3D Zoning: A Missing Piece to Link Planning Regulations with 3D Cadastre

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STARTING POINT OF THIS REFLECTION



- PhD Research Project
 - Modeling Land-use Regulations as Part of 3D City Models
 - Detecting Potential Conflicts Automatically
- Such Restrictions, Should They Be Represented Within 3D Cadastre?!

MODELING LAND-USE REGULATIONS





MULTIPURPOSE CADASTRE CONCEPT



• YES !

- Representing Usable/Restricted
 Spaces
- Multipurpose Cadastre
 - Linking Planning Restrictions With 3D Cadastre
- How Can Planning Restrictions Be Linked With 3D Cadastre?



(Ref: Dale et McLaughlin 1988 - Multipurpose Cadastre Concept)



LINKING PLANNING RESTRICTIONS WITH 3D CADASTRE

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- Missing Piece:
 3D Zoning
- Possible Solution:
- Enriching 3D Zoning With A Spatial Representation of Planning Restrictions





(https://archistar.ai/for-property-developers)

ZONING

- What is Zoning?
- How does it work?
- Shortcomings
 - Complexity of Interpreting Ο **Planning Documents**
 - Primary/Secondary Sources
 - Schedules & Guidelines
 - Multi-Dimensionality of Planning Ο Restrictions

DO WE HAVE A 3D ZONING?



MELBOURNE ZONING BASE MAP



(Color-Coded Based on Different Zones)

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3D ZONING



- Software Development Companies (e.g., ESRI, Gridics, MODELUR)
- Cities (e.g., Toronto, Vancouver, Washington D.C)
- Shortcomings:
 - Not Being Fully Operational
 - No Linkage With 3D Cadastre

Can We Map All Planning Restrictions into 3D Cadastre?!



WASHINGTON D.C 3D ZONING



(https://maps.dcoz.dc.gov/3d/)

(Color-Coded Based on Different Zones)

MAPPING USABLE AND RESTRICTED SPACES



- NO !
- WHY?
 - Planning Information
 - Physical/Legal Land Objects
- What Are Potential Planning Restrictions?



SOME PLANNING RESTRICTIONS



CATEGORIZING LAND-USE REGULATIONS

MELBOURNE





EXAMPLE







Specified Restrictions of Regulations Based on Schedule 67 to Clause 43.02 Fishermans Bend - Lorimer Precinct

Height Limits: 36 meters;

(10 Storeys)

Noise Impacts: 300 meters distance from the nearest lane of specified freeways

 <u>Street Setbacks (front</u> and side):

5 meters from street wall height level up to the height limits

- Front Street Wall (8 storeys height)
- Side Street Wall (6 storeys height)

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Side and Rear Setbacks: 5 meters from street wall height level up to the height limits

Flooding Limits: 2.4 meters

Based on either predicted
 2100 1% Annual Exceedance
 Probability (AEP) flood level
 or Nominal Flood Protection
 Level (NFPL)



Restricted Spaces

Height Limits - Street Setbacks - Side & Rear Setbacks -Noise Impacts - Flooding Limits

Usable Spaces







- 3D Zoning Can Enable:
 - Visualizing Restricted and Usable Spaces (For All Parties)
 - Designing Buildings in Accordance With Regulations (For Architects)
 - Defining New Ownership Boundaries for Multi-Owned Buildings (For Land Surveyor)
 - Faster Decision-Making Process (For Planning Authority)
 - Having Multi-Purpose Cadastre!





- Qualitative Reasoning: Discretionary & Mandatory Rules
- Reaching a Generic Approach: Difference in the Description of Planning Rules
- Data Linkage and Accessibility: Data Quality and Standardization
- 3D City Models: Combining 3D Zoning with 3D City Models
- Automatic Enrichment of 3D Zoning



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THANK YOU!

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QUESTIONS?