Inspect Smarter, Build Better®

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President

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3D REMOTE BUILDING INSPECTIONS



overview

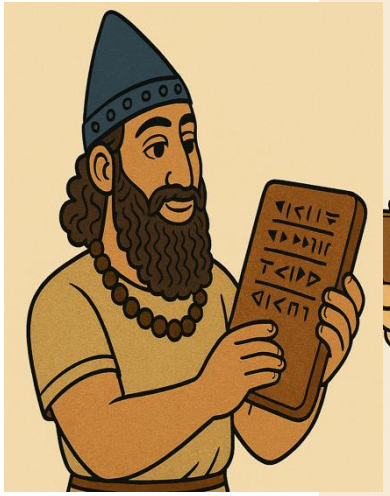
- Current situation
- What is a 3D camera
- How does it work
- Why 3D cameras for inspections
- 3DRBI platform
- Benefits
- Questions

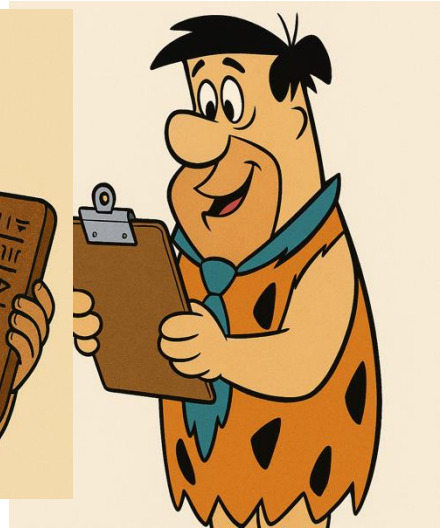
Quote from Steve Jobs on innovation

“Some people say give the customers what they want, but that's not my approach. Our job is to figure out what they're going to want before they do. I think Henry Ford once said, 'if I'd ask customers what they wanted, they would've told me a faster horse.' People don't know what they want until you show it to them. That's why I never rely on market research. Our task is to read things that are not yet on the page.”

Evolution of Building Inspectors

+2000 BC → Today















This makes no sense?







Imagine

- The Street View Car with a camera system on the roof collecting 360 imagery on the street
- The trekker with a back walking up mountains or down narrow streets.
- Rather than driving on the streets, the car or trekker goes into your house.
- Google Street View, but inside buildings—and much more detailed

Imagine no more

- Leading the way as using 3D reality capture on an inspection planform
- Camera imagery reconstructs a 3D environment
- 3D imagery enables inspectors to see the building and conduct measurements where needed.
- 3D imagery captures construction information needed for document.





Why 3D camera for inspections?

- Substantial costs savings
  - Travel and accommodation costs
  - Construction delay
  - Additional costs for homeowner (renting longer than plan, storage fees, extending construction loans or bridge financing, stress)
- Efficiency and productivity increases
- Ensure building code inspections for each stage
- Provide inspections for renovations
- Documentation of the construction stages
- Addresses spatial memory
- Biases toward contractors



How it works

- Need a 3D camera and a tripod
- Need cell phone/tablet for app
- Sign into 3DRBI account
- Take video and upload (internet not required)
  - Generally, takes 2 hours for capture to be reviewed
- Inspector reviews 3D imagery
  - Provides comments on video and sends back
- Completes an inspection report with comments from videos
- Send report
- Communication with contractor if needed

Camera Equipment

- Ricoh Theta Z1 52 GB
- Lens cap (important to keep on when not using)
- Tripod
- Cable
- Keep shipping boxes!
- 3drbi provides support on how to use the camera



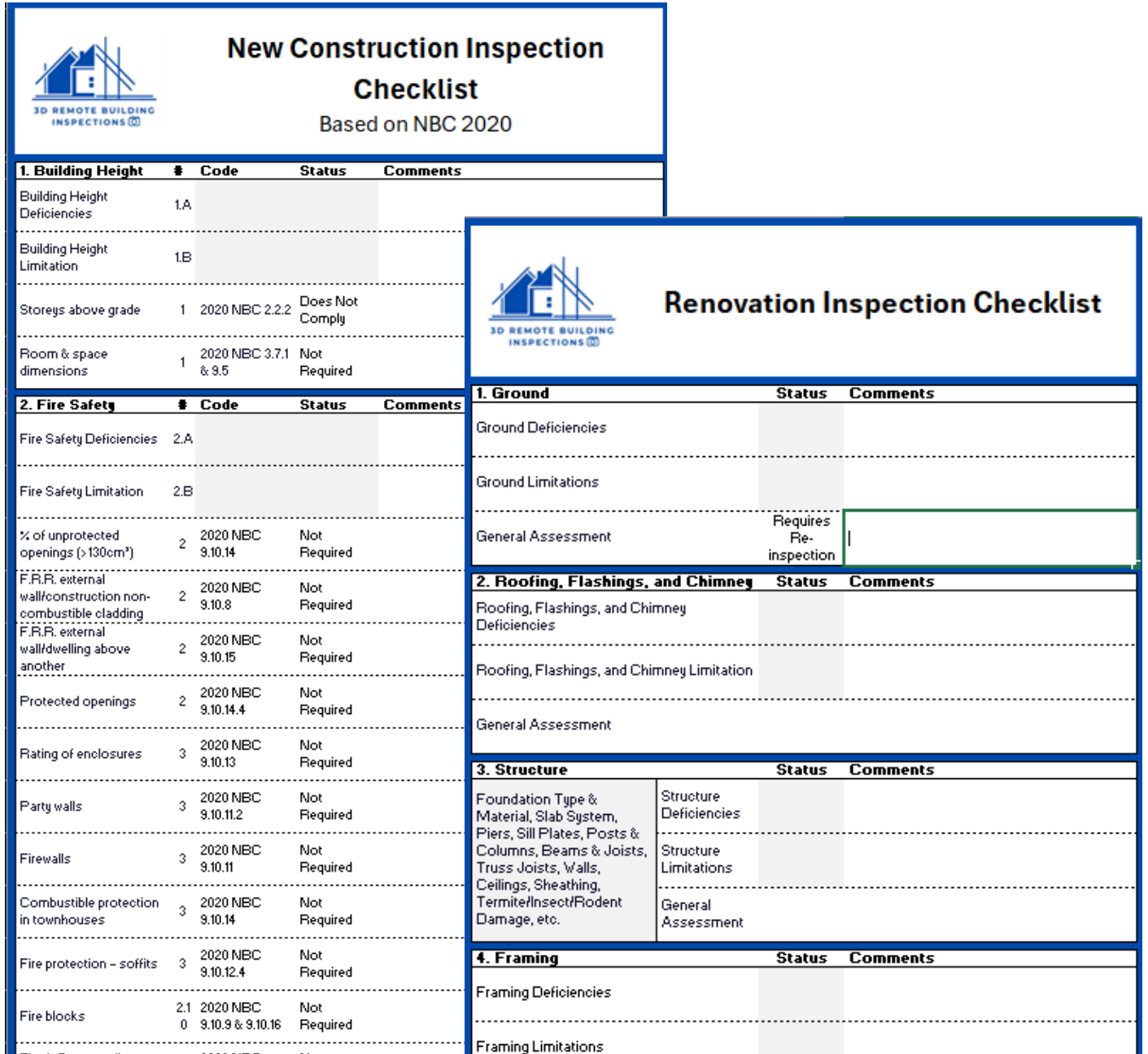




Inspection Checklist and Report

The checklists contains two parts:

- **Project details:** information related to the property, along with the general info of both requester and inspector.
- **Inspection checklist:** necessary items that need to be assessed by the inspectors according to the National Building Code (NBC) Part 9. Note: this section will be updated regularly to cover other aspects of inspections.



New Construction Inspection Checklist

Based on NBC 2020

1. Building Height	#	Code	Status	Comments
Building Height Deficiencies	1.A			
Building Height Limitation	1.B			
Storeys above grade	1	2020 NBC 2.2.2	Does Not Comply	
Room & space dimensions	1	2020 NBC 3.7.1 & 9.5	Not Required	

2. Fire Safety	#	Code	Status	Comments
Fire Safety Deficiencies	2.A			
Fire Safety Limitation	2.B			
% of unprotected openings (>130cm²)	2	2020 NBC 9.10.14	Not Required	
F.R.R. external wall/construction non-combustible cladding	2	2020 NBC 9.10.8	Not Required	
F.R.R. external wall/dwelling above another	2	2020 NBC 9.10.15	Not Required	
Protected openings	2	2020 NBC 9.10.14.4	Not Required	
Rating of enclosures	3	2020 NBC 9.10.13	Not Required	
Party walls	3	2020 NBC 9.10.11.2	Not Required	
Firewalls	3	2020 NBC 9.10.11	Not Required	
Combustible protection in townhouses	3	2020 NBC 9.10.14	Not Required	
Fire protection – soffits	3	2020 NBC 9.10.12.4	Not Required	
Fire blocks	2.10	2020 NBC 9.10.9 & 9.10.16	Not Required	

Renovation Inspection Checklist

1. Ground	Status	Comments
Ground Deficiencies		
Ground Limitations		
General Assessment	Requires Re-inspection	

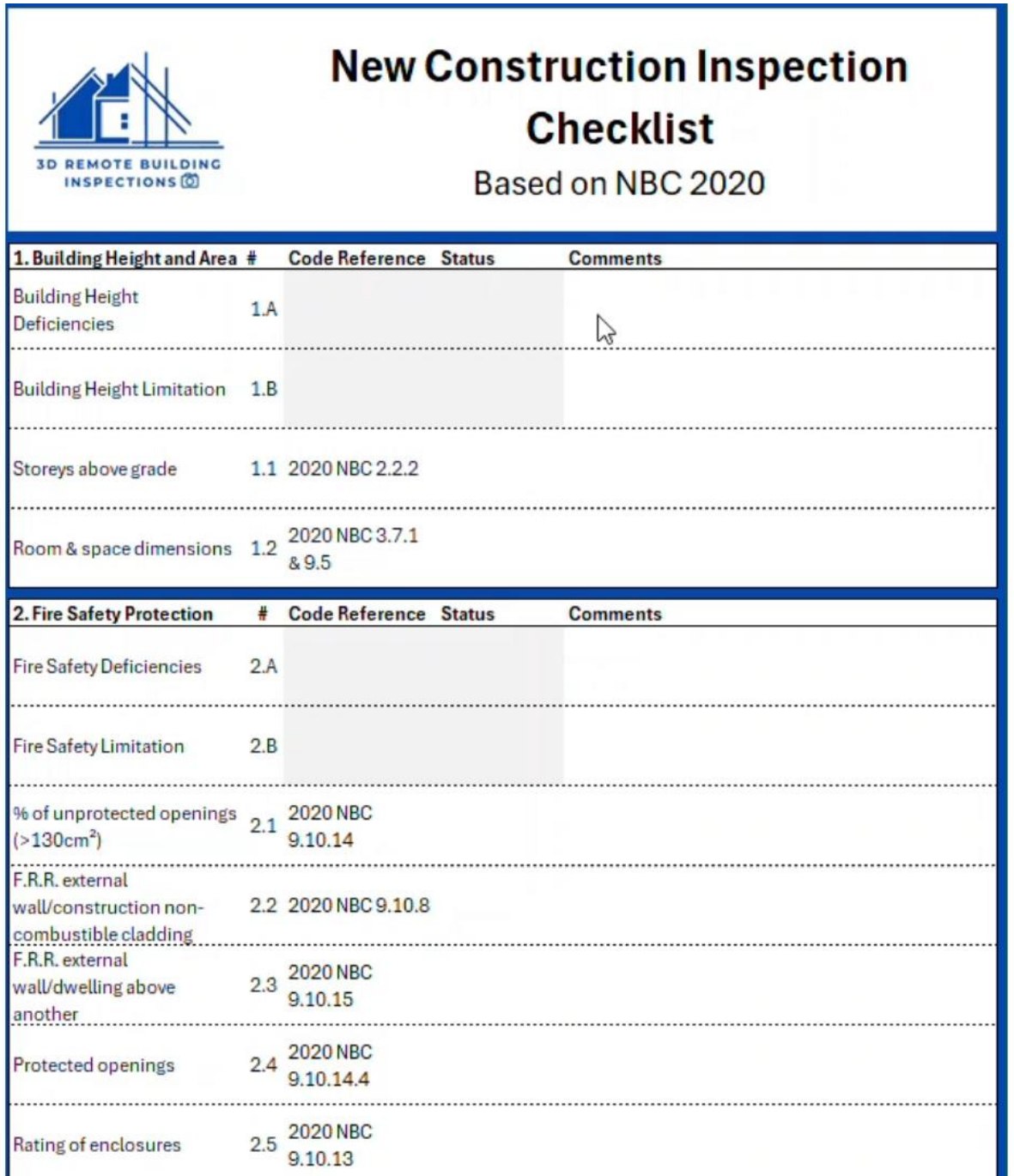
2. Roofing, Flashings, and Chimney	Status	Comments
Roofing, Flashings, and Chimney Deficiencies		
Roofing, Flashings, and Chimney Limitation		
General Assessment		

3. Structure		Status	Comments
Foundation Type & Material, Slab System, Piers, Sill Plates, Posts & Columns, Beams & Joists, Truss Joists, Walls, Ceilings, Sheathing, Termite/Insect/Rodent Damage, etc.	Structure Deficiencies		
	Structure Limitations		
	General Assessment		

4. Framing	Status	Comments
Framing Deficiencies		
Framing Limitations		

Inspection Checklist and Report

A hierarchy of pre-defined checklist sections and their detailed items based on NBC 2020



3D REMOTE BUILDING INSPECTIONS

New Construction Inspection Checklist

Based on NBC 2020

1. Building Height and Area	#	Code Reference	Status	Comments
Building Height Deficiencies	1.A			
Building Height Limitation	1.B			
Storeys above grade	1.1	2020 NBC 2.2.2		
Room & space dimensions	1.2	2020 NBC 3.7.1 & 9.5		

2. Fire Safety Protection	#	Code Reference	Status	Comments
Fire Safety Deficiencies	2.A			
Fire Safety Limitation	2.B			
% of unprotected openings (>130cm^2)	2.1	2020 NBC 9.10.14		
F.R.R. external wall/construction non-combustible cladding	2.2	2020 NBC 9.10.8		
F.R.R. external wall/dwelling above another	2.3	2020 NBC 9.10.15		
Protected openings	2.4	2020 NBC 9.10.14.4		
Rating of enclosures	2.5	2020 NBC 9.10.13		

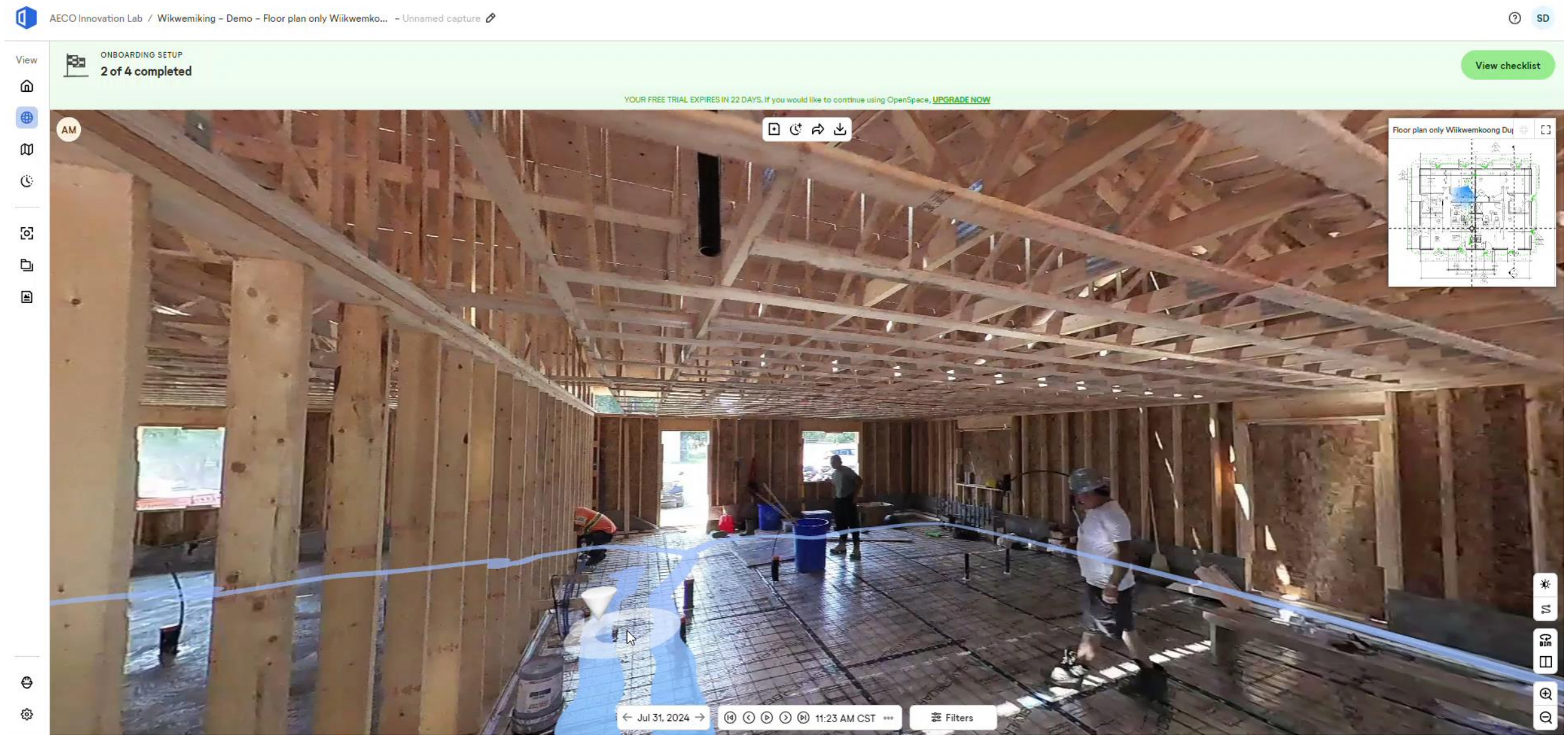
Physical vs Virtual Visual Inspections

- Pilot studies - 6 physical inspections were conducted. Same buildings a VVI conducted. Third party reviewed both reports. The same points identified in physical inspection were identified in VVI.
- VVI identified other items; able to share with his colleague for additional comments.
- **Substantial savings using VVI versus physical inspection – approximately 60% savings. Higher in some cases depending on "remoteness"**
- **One community potential saving of**
- Documentation in 3D versus 2D pictures.
- Efficiencies in completing the inspection reports. Comments made on video downloaded onto inspection report
- Created a manual for person for taking 3D image. Do not need to be a contractor or inspector.

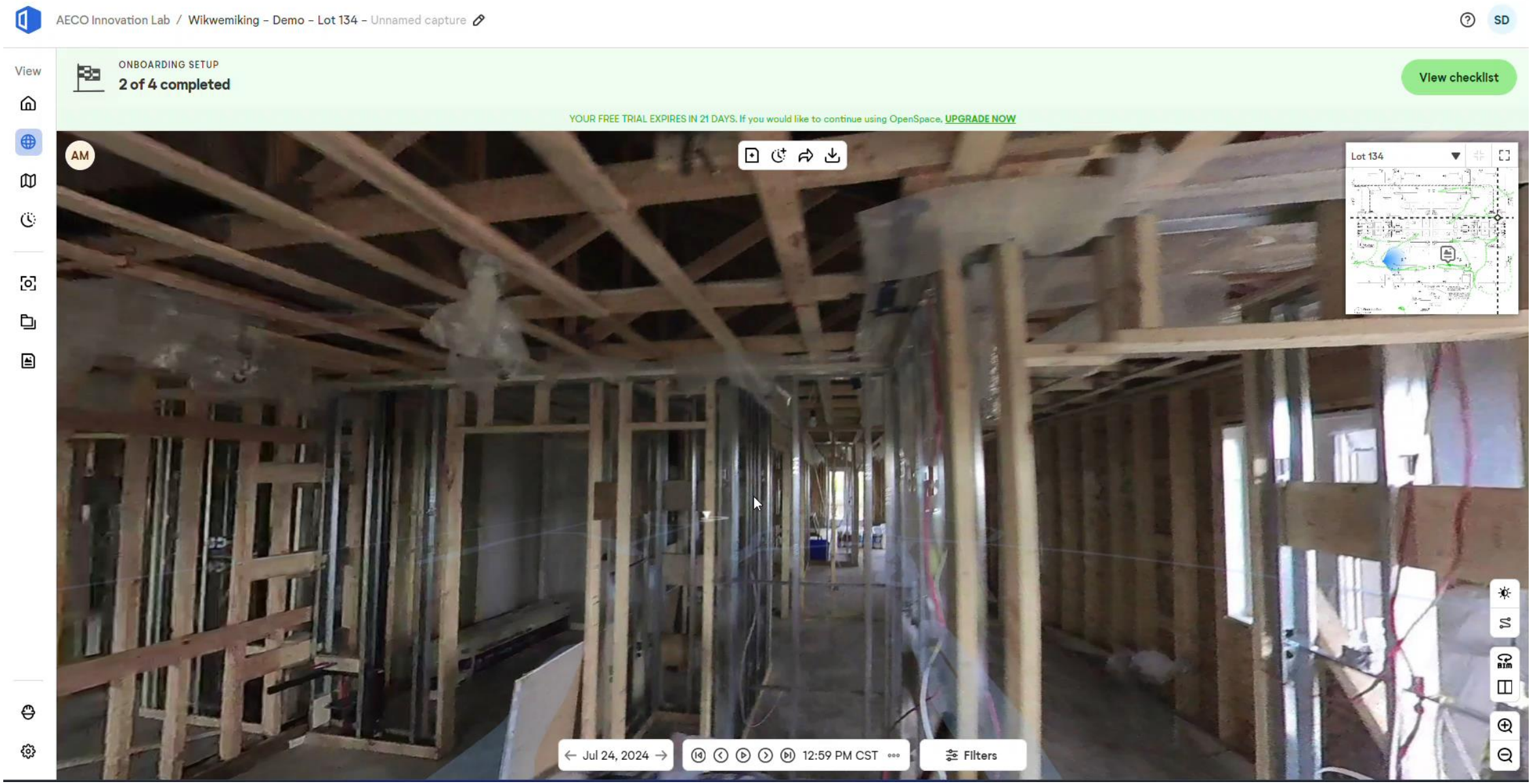
3DRBI & First Nations

- Working with approximately 55 communities.
- Inspection services
  - Band Council build
  - Private homes
- Asset management
- Training
  - Inspectors
  - Contractors
- Mentoring

3D Reality Capture (3DRC) in practice



3D Reality Capture (3DRC) in practice




White sheet-615M.png
CAPTURE ERROR
Sep 17, 2024
8:42 AM CST
Filters

3D Reality Capture (3DRC) in practice



Inspection Points via 3D camera

- In floor heating - pressure test captured on camera + attestation
- Plumbing – pressure test captured on camera + attestation
- HAVC – tests captured on camera + attestation
- Gas connection - pressure test captured on camera + attestation
- Electrical Completed by authorized/licence inspector – not covered via 3D camera

3D Captures and First Nations(1)

- 3D camera mailed to community.
- Community generally purchase camera.
- Ricoh Theta Z1 51GB (lens cap, tripod) approx. $2,000
  - Insta360x5 $765.00 (excludes shipping)
- FNNBOA some cameras for loan.
- To receive camera for loan required BCR
- Some regions ISC will purchase camera for community.

3D Captures & First Nations Communities(2)

- On boarding training
- Training provided to person who will walk around with the 3D Camera
- Manual available. Don’t know “construction”
- Very simple to connect the camera to the app and take pictures.

3D Captures & First Nations Communities(3)

- Enter inspection information on 3DRBI Platform
  - Name, location, etc.
  - Housing/planning department receives 3D captures.
- Provides comments
- Upload data to your own platform.
- First Nations owns data

Pricing Models

- Full Service
- FN hires have access to own inspection services
- 3DRBI referral inspection services

Pricing Full Services (1)

- Where 3DRBI provides inspection services (Part 9)
- $2,300.00 per inspection
- $650.00 for plan review (new and renovations)
- Inspector fully insured

3DRBI trains person providing 3D Capture and support

- 3DRBI provides training to reviewer of 3D capture and support
- Help with data management
- Follow up inspections use 2D captures (cellphone)

Pricing First Nations hires Inspection Services (2)

- First Nations may hire their own inspection services (e.g., Tribal Council provides inspection services or currently have their own inspector).
- $1,250.00 per inspection
- 3DRBI trains person providing 3D Capture and support
- 3DRBI trains reviewer of 3D capture and support
- Help with data management
- Follow up use 2D captures (cellphone)

Pricing First Nations Refers Inspection Services (3)

- Currently, 3DRBI is working on a list of inspectors who can use the 3DRBI Platform.
- $1,250.00 per inspection
- Referral fee is charged to the inspector.
- Inspection contract is directly with FN
- 3DRBI trains person providing 3D Capture and support
- 3DRBI trains reviewer of 3D capture and support
- Help with data management
- Follow up inspections use 2D captures (cellphone)

Required Documentation

Signed BCR – provides indemnification for use of 3D Camera and allows Council to sign an agreement

Signed Agreement – roles and responsibilities, what is not covered via 3D cameras (behind walls, electrical etc).

Data Ownership

3DRBI adheres to the First Nations principles of ownership, control, access, and possession – more commonly known as OCAP®

Agreement provides how data OCAP is accomplished for each of the principles.

Once project is “closed” data is transferred to Community.

Provide recommendations on data management.

Whether to use 3D Cameras?

1. What are your current costs for inspections services?
   - Travel, food, and accommodation costs?
   - Professional fees charged to travel, conduct inspections , complete reports?
   - Many inspectors like to be paid to travel and visit your community on your expense!
2. What are your construction delay costs? (approx. $1,000 a day)
   - Cost associated with potential occupant in another location (paying rent, hotel)?
   - Inclement weather (need inspection asap) as next week is rain?
   - Contractors leave site to another one due to delays
3. Financial delays costs?
   - CMHC /bank no advancement due to no inspections?
   - Financial costs to the tenant/owner - financing, rent, inconvenience
4. Urgency – need inspection/asset mgt report quickly to for funding applications
   - Missed opportunities for funds

Construction Delays

- Construction delays can result from materials, rescheduling, and labour shortages; they worsen when the inspection system cannot keep pace.
- BC has roughly 480 municipal building officials, yet the province is planning 40,000 new homes.
- Capacity bottlenecks which slows down approvals.
- Inspection delays can cost approx. $1,000 per day in labour, equipment and financing.

Capacity

- Limited Inspections and capacity
- Labour intensive, time consuming, costly and often inefficient because of travel time to and from job site.
- Reliance on conventional 2D methods such as paper-based walking around with a clipboard to make notes is becoming inefficient and time consuming.

Asset Management

- Currently reviewing buildings for asset management
- Provide estimations for repairs
- Pricing same as inspections

Benefits of 3DRBI

- Lower cost and travel fees
- Expands access to inspections. If current inspector does not want to use (liked to be paid to travel) we have alternatives.
- Reduces construction delays
- Complete inspection points based on building code (approx. 9) compared to 5 or 3 inspection points; Increases inspection frequency
- Training tool for inspectors and contractors
- Supports renovations
- Records construction progress
- Enables electronic reporting
- Stores data
- Addresses privacy concerns

Current Inspections (if time permits)

- https://can.openspace.ai/orgs/Mil6bGkBRLG3SUxHY3LSog/groups

Conclusions

- Game changer on how building inspections will be conducted.
- This is the future!



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