

Green Roofs Environmental Considerations and Plant Selection

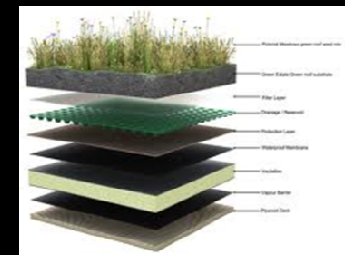


SWT DESIGN

Klaus-Dieter Rausch, RLA

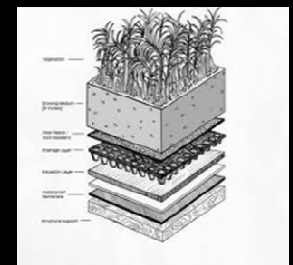
Extensive Green Roofs

- Self Sustaining
- Reduced Fertilizing
- Limited Watering
- Limited Maintenance



Intensive Green Roofs

- Watering
- Fertilizing
- Typical Maintenance



TYPES OF GREEN ROOF

Benefits

- Aesthetic Improvement
- Storm water Management
- Reduce Urban Heat Island Effect
- Improved Air Quality
- New Amenity Spaces
- Energy Efficiency
- Increased Roof Membrane Durability
- Fire Retardation
- Noise Reduction
- Job Creation



BENEFITS OF A GREEN ROOF

Effects of Environmental Conditions on Plant Selection

- Wind
- Daylight Exposure
- Temperature
- Precipitation



Non-Controllable



- Substrate
 - Soil Mix
 - Soil Depth
- Watering
- Fertilizing



Controllable



Wind

- Consistent Direction
- Turbulences
- Vents

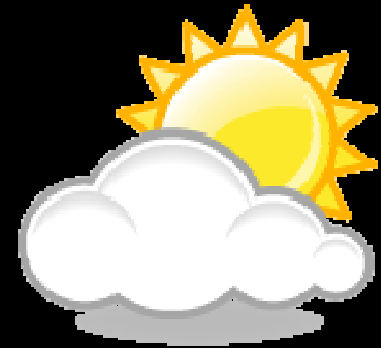
Concerns

- Drought
- Partial Plant Damages through Wind Nozzle Effects
- Breakage
- Uprooting
- Erosion of Substrate



Daylight Exposure

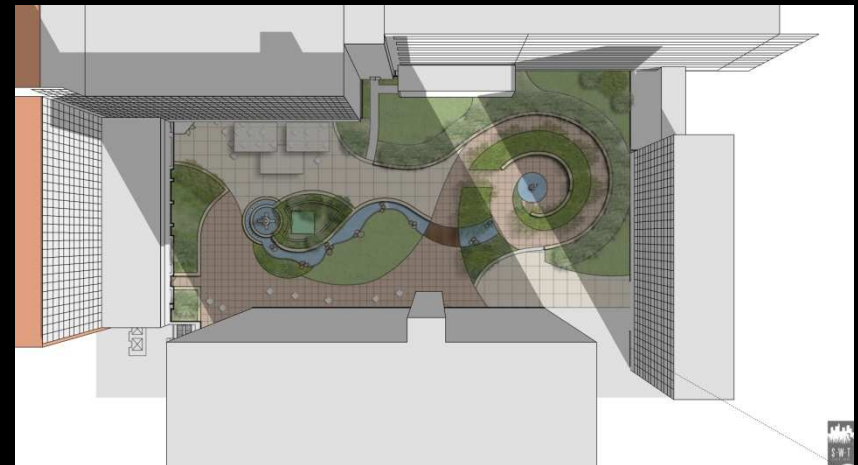
- Extended Exposure
- Light Reflection of Facades and Pavements



Shading from adjacent Buildings



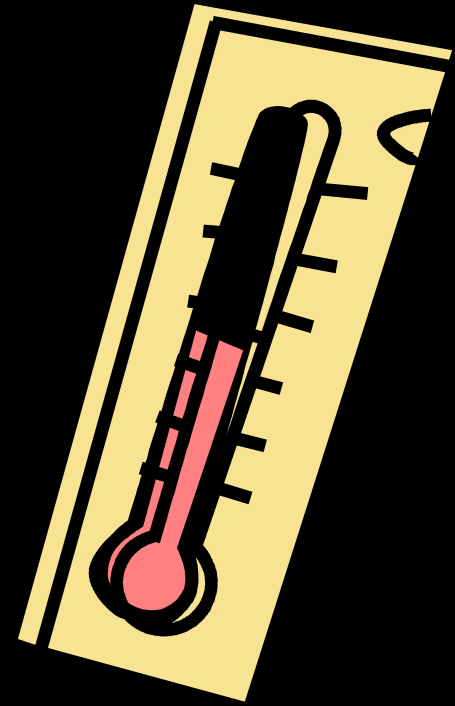
June 10.00 am



December 10.00 am

Temperature:

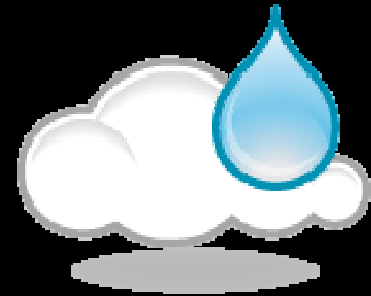
- In General Higher Temperatures During Daytime
- Less Cooling at Night Time
- Higher Extremes in Summer
- Higher Extremes in Winter



Water / Precipitation

- Unpredictable
- Extreme Conditions

Oversaturated \longleftrightarrow Dry



Plant Selection / Consideration:

- Reduction of Potential Plant Height with Increasing Elevation of Roof Height
- Plant Scale Considerations to Work with Architecture
- Small Compact Forms of Plants
- Loose Plant Forms to Minimize Wind Resistance
- Consideration of Plant Height to Minimize Wind Impact / Leverage
- Use of Multi-Stems
- Avoid Known Breach Susceptible Plant
- Minimize Use of Evergreens
 - Less Frost Resistant
 - Susceptible to Winter Sun / Frost Drought
- Maintain Nutrients and Watering Below Optimum Levels

Increasing Substrate Depth ↑

- | | |
|------------------------|---------|
| • Canopy Trees | >36" |
| • Small Shrubs / Trees | >24" |
| • Dwarf Woody Plants | 24" |
| • Perennials | 8" |
| • Grasses | 5" |
| • Bulbs | 3" |
| • Sedum / Succulents | 1"-2.5" |
| • Moss | 1" |

Intensive

Extensive

Sedums

- Plugs
- Cuttings



SEDUMS

Bulbs

- Majority of Bulbs Dependent on Soil Moisture
- Various Species Need Various Soil Depth
- Very Limited Selection for Extensive Green Roof Application
 - Allium
 - Muskari armeniacum
 - Tulipa silvestris



Grasses

- Limited Drought Tolerance
- Wind Susceptible
- Limited Usage

.....These Type of Grass Roofs do not work in our temperate Environment



Perennials

- Aster 'Wood Purple'
- Coreopsis lanceolata
- Delosperma kelaidis
- Liatris spicata 'Kobold'
- Oenothera speciosa
- Salvia 'Mainacht'
- Thymus vulgaris
- Miscanthus sinensis 'Adagio'
- Schizachyrium scoparium 'The Blue's'



Woody Plant Material / Shrubs

- *Buddleija davidi* 'Blue Chip'
- *Buxus* 'Green Gem'
- *Caryopteris clandonensis* 'Longwood Blue'
- *Amelanchier ovalis*
- *Nandina domestica*



Trees

- *Magnolia virginiana*
- *Gleditia triacanthos* var. *inermis*
- *Ulmus parvifolia* 'Dynasty'
- *Chionanthus virginicus*
- *Cotinus obovatus*

