

# Simple Architecture for a Living 3D Model of the Metropolis

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cultivating spatial intelligence®

# Metropolitan Scale 3D



# Goals: Improve Planning Effectiveness

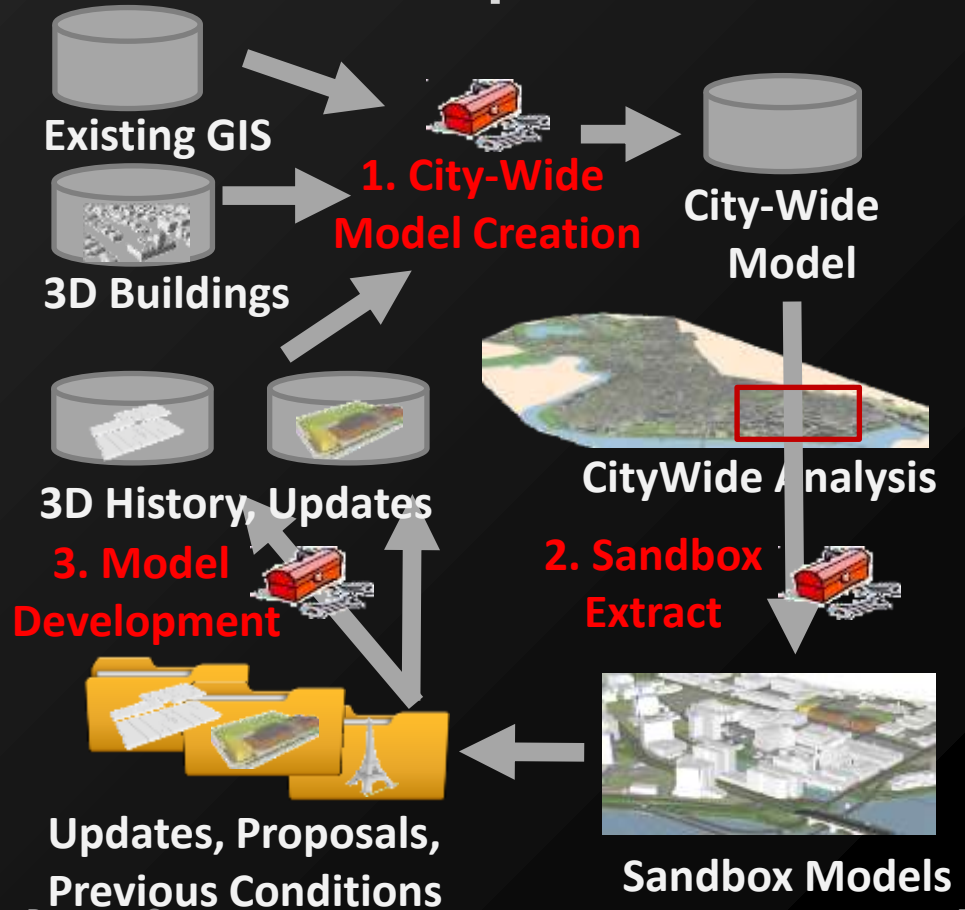
- Provide 3D context for planning and design:
  - Current conditions
  - Historical conditions
  - Approved projects
  - Proposed future scenarios
- Improve public information & participation
- Provide context for public safety applications

# Principles: Information Stewardship

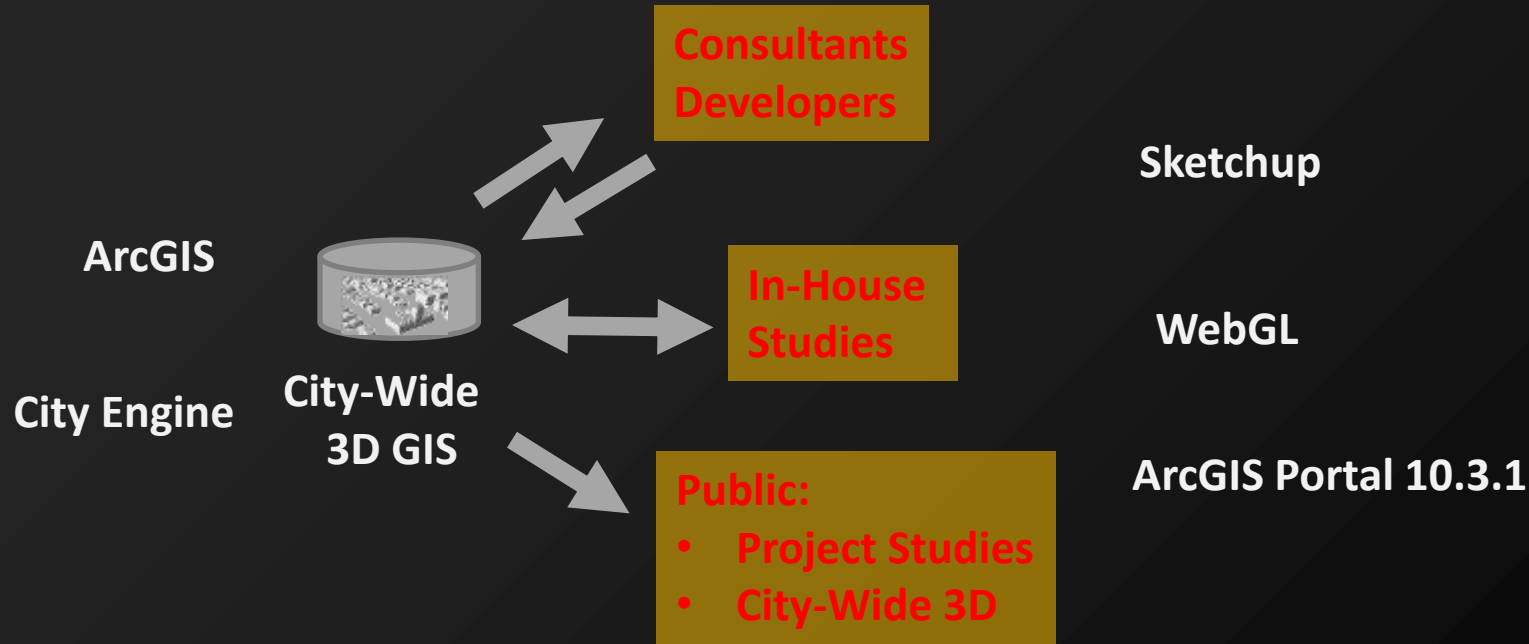
- Information created by consultants and in-house analysts should be consolidated.
- Updates and improvements to model should be distributed.
- Exchange 3D models with design applications
- Maintain catalog of proposals & source documents.
- Remember past form of the city

# Develop 3D as Part of Municipal GIS

- Build optimized data model
- Extract Design Sandbox Models
- Generate design Ideas
- Integrate updates, improvements and design schemes



# Information Lifecycle in Planning





# Existing Planimetrics Optimized for City-Wide 3D Model

**Tree Heights  
from LIDAR**

Photogrammetry  
by InfoTech 2010

**Benches and  
Street Furniture**

**Detailed Terrain  
and Ground Plan**

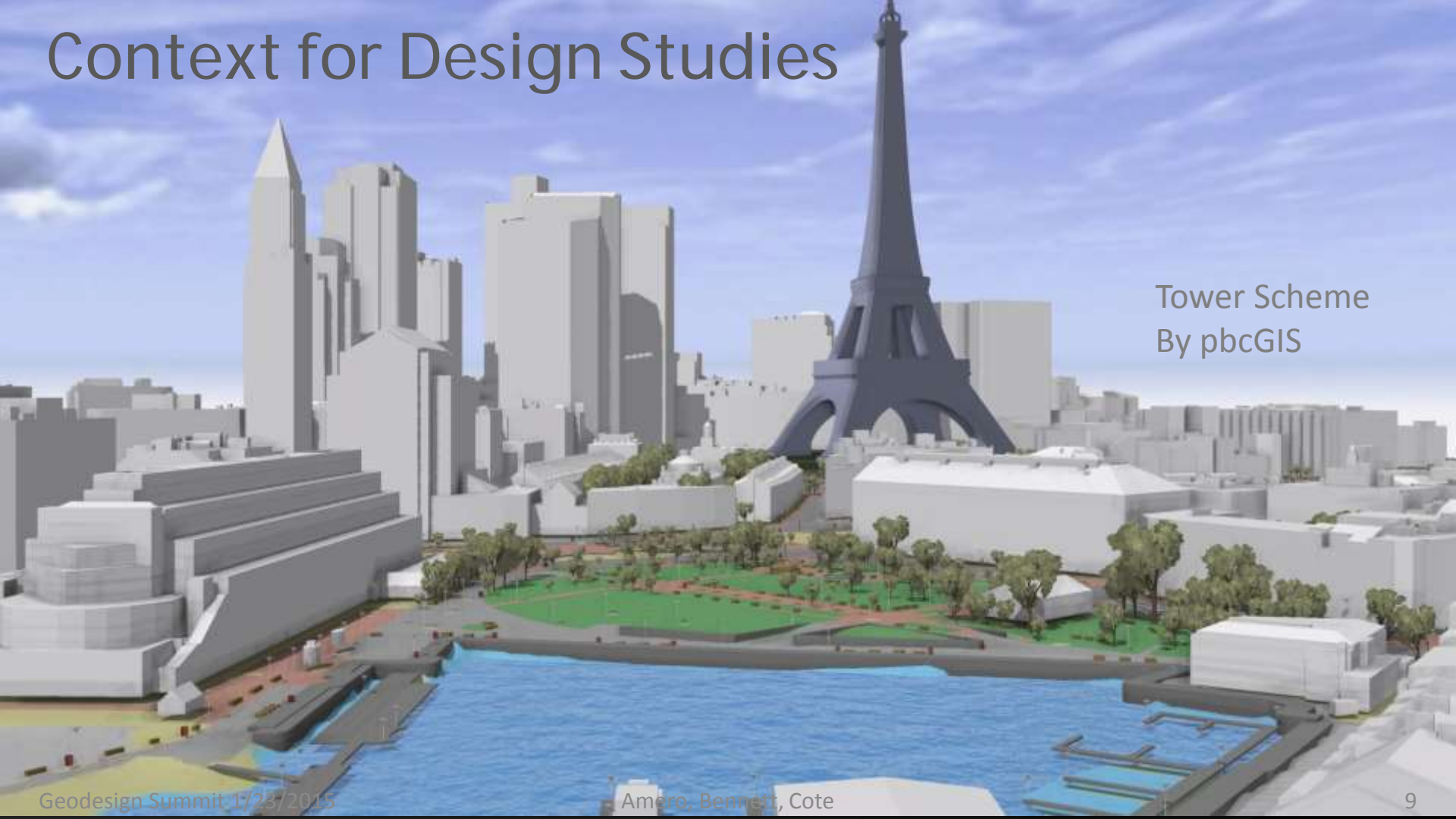
# Inexpensive 3D Building Models from Existing Stereo Imagery

Photogrammetry  
by Cybercities3D





# Context for Design Studies



Tower Scheme  
By pbcGIS

# Metropolitan-Scale Visual Studies



# Web-Based Shadow Studies





# Manage Updates and Improvements



Boston City Hall  
By Cybercity3D

# Manage Updates and Improvements



Boston City Hall  
By Google



# Manage Updates and Improvements



Boston City Hall By  
Parsons Brinckerhoff

# Simple Schema for Managing Updates and Improvements

**Never delete buildings from Snapshot!!!**

| OBJECTID | Shape      | Name      | Appear | EGID            | Disappear | Render  |
|----------|------------|-----------|--------|-----------------|-----------|---------|
| 8001     | MultiPatch | <Null>    | <Null> | <Null>          | <Null>    | current |
| 8002     | MultiPatch | <Null>    | <Null> | <Null>          | <Null>    | current |
| 8003     | MultiPatch | <Null>    | <Null> | <Null>          | <Null>    | current |
| 8004     | MultiPatch | <Null>    | <Null> | <Null>          | <Null>    | current |
| 2418     | MultiPatch | City Hall | <Null> | Boston_00009222 | <Null>    | supress |

1 of 8004 selected

**Table for Updates and Alternative Models**

| OBJECTID | SHAPE      | Name                                   | Appears  | Disappears | Render    |
|----------|------------|--|----------|------------|-----------|
| 3        | MultiPatch | Boston City Hall by Google             | 1/1/1968 | 1/1/2099   | alternate |
| 7        | MultiPatch | Boston City Hall by Parsons Brinckerhc | 1/1/1968 | 1/1/2099   | current   |

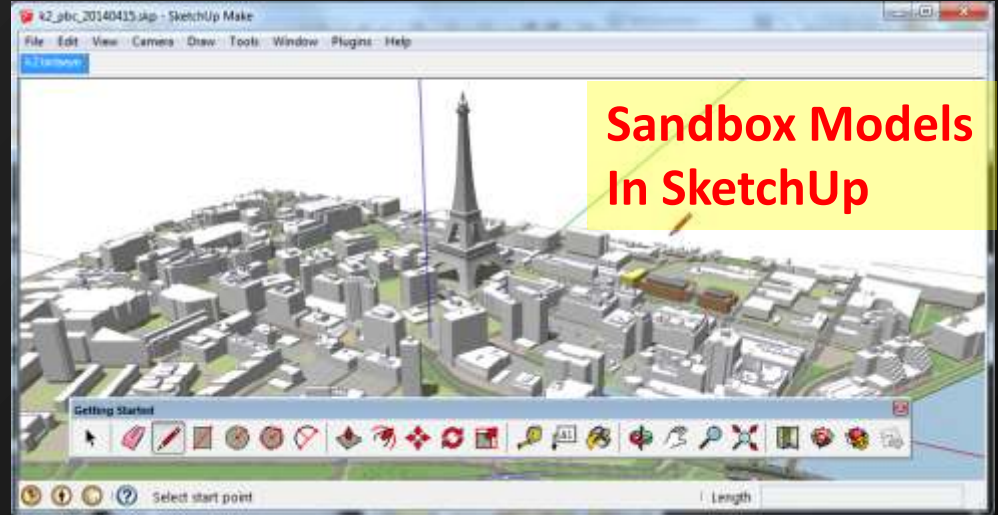
Click to add new row.

# Specification for Submitting Design Schemes

## Traditional Submission (PDF)



## Sandbox Models In SketchUp



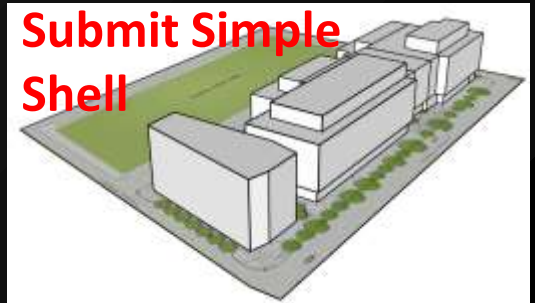
ArcMap ↔ CityEngine



Design Tools



## Submit Simple Shell





# Planning Studies: Existing Condition

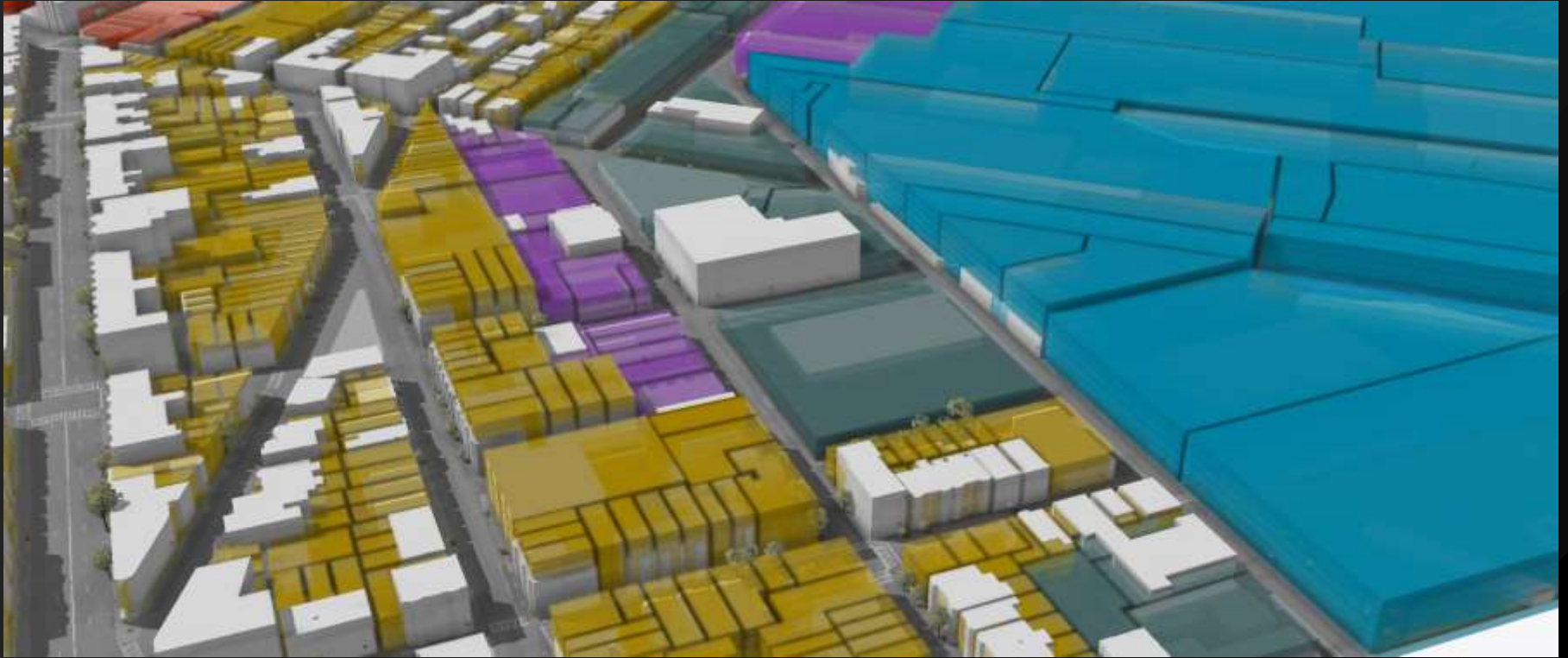


# Planning Studies: Approved Projects





# Planning Studies: Zoning Heights



# Save History of City Including Design Proposals

1. Annotate Model

Appear Date  
#2014-01-01#

DisappearDate  
#2099-01-01#

AppearNote  
"What is the source of the appearance info?"

Disappear Note  
"What is the source of the disappearance info?"

Render Flag  
"current"

Name  
"Enter Name"

Input Layer  
125 Binney\New Buildings Textured

OK Cancel Environments... Show Help >>

**Model Ingest  
Form**



BuildingChange\_MP

|   | OBJECTID * | SHAPE *    | Name                         | Appear   | Disappear | status     | Render   |
|---|------------|------------|------------------------------|----------|-----------|------------|----------|
| ▶ | 2          | MultiPatch | 125 Binney Block             | 1/1/2014 | <Null>    | Built      | Current  |
|   | 3          | MultiPatch | 125 Binney Cleared Buildings | <Null>   | 1/1/2014  | Demolished | Historic |

**Data-Driven  
Model Views**

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Model Ingest Form

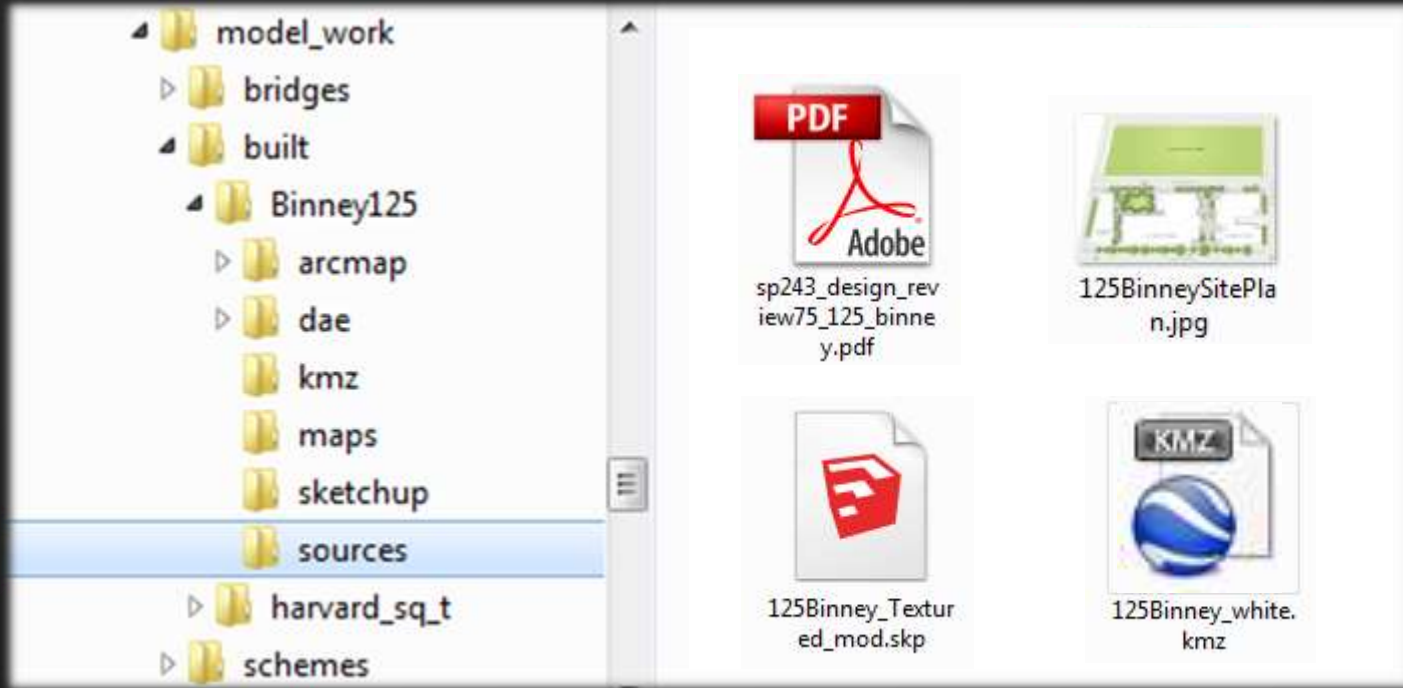


BuildingChange\_MP

|  | OBJECTID * | SHAPE *    | Name                         | Appear   | Disappear | status     | Render   |
|--|------------|------------|------------------------------|----------|-----------|------------|----------|
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Data-Driven  
Model Views

# Archive Source Documents for Updates and Schemes



# Challenges

- Developers share information only when required
- Designers must be sold on new information sources and new tools.
- Learning Curve for GIS Staff:
  - Data management requirements are simple.
  - 3D model QA and transformations requires training.



# Next Steps: Model Development

- Prepare & share sandbox models for master-plan areas. Olympics sites???
- Create bridge models & improve viaducts.
- Improve models of distinctive buildings.
- Model projects in approval pipeline.
- Create 3D zoning themes

# Next Steps Web Development

- Develop web-based city-wide model (ArcGIS Portal)
- Develop tiled sandbox models for sharing on web.
- Develop custom webscene viewer for WebGL scenes

# Next Steps: Outreach

- Reach out to in-house planners and authorities.
- Connect with BRA Urban Design Technology Group
- Reach out to design community.
- Advance protocols for submitting models
- Training for city workers: GIS and Design
- Training / information for developers and consultants

# Thank You

- For more information: [www.pbcGIS.com/boston3d](http://www.pbcGIS.com/boston3d)



City of Cambridge  
Geographic Information System



**BRA** | OFFICE OF GEOGRAPHIC  
INFORMATION SYSTEMS



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