Residential Design – Habitat for Humanity House

Civil Engineering and Architecture - 2014
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Project Description

Overview
This residential design project is to design and create a set of plans for a Habitat for Humanity Home to be built as new construction on a site in Noblesville Indiana. The projects stated objective is to design and build a simple decent affordable place to live in which the financial burden on the homeowner is reasonable. In an effort to meet this goal the design will include cost efficient choices for room size, layout, and material choices. The finished home should also be affordable to maintain and to heat and cool. The design is to include universal design features and where possible include green and sustainable design practices. This design is for a three bedroom home with a full basement with access from the interior of the home. The home includes 2 full baths and an open floor plan that includes a great room that includes the kitchen and the living room.

Design Criteria and Constraints
This design incorporates the new construction guidelines defined within the curriculum of the Project Lead the Way Civil Engineering and Architecture course. The guidelines specify the following constraints for a 3 bedroom habitat house:

- Relevant Codes: Meet applicable Building Codes for Noblesville Indiana.
- House Size: A three bedroom house is allowed 1070 square feet. (additional square foot is allowed for interior stairs to a full basement with mechanicals)
- Baths: A three bedroom house is to have 1 ½ baths (2 acceptable).
- Construction: Exterior wood frame construction 2x6 fully sheathed with ½” foam board insulation.
- Roof Construction: 2x8 rafters 16” OC with ½” OSB sheathing covered with 30 YR asphalt shingle with a roof pitch of 5/12.
- Foundation construction: 8” CMU filled core sitting on 24” x 12” deep keyed footing with ¾” anchor bolts attached to 2x8 PT sill with appropriate insect barrier.
- No car port or garage
- Insulation: R-19 walls and R-30 Attic. Basement walls to be insulated with 2 in “Blue board” foam insulation on exterior of wall.
- Doors: Primary entrance is to be a 36” steel 6 panel door with fan light.
- Windows: Double hung vinyl.
- Lighting: Each room to have incandescent ceiling fixtures. Each Closet is to have a single fluorescent fixture. All exterior entrances to have an exterior light.
Universal Design Features
The Universal Design features present in this design are those dealing with accessibility: The following is a summary of the accessibility features:

- One entry to the structure is barrier free with no steps.
- Single Floor home
- Passage door to full bathroom has a 36” entrance door.
- All hallways are 42” minimum frame to frame.
- Kitchen design has 60” between counter tops allowing wheel chair access.
- Framing in baths includes structural mounting points for grab bars.
- Passage door to master bedroom has a 36” entry door.

Additional Universal Design features:

- Reachable controls and switches and outlets set at the appropriate heights (light switch 42”-48” above floor, Outlet 18”-24” above floor.
- Easy to use door handles – lever style
- Covered entry way
- Non slip floors and bathtubs
- Comfort height Toilets
- Front loading washer dryer
- Range with controls at front
- Easy grasp cabinet pulls
- Easy access kitchen storage with adjustable shelves and use of Lazy Susans.

Green and Sustainable Design Features
The Green and sustainable design features in this design include the following:

Optimize Site potential:

- Southern facing glass for passive heat gain
- Southern plantings with deciduous trees to provide shade in summer
- Position home away from noise sources
- Prevailing wind from west – plant evergreens to break wind
- Others

Building material selection:

- Recycled aggregate for driveway and patio base
- Double pane insulated glass in windows and foam core steel entry door with minimal glass
- Vinyl siding and composite fascia use
- Permeable pavers for outside deck
- Others that have been investigated
Optimize energy use:

- Energy star appliances
- Insulation R-19 walls and R-30 attic
- High efficiency furnace
- On demand Instant hot water generation
- House wrap vapor barrier that is taped for low air infiltration
- LED task lighting and dimmers for incandescent lights
- Solar panels on south facing roof
- Cross ventilation provided by accessible windows
- Install clothes line for drying

Protect and Conserve Water:

- Patio made with pervious pavers
- Rainwater capture from gutters for plant irrigation
- Landscape design that uses plant beds with native species
- Washer high efficiency front loading with low water requirement
- Low flow faucets
- High efficiency low volume toilets
- others

Optimize building space and material use:

- Size of home is minimal for number of bedrooms
- Dimensions of structure minimize building waste
- Others

Enhance indoor environmental quality

- Day-lighting
- Placement of closets to minimize noise
- Ventilation form opening windows
- Programmable thermostat
- Automatic light control when room occupied
- Others

Minimize Maintenance:

- Vinyl siding and fascia do not require painting
- Windows have the capability of being cleaned by tilting in
- Hardwood floors throughout have factory applied finish
- LED lighting has much longer bulb life than incandescent bulbs
- Deck material needs no maintenance
• Use of composting
• Others

Construction Drawings

Site Plan

Figure 1  Site plan with house present
Floor plan

Features present in this floor plan include:

- 2 full baths with master bathroom having a 36” door
- Staircase to basement for access to mechanicals and washer dryer
- Combined kitchen and living room
- MBR with separate master bath
- Etc...

Figure 2 Fully dimensioned floor plan
Elevations

East Elevation:

West Elevation:

Figure 3 East elevation

Figure 4 West elevation
North Elevation:

Figure 5 North elevation

South Elevation:

Figure 6 South Elevation
Kitchen Elevation

Figure 7 Kitchen Elevation

Bath Elevation

Figure 8 Bath Elevation
**Wall Section**

This drawing is incomplete – missing details of wall construction. All elements need to be defined.

![Wall Section Diagram](image)

Figure 9 Typical Wall Section with details
**Window schedule**

**Table 1 Window Schedule**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<td>Family</td>
<td>Type</td>
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<td>Width</td>
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<td>3’ - 6”</td>
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**Door Schedule**

**Table 2 Door Schedule**

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<th>D</th>
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</thead>
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<td>Family</td>
<td>Type</td>
<td>Width</td>
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<td>30” x 80”</td>
<td>5’ - 0”</td>
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<tr>
<td>2</td>
<td>Single-Flush</td>
<td>36” x 80”</td>
<td>3’ - 0”</td>
<td>8’ - 8”</td>
</tr>
<tr>
<td>3</td>
<td>Single-Flush</td>
<td>30” x 80”</td>
<td>2’ - 6”</td>
<td>8’ - 0”</td>
</tr>
<tr>
<td>4</td>
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<td>32” x 60”</td>
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<td>5</td>
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<td>6</td>
<td>Bifold-4 Panel</td>
<td>72” x 80”</td>
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<td>7</td>
<td>Bifold-4 Panel</td>
<td>72” x 80”</td>
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<td>8’ - 0”</td>
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<tr>
<td>8</td>
<td>Bifold-4 Panel</td>
<td>48” x 80”</td>
<td>4’ - 0”</td>
<td>8’ - 0”</td>
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<tr>
<td>9</td>
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**Room Schedule**

**Table 3 Room Schedule**

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</table>
**Electrical Plan Kitchen**  
Scan of hand sketched drawing

**Electrical Plan Bath**  
Scan of hand sketched drawing

**Plumbing Plan Kitchen and Bath**  
Scan of hand sketched drawing

**Supporting Documents**

**Floor Plan Bubble Diagram 1**  
Scan of hand sketched drawing or computer generated version

**Floor Plan Bubble Diagram 2**  
Scan of hand sketched drawing or computer generated version

**Floor Plan Rough Sketch 1**  
Scan of hand sketched drawing – identifies rooms by name

**Floor Plan Rough Sketch 2**  
Scan of hand sketched drawing – identifies rooms by names

**Final Floor Plan Sketch**  
Scan of hand sketched drawing with general size dimensions for outside of structure and some detail on layout of bath and kitchen
Site Opportunities Map

Calculations

Water supply

Storm Water Runoff

Wastewater

Appendices

Client survey

Client meeting notes

Sustainable design back up documentation

Complete set of design drawings