A GLIMPSE ON THE HISTORY

- Green Roof Technology started in Babylon in the 7th century.
- In Scandinavia, roofs were covered with sod to insulate homes.
- Our ancestors covered their shelters with live vegetation to keep them cool in summer and warm in winter.
- 21st century green roof technology employs a multilayer system, with a waterproof membrane, drainage layers, specialized soil medium, soil stabilizer, and a selection of plant species.
A GLIMPSE ON THE HISTORY

http://www.goworldtravel.com
INTRODUCING GREEN ROOFS

• Green roofs, also known as *vegetated roof covers* or *eco-roofs*, are thin layers of living vegetation installed on top of conventional flat or sloping roofs.

• Green roofs protect conventional roof waterproofing systems while adding a wide range of ecological and aesthetic benefits.

http://www.hrt.msu.edu/faculty/Rowe/Green_roof.htm
1. Intensive Green roofs

- Thick soil depths (8" - 4')
- Heavy weights
- Elaborate plantings that include shrubs and trees.
- Designed as outdoor amenity with garden-like atmospheres
- Need elaborate drainage and irrigation systems.

http://www.eltgreenroofs.comm/
2. Extensive Greenroofs

- Soil depths ranging from 3" to 7".
- Lighter in weight
- Planted with very hardy species such as sedums.
- Tolerate extreme moisture conditions
- Need less maintenance.

http://www.commons.bcit/images.com
## COMPARING THE TWO TYPES

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Intensive Green Roof</th>
<th>Extensive Green Roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Requires minimum of one foot of soil depth</td>
<td>Requires only 1 to 5 inches of soil depth</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Accommodates large trees, shrubs, and well-maintained gardens</td>
<td>Capable of including many kinds of vegetative ground cover and grasses</td>
</tr>
<tr>
<td>Load</td>
<td>Adds 80-150 pounds per square foot of load</td>
<td>Adds only 12-50 pounds per square foot</td>
</tr>
<tr>
<td>Access</td>
<td>Regular access accommodated &amp; encouraged</td>
<td>Usually not designed for public accessibility</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Significant maintenance required</td>
<td>Annual maintenance walks are performed</td>
</tr>
<tr>
<td>Drainage</td>
<td>Includes complex drainage systems</td>
<td>Simple drainage system</td>
</tr>
</tbody>
</table>
ADVANTAGES OF GREEN ROOFS

1. Storm Water Management
2. Air pollution reduction
3. Reduction of ‘Heat Island’
4. Water Quality Improvement
5. Provision of Green Space (aesthetics and recreation)
6. Preservation of Habitat and Biodiversity
GREENROOF RESEARCH AT LTU

Research Goals

The goals of this research project are as follows:

• Determine the overall percent of precipitation retained and detained by the green roof (water quantity).

• Determine the nutrient loading attenuation capabilities of the green roof (water quality).

• Determine the reduction in ambient temperature associated with the green roof (air quality).

• Determine the reduction in storm water temperature associated with the green roof.

• Establish long-term monitoring station capable of determining the temporal performance of the green roof.
GREENROOF CROSS-SECTION AT LTU

- Drought tolerant plants including sedum varieties & dianthus
- Filter fabric
- Floradrain FD25
- 2 Layers of 1 1/2" polystyrene insulation
- Roof protection course
- Primer
- 4" expanded shale blend planting medium
- Drip irrigation tubing used during initial 2 seasons of plant establishment
- Water retention layer
- Root barrier
- Waterproof roof membrane
- Roof deck
  - Fire rated gypsum deck board
  - Metal deck
THE BEGINNING STAGES OF GREENROOF CONSTRUCTION AT LTU