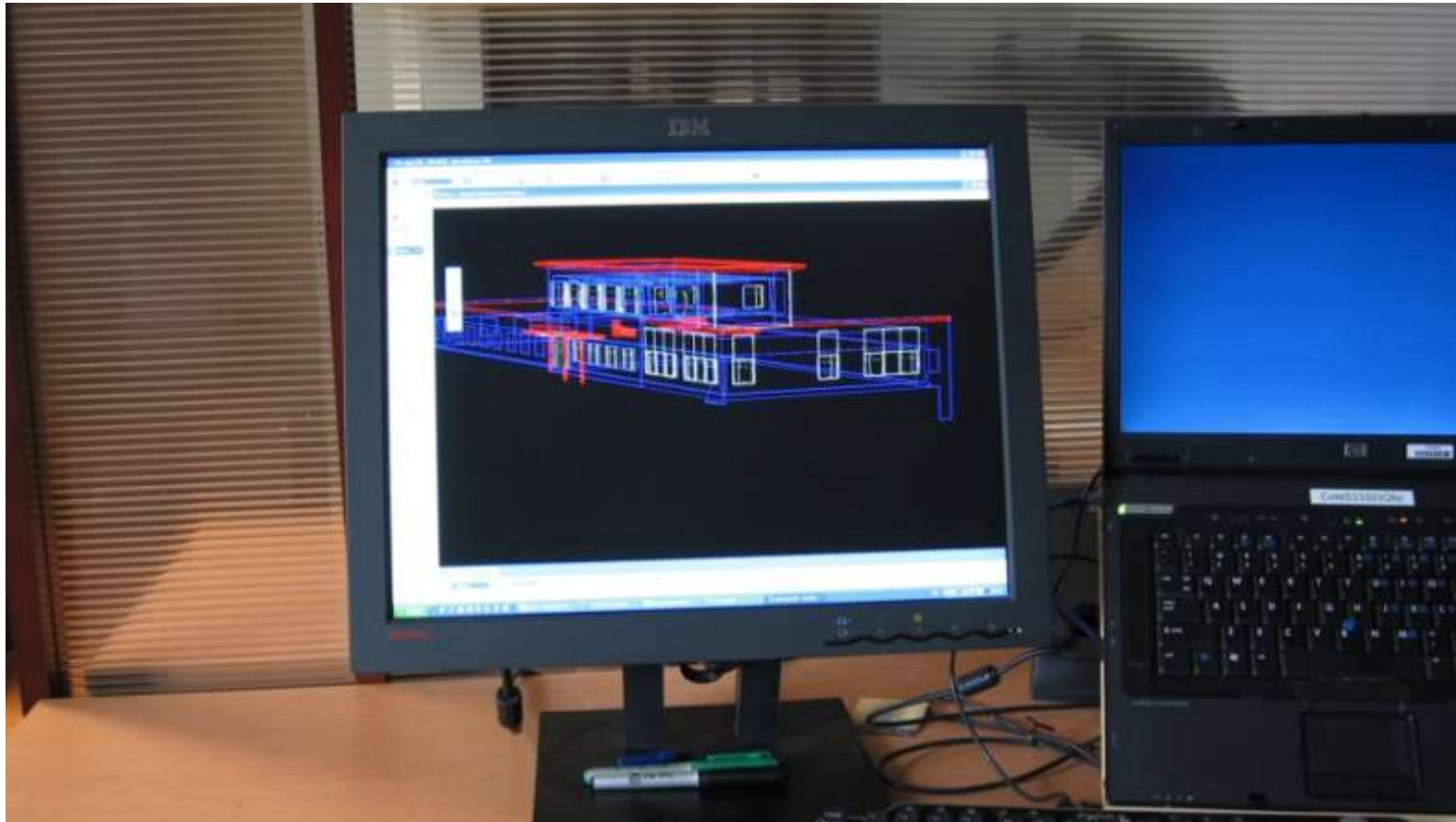


Onsite infrastructure asset identification and query using augmented panoramas.

Applied Research Group
Bentley Systems



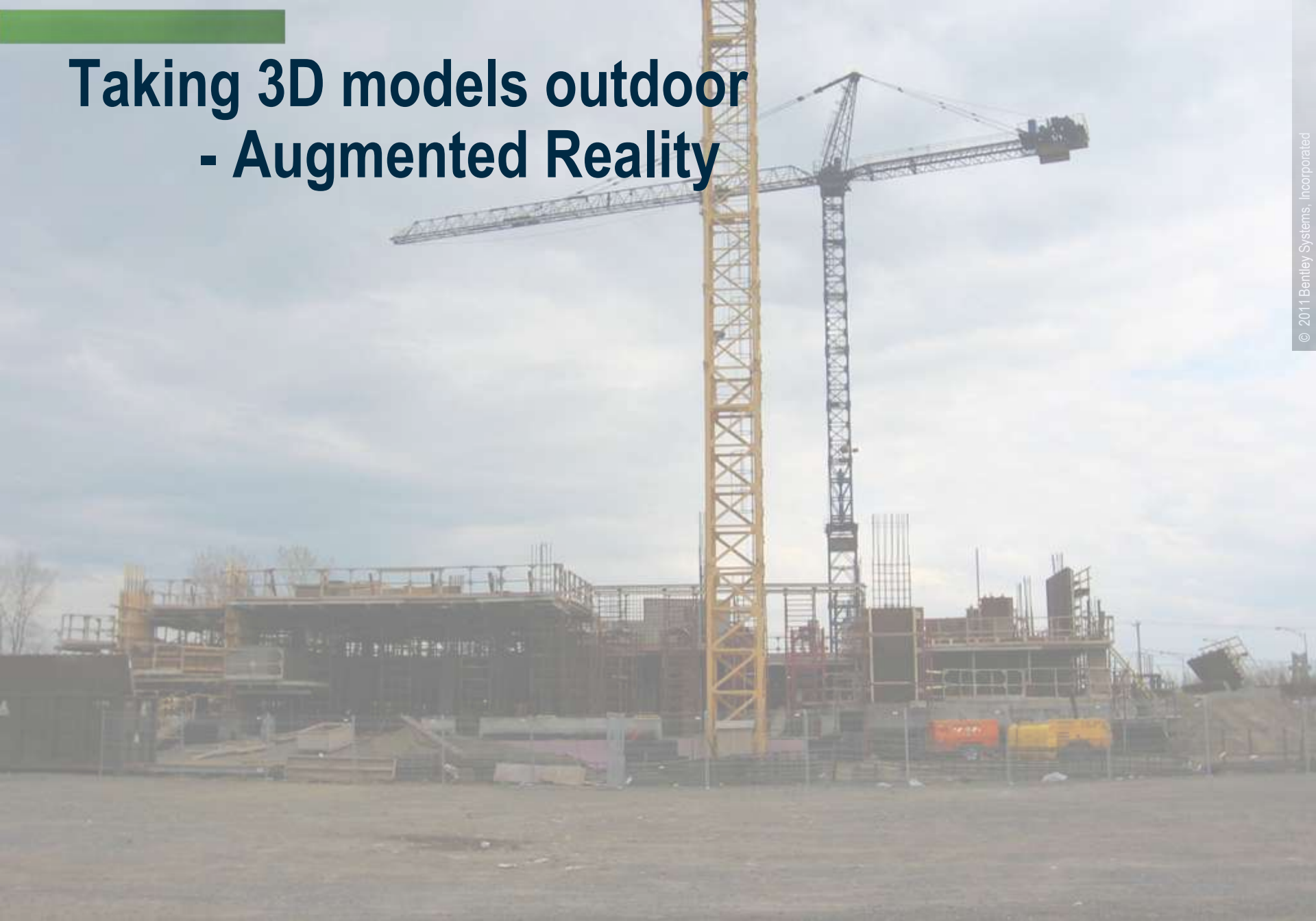
3D infrastructure models



3D infrastructure models



Taking 3D models outdoor - Augmented Reality



Augmented Reality



Augmented Reality



Augmented Reality



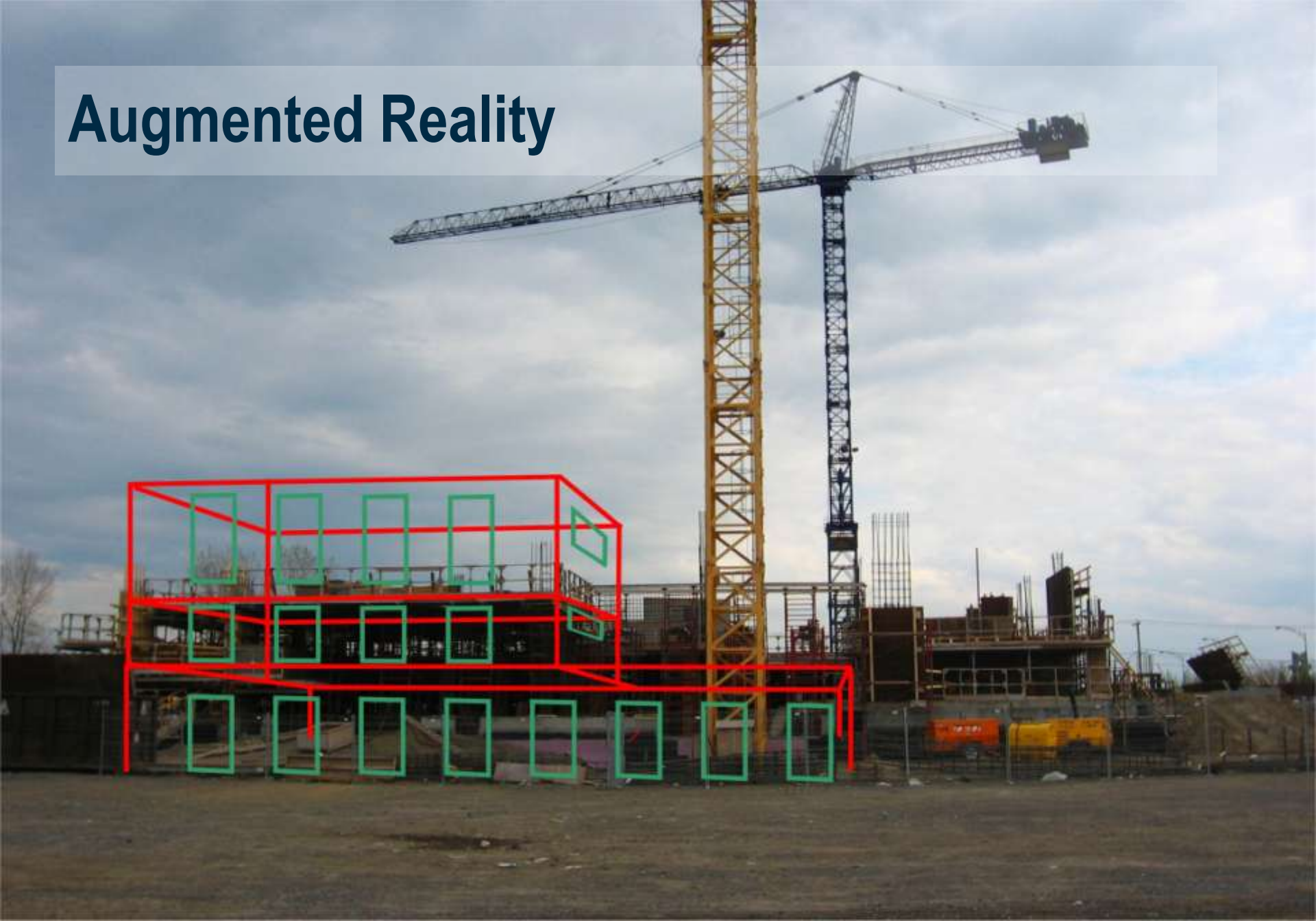
Augmented Reality



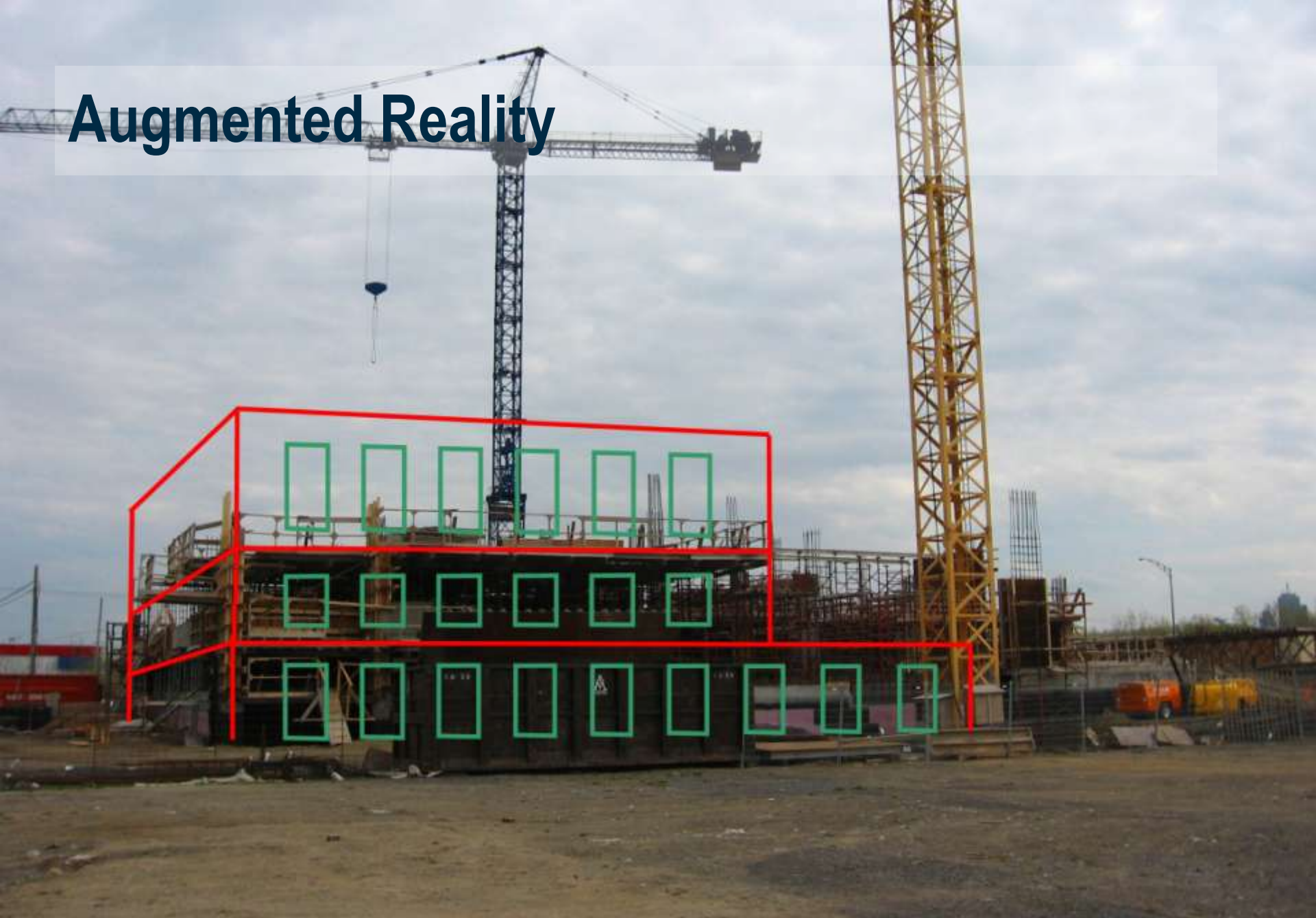
Augmented Reality



Augmented Reality



Augmented Reality

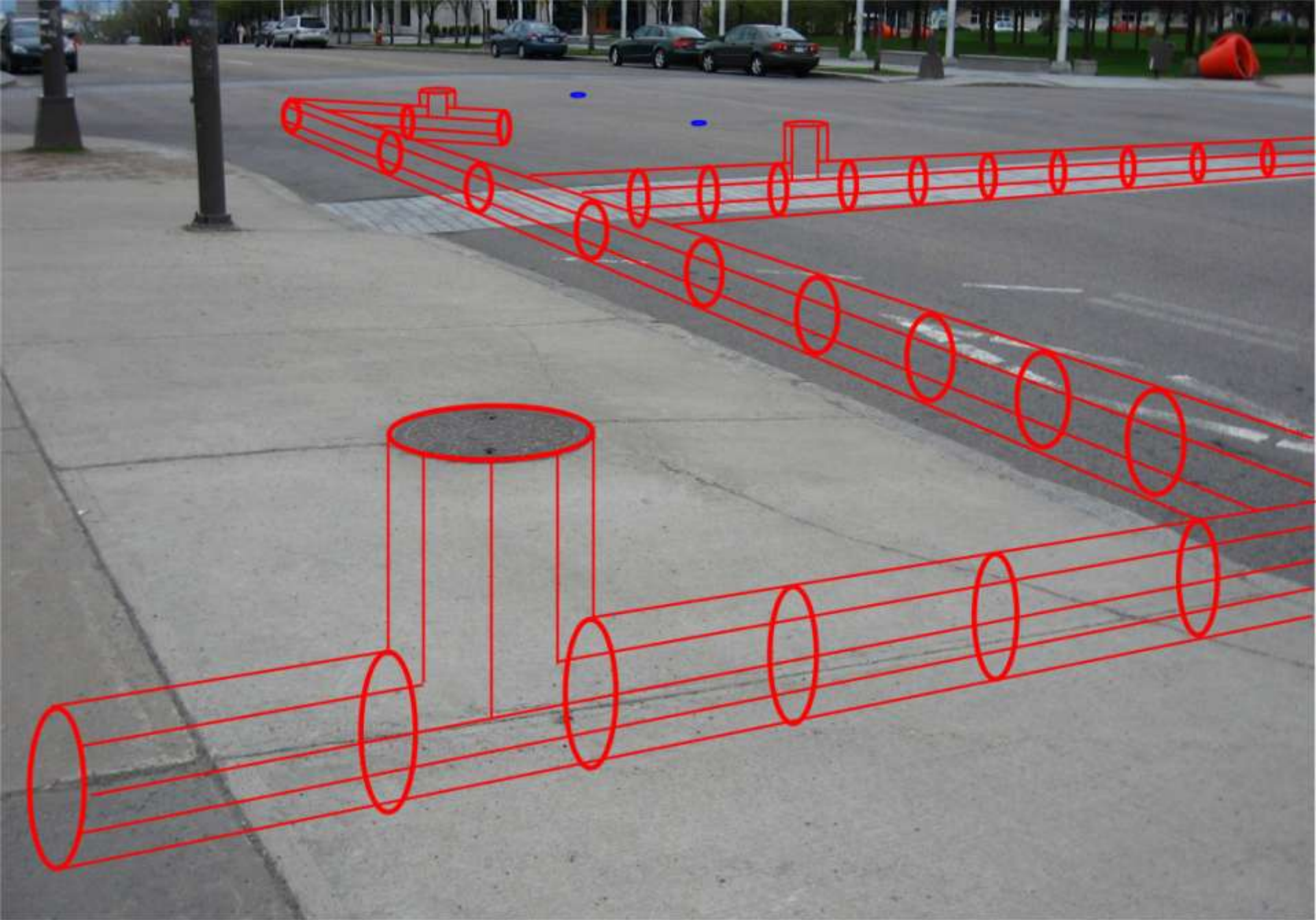


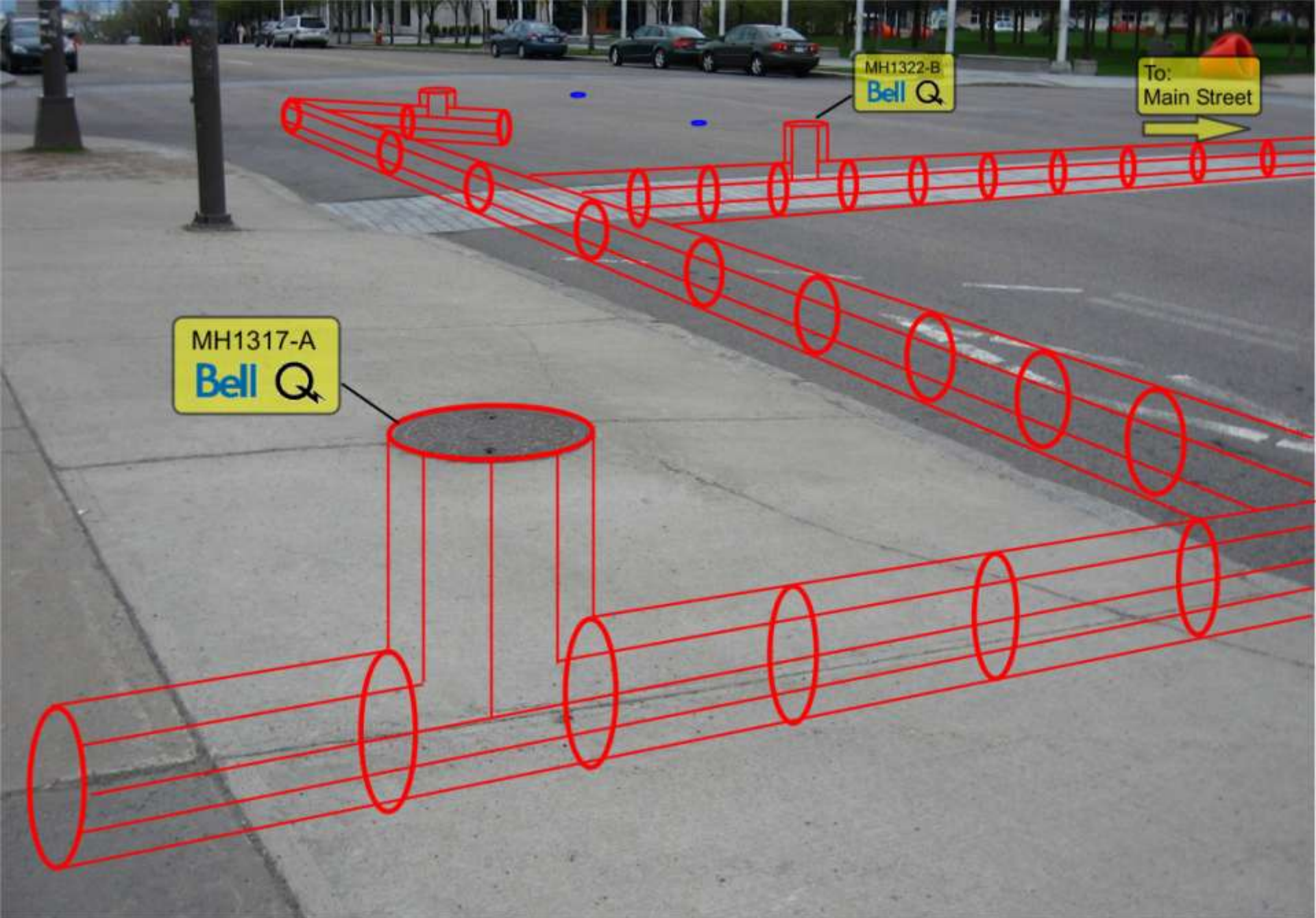
Augmented Reality



Augmented Reality





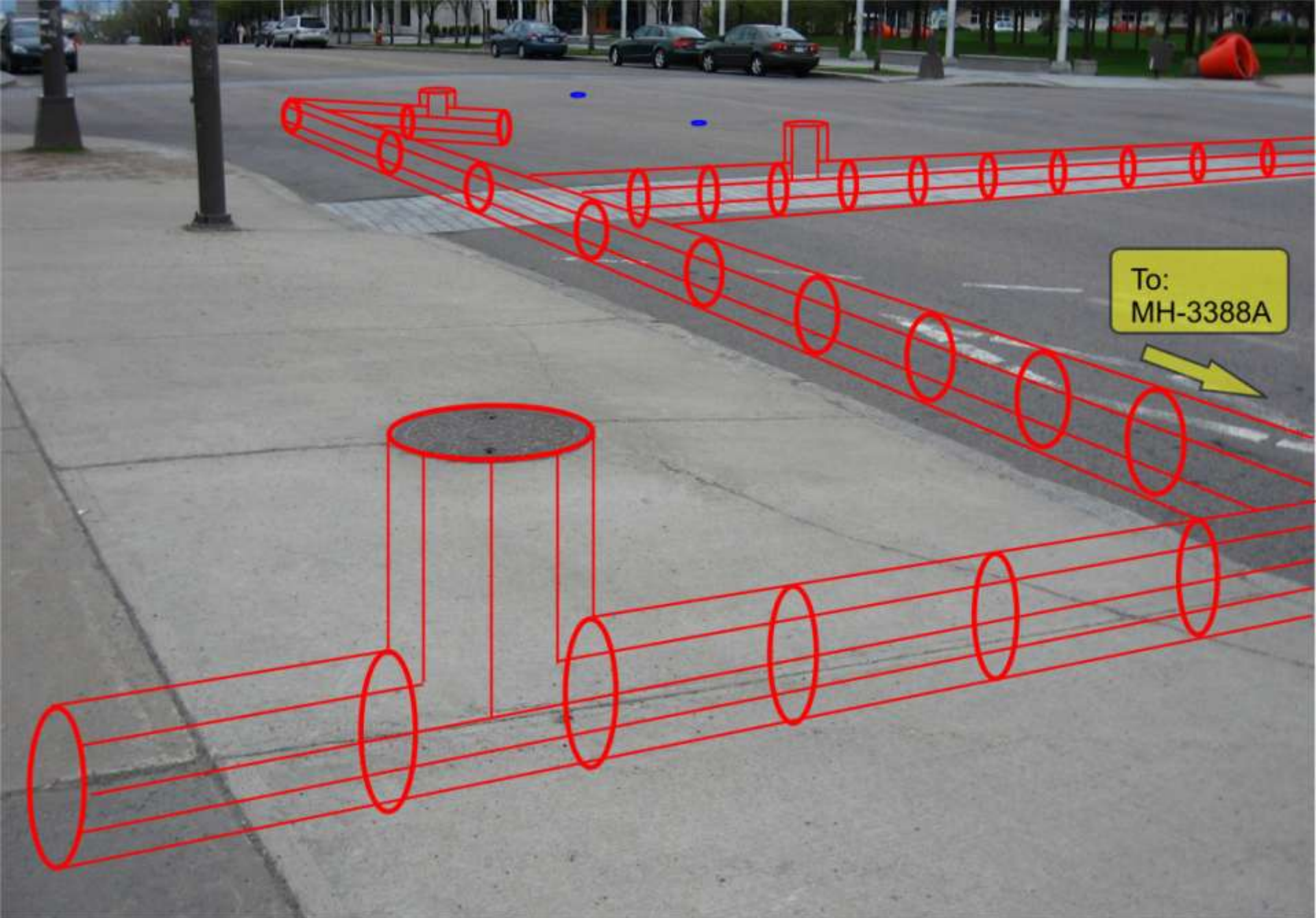


MH1317-A
Bell Q

MH1322-B
Bell Q

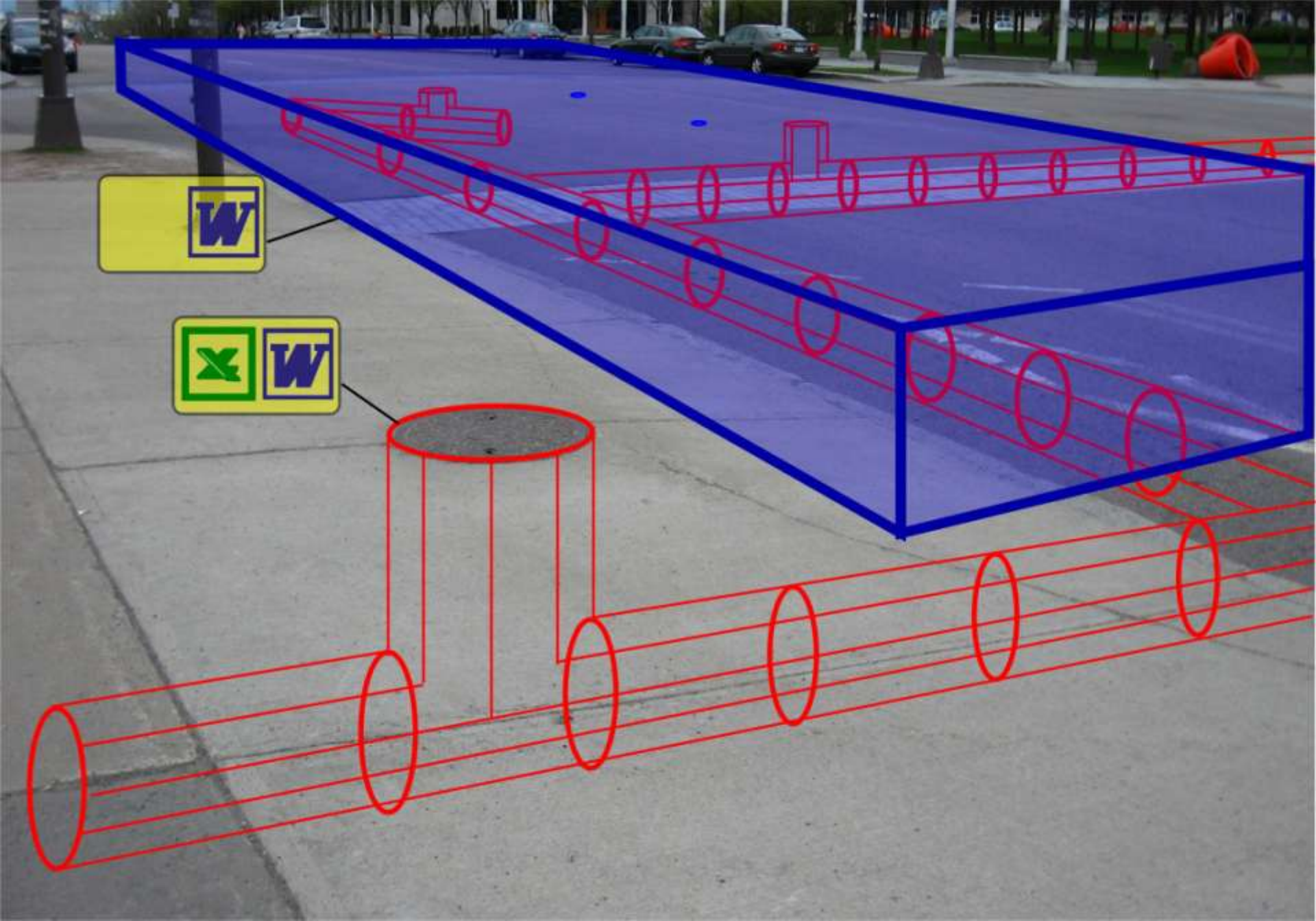
To:
Main Street



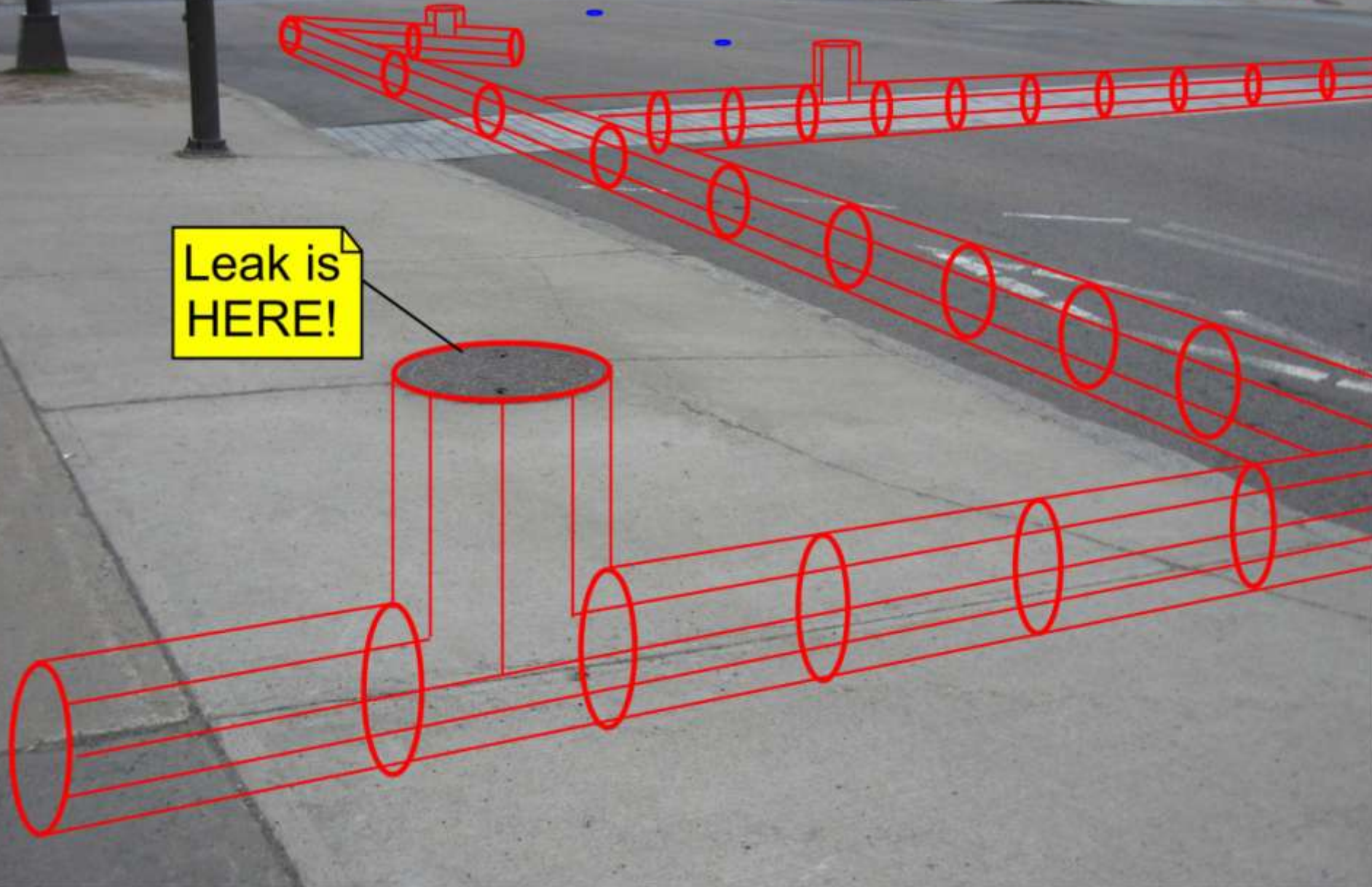


To:
MH-3388A





Leak is
HERE!



Identification and Query



http://farm4.static.flickr.com/3225/2713017763_ea2a2381a3.jpg

<http://images.crestock.com/790000-799999/795388-xxs.jpg>



ID and query



Augmented Reality: the Challenge



Registration challenge



Registration Challenge



Registration Challenge



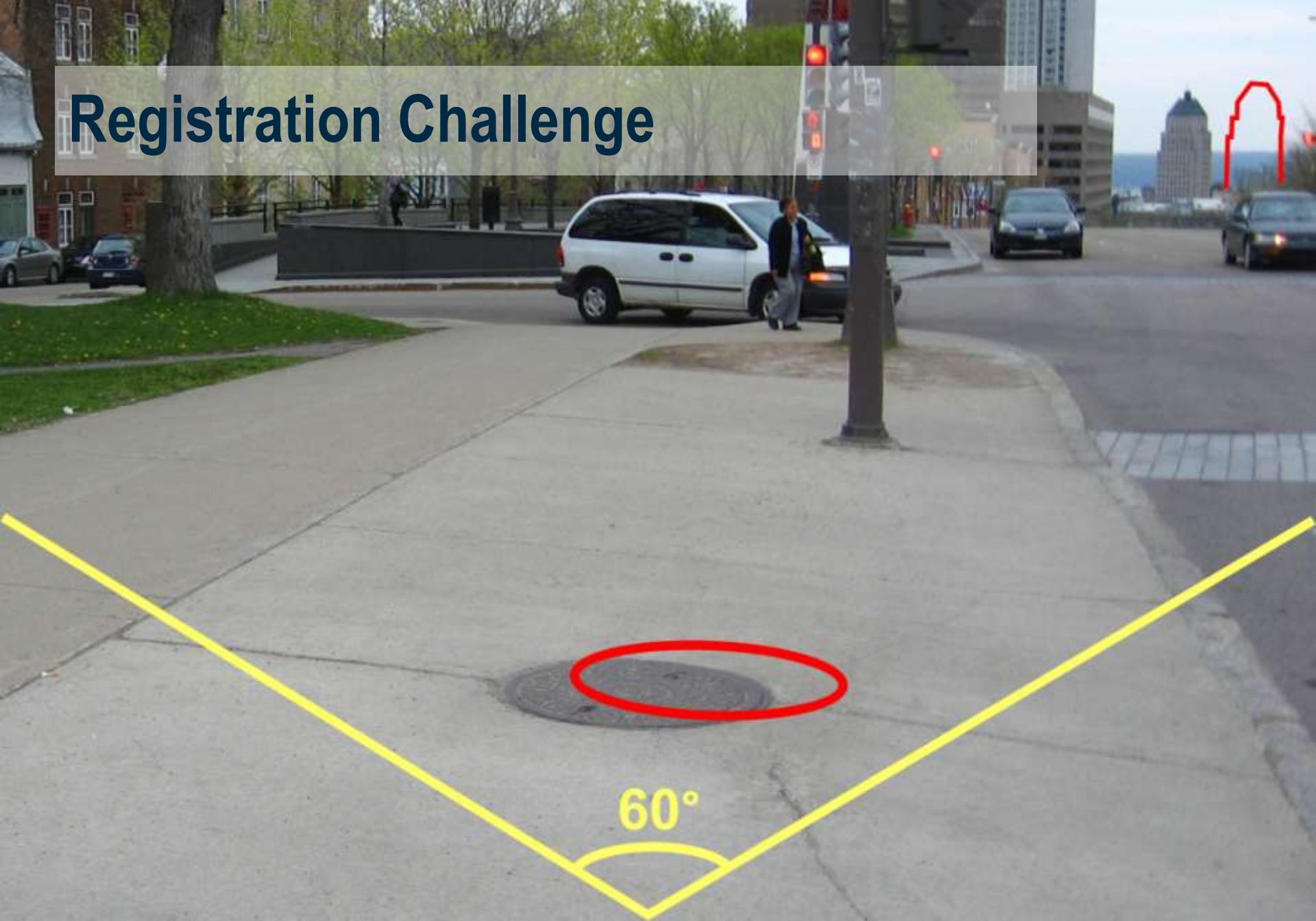
Registration Challenge



Registration Challenge



Registration Challenge



Registration Challenge

640

480

60°



Registration Challenge

640

480

1 pix

60°



Registration Challenge

	<u>Object distance</u>	
	2 m	2 km
Orientation	0.09 °	0.09 °
Position	3.6 mm	3.6 m

- Location
 - Outdoor
- Frequency
 - Real time



Registration Challenge

- Main difficulty is tablet movement
- Solution: user should not move !

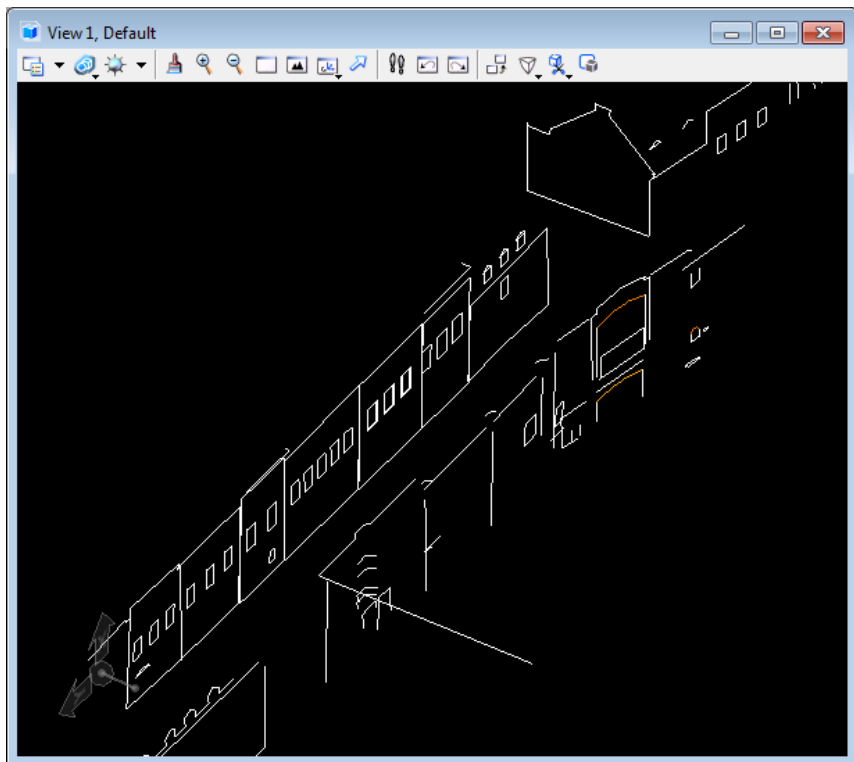


Registration Challenge

- Main difficulty is user movement
- Solution: user should not move !



Panorama Initialization



3D model



Corresponding panorama

Panorama Initialization



Image overlapped with **non-initialized** model

Panorama Initialization

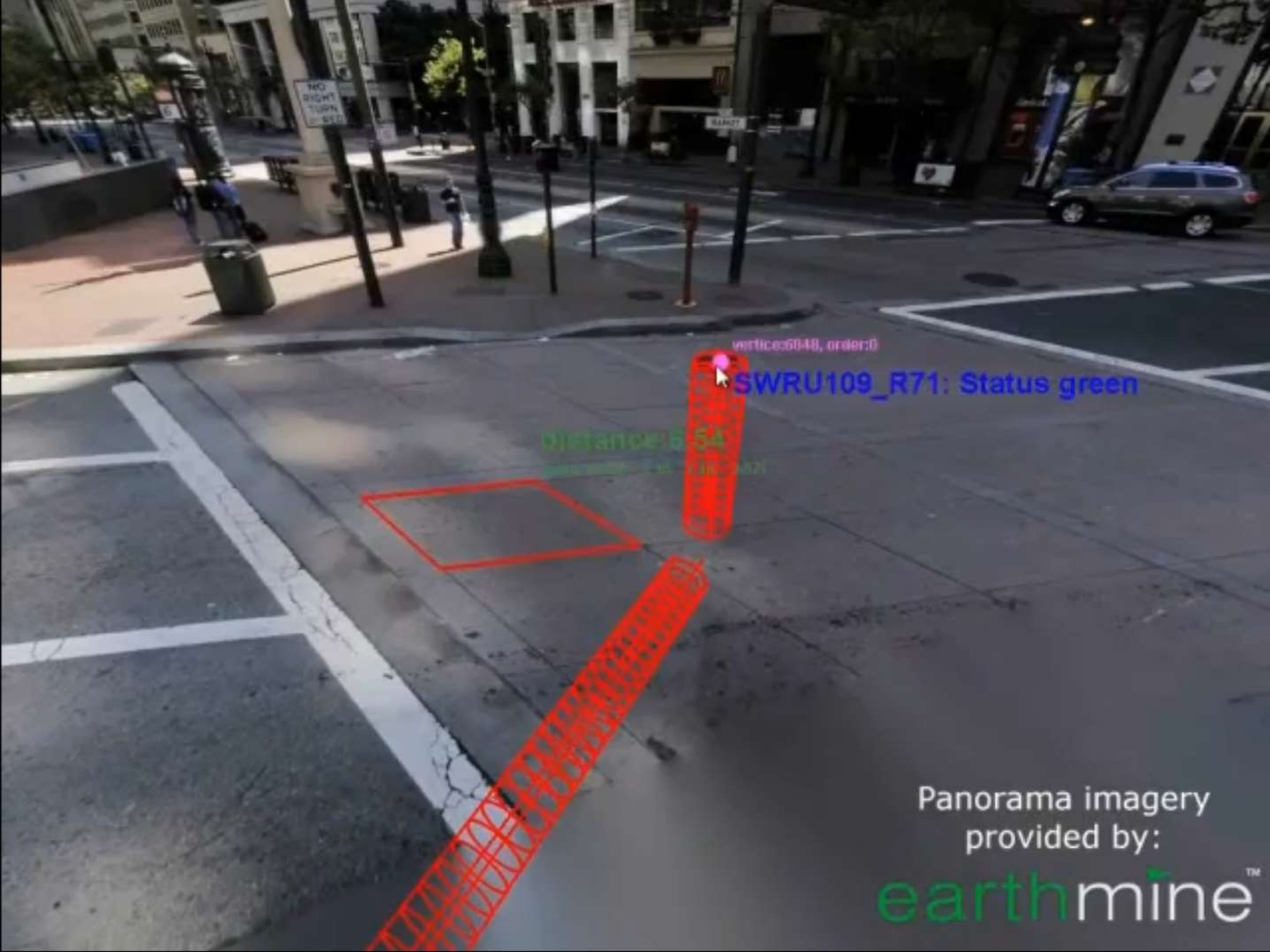


Image overlapped with **initialized** model

Augmentation system

ID: **MH-1385-B**
Display related pipe network





vertices:6040, order:0

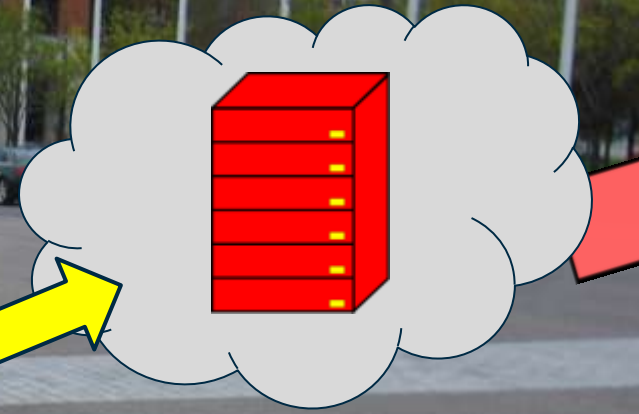
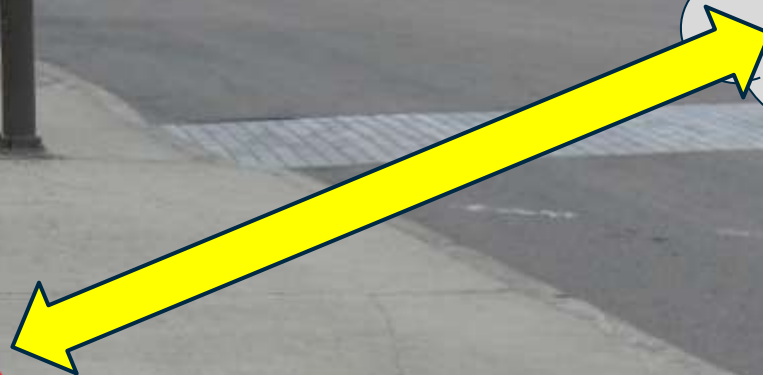
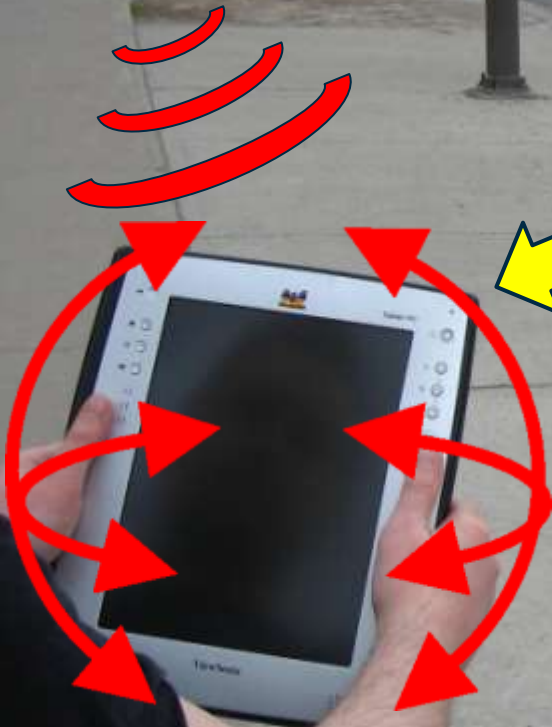
SWRU109_R71: Status green

distance: 5.54

Panorama imagery
provided by:

earthmine™

Mobile augmentation







cam.pX: 0
cam.pY: 1
cam.pZ: 80
:
Toward entity: true
Node selected (F3) ::
:
RUBoxCamNode

Summary

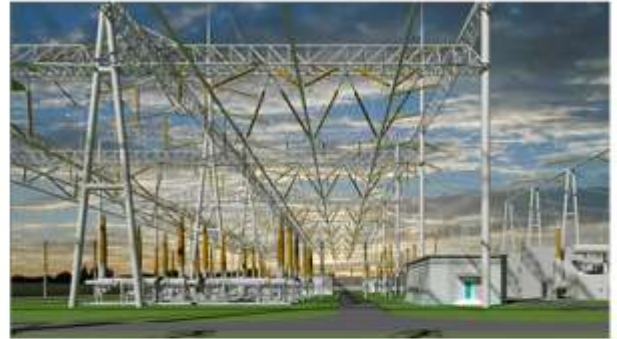
- Panorama augmentation: 2 prototypes
 - Desktop
 - Mobile
- Pros:
 - Accurate augmentation
 - Stable (jitter-free)

Summary

- Panorama augmentation: 2 prototypes
 - Desktop
 - Mobile
- Pros:
 - Accurate augmentation
 - Stable (jitter-free)
- Cons:
 - Not true augmented reality
 - Translation is not allowed
 - Augmented scene is not real time
 - Panorama not viewed from capture position
 - Panorama capture date

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Thank you!