



Biological Design Experiment in Arid Urban Regions

Multi scale faceted experiments for effective testing of vegetative growth, design tools, bio groups and their effect on micro climate.

Outline

The smallest scale of experiment is that of the dwelling level. This level tests for devices, products and methods that are used within individual dwellings, does not affect usage patterns nor has any great effect on larger scales. One can measure the effectivity of energy usage of Boiler type A versus B, the use of Solar devices, and individual shading solutions. The Quality Perception study is of high importance here and tests for the standard of living, and the Wear, Maintenance and Installation costs surveys provide information on a financial level about these products.

Vegetative corridors define the shape and patterns of the different bio groups and test for their susceptibility to varying growing circumstances. The control group would utilize ordinary city planning vegetation application that does not use ecological principles. This way information can be gathered on the susceptibility of bio groups to varied habitat geometry.

Sets of plants are selected and put together in a variety of bio groups. The experiment will test on the effectivity of the groups as a whole within the configurations of the vegetative corridors, and the interaction between the individual plants within the groups, as well as the interaction of groups between each other in border regions.

Quality perception surveys will test for the perceived quality of the open space for the different bio groups, and maintenance and health reports will keep track of the performance of the groups.

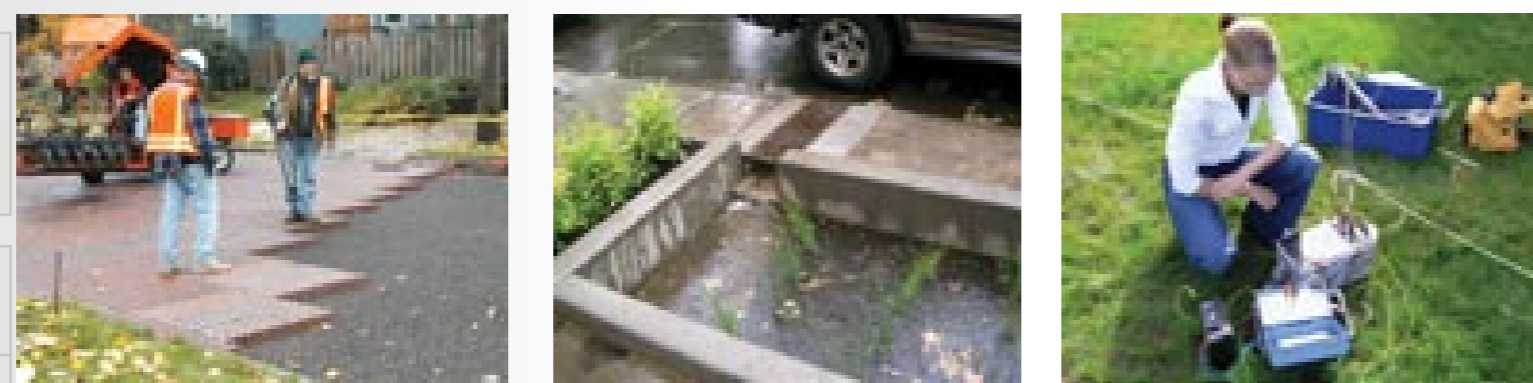
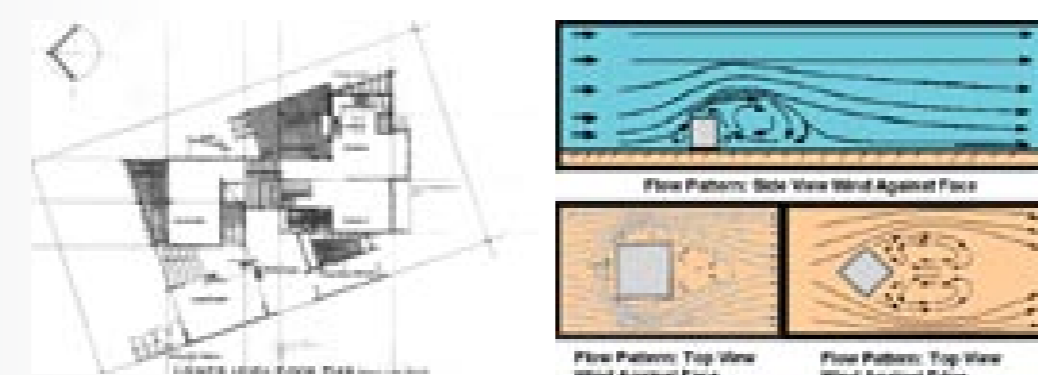
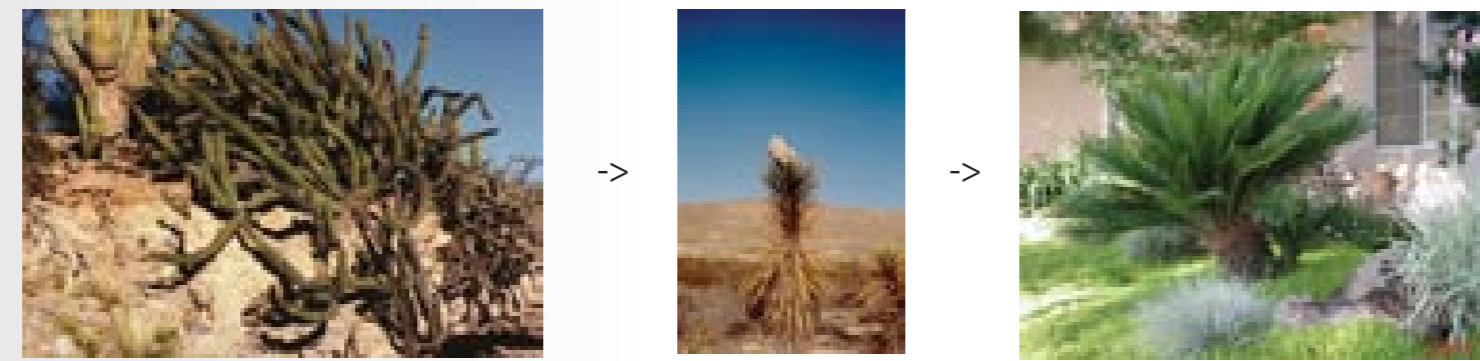
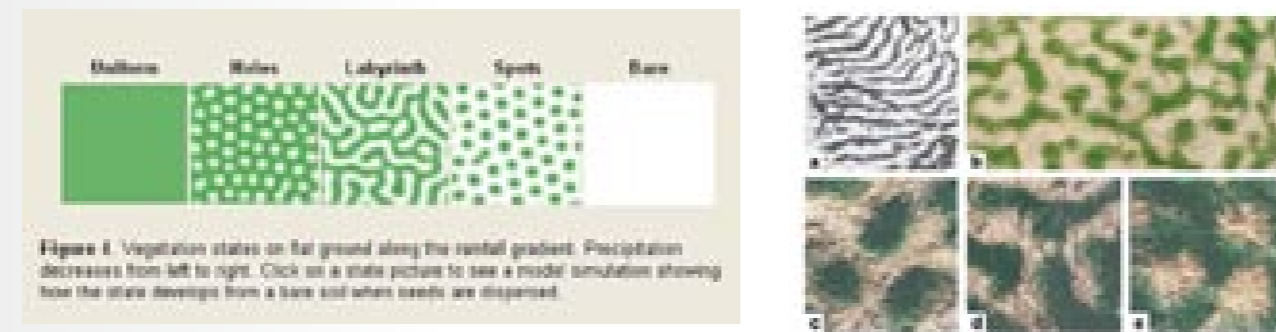
Waste sheds collect grey and black water from buildings and keep them in a sealed environment, where it is treated. They then in turn feed the vegetative corridors with water and nutrients, allowing the waste of buildings to be used to improve the direct environment.

Green roofs are planted roof tops using a variety of plants, to increase insulation, reduce heat gain, retain and collect storm water and provide for useable open spaces in areas that are otherwise unused. White roofs bounce as much sun light back from roofs to prevent heat gain from occurring, this experiment will test one type over the other, also for costs and maintenance, and the effectivity of green roofs in arid climates.

City blocks are oriented either North-South or East-West for solar gain and control of direct sunlight, as well as in the direction of the prevailing winds, to increase wind speeds in the city, and anti-wind direction, to decrease it. Micro climate tests will inform the experiment about the absolute measurements while quality perception is measured by surveys showing the perceived climate. Energy is tested on a city wide basis as well as on a dwelling level to check for increased air-conditioning and other control device usage.

The largest scale is that of the ground water test zone. It is placed apart from the control group so as not to affect it. At this level permeable streetscapes, soft scapes, vegetation and storm water usage is applied. Testing of soil water retention, humidity and temperature informs of the effectivity of these measures against the control group. Various districts could be applied different types. Wear and maintenance surveys can point to more cost effective solutions and possible issues over time. The usage of water by the city is measured for both dwellings and vegetation to test for the effectivity of the usage of precipitation.

Tools



Measured

- Waste water expulsion rate
- Micro Climate
- Building Water Usage
- Building Energy Usage
- Quality Perception Survey
- Wear & Maintenance Survey
- Construction / Installation Costs

- Micro Climate & Direct Sun Levels
- Presence of biodiversity & non plant species
- Interaction between plant species
- Storm Water Levels
- Plant Pattern Variety, Size & Health
- Quality Perception Survey
- Maintenance & Health Survey
- Construction / Installation Costs

- Plant Pattern Variety, Size & Health
- Presence of biodiversity & non plant species
- Water Retention in Soil
- Interaction between plant species
- Quality Perception Survey
- Maintenance & Health Survey
- Construction / Installation Costs

- Grey Water & Fertilizer Output
- Conversion rates / Overflow
- Quality Perception Survey
- Wear & Maintenance Survey
- Construction / Installation Costs

- Interaction between plant species & Biodiversity
- Plant Pattern Variety, Size & Health
- Temperature, Humidity & Percipitation Roof Top & Dwelling
- Building Energy Usage
- Water Retention in Substrate
- Quality Perception Survey
- Maintenance & Health Survey
- Construction / Installation Costs

- Tree Canopy cover & total Vegetation
- Aggregated City Temperature & humidity
- City Energy Usage
- Quality Perception Survey
- Construction / Installation Costs

- Ground Water Retention, Temperature & Humidity @ 0 & 6ft
- Total Percipitation
- City Water Usage
- Quality Perception Survey
- Wear & Maintenance Survey
- Construction / Installation Costs

Level / Scale

Dwelling level systems

Vegetation corridors

Bio Groups

Waste Sheds

Green VS White Roofs

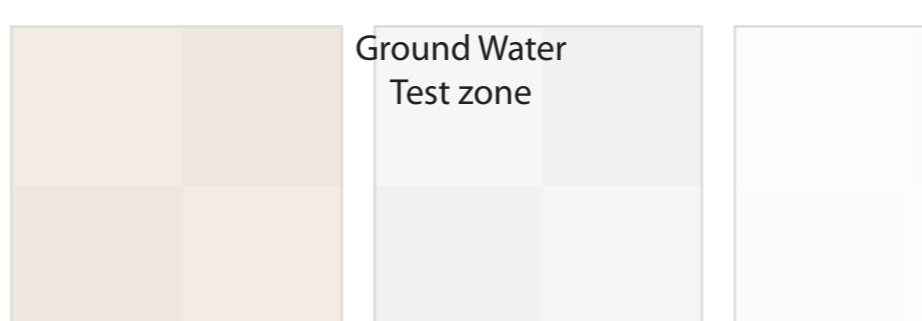
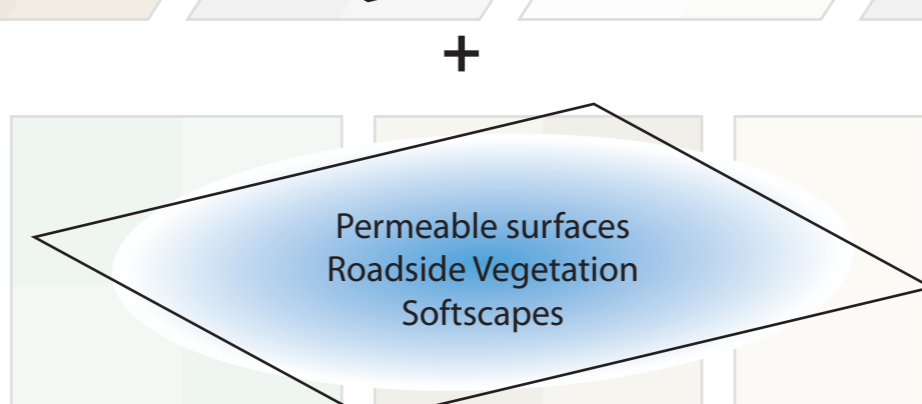
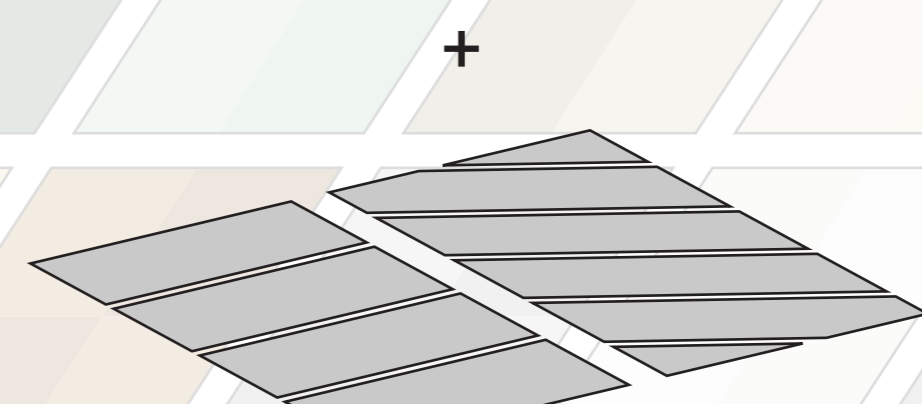
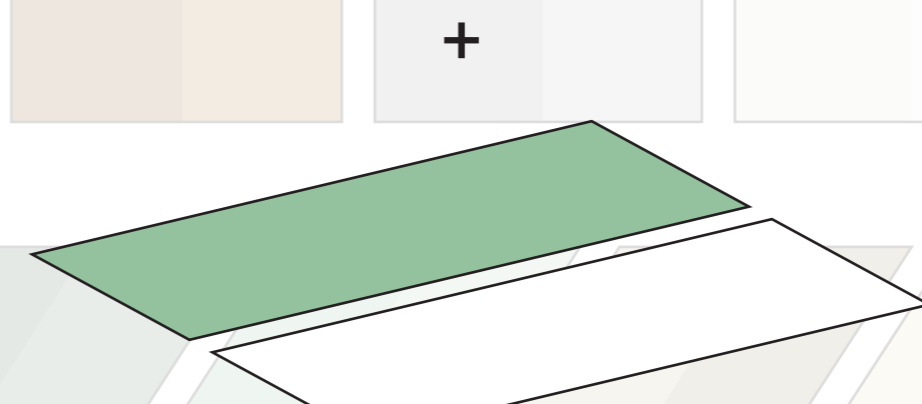
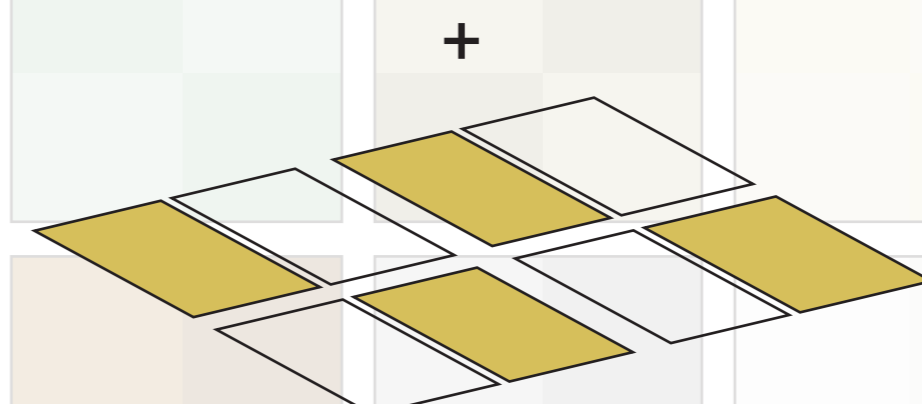
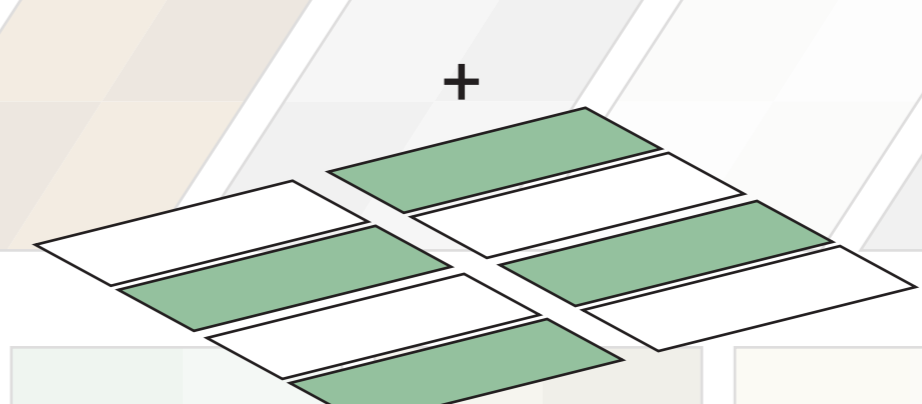
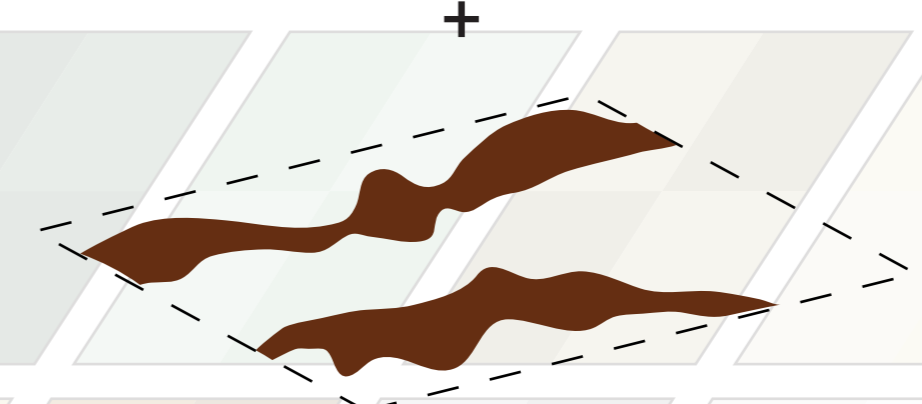
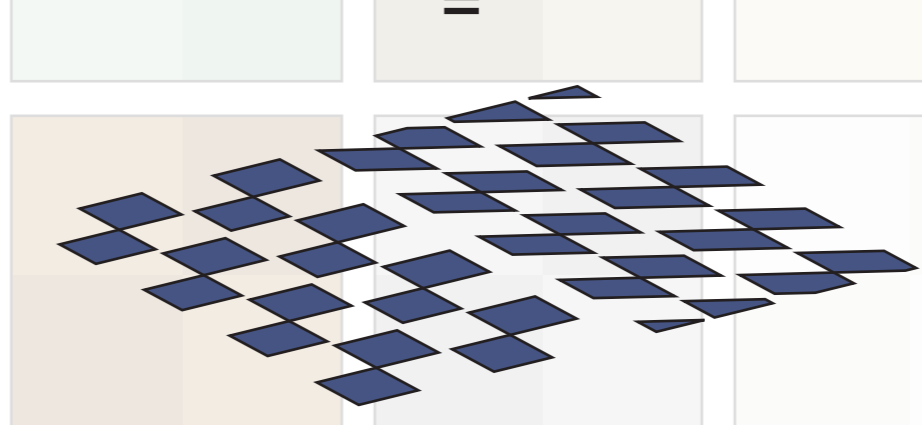
Wind Orientation

Ground Permeability

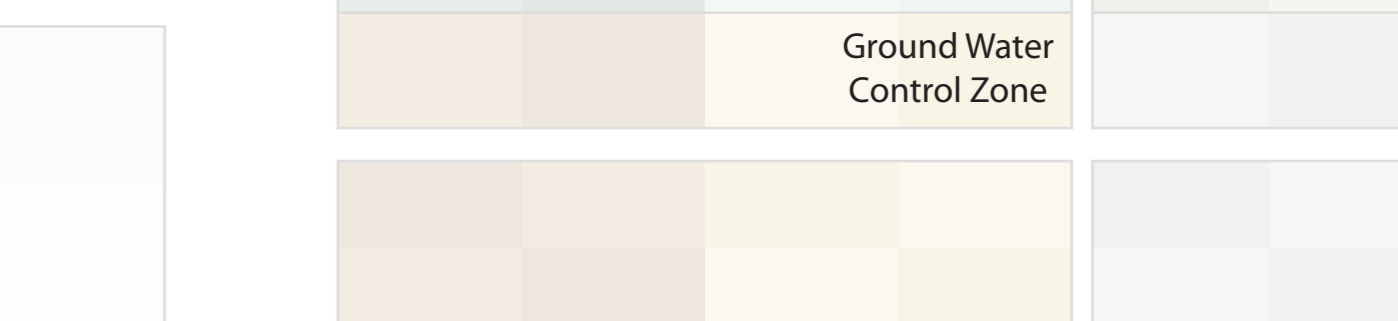
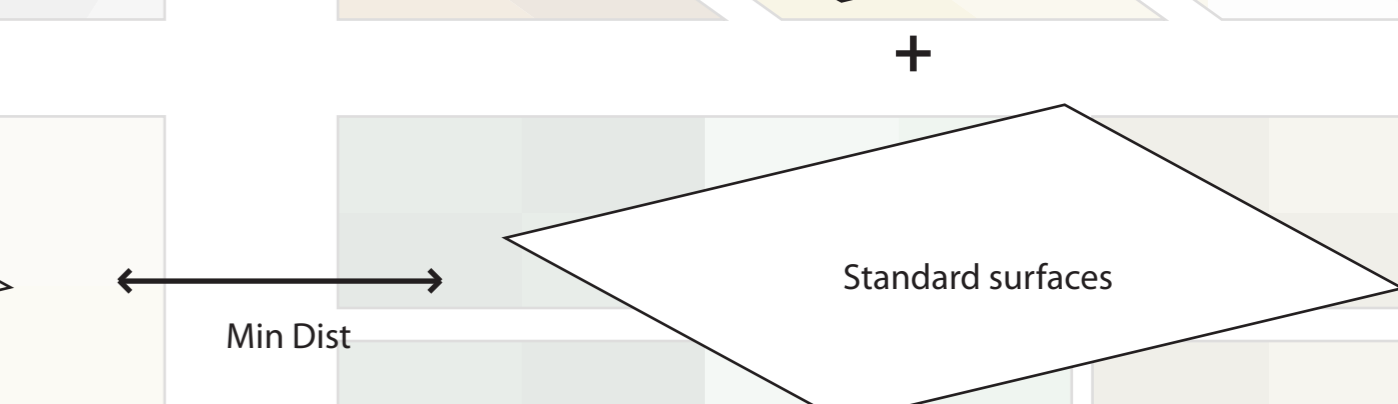
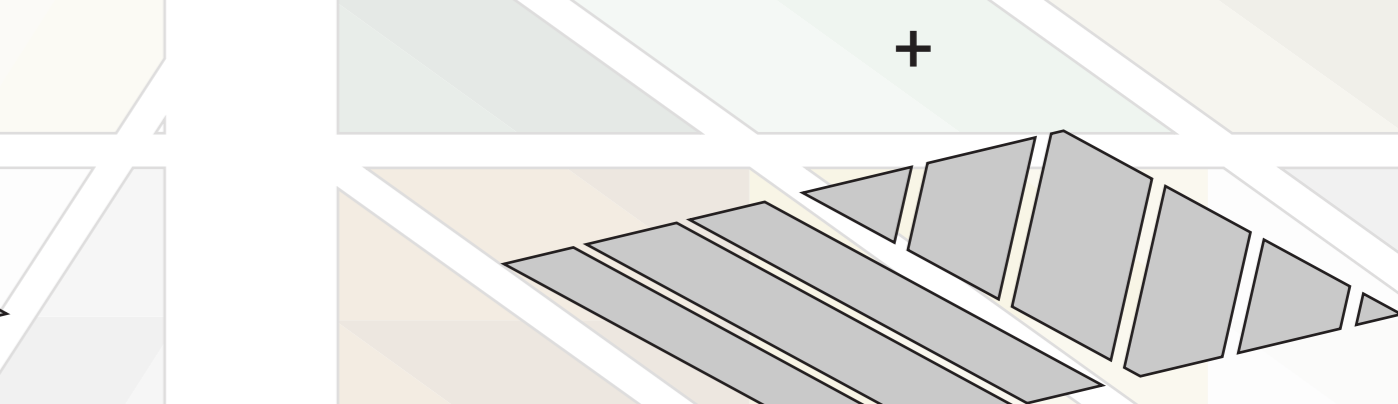
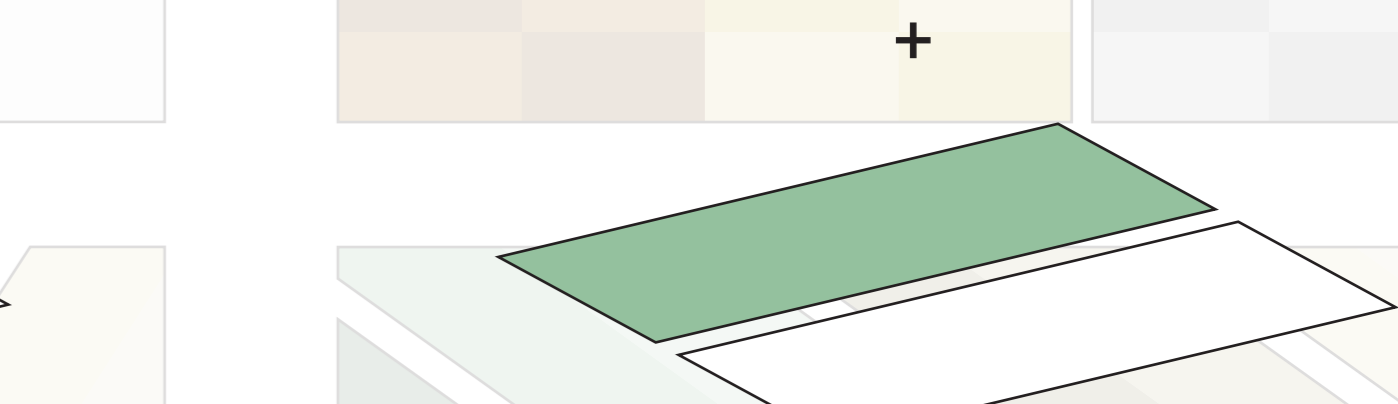
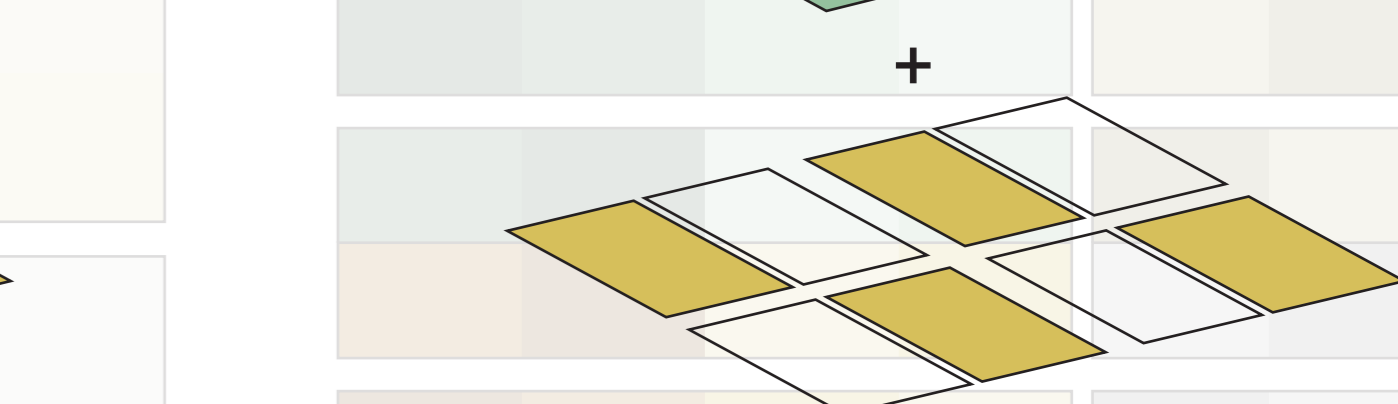
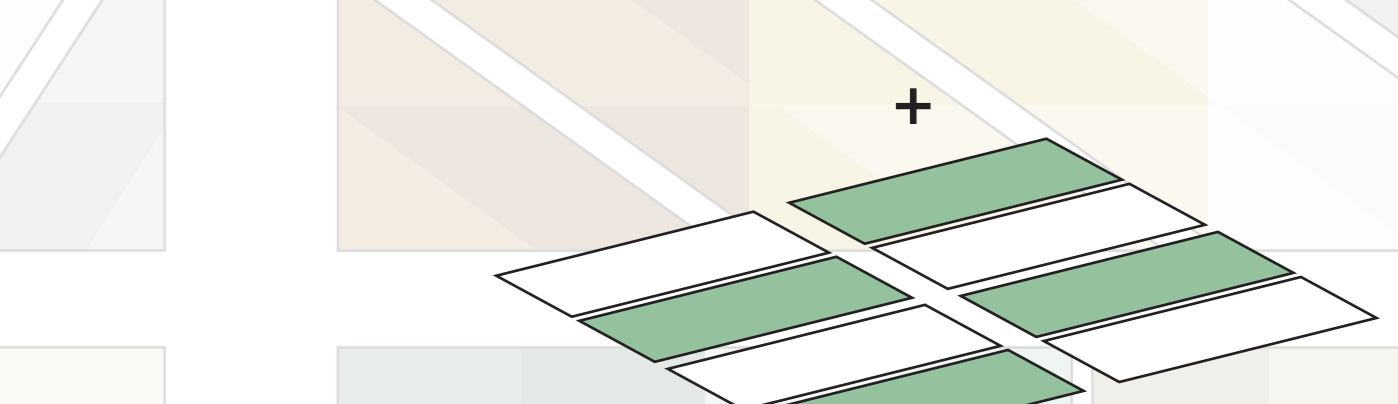
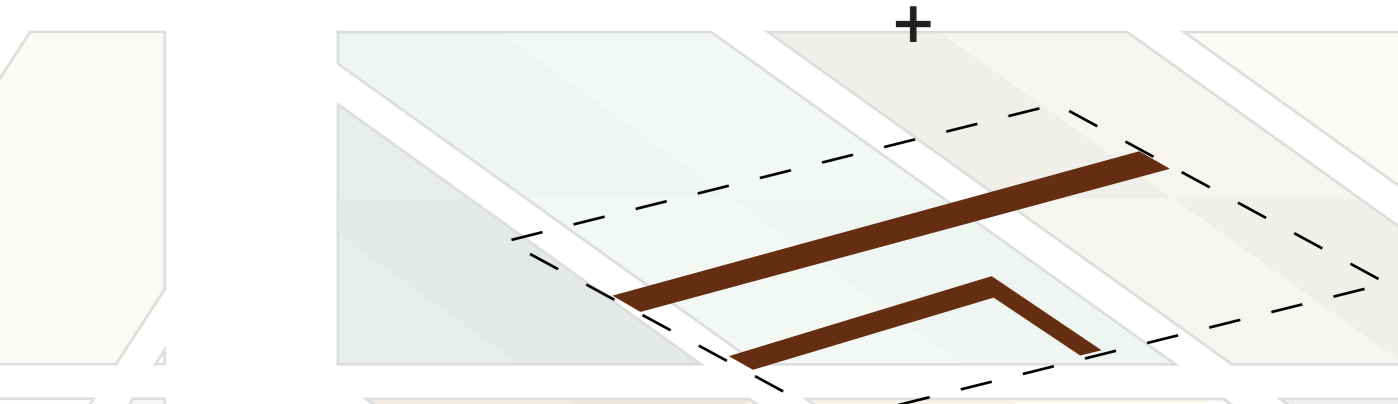
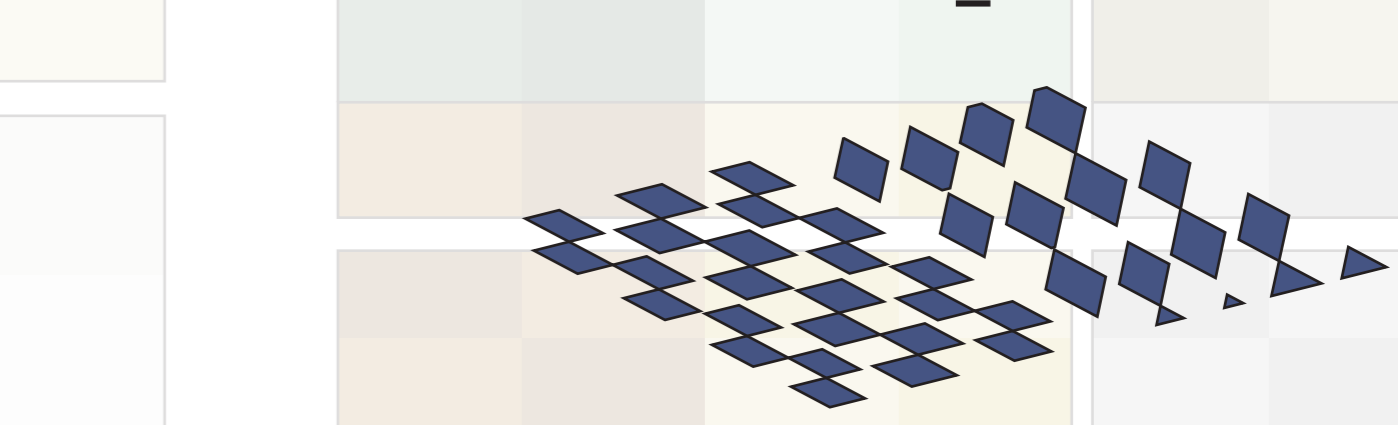
Ground Water Test zone

Standard surfaces

Ground Water Control Zone



Designed Experiment



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