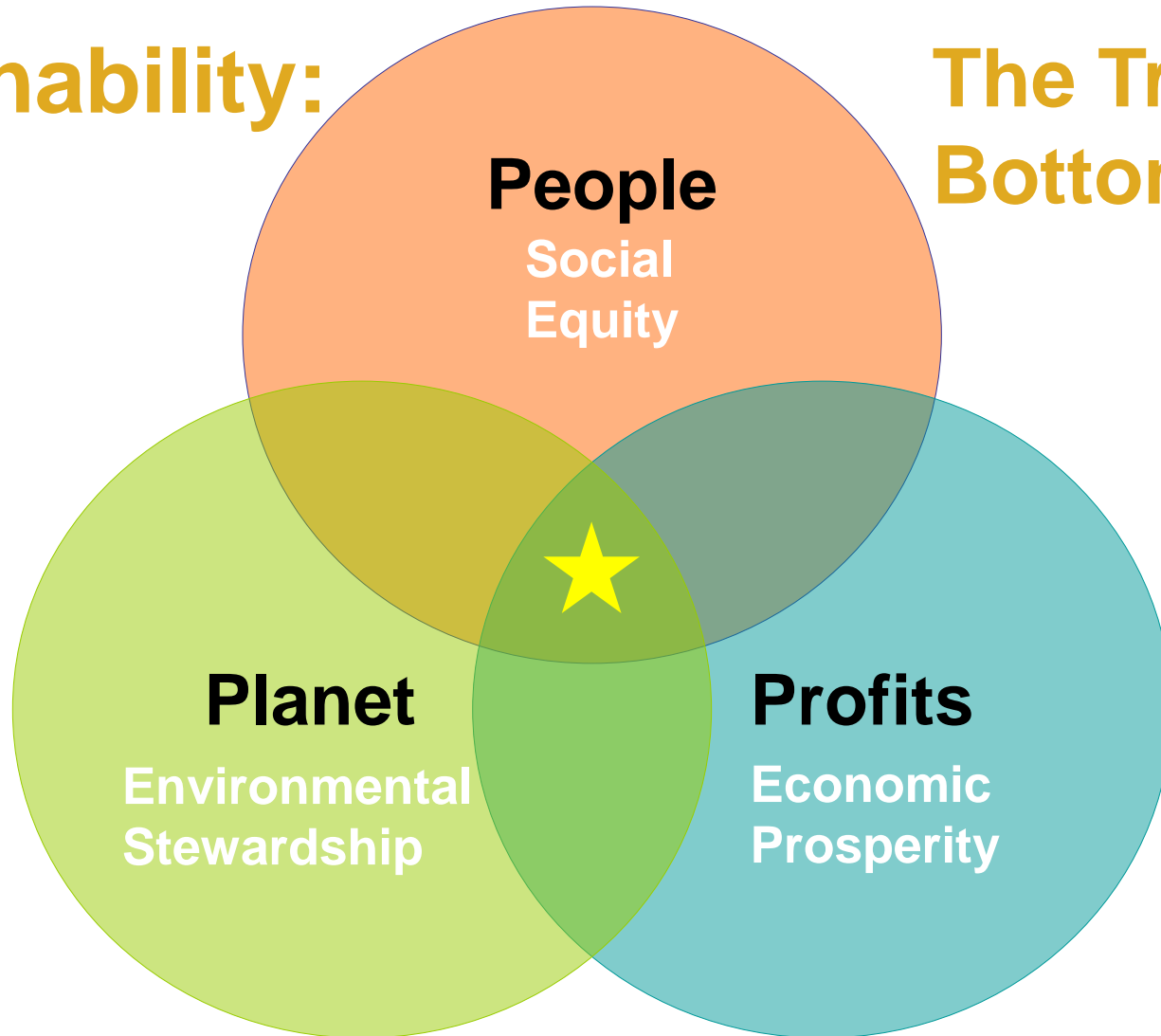
A stylized globe with green continents and blue oceans. The text is overlaid on the globe.

# **Sustainability:**

**Meeting present social, economic,  
and environmental needs  
without compromising the ability to meet  
such needs in the future through  
degradation or exhaustion of  
key resources.**

# Sustainability:

# The Triple Bottom Line



# Universal Design and The Triple Bottom Line

- **Social Equity**
  - **Inclusiveness**
    - Family, friends, visitors
  - **Changing needs**
    - Relocation or institutionalization avoided
  - **Independent living**
    - Preserve honor and dignity
  - **Easier for everybody**
    - Not just those who need it

# Universal Design and The Triple Bottom Line

- **Environmental Stewardship**
  - ***Few additional* resources up front**
  - **Less waste and resource consumption from retrofit**

# Universal Design and The Triple Bottom Line

- **Economic Prosperity**
  - **Market homes to more buyers**
    - Aging, mobility and ability challenged
  - **Markets for appropriate products, services, and technologies**
  - **Higher perceived home values**
    - Selling price, homeowner equity

# Sustainable Design Principles:

- Efficient to construct and rehabilitate
- Durable, low maintenance
- Sized appropriately for purpose
- Efficient to heat and cool
- Accessible and adaptable
- Healthy indoor air quality
- Safe, comfortable
- Use water efficiently
- Sensible site selection, orientation
- Verification & certification
- Owner/occupant education
- Recyclable or reusable at end of useful life



# Designing



for

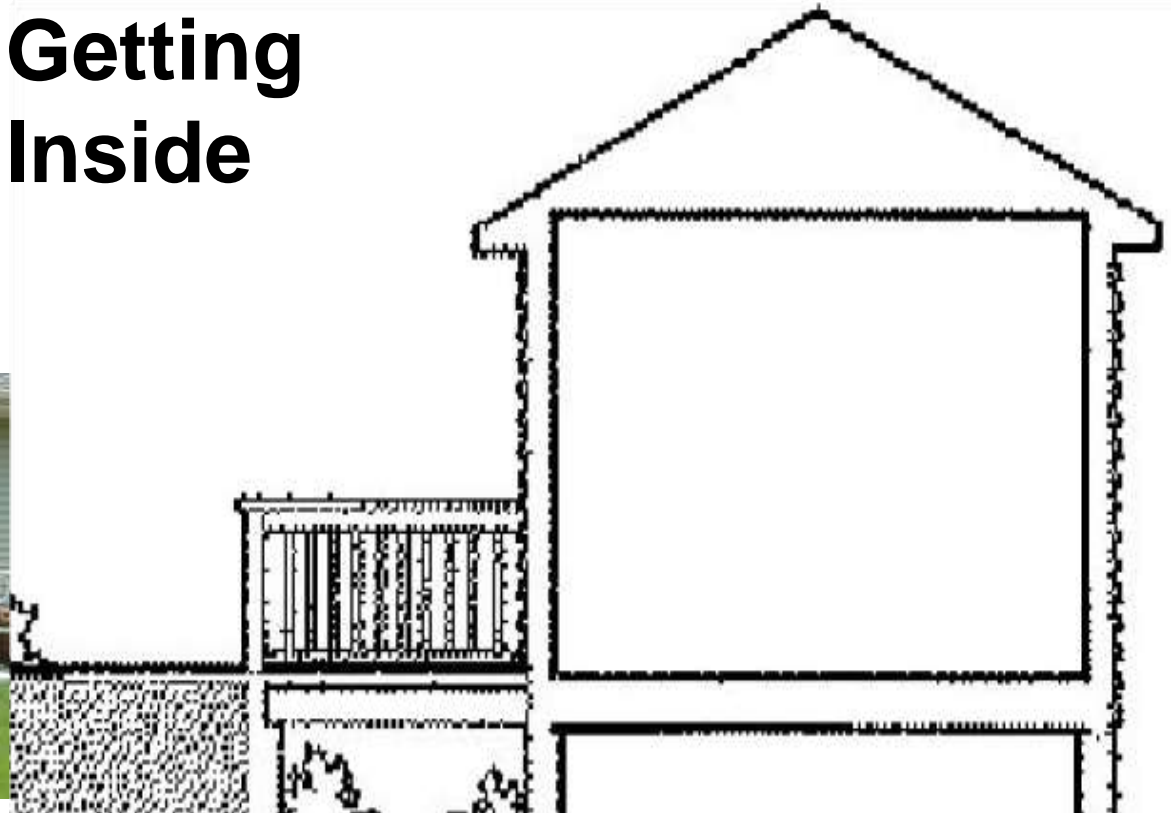


# Everyone



# Exterior Features

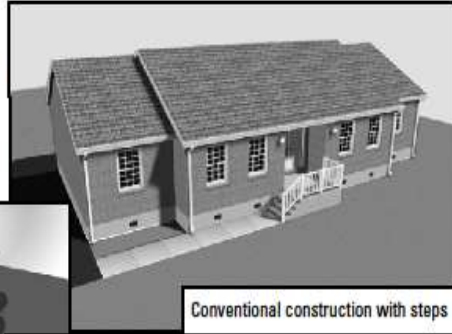
## Getting Inside



# Accessible Route

## Key Construction Issues

Along with adequate space for maneuvering around the house, stepless entrances, bathroom blocking, and adaptable cabinets make big contributions to a universally usable house. These three important universal construction features in homes are reviewed in the following section.



Conventional construction with steps



Earth berm and bridge used to achieve stepless entrance

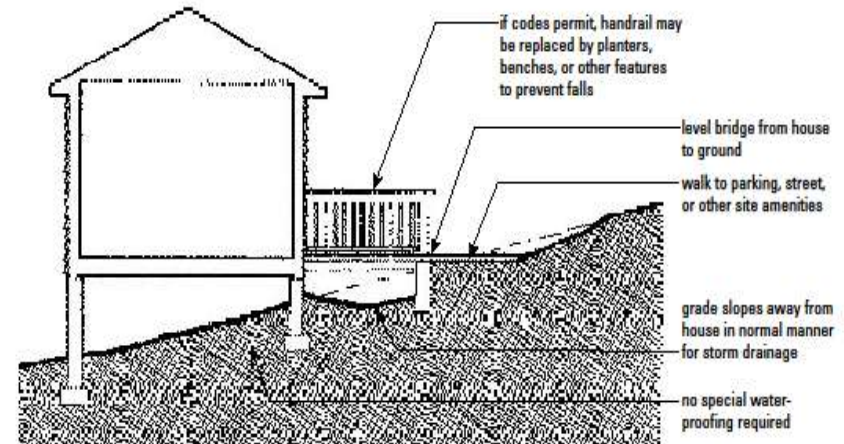
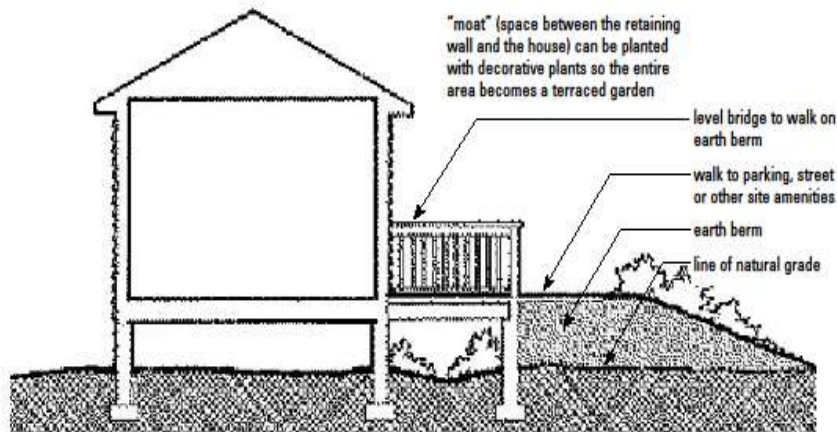
## Stepless Entrances

To achieve stepless entrances some unconventional, although not necessarily difficult, construction details may be required. With a crawl space foundation, creative landscaping can be an effective way to resolve differences in elevation between the exterior grade and interior floor level. Using soil from foundation excavation or having additional soil brought onto the site allows the creation of an earth berm and bridge—a combination landscape and hardscape feature. This strategy uses soil pushed up against a new retaining wall leaving a “dry moat” just in front of the house foundation for drainage and air circulation. A bridge spans the moat from the gently sloping walk to the house entrance. Of course, a slab foundation makes a universal entrance much easier to achieve.

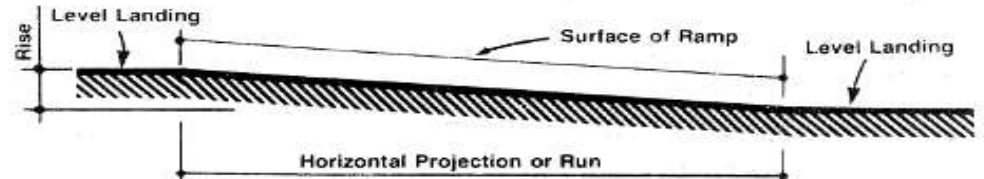


Example of a Habitat house with a gently sloping walk on an earth berm and bridge to provide a stepless entrance.

When site conditions allow, the existing grade may be used to advantage. The length of an earth berm and bridge can be minimized by starting the route from parking at a “high” point on the site. It may even be possible to eliminate all slopes on a walk by extending a level bridge from a front porch or side entrance to an uphill point. With any strategy used, the relationship of parking to the house is critical and must be adequately addressed for an entrance to be truly universal.



# Exterior Considerations



Slope	Maximum Rise		Maximum Horizontal Projection	
	in	mm	ft	m
1:12 to < 1:16	30	760	30	9
1:16 to < 1:20	30	760	40	12

Maximum 1:12 slope to a.....  
 minimum 5' X 5' covered landing.....  
 even with the interior floor level with a....  
 1/2 inch maximum rise threshold and....  
 sidelights or a lowered peep hole with a....  
 5' X 5' minimum clear floor space inside and..  
 general illumination along the entire route

# Planning Ahead



# Retrofit



# Challenging Sites



# Entry Level:

- General amenities and an accessible bedroom and bathroom located on this level
- 32” wide minimum ***clear opening*** at all doors
- Lever and loop handles and latches
- Minimum 1’-6” wall space to latch side of doors
- Minimum 3’-8” wide hallways
- 5’ diameter turning space in all rooms

# Kitchen:

- Minimum 3'-4" maneuvering space
- Appropriate height counter top work spaces with continuous stretches to slide heavy objects
- Clear knee space under sink - 27" high minimum
- Plumbing pipes covered under sink
- Contrasting colors at fixture borders and edges
- Full-extension pullout drawers, shelves, & racks

## **Kitchen (cont.)**

- Pantry storage with easy access adjustable shelves
- Front mounted controls with clear labels
- Glare-free task lighting at work areas
- Side-by-side refrigerator
- Drop-in cooktop with staggered burners
- Raised dishwasher

DRAIN PIPE, HOT WATER, AND SHARP EDGES SHOULD BE COVERED WITH AN INSULATED MATERIAL. OPTIONAL PIPE PROTECTION REMOVABLE FOR MAINTENANCE

8" MAX DEEP SINK BASIN W/ REAR LOCATED DRAIN

SWINGING RETRACTABLE CABINET DOOR

DOOR STOP

STANDARD HEIGHT

LOOP HANDLE  
MIN. 1 1/2" X 4"

27" MIN.  
CLEAR

DOOR IN RETRACTED, STORED POSITION

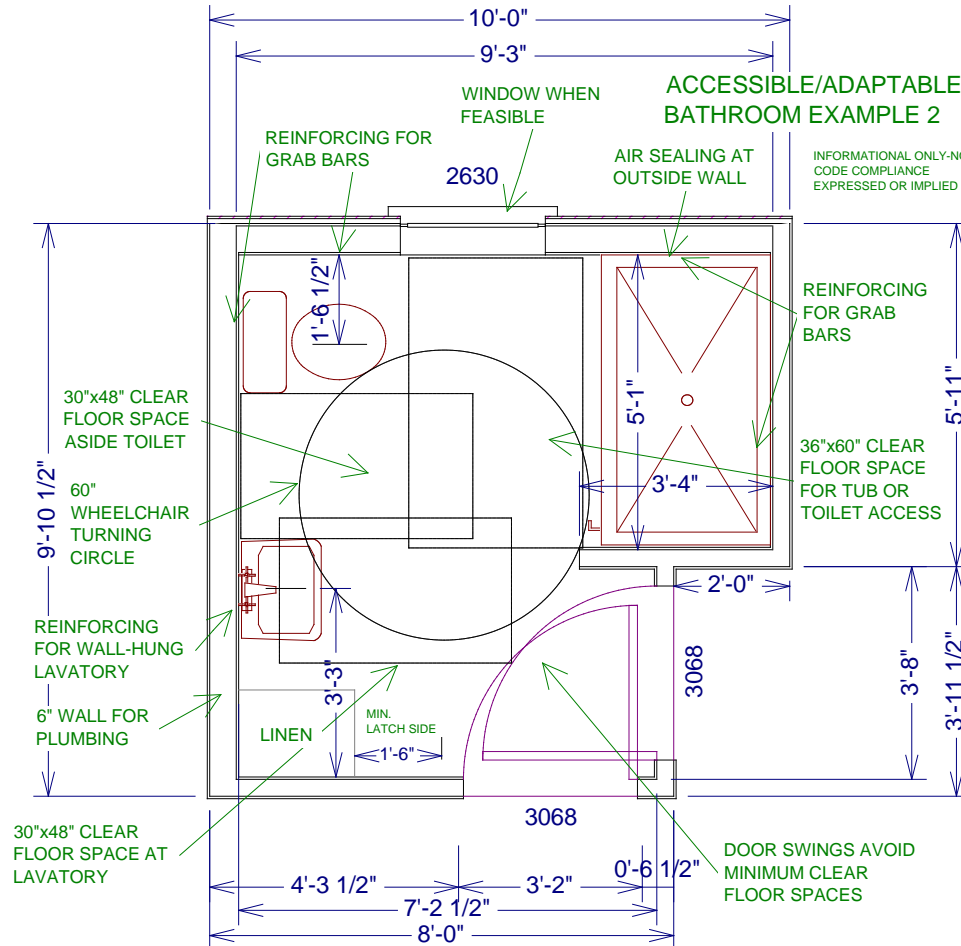
36" MIN

REMOVABLE FALSE FRAME AND TOE KICK

**Cabinet Elevation Example**

# Bathrooms

- 60” *unobstructed* turning space
- 30” X 48” space at fixtures
- 36” X 60” space at shower
- Toilet centered 18” from sidewall
- Taller “comfort height” toilet
- Blocking in walls for grab bars and lavatory
- Knee space at lavatory with pipe protection
- Mirrors placed to allow appropriate viewing
- Compartmentalized design for multiple users

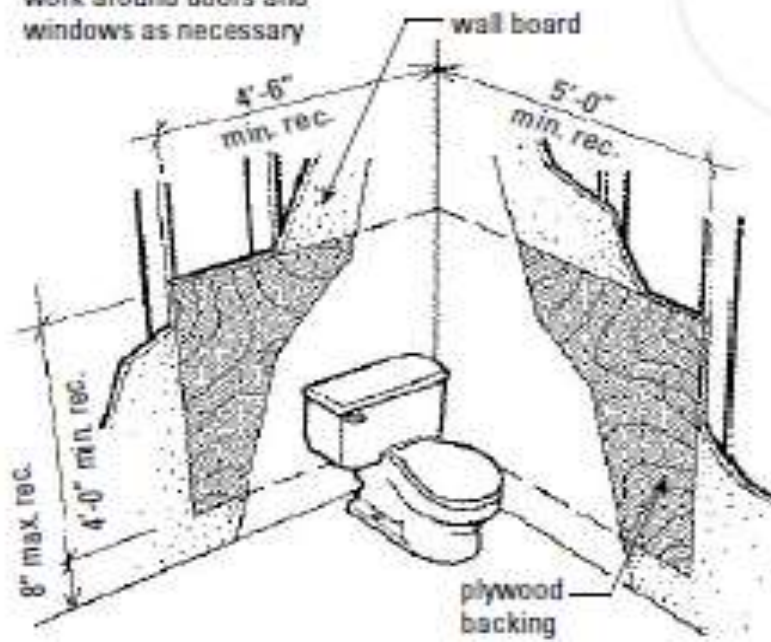


- OTHER FEATURES AND OPTIONS:**
- CURB-LESS THRESHOLD AT SHOWER
  - REINFORCING IN WALLS AND TUB FOR GRAB BARS
  - HAND-HELD SHOWER HEAD
  - SINGLE LEVER OFFSET ANTI-SCALD FAUCET AND SHOWER VALVE
  - MIRROR LOCATED 40" ABOVE FLOOR OR ON TOP OF BACK SPLASH
  - SWITCHES AND OUTLET IN ACCESSIBLE LOCATIONS
  - TOILET SEAT MIN. 17" AND MAX. 19" HIGH
  - FLOOR COVERING INSTALLED UNDER SINK AREA IF CABINET INSTALLED
  - DRYWALL PRIOR TO INSTALLING TUB FOR FUTURE ROLL-IN SHOWER
  - OR ADD 1" FURRING TO FIXTURE SIDE

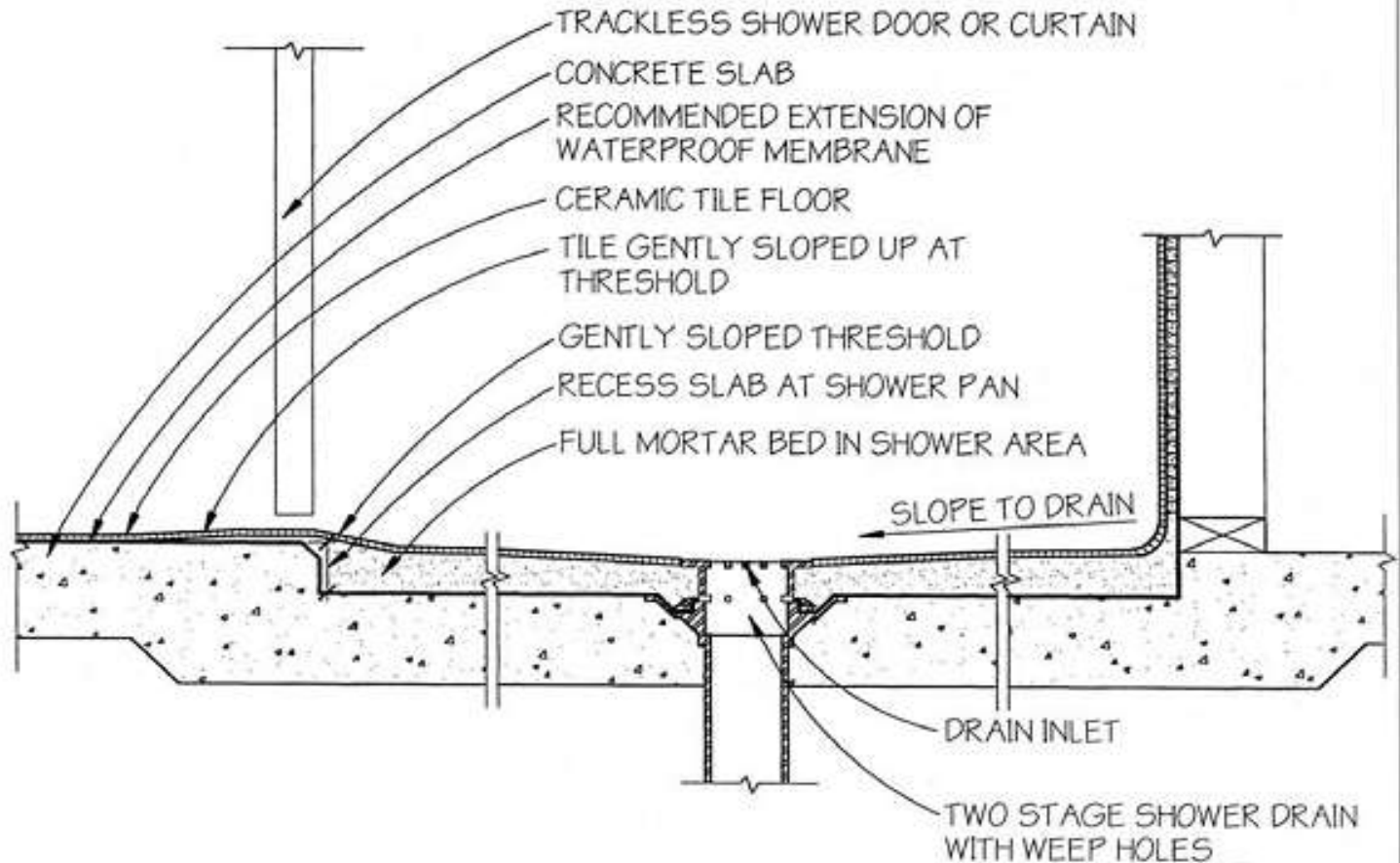


Whole wall reinforcing installed in a Habitat house

work around doors and windows as necessary



## TECH SHEET



ROLL-IN SHOWER FLOOR AND DRAIN DETAIL  
SLAB ON GRADE CONSTRUCTION

# Fixture Controls

- Can be offset for access from clear floor space
- Single-lever controls are easier to use
- Use anti-scald valve and hand-held shower head



Pressure balanced anti-scald lever control valve in offset location improves usability and safety.

# Storage & Hardware

- Adjustable height rods and shelves
- Power operated clothing carousel
- Use lever handles and loop pulls on drawers and cabinet doors – no knobs



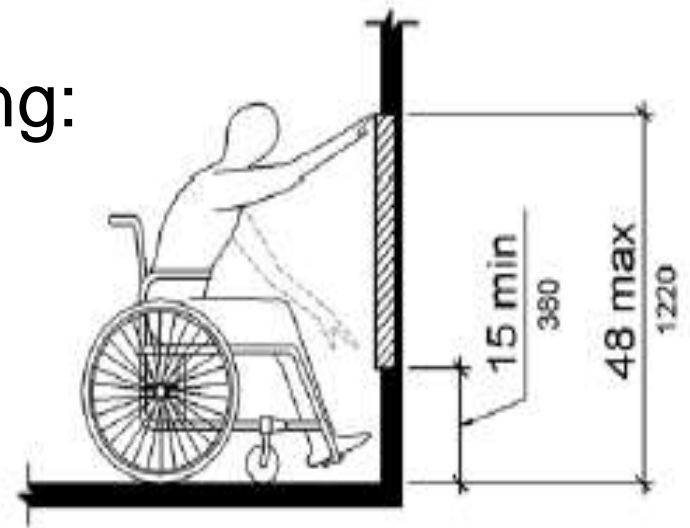
# Windows

- Crank operated are easier to use than double hung
- Maximum 20"- 36" sill height for viewing
- Use power operation for difficult to reach locations



# Switches and Controls

- Heights above finished flooring:
  - Light switches: 36" – 44"
  - Thermostats: 48"
  - electrical outlets: 18" – 24"
- Use rocker switches
- Install additional outlets at bed



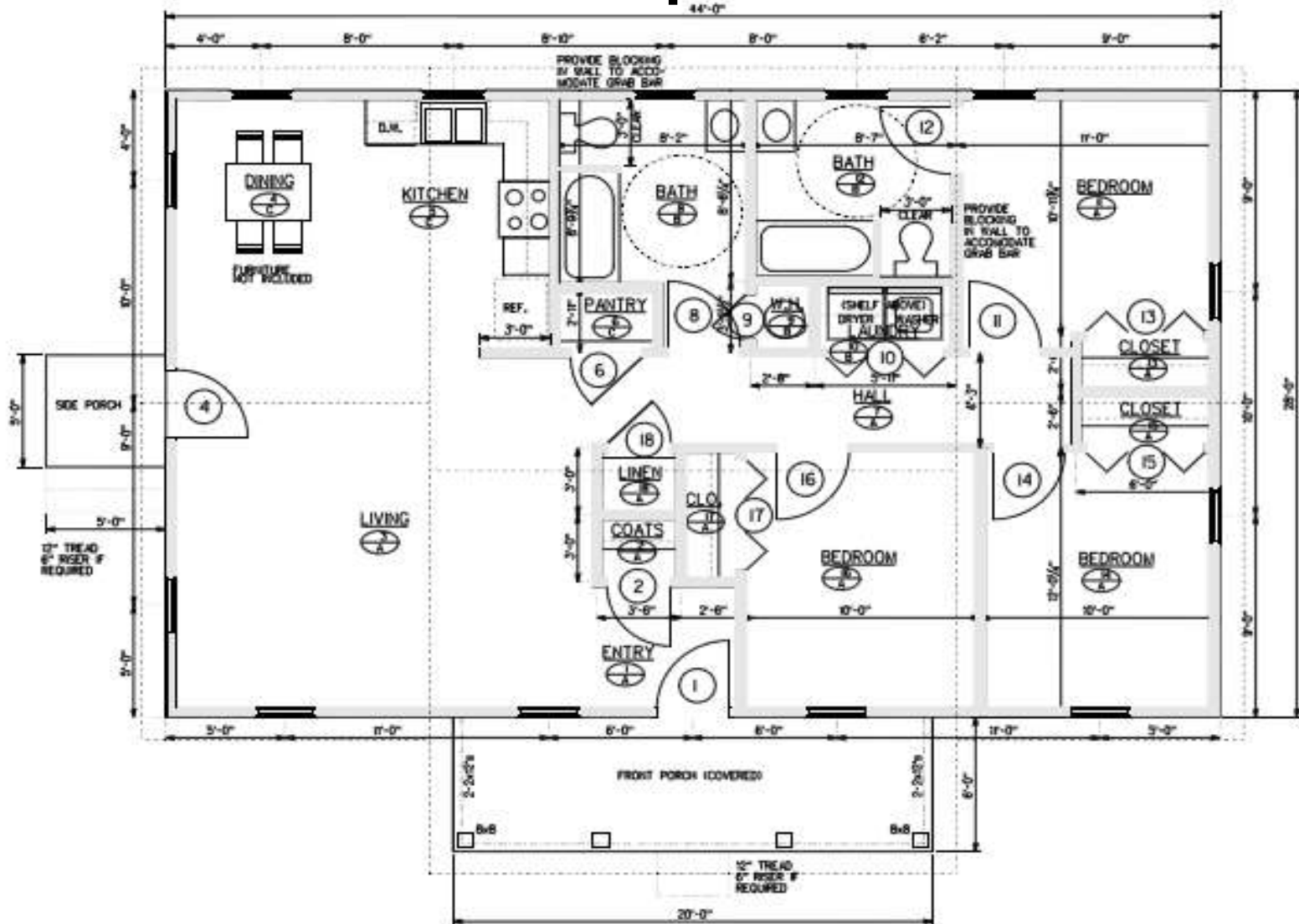
# Laundry

- Use front-load washers and dryers, raised 12” above floor for ease of access
- Allow for either appliance to be located on either left or right side



Front-loading washer and dryer with front mounted controls raised on a platform to minimize bending and stooping and place items inside the appliances within easier reach.

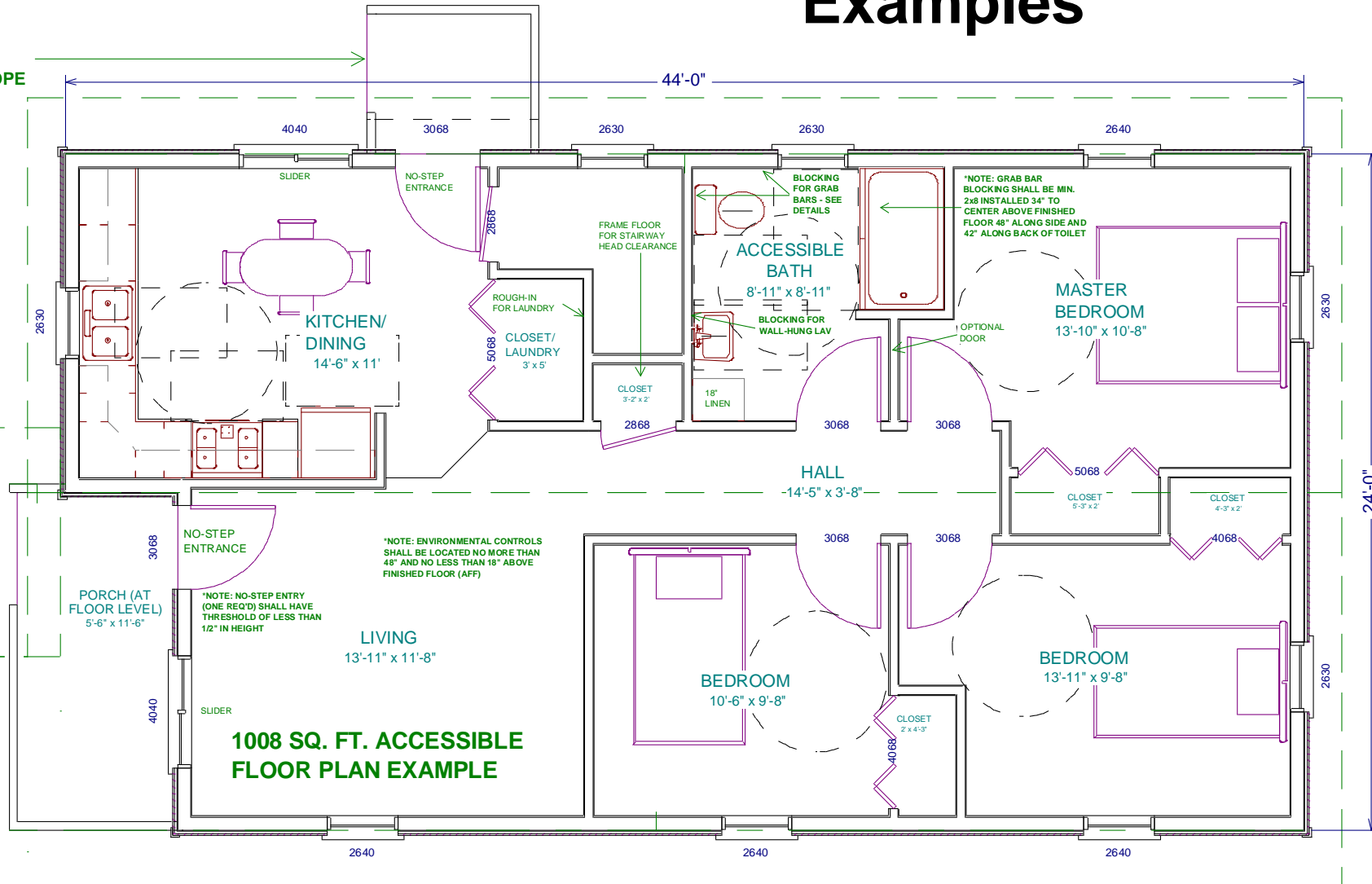
# Examples



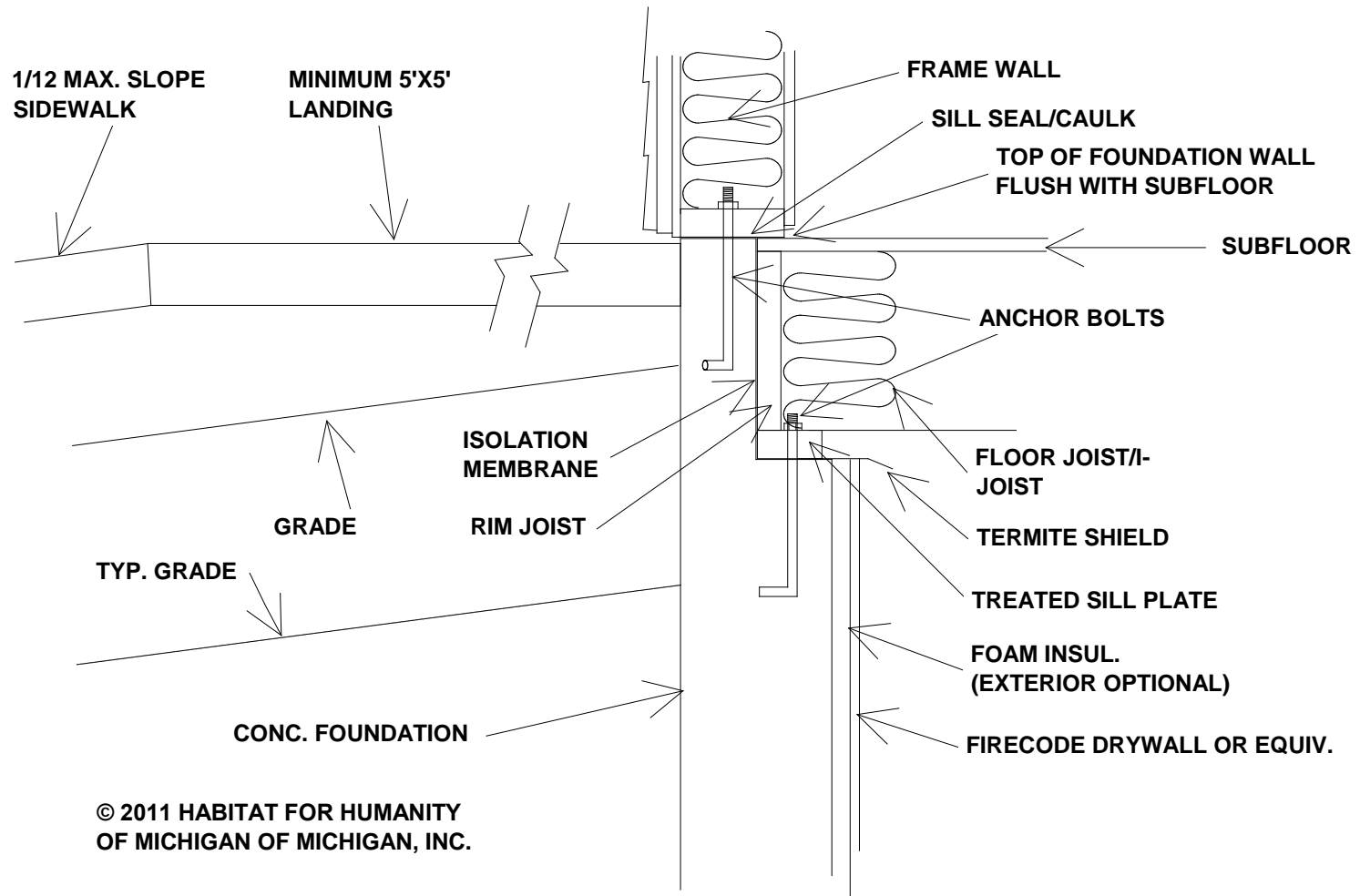


# Examples

ACCESSIBLE  
 ROUTES NOT TO  
 EXCEED 1:12 SLOPE



## REVERSE BRICK LEDGE FOUNDATION FOR NO-STEP ENTRANCE



# Additional Costs:

\*note that additional costs are relative to current practices

- **Approximate costs of UD features:**

– Design changes	\$0	to	\$400
– No-step entrance, approach	100		1200
– ADA threshold entry door	40		60
– 36” wide interior doors	20		80
– Flooring under sinks	10		80
– Blocking in walls	10		40
– Raised-height toilet	0		30
– Pulls and levers	0		120
– Locate heat ducts, plumbing	0		200
– Placement of controls	0		50
– Other miscellaneous	0		100
– Total:	\$180	to	\$2,360

# Additional Costs Comparison

- **Average estimated costs for Inclusive Design elements in new construction – under \$800.00**
- **Compare to average estimated costs of retrofitting existing housing stock - \$7,500.00 to \$15,000.00 (or more)**



## Universal Design Features

**Single Story** keeps Living Area on One Level.

**ADA-Compliant Cabinetry**  
and Kitchen & Bath Fixtures.

**60-Inch-Wide Circular Area**  
of clear floor space in middle of  
rooms, including kitchen, laundry  
and on main floor bathroom.

### Other Considerations:

- 18 to 24-Inch-High Electrical Outlets.
- Rocker-Style Light Switches.
- Lever-Style Door and Faucet Handles.
- Design a closet as a future elevator shaft.

**Zero-Step Entryways**,  
including porch, front door  
and garage entry doors.

**42-Inch-Wide Hallways and Stairways**  
(48-inches-wide is better).  
Double handrails on stairways.

**Smooth, Durable Flooring**  
surfaces in all traffic areas.

**Zero-Step Entry**  
to Shower.

**36-Inch-Wide Doorways**,  
(interior and exterior) including  
bedrooms, closets, baths and laundry.



- **Questions**
- **Comments**
- **Discussion**
- **Feedback**

Thank You

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# Links and Resources

The Center for Universal Design  
North Carolina State University  
1.800.647.6777

<http://www.ncsu.edu/project/design-projects/udi/>

Concrete Change  
600 Dancing Fox Road, Decatur GA  
30032  
404-378-7455

[concretechange.org](http://concretechange.org)

The Pew Research Center's Internet & American Life Project  
[www.ilr.cornell.edu/dei/disabilitystatistics/index.cfm](http://www.ilr.cornell.edu/dei/disabilitystatistics/index.cfm)

<http://EzineArticles.com/1918829>