

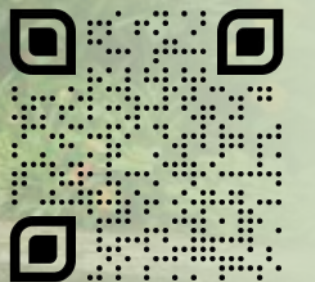
Human and Nature Synthesis

SUSTAINSLOPES

X-factor: Adaptability

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SITE STUDY

Wah Fu Estate is built on steep coastal hillsides, making it vulnerable to severe weather and high landslide risks. Prevention methods are extremely expensive and require constant maintenance and engineering repairs.



SITE OBSERVATIONS

Currently, impermeable concrete retaining walls are implemented on hillsides. It acts as a rigid block to hold back soil pressure.



concrete pours to prevent landslides



tree cut down to prevent it overgrowth?



some openings for tree growth. does it work? will the tree root overgrowth and damage the concrete?



PROBLEM ANALYSIS

(1)

Completely seals the ground

Suffocating the soil underneath, oxygen depletion

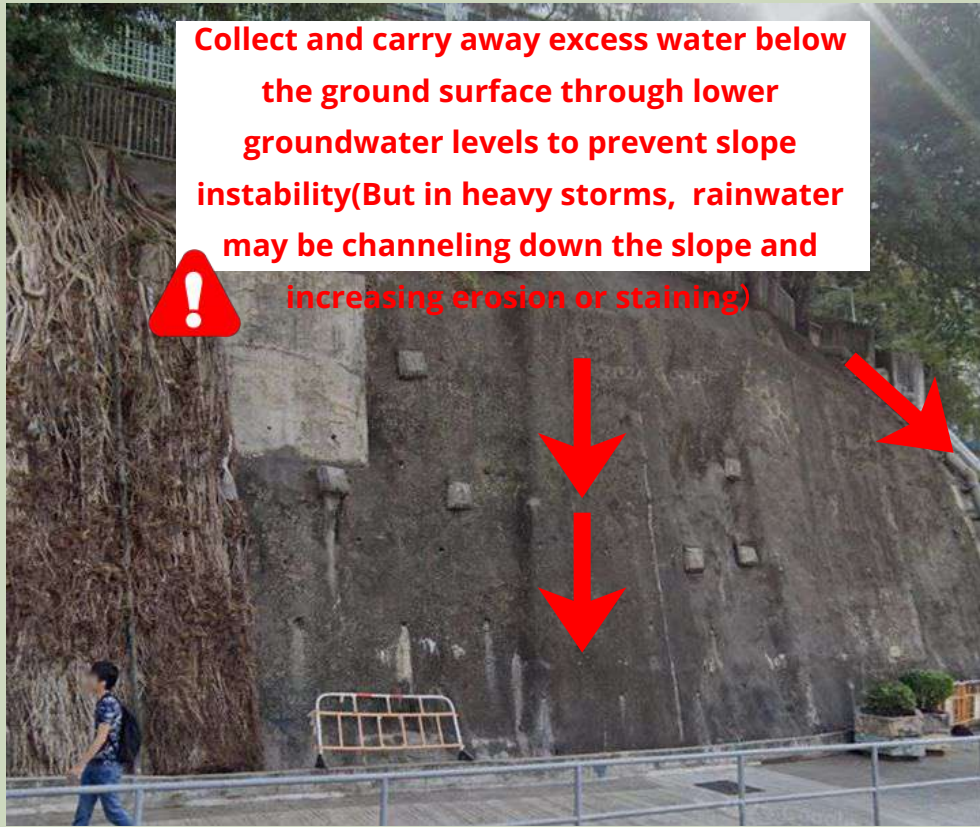
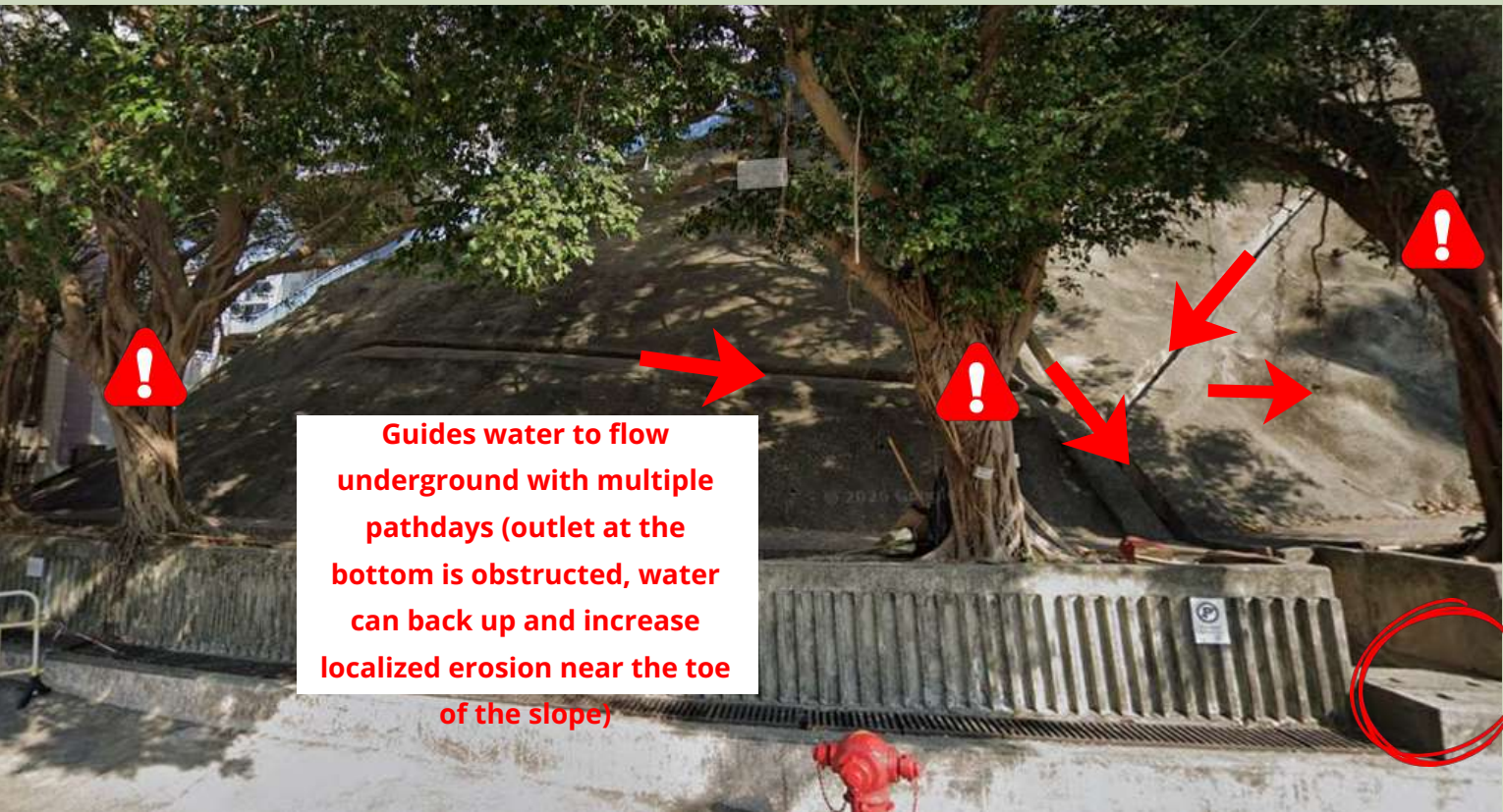
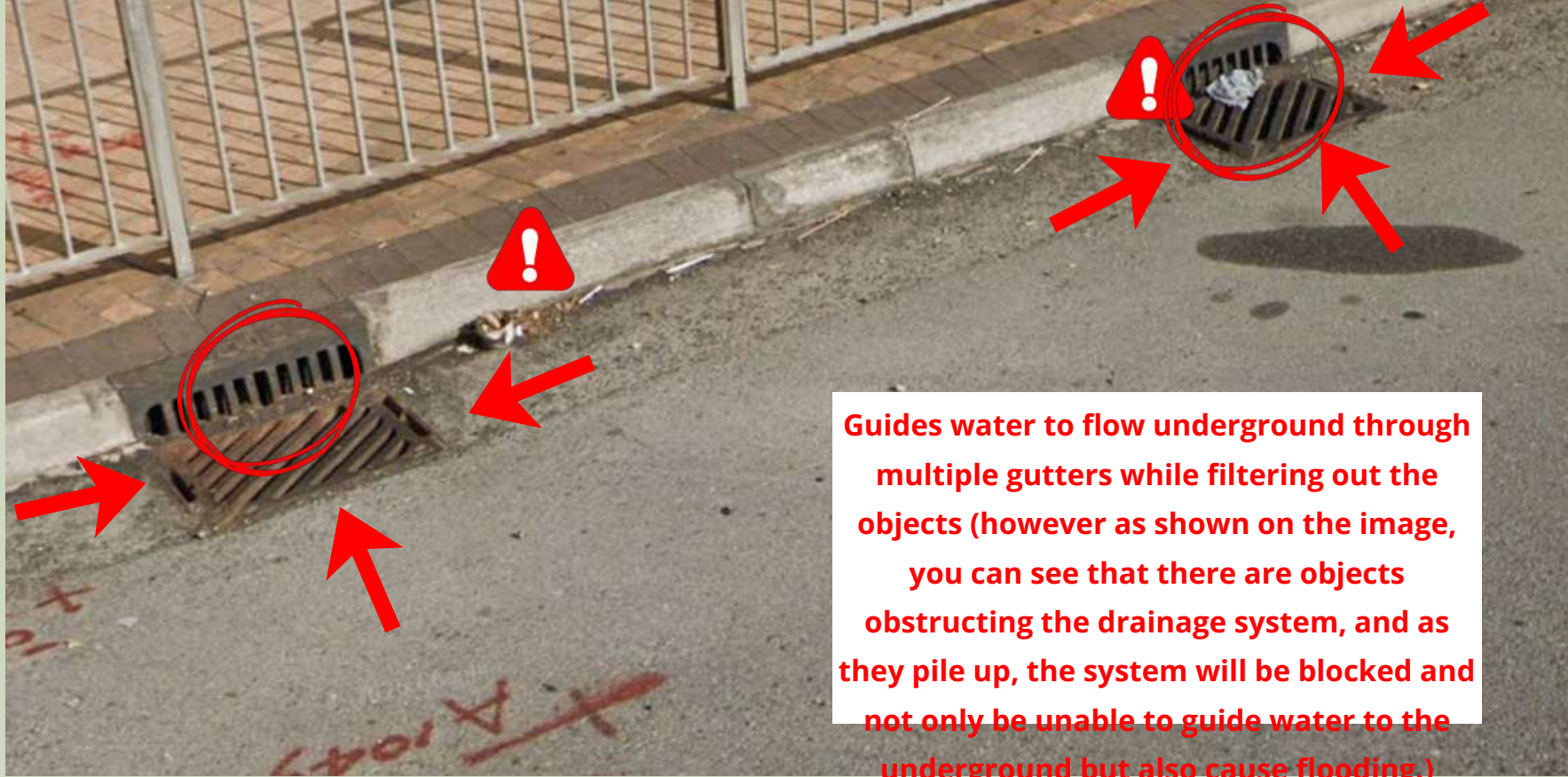
Disrupts local biodiversity and destroys native terrestrial habitats.

(2)

Relying on artificial drainage channels that require high maintenance

(3)

Visual & physical barrier that cuts residents off from green spaces



KEY

→ (Waterflow)

○ (Where the water ends up)

! (Hazards)



RESEARCH QUESTION & DESIGN GOAL

Research Question:

How can we integrate **nature-based solutions (NbS)** with **community design** to upgrade existing retaining wall infrastructure?

Design Goal:

To transform the current concrete retaining walls of Wah Fu Estate into thriving, self-sustaining ecological corridors that enhance biodiversity, mitigate urban heat, and foster community well-being through integrated nature-based solutions.

USER ANALYSIS

Resident needs and Community functions:



Seniors/Elders: Need more shaded rest points, gentle multi-level walkways (instead of steep paths), non-slip pathways



Families/Children: Need safe, accessible nature areas, social areas



Daily commuters: Relief from urban heat, safe pedestrian connection areas

Our Design Response:

- (1)** Integrated wooden benches and platforms. Wide, low-incline staircase landings that provide frequent rest zones and handrail support.
- (2)** Multi-coloured flower planters and bio-integrated greenery, creating vertical park spaces and eco areas directly adjacent to housing blocks.
- (3)** Deep-rooted structures to replace conductive and reflective concrete walls to cool down the area, provide separate relaxing areas for commuters to slow down.

BRIEF HISTORY - HK RETAINING WALLS



1800-1950's - The Masonry Era

- Hand-cut granite blocks with open gaps allowed natural water drainage and plant roots to grow freely.



• 1960s–1970s: Urbanisation & Concrete

- Rapid population growth, widespread use of thick concrete walls, sealing the soil and trapping urban heat.



• 1972–1977: Landslides & GEO Formation

- Tragic slope failures in Sau Mau Ping and Po Shan Road led to strict government slope regulation under the GEO.



• 1980s: Structural Rigidity & Soil Nailing

- Deep steel soil-nailing introduced across Hong Kong to permanently anchor unstable soil directly to bedrock.



• 2000s: High-Wall Drainage & Vegetation

- High concrete retaining walls built directly adjacent to urban housing blocks, relying on weeping pipes for water runoff.



• 2020s: Cascading Planter Boxes & Green Slopes

- Modular planter box terraces built along hillside steps to integrate cascading greenery and soften hard concrete infrastructure.

PALIFICATA VIVA LORICATA TERRASAFE (PLT) - ITALY



native plants grow underneath the mesh between tree trunks, reinforcing the structure

modular units made up of hollow steel frame and visible tree trunks

mesh tubes are filled with fertile soil in order to allow the growth of native plants.

Advantages:

- Strengthens over time (roots grow deeper)
- concrete-free
- biodiversity friendly

Disadvantages:

- Roots can take years to fully grow

GREENLOXX



Gridlocking mechanism - A stiff mesh grid is placed behind the mesh, this allows roots to grow and weave into the sheet, reinforcing the structure biologically

granulated material is placed at the bottom to support drainage

Advantages:

- Permeable mesh reduces water pressure buildup
- Near-vertical capability

Disadvantages:

- Requires years in order to reach target vegetation coverage.

DESIGN PRECEDENTS

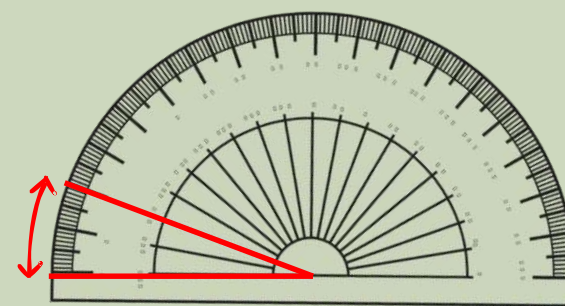
DESIGN PRECEDENTS



Exchange Square

Location: London Liverpool Street, UK, 2022

- Stair-like structure
- Large open areas
- Trees planted
- Deepens connection between community and nature

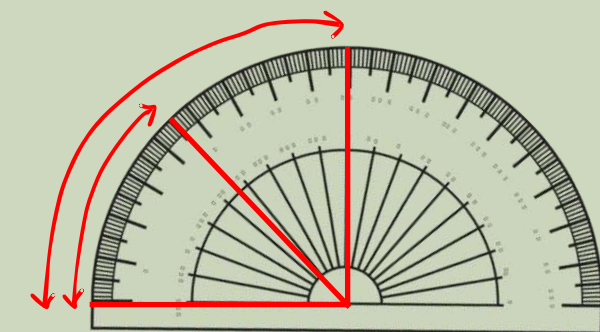


Examples for [0-20 degree]



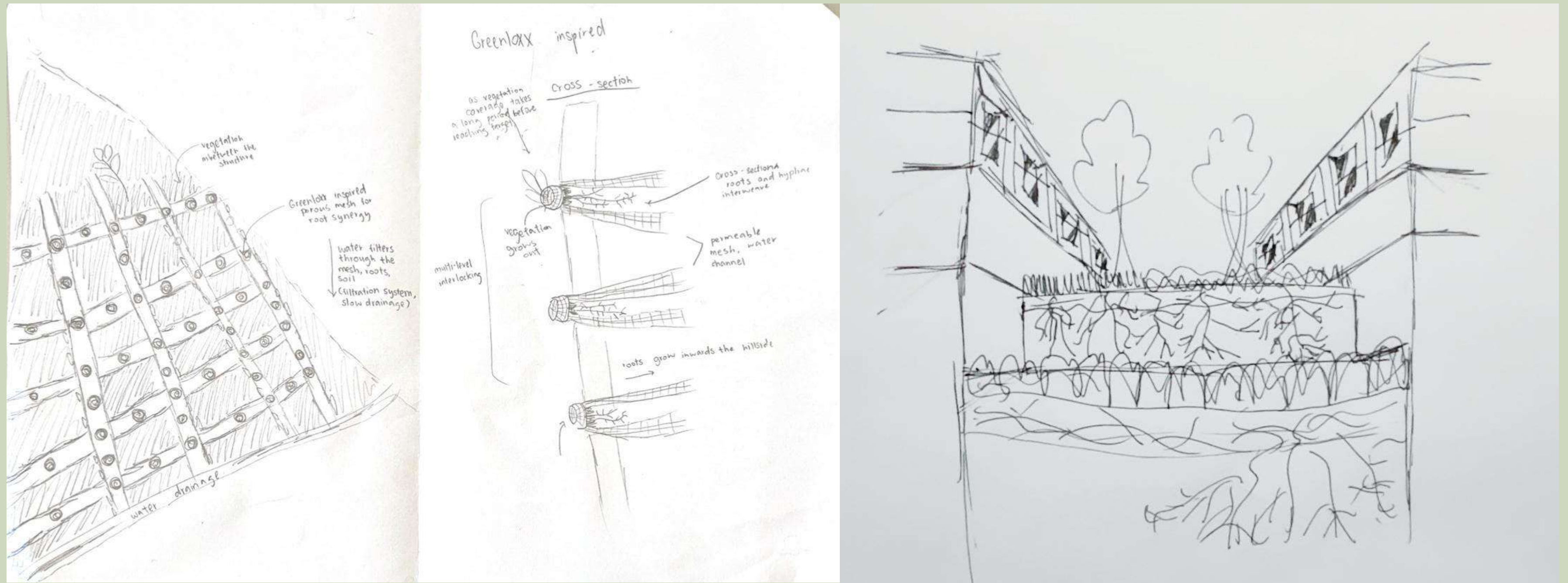
Lynton and Lynmouth Cliff Railway

Location: The Esplanade, Lynmouth, North Devon, UK



Examples for [46-90 degree]

PRIMARY SKETCHES



Inside the slope / technical details



Values on top of the slope/ the surface

COMMUNITY CONNECTION & COMMENTS:

Stair-like structure

Trees

Stairs

Social spaces



Plant roots

Resident comments:

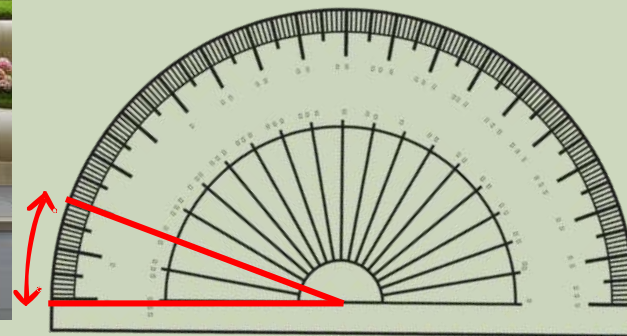
- Innovative idea
- Strong project - responds to future climate conditions
- Can add further social/sustainable features on the surface

4 CORE IDEAS:

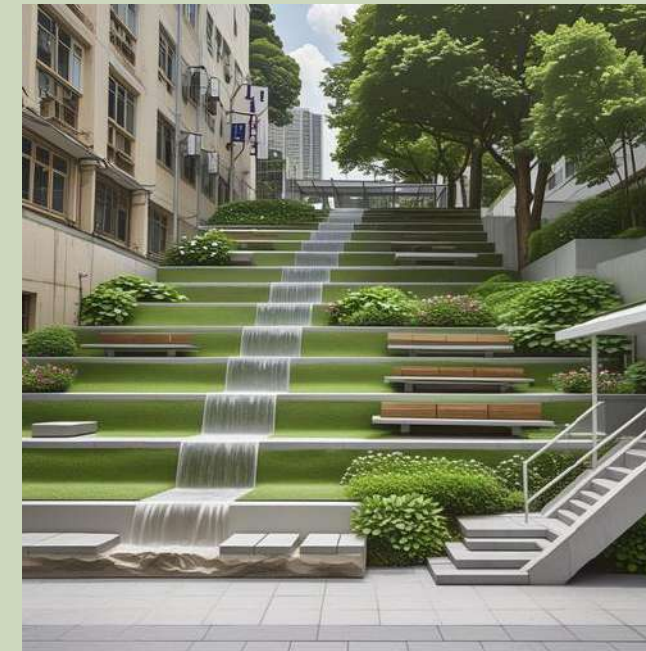
1. Safe Zone [0-20 degree]



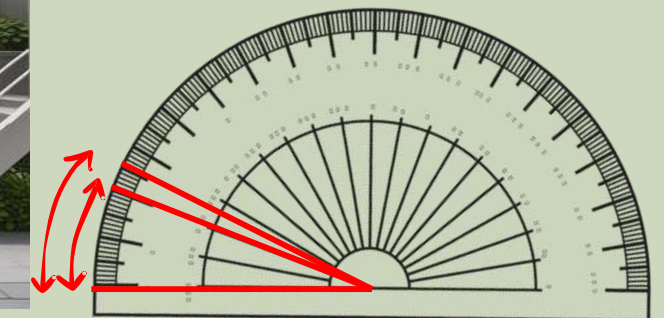
Elderly Zone



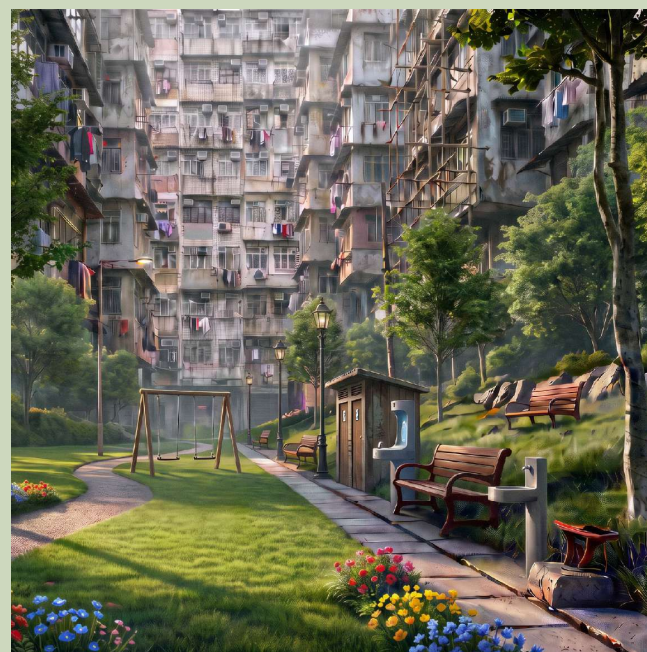
2. Transition Zone [21-26 degree]



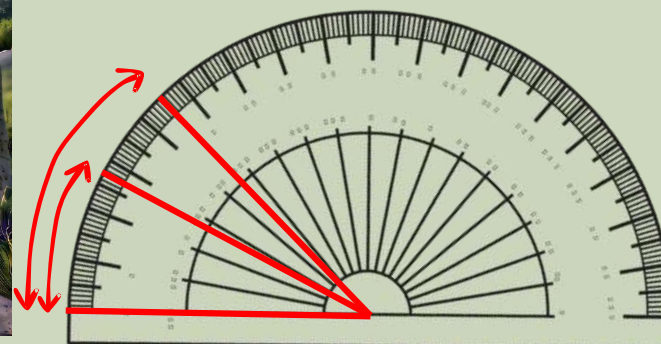
Commuters Zone



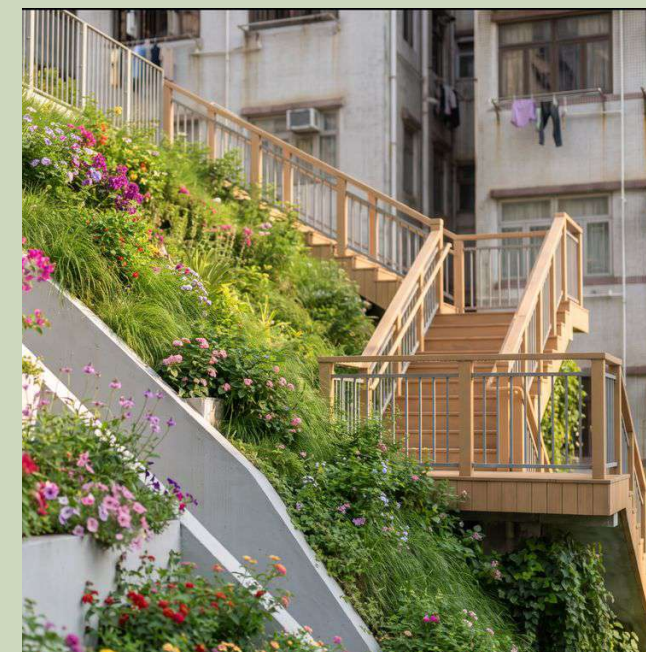
3. Wall Required [27-45 degree]



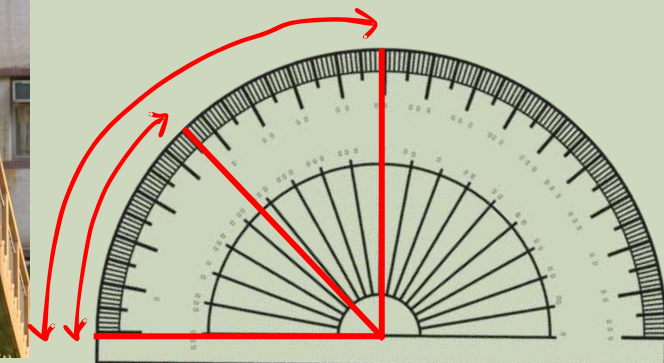
Family Zone



4. Critical Slope [46-90 degree]



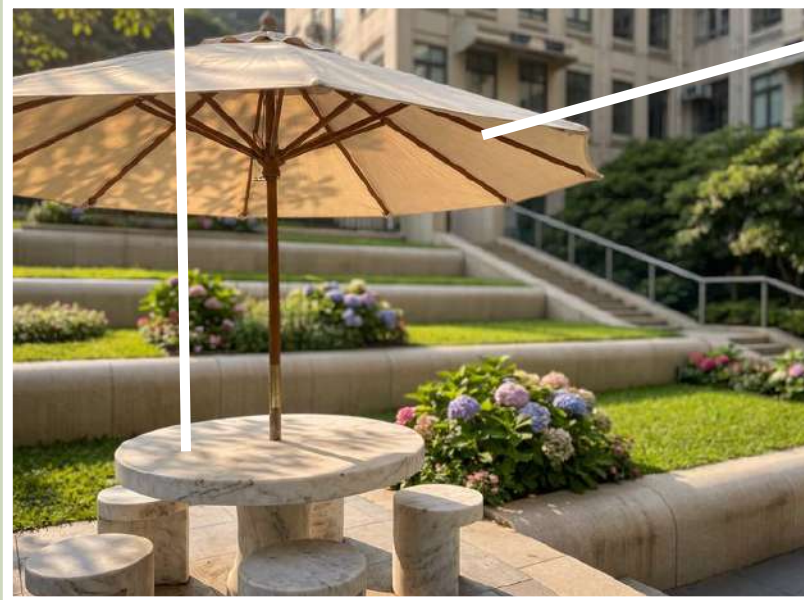
Greenery Zone





IDEA 1: SAFE ZONE (0° TO 20°) SLOPE

Marble tables and chairs with round edges



Parasols for shading



Staircase with handrails

Socialize with each other



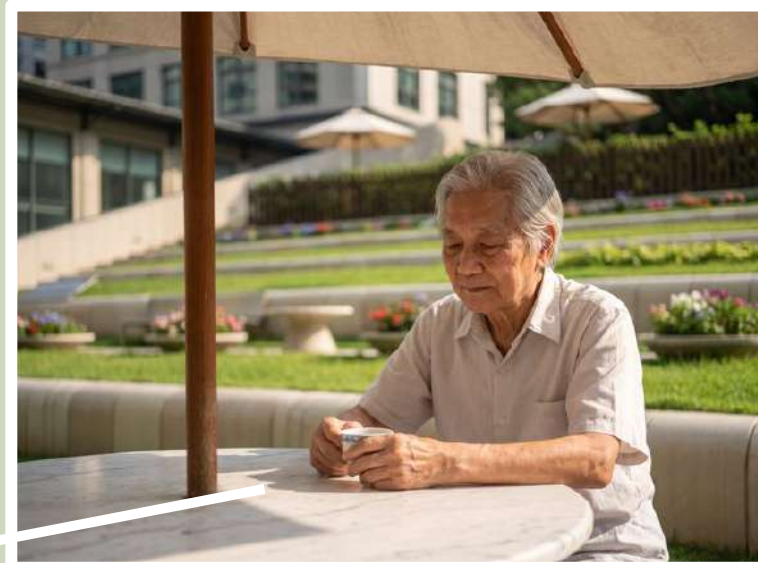
Chess for elderlies to play with



Wooden benches for resting



Rest under shades



Flowers and bushes planted



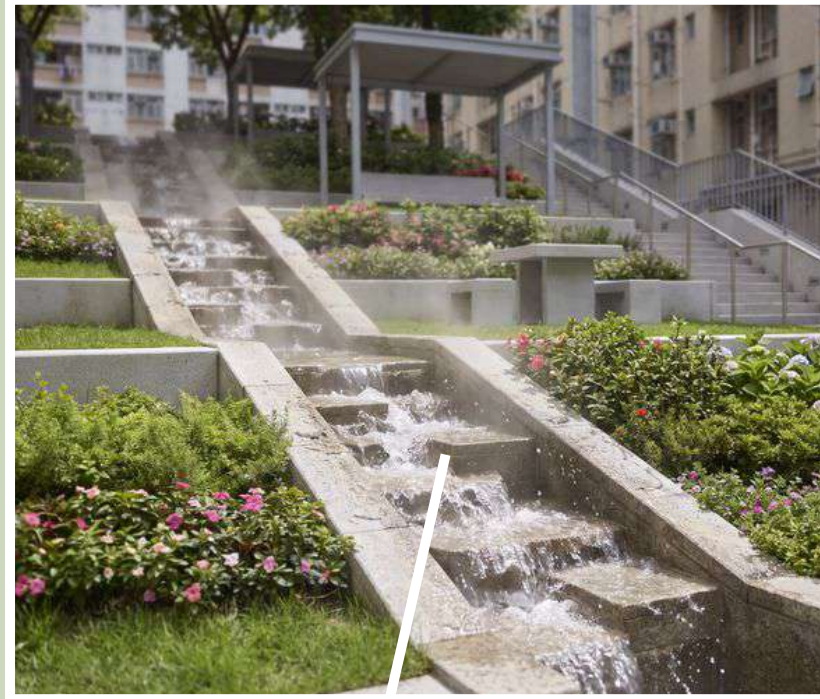
IDEA 2: TRANSITION ZONE (21° TO 26°)

SLOPE





Commuter taking a rest on the bench



Mini-waterfall for cooling



pavilion-like structure for shading



Residents chatting under the shade



Commuters socializing

Marble tables and chairs for socializing



Solar charging benches



Commuters charging laptop with solar charging bench

IDEA 3: WALL REQUIRED (27° TO 45°)

SLOPE



COMMUNITY
ACTIVITIES

Swings for children to play with



Flowers and grass for fresh air



Roadlights are available for nighttime when it is dark



Large area of grass allows families to have picnics or just have a conversation

Benches for resting or for parents to sit down while their child is having fun



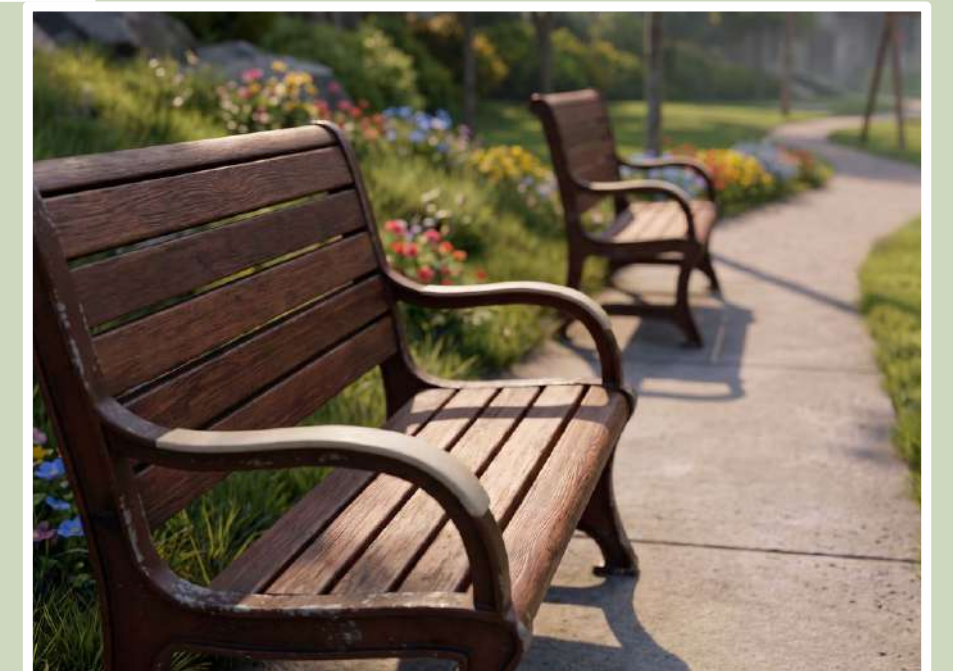
Grass and shade for people to sit down and chat or just relax



People can sit on the benches and have their own private time



Children are able to run around and have fun because of the large amount of land



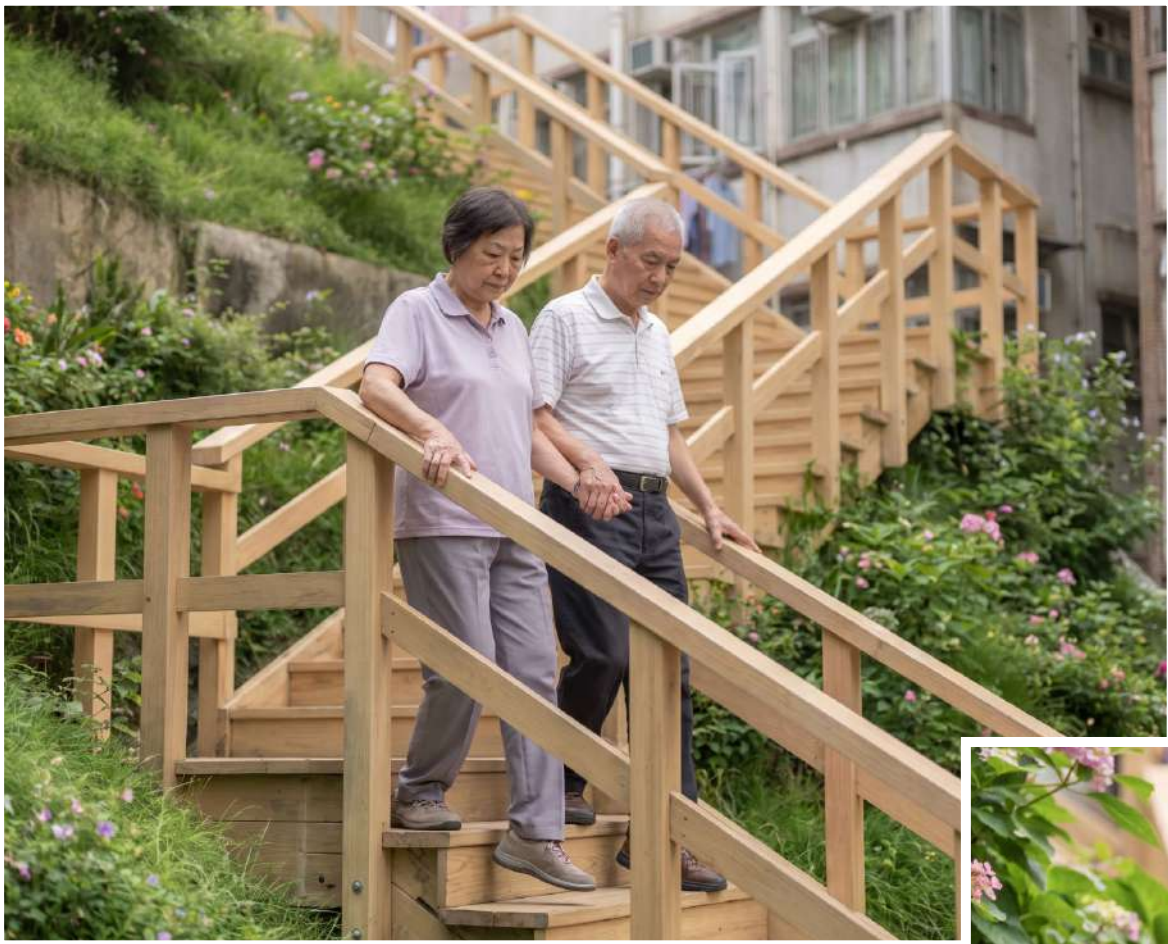
Benches for resting or for parents to sit down while their child is having fun

IDEA 4: CRITICAL SLOPE (46° TO 90°) SLOPE



**Stair railing for support and stable holding,
especially for the elderly and older residents**

**Flowers and bushes planted on the steep wall for
fresh air and aesthetics**

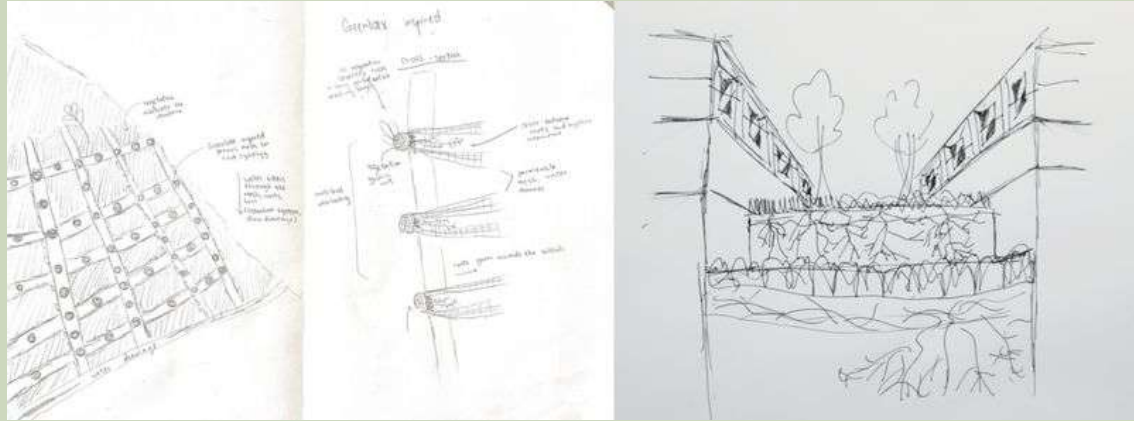


**Plants around can inspire
children's to observe while
walking along the staircase**

**Staircase for residents to walk along
the slope to travel up and down to
the place they want to go to**



REFLECTION:



The Vibe; The Space; The Detail

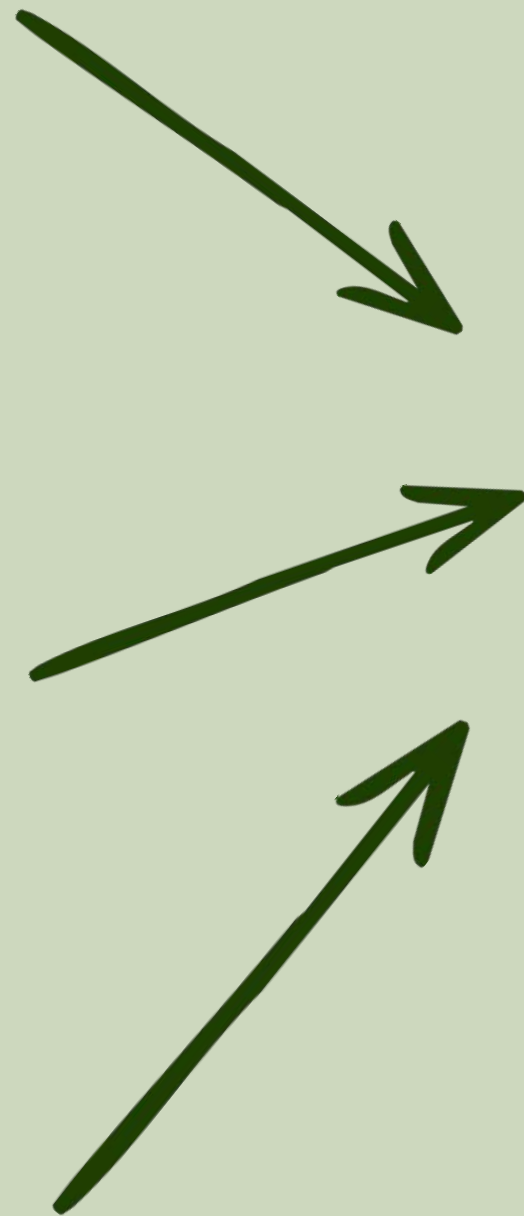
Vibe:



Space:



Detail:



We know that...

- still needs lots of improvements and modification

We've learned about...

- using different tools
- different building structures and their pros and cons
- the effects of concrete walls on surrounding natural environments



“The slopes we build with strength and grace, will keep human steps and green in place.”





第三屆 青年建築師計劃



Digital Common(s)
數碼共同體

Design Scientist 2026 Incubation Program
The 3rd Annual Program of The Citizen Architect Initiative



AI-For-Good 仿生設計夏令營

Artificial Intelligence & Biomimicry Design Workshop | Summer Cohort

