



## Gimme Shelter



No, this is not about rock music, but about having a roof over your head that keeps the water out.

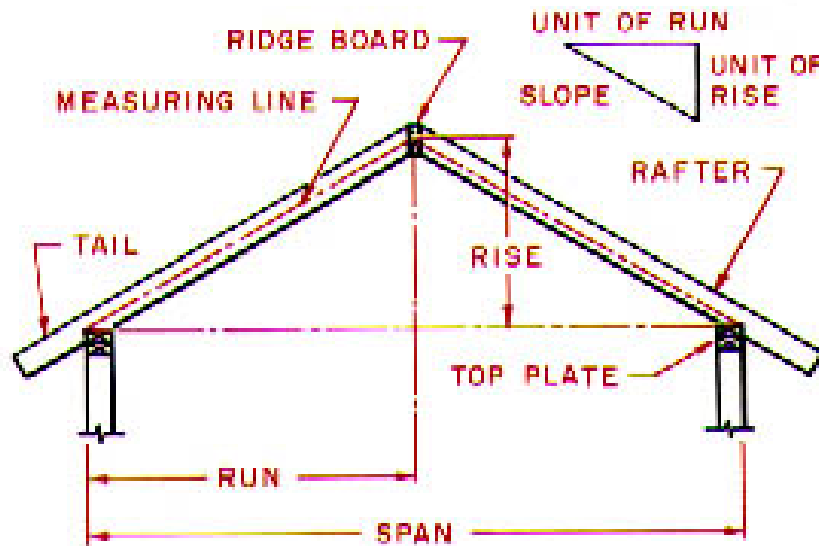
## Gimme Shelter



Gimme the facts, ma'am, just the facts...

- I. 5% of total construction cost is spent on the roof  
60-80% of dollars spent on litigation and settlement are roof problems
- II. Where do they leak?
  - Edges and eaves
  - Changes in plane or direction
  - Flashings, terminations, and penetrations
- III. Consider a “life cycle” analysis to determine the best roofing options.

## Roof Slope Terminology



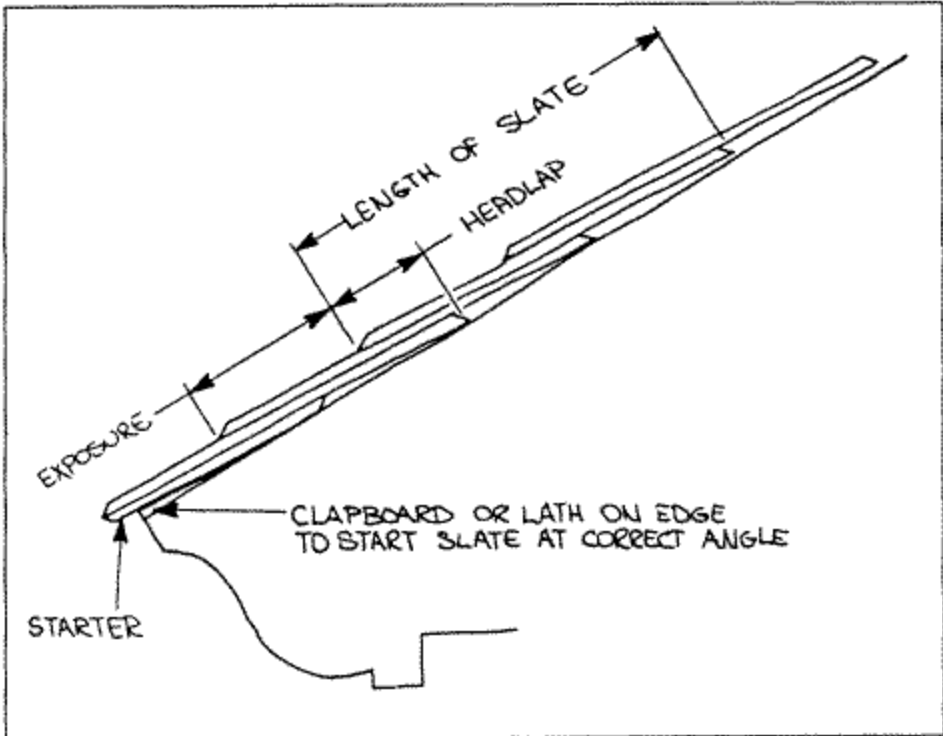
Unit of rise compared to unit of run—expressed as “8-in-12” – indicates roof pitch and correlates to:

- appropriate roof materials
- roof type and
- architectural style

*Rise is a variable, but run is always 12 inches, or one foot.*

*Terms used in roof framing.*

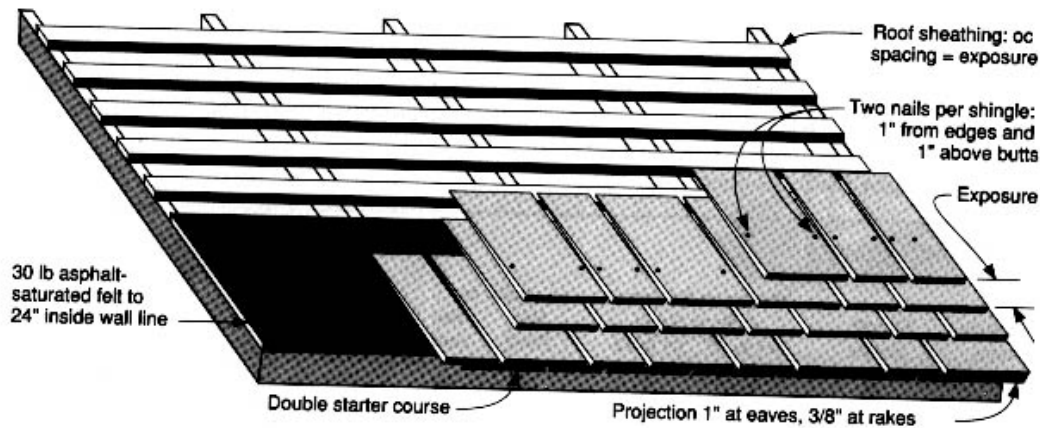
“Starter course” required for all shingle roofing – asphalt, cedar, or slate



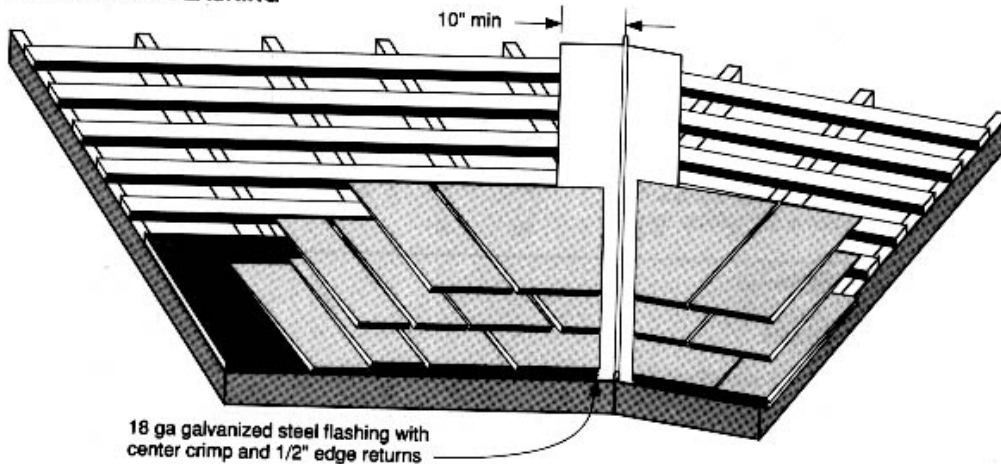
## Spaced sheathing is used under a cedar shingle roof

### Cedar Shingles

#### APPLICATION



#### OPEN-VALLEY FLASHING



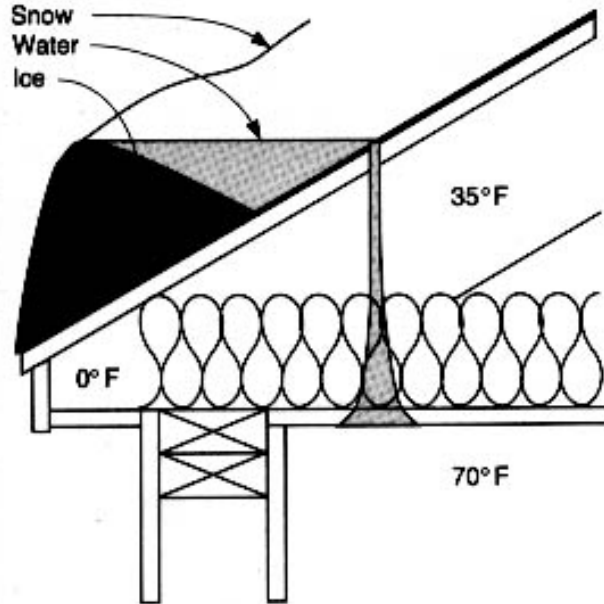
*Fayette State Park, Bldg. No. 3 – New cedar shingle roof*

...or plywood sheathing with Cedar Breather to eliminate trapped moisture under the shingles

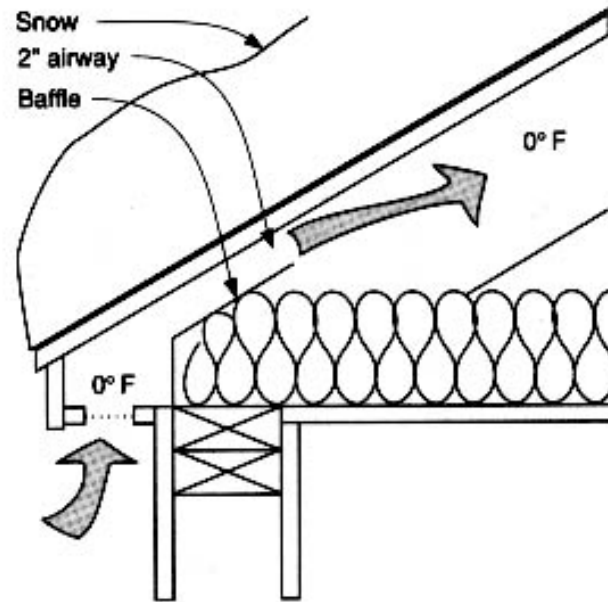
## Prevent Ice Damming with a “cold roof”

...fiberglass is old thinking,  
compared to SIPS and spray foam

### Ice Dam Prevention



**INSUFFICIENT VENTILATION**



**PROPER VENTILATION**

**UNCONDITIONED ATTIC** must be ventilated

## Filling the cavities eliminates concerns about condensation or dew point



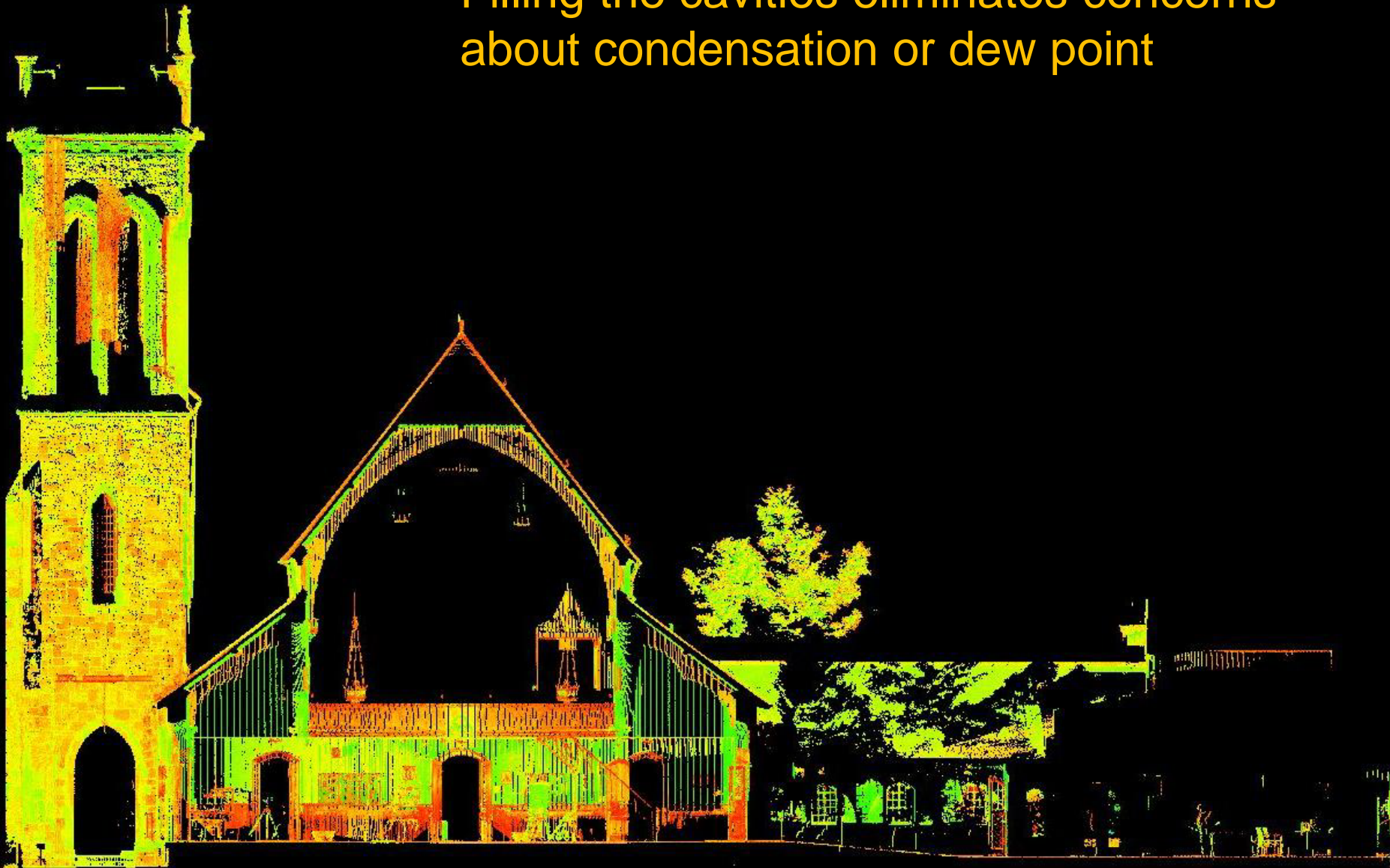
...cellulose is a viable and reversible option

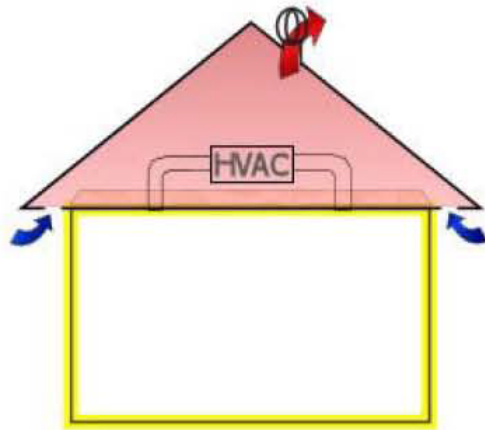


### Cellulose insulation –

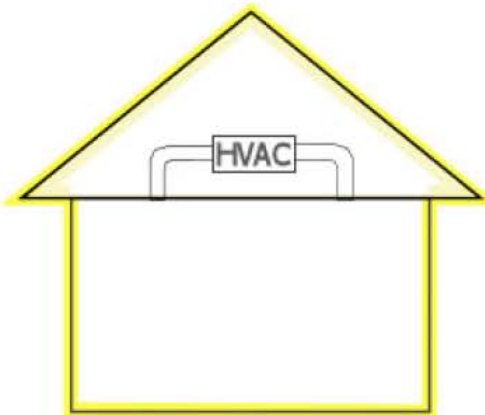
- one of the best all purpose home insulation materials
- effective barrier to air movement and acts to diffuse vapor
- R value of ~3.8/inch is similar to fiberglass and open cell foam
- 20-30% more effective at reducing air infiltration than fiberglass
- dry loose-fill or wet spray works for new and existing construction

Filling the cavities eliminates concerns about condensation or dew point





**Figure 1.** The yellow highlight shows the thermal envelope in a conventional attic.



**Figure 2.** The yellow highlight shows the thermal envelope in a conditioned attic.

or move an Air Barrier and Thermal Envelope up to the Roof Line

...fiberglass is old thinking, compared to SIPS and spray foam

**CONDITIONED ATTIC** does NOT need to be ventilated

## Spray foam “air barrier” trumps R-value



### Open-cell spray foam –

- one of the best all purpose home insulation materials
- lightweight (~0.5 lbs./board ft) semi-rigid polyurethane foam
- capable of reducing your heating/cooling utility costs by 50% - 70%
- R value of ~3.8/inch, similar to fiberglass and cellulose
- installed in walls, attics, directly on interior roof decks, basement interior walls, crawl spaces, and injectable into wall cavities

## Spray foam “air barrier” trumps R-value

...but this is NOT a reversible treatment, and must be carefully considered for historic buildings...

*NPS and SHPO oppose its use!*



## Spray foam “air barrier” trumps R-value



### **Closed cell spray foam -**

- installed in areas of high humidity (e.g. indoor pools, hot-tubs, saunas)
- low clearance cathedral ceilings
- rigid higher density (~2.0 lbs./board ft) insulation
- higher R-value per inch (~7/inch)
- costs about twice as much as open-cell spray foam

## Spray foam “air barrier” trumps R-value

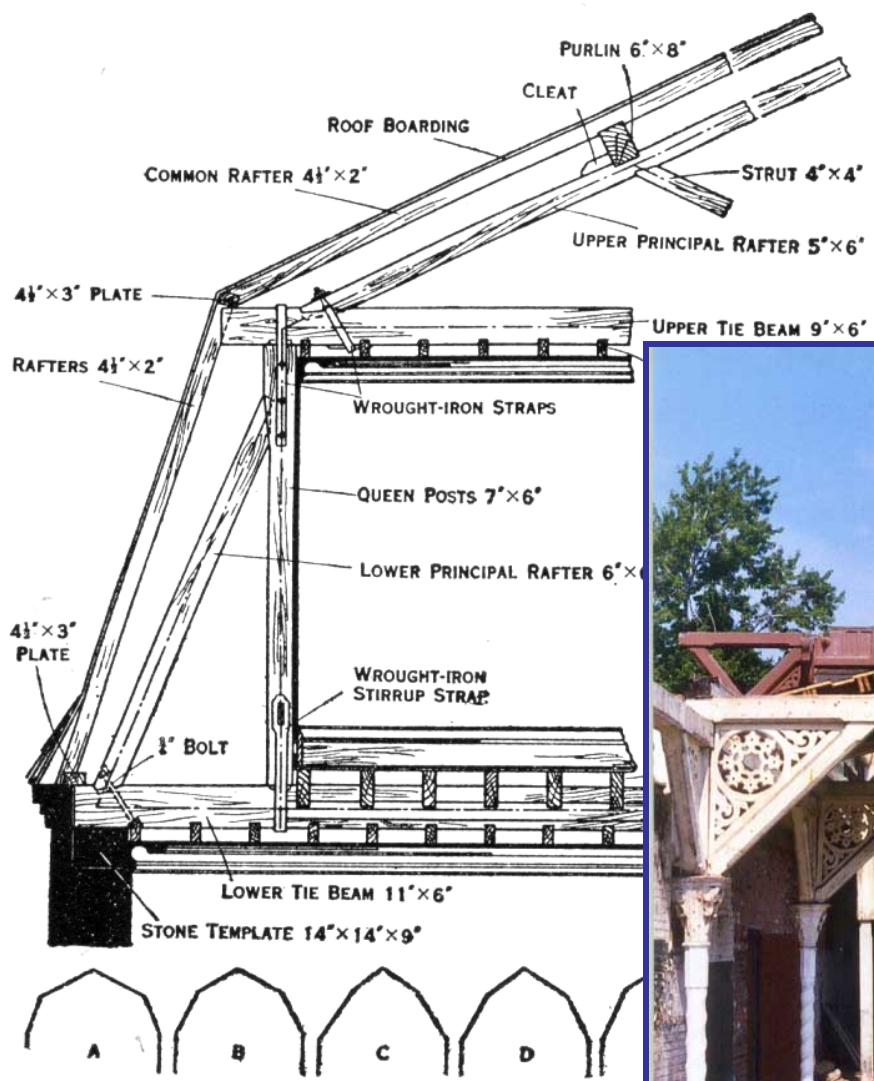
...but this is **NOT** a reversible treatment, and must be carefully considered for historic buildings ...

*NPS and SHPO oppose its use!*



## Roof Slope Terminology

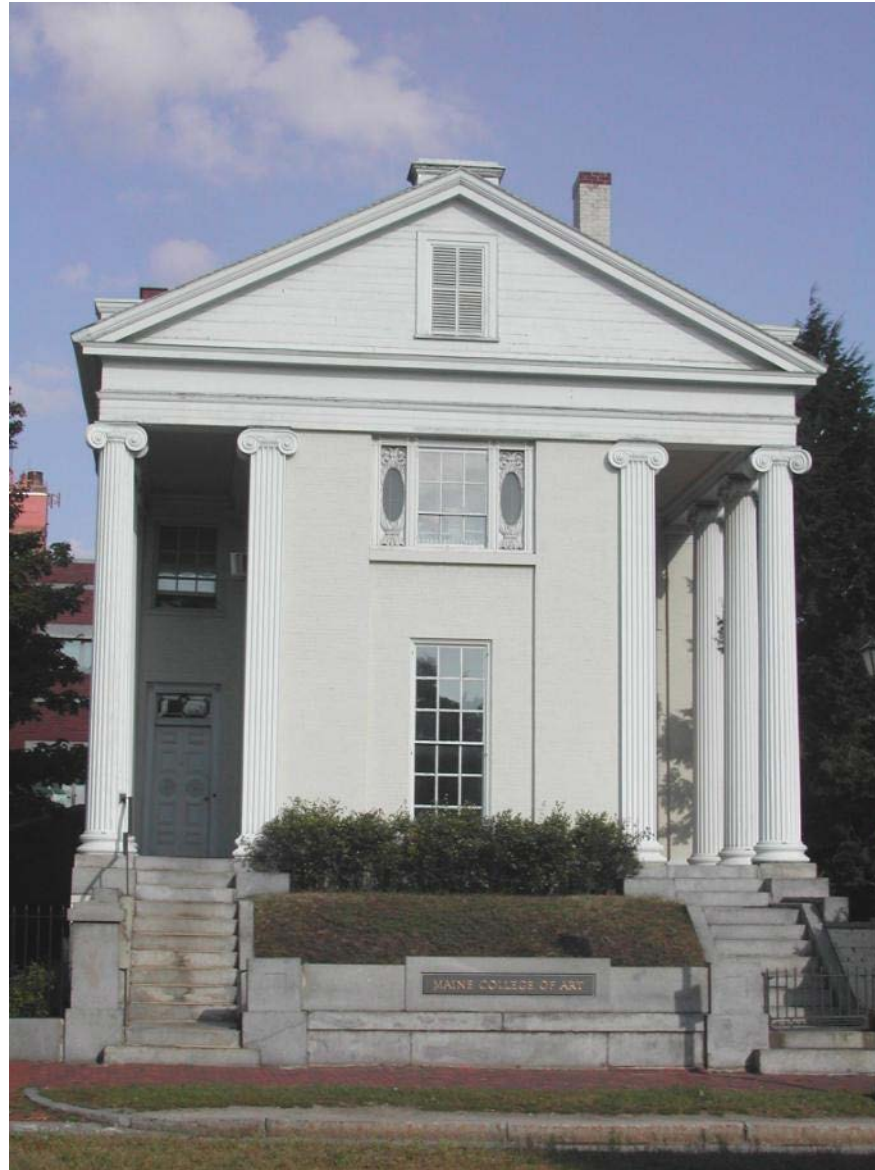
Terminology is associated with a specific the structural system and materials of assembly.



## Roof Form Terminology: **Simple Gable**



*Federal Style, 1790-1820*



*Greek Revival, 1820-1865*

## Roof Form Terminology: **Gables and Cross-Gables**



*Greek Revival, 1820-1865*

## Roof Form Terminology: **Cross Gables**



*Gothic Revival, 1840-1880*

## Roof Form Terminology: **Gables with Patterned Slate**



*English Gothic Revival, 1840-1880*

## Roof Form Terminology: **Mansard**



*French Second Empire, 1865-85*

## Roof Form Terminology: **Pyramidal**



*Queen Anne, 1885-1905*

## Roof Form Terminology: **Gable and Hip**



*Shingle Style, 1875-1910*

## Roof Form Terminology: **Hip**

*Richardsonian Romanesque, 1870-95*



*Four-Square, 1910-30*

## Roof Form Terminology: **Dormers, Open Porches, Gambrel Roof**



*Craftsman Bungalow, 1905-1930*



## Roof Form Terminology: **Low-Sloped, Open Porches, Wide Overhangs**



*Craftsman Bungalow, 1905-1930*

## Roof Form Terminology: **Flat**



*Moderne, 1930s*

## Roof Form Terminology: **Round**



*Mid-Century  
Modern, 1950s*

## Roof Form Terminology: **Pointed**



*Mid-Century  
Modern, 1960s*

## Roof Form Terminology: **Flat, Boxy**



*Mid-Century  
Modern, 1960s*

## Roof Form Terminology: **Shed**



*Modern and Sustainable, 1970s*

## Roof Form Terminology: **Ornamental**



lantern on 1930s  
Publications Building  
U of M, Ann Arbor



bell tower at Milwaukee City Hall



recycled belvedere at  
Gardner Museum of Art and Architecture,  
Quincy, Ill

## Roof Form Terminology: **Curved**

Frank Gehry's titanium, lock-seamed, sheet metal roof at Case Western Reserve's new Business School, Cleveland, OH

