GREEN OPEN SPACE IMPLEMENTATION ON THE UNDERGROUND BUILDING
01

INTRODUCTION

Definition & Function of Green Open Space for the Sustainable Cities
INTRODUCTION

- Green Open Space (GOS) as described as an open place to grow plants both naturally or intentionally planted.
- GOS is also associated with sustainable cities because of its various functions, namely as a carbon capture area (carbon sink), maintenance of biodiversity, location of aquifers, and air pollution control.
- Based on the underground building development plan, the type of GOS is determined from the estimated surface area that can be converted into its function of GOS, above the underground building.
- Using design of **Underground Gas Insulated Substation**. The specific function of the building, and the potential location in the high-density population, it could be an attractive object to be a further consideration.
02

THEORETICAL BACKGROUND

Theory/theories that are used for this particular study
THEORETICAL BACKGROUND

Green Roof Layers: including building roof, insulation layer and waterproofing, protective layer and shelter, drainage layer, plant root boundary layer, plant growth media, plants, and vegetation.

Types of Green Roof are divided into 2 (two) types, namely: Intensive Type and Extensive Type.

| No | Vegetation          | Function                                                      |
|----|---------------------|---------------------------------------------------------------|
| 1  | *Ixora coccinea*    | Absorption of rain water on the green roof (Vacari et al., 2019) |
| 2  | *Axonopus compressus* | Absorption of rain water on the green roof (Vacari et al., 2019) |
| 3  | *Ipomoea batatas*   | Absorption of CO₂ (Chow et al., 2018)                         |
| 4  | *Sedum mexicanum*   | Absorption of CO₂ (Chow et al., 2018)                         |
| 5  | Cactus              | Aesthetics                                                   |
METHOD

How to Conduct the Research
METHOD

TYPE OF RESEARCH
Using a quantitative approach, this study described data processing for the provision of GOS.

TOOLS
AUTOCAD, Google Earth, and SKETCHUP will determine:

- the area of GOS
- Percentage of vegetation
- The number of shade trees
04

RESULT et DISCUSSION

Presentation of Findings, the Explanation and Interpretation of Result
GOS ON UNDERGROUND GIS

Using a green roof structure, its soil layer is divided into 6 layers to provide growing medium. The type of green roof is intensive type

WATERPROOFING LAYER

The Underground GIS will be coated with combination of pre-application and post-application.

RESULT

DESIGN OF GOS ON UNDERGROUND GIS

TYPE OF GOS

| Variable        | Operational Definition                                                                 | Unit of Measurement | Measurement Tools |
|-----------------|----------------------------------------------------------------------------------------|---------------------|------------------|
| Area of GOS     | The minimum area of GOS “Taman Rukun Warga” in urban areas is 0.5 m² per resident, with a minimum area of 1,250 m² | m²                  | Google Earth, AutoCAD, Sketchup |
| Type of GOS     | GOS “Taman Rukun Warga” serves one resident in the form of 70%-80% green space, and the rest can be in the form of a hardened yard as a place to implement activities. There are at least 10 (ten) shade trees of small or medium tree species. | % of green space, unit of shade trees | Google Earth, AutoCAD, Sketchup |
DISCUSSION

Land Surface Allocation, explains that the proportion of the built-up area for the entire Underground GIS land is planned to be 26%.
05

CONCLUSION

Synthesis of key points
CONCLUSION

- by adding **public activity spaces** and arranging **layout of GOS**, this study found that those aspects must be **considered in designing green open space** above underground buildings.

- Underground GIS can become a **built environment** that can **reduce** the ecological footprint, generate benefits for the environment, and make the growth of urban space more **sustainable and livable**
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THANK YOU

IRMA NOVALIA INDIRA et HERDIS HERDIANSYAH

SCHOOL OF ENVIRONMENTAL SCIENCE
UNIVERSITAS INDONESIA