



Presented at the FIG Working Week 2023,
28 May - 1 June 2023 in Orlando, Florida, USA

FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting
Our World,
Conquering
New Frontiers

Conceptual Design of Advanced Construction Progress Monitoring with Terrestrial and Robotic Laser Scanning Systems

Achieve Sustainability in Construction Industry with helping of Advanced Geomatics Tools

Mohsen Arjmand, Jaehoon Jung, Michael J Olsen, H.Andrew Lassiter, Melika Jafari

Geomatics Group School of Civil & Construction Engineering Oregon State University

College of Built Environmnets University of Washington

Organized By



Diamond Sponsors



Sustainability in construction is important to protect the world against the climate change impacts

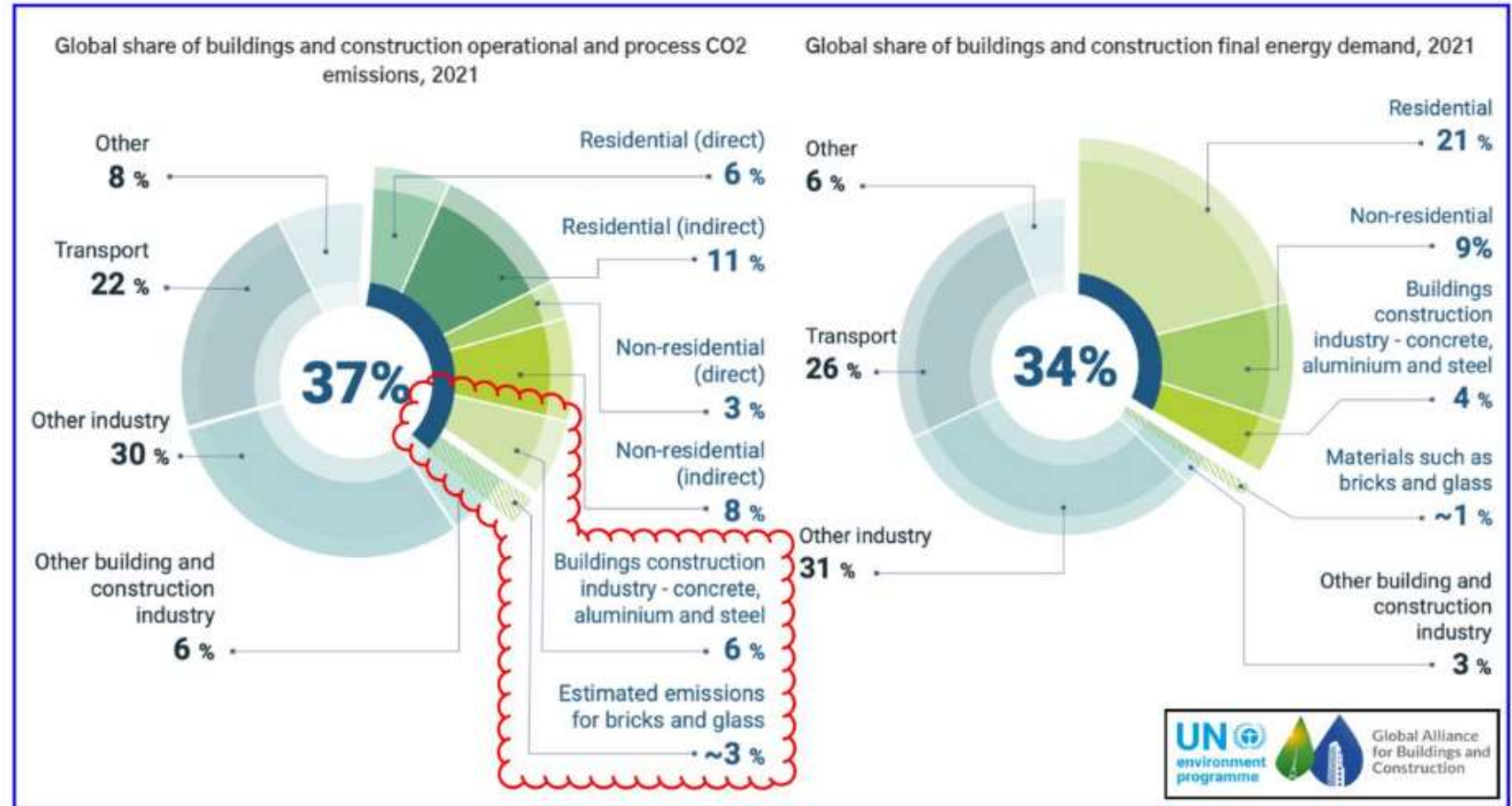


Figure 1. Global share of buildings and construction's energy use and emissions in 2021. Image adapted from (GlobalABC, 2021).

Sustainability in construction

Around 10 % of construction materials wasted due to mistakes and errors during construction, accounting for roughly 1% of total GHG emissions



Credit: [weeklysafety.com](https://www.weeklysafety.com)

Why can surveyors significantly improve sustainability in the building industry?

Surveyors are the last step to implement designs in the construction sites



Credit: globalsurvey.co.nz

How Surveyors Could improve sustainability?

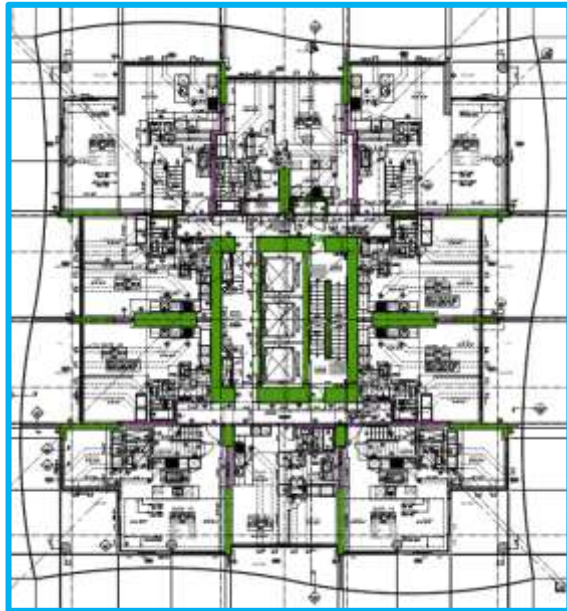
Quality Assurance:

Due to Lack of Effective Communication between designers (Architects, Structural Engineers, Planners, HVAC & Piping Designers,..)

Quality Control:

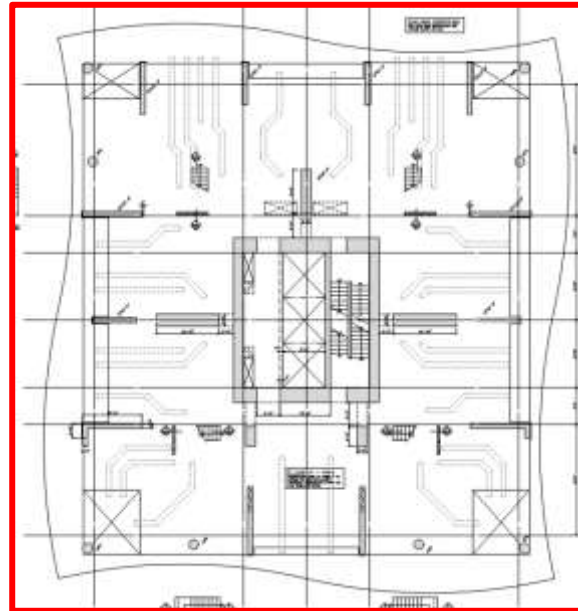
To make sure As- built is match with As-designed

2D Quality Assurance:



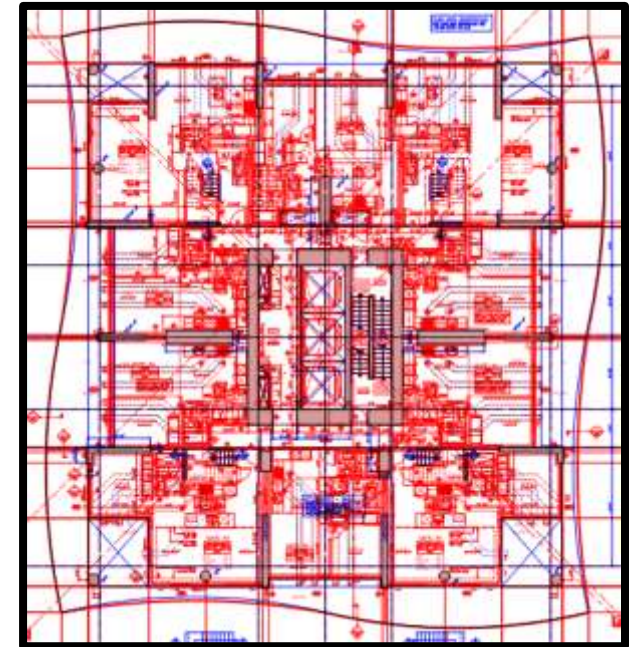
Architectural set

+

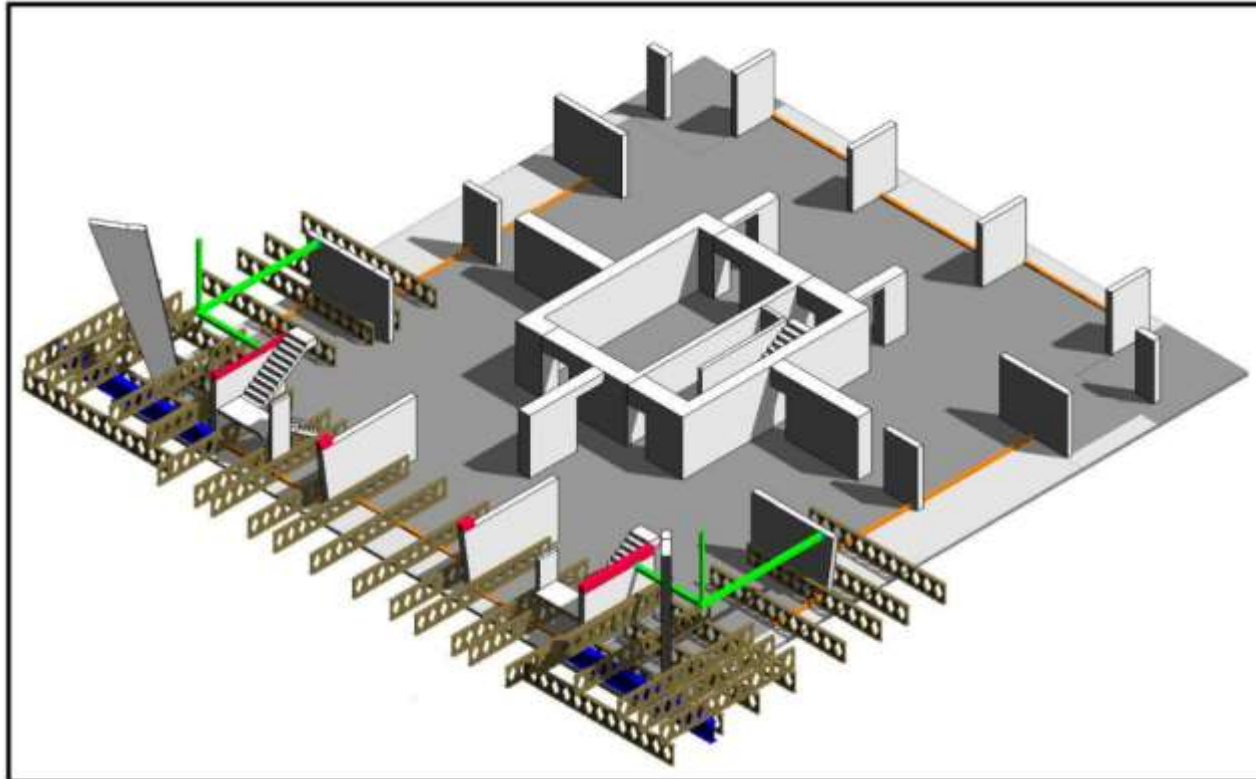


Structural set

Overlaid with
Bluebeam



3D Quality Assurance: (BIM)



Quality Control:

In construction projects, site superintendents and supervisory teams spend 30-50% of their daily time on manual inspection

Automatic Quality Control with Robotic Lidar systems & TLS:



(a)

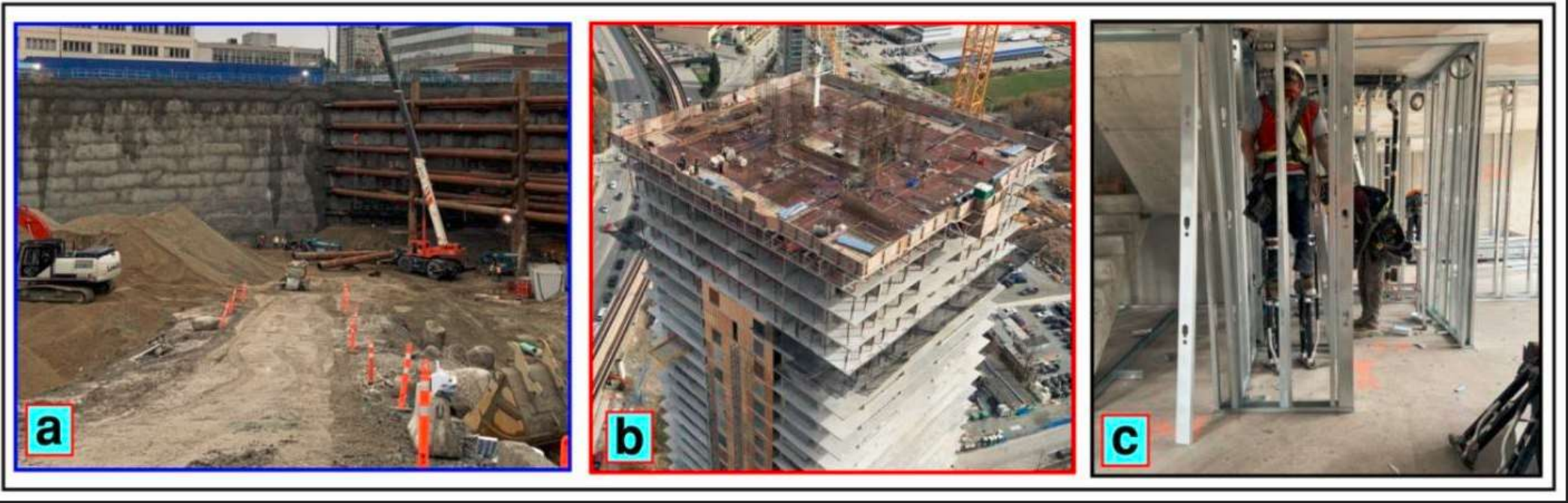
DRLS



(b)

GRLS

Automatic Quality Control in Construction monitoring:

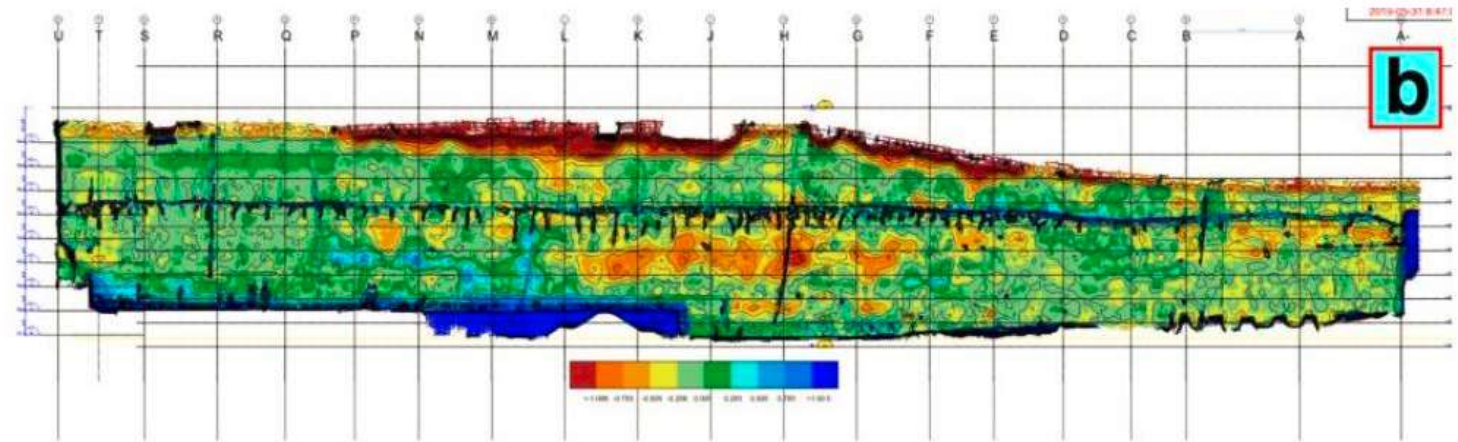


Pre-construction

Outdoor

Indoor

Automatic Quality Control in Construction monitoring:



Pre-construction

Automatic Quality Control in Construction monitoring:

Outdoor monitoring with Lidar:

(a) Cast-in-place slab formwork before pouring concrete (b) exposed concrete for as-built monitoring.



Automatic Quality Control in Construction monitoring:

(a) A formwork of a structural transfer beam under a high-rise tower with 8.5 feet deep ready to be poured in 2020

and (b) after the building was constructed in 2021.





FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers

Question?

Organized By



Diamond Sponsors





FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting Our World, Conquering New Frontiers

Thank you

arjmandm@oregonstate.edu

Organized By



Diamond Sponsors

