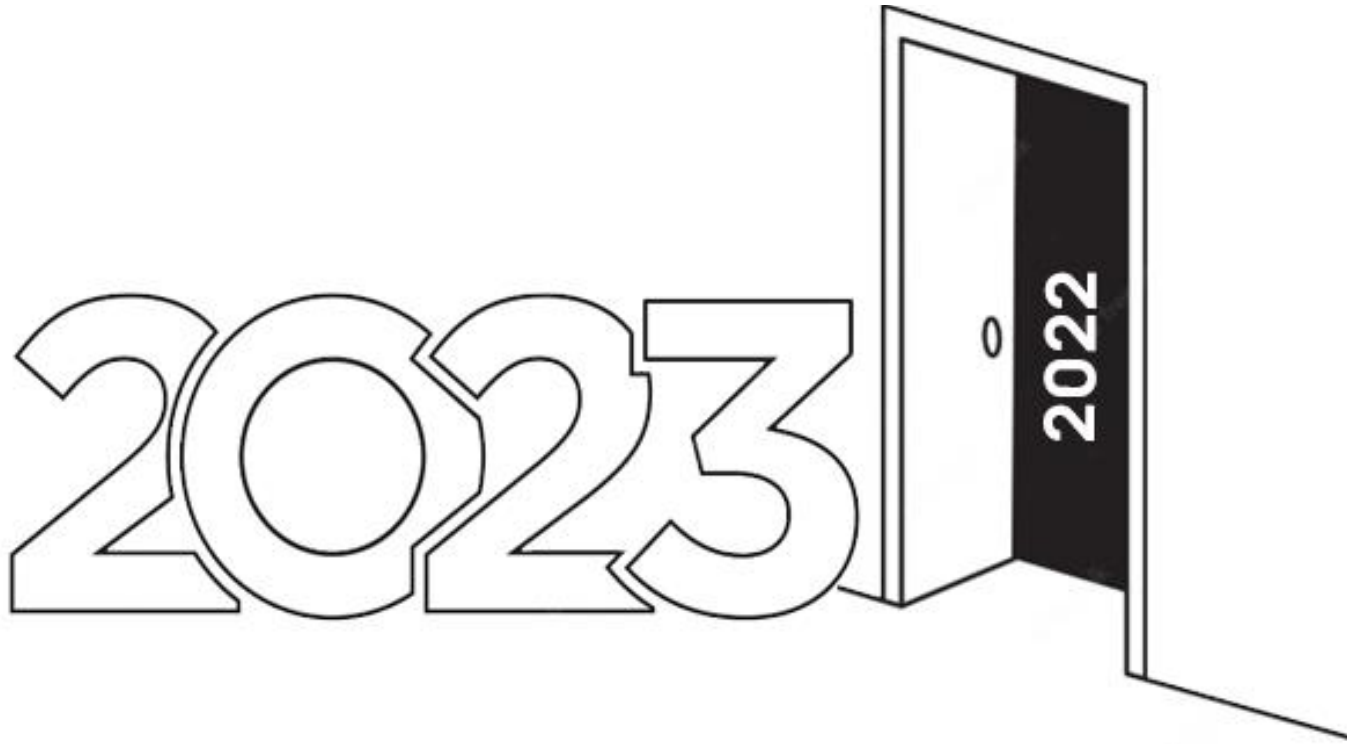




FOCUS

Quarterly E-Magazine of the
Institute of Quantity Surveyors, Sri Lanka
Volume 16: Issue 01, January 2023



Magazine Highlights

IQS Estimating Guide

Can Buildings Be Green Without
Waste Minimisation?

Construction Specialised Mobile Apps
for Effective Project Implementation

Recent Memories

Published by:
Institute of Quantity Surveyors Sri Lanka (IQSSL)



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MERRY
Christmas
AND HAPPY NEW YEAR



Table of Contents

Seasonal Greeting from IQSSL	3
Message from the President	4
Message from the Secretary	5
Can Buildings Be Green Without Waste Minimisation?	6
Recent CPDs	9
APC Application and 2023 Schedule	10
IQS Estimating Guide	11
Construction Specialised Mobile Apps for Effective Project Implementation	28
New Associate Members - 2022	33
Recent Memories	34
IQSSL Membership Subscription Form	39



Message from the President

Ch.QS. Prof (Mrs.) Kanchana Perera

BSc (Hons) QS, MPhil, FIQSSL, FAIQS, FRICS, CQS, ICECA
President - Institute of Quantity Surveyors, Sri Lanka

I am very pleased to send this message to 'Focus' publishing at the dawn of the New Year 2023. Year 2022 was a very challenging year, since Sri Lanka was in the midst of a grave economic crisis. The economic crisis has badly affected the construction sector, which is considered a barometer of the economy. As construction professionals, we are all undoubtedly undergoing a difficult time and facing huge challenges as a prominent industry in the country. As we are stepping into the New Year 2023, we need to develop a systematic process of defining goals to overcome the economic maladies and steps that need to be taken to achieve such goals for the betterment of the construction industry and our profession.

Being professionals, we cannot afford to give up our professions at this stage just because the times have become tough for no fault on our part..

We need to be courageous, positive, and look for practical solutions to the problems we face. I strongly believe that as quantity surveyors, we can explore solutions to the prevailing crisis. The Institute of Quantity Surveyors Sri Lanka (IQSSL), being the regulating body of the Quantity Surveying profession in Sri Lanka, had already taken steps towards achieving such goals by participating in discussions with the relevant government authorities and informing them of our observations and suggestions in numerous occasions. Thus, we fervently hope that in this New Year we will be able to develop a good strategic plan to manage the problems in the construction industry and the country.

I wish the members of IQSSL and their families a very happy, healthy and a prosperous New Year 2023.



Message from the Secretary

Ch.QS. Tilanka Wijesinghe

BSc (Hons) QS, PG. Dip in Project Mgt, FIQSSL
Secretary - Institute of Quantity Surveyors, Sri Lanka

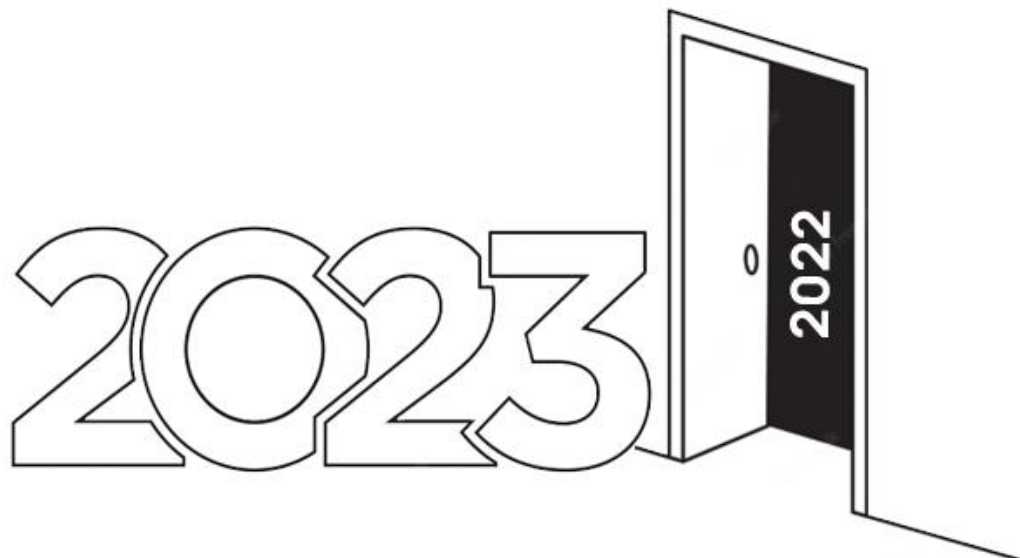
It is with great pleasure that I write this message on the dawn of year 2023.

All of us negotiated the year 2022 despite the unprecedented challenges inflicted by the financial crisis of the country. We are up against another challenging year ahead.

It is only a positive mind set and courage that can drive us during the year 2023 toward individual success and the rebuilding of the nation. The crisis could give us a window of opportunity to realise our true potential through creativity.

I am confident that the IQSSL and its members owing to the capabilities and perseverance, can fit well into the challenging task ahead of us.

I wish all IQSSL members, stockholders, and the general public the courage and perseverance they will need to succeed in 2023.





Can Buildings Be Green Without Waste Minimisation?

Panchali Weerakoon and Tharusha Ranadewa

Department of Building Economics, University of Moratuwa

Introduction

The construction industry has been identified as one of the most profitable industries which has become more complex with the improvements of modern technology (Alaloul et al., 2021). Even though the construction industry has many positive impacts in terms of a country's economy (Gnanothayan & Kauškale, 2022), it has been accused for being environmental inimical due to the traditional construction methods used in the industry (Du et al., 2021). Therefore, the demand towards sustainable developments have impacted the construction industry in major to promote sustainable practices (Opoku & Fortune, 2011). Through practicing, it can bring various objectives such as responsibility towards environment, social awareness and economic profitability towards the built environment as well as for the wider community to accomplish the ultimate sustainability goals (Ali & Al Nsairat, 2009).

A Green Rating system generally monitor the sustainable performance of a construction throughout the life cycle of the project in terms of many aspects such as; energy efficiency, water efficiency, material efficiency, indoor environmental quality enhancement, waste reduction as well as operations and maintenance optimization (Illankoon et al., 2017; Shan & Hwang, 2018). Thus, this paper focuses to investigate the relationship waste minimisation through green rating systems in Sri Lankan construction industry.

Construction Waste Management

Rapid development of construction technology, global economy, urbanisation, and establishment of fourth industrial revolution has caused

increasing of the living standard of societies all over the world (Chummun, 2019). Simultaneously, waste generation has amplified rapidly over past years and waste is predicted to increase by 300% in the year 2100 (Cohen et al., 2015). This has adversely affected on overall performance of construction projects, the society and the nature (Etipola et al., 2021). Construction and demolition (C&D) waste is generally a mixture of additional materials produced during a construction project or the waste generated through a demolition activity of a constructed facility (Chowdhury et al., 2016). Even though many researches has conducted researches in the area of construction waste management in Sri Lanka (Rameezdeen et al., 2004), still it is being treated as one of the major issues in the Sri Lankan construction industry (Dinu et al., 2022). According to the research carried out by Jayawardane (1994) noted that, wastage of concrete and mortar respectively takes up to 21% and 25% in Sri Lankan construction sites. In 2004, Rameezdeen et al. (2004) quantified the material wastage in Sri Lankan construction sites as follows;

Material	Wastage (%)
Sand	25%
Lime waste	20%
Cement waste	14%
Brick waste	14%
Ceramic tile waste	10%
Timber waste	10 %

(Rameezdeen et al., 2004)

Rameezdeen et al., (2004) indicated that material handling processes and improper management are the major causes for waste generation.



In general, C & D waste is bulky, heavy and is mostly unsuitable for disposal by incineration or composting. Therefore, managing construction waste specifically in urban areas (Sfk & Ding, 2007). 50% of the waste generated through construction activities use to landfills as a disposal method which is largely acknowledged worldwide (Al-Hajj & Iskandarani, 2012). The research carried out by Nagapan et al. (2012) noted that about 13-26% of wastes collected for landfills are waste materials related to construction works.

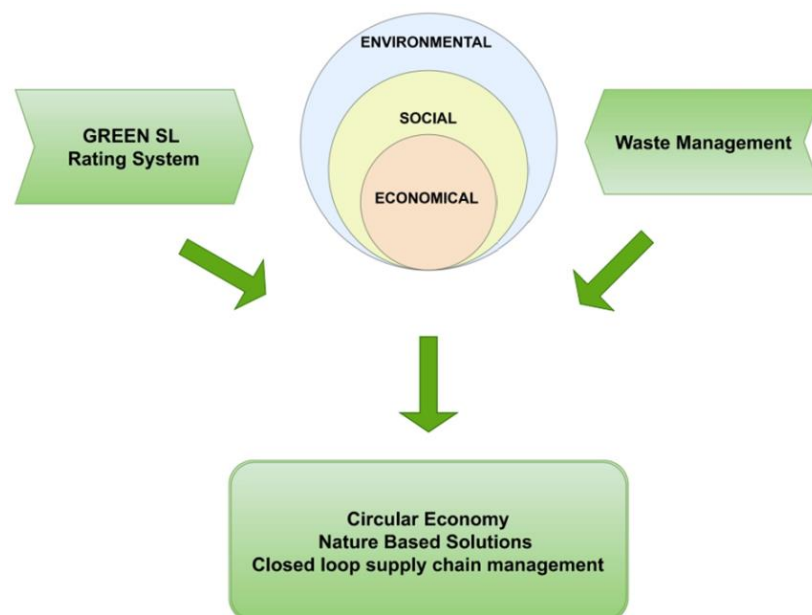
Landfill sites act as ecological reactors where wastes undergo physical, chemical and biological transformations which might be harmful to the environment (Nanda & Berruti, 2021). To overcome environmental problems such as, construction and demolition waste, CO2 emission, energy consumption and raw material extraction in built environment (Schützenhofer et al., 2022), it is vital to practice sustainable construction methods (Lima et al., 2021) with the aid of an acceptable green rating system.

Green Rating Systems

Green Rating system is a method which is used as an action strategy in order to associate construction projects (Cao et al., 2015).

An increased focus and attention on the development of sustainable buildings has led to the certification of various green buildings during the last three decades (Olawumi et al., 2020). Several green building certification systems (GBCs) such as Building Research Establishment Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED) has established as well-known green rating systems globally (Tleuken et al., 2021).

In the Sri Lankan context, GREEN SL rating system was introduced by Green Building Council of Sri Lanka in 2011 (District & Scott, 2009). These rating tools has been developed based on geographical conditions (Ding, 2008). Therefore, the focus is different from each other when comparing these rating tools. Soharu et al. (2021) stated that achievable points without waste minimization in BREEAM, LEED rating systems are respectively 81%, 88% which leads to achieve a higher grading in both rating systems. Further Soharu et al. (2021) indicated that through waste minimization, the maximum points percentage which can be gained from these rating systems are 20%, 12% accordingly.





This confirms that even without focusing on waste minimization, projects can be labelled as green buildings. In GREEN SL rating system out of total 100 points, 84% can be achieved without any consideration about minimizing waste and classified the building as Platinum certified green building (GBCSL, 2022). In Sri Lankan context, GREEN SL rating system does not provide adequate guideline of waste minimization or solution to overcome the problem of disposing bulk construction waste in to lands or using construction waste to land fill. According to the pilot case studies carried out it was evident that GREEN SL rating system accepts landfill as a waste disposal method which will be harmful for the human well-being.

Conclusion and Recommendation

Sustainable building construction captures all integrated parameters towards the environment, social, and economic (Soharu et al., 2021b). The available green rating systems do not facilitate construction waste minimization in an effective manner. Even though there are mandatory points available for waste minimization in green rating systems, it is not adequate enough to solve the prevailing problems related to construction waste. Hence, it is recommended to incorporate mandatory points for waste minimization through the process of construction and use of 3R concept (Reduce, Reuse, Recycle) in construction. Further, new concepts such as, Circular Economy, Nature Based Solutions and Close-loop supply chain management can be incorporated as mandatory points in the Green rating systems to minimize the construction waste.

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Recent CPDs

S/N	CPD No.	Date	Title	Resource Person	Abstract
1	CPD 1 - 2022/23	25 th November 2022	Moving to and succeeding in the Middle East: essential elements	Ch.QS S.P.A. Keerthiratna , BSc (QS) Hons, MBA, AIQSSL, MRICS, Expert QS, Hon. Co-Representative of IQSSL in Dubai, UAE. Ch.QS. M.B. Ekanayake , BSc (QS) Hons, AIQSSL. MRICS, MCI(Arb), Arbitrator, Expert in Construction Claims and Dispute Resolution.	IQSSL presented this CPD to share knowledge of Middle East practitioners with Qs who seek opportunities and career progression in the region.
2	CPD 2 - 2022/23	6 th December 2022	Decarbonising Challenge: Are we ready?	Prof. Shiromi Karunaratne , BSc (Eng) Hons, PhD, MIESL, CEng, (Professor at Department of Civil Engineering, Sri Lanka Institute of Information Technology)	IQSSL presented this CPD webinar to discuss the decarbonising challenges associated with the construction sector and present methods available to assess the same.



APC Application and 2023 Schedule

IQSSL hereby wishes to call for applications for the Assessment of Professional Competence (APC) for the March 2023 session. The APC registration will commence on 6th January 2023 and will close on 27th January 2023. The candidates who are working abroad are eligible to sit for the APC through online mode and the candidates who are working in Sri Lanka shall sit for the APC through the regular physical mode. (This however may be subjected change.)

Eligible candidates shall submit duly filled applications either to the IQSSL Secretariat at the OPA Building or via e-mail to iqssl@sltnet.lk, before 3.00 p.m. on 27th January 2023. Please refer below schedule for more details. All the necessary forms are available to be downloaded from www.iqssl.lk.

Registration fees (for the APC application and Charter Classes) can be deposited to the following bank account and the remittance slips shall be attached to the registration form.

Name of Account: Institute of Quantity Surveyors Sri Lanka

Account Number: 1208409001

Bank Name and Branch: Commercial Bank - Borella

Currency Type: LKR.

For any further clarifications, please e-mail to iqssl@sltnet.lk or contact Harshani on 0774441221.

No	Description	Date	Remarks
Registration and Submissions			
1	Commencement of registration	January 6, 2023	
2	Deadline for registration	3:00 PM, January 27, 2023	Online submission of the application form and payment proof shall be as a single PDF.
3	Deadline for diary submission	3:00 PM, February 03, 2023	Overseas candidates can submit the diaries via the web link provided by IQSSL after registration. Candidates in Sri Lanka shall submit the diaries to the IQSSL Secretariat.
4	Issuing of APC Practice Problem	10:00 AM, February 17, 2023	
5	APC report submission	3:00 PM, February 21, 2023	Overseas candidates can submit the report via the web link provided by IQSSL. Candidates in Sri Lanka shall submit the report to the IQSSL Secretariat.
Charter Classes			
6	Commencement of Registration for charter classes	January 6, 2023	Charter classes will be held online
7	Commencement of Charter Classes	January 22, 2023	Classes will be held on Sundays. The class schedule will be published in due course.
8	End of Charter Classes	February 12, 2023	
APC Viva Voce			
9	APC Interview Day 01	March 11, 2023	Subject to change
10	APC Interview Day 02	March 12, 2023	
11	APC Interview Day 03	March 18, 2023	Subject to change
12	APC Interview Day 04	March 19, 2023	
	Reserve Date	March 26, 2023	Subject to change

IQS ESTIMATING GUIDE

Institute of Quantity Surveyors Sri Lanka (IQSSL)



2023



IQS Estimating Guide

Foreword

We are in an era where construction activities are influenced by evolving technologies and business psychologies. Since the first official release of Building Schedule of Rates (BSR) in 1989 construction inputs, methods and industry characteristics have evolved to a greater extent, necessitating an appropriate new publication with revised norms for rate analysis. The absence of a suitable estimating guide has been a concern felt by the stakeholders in the construction industry.

Considering this need of the industry and the requests made by many personnel and institutions in the construction industry, Institute of Quantity Surveyors, Sri Lanka (IQSSL) has initiated the process of developing an IQS Estimating Guide (IQSEG). Main objective of this process was to develop IQSEG for pricing and rate analysis for work items most commonly used and which have high contribution to cost in building construction.

The name "Guide" is used as this provides a guide for user to make necessary adjustments in the rate analysis based on the nature, location, method and complexity of the project, so that the misconception that the published rates can be applied to every situation is eliminated.

With the involvement of experienced panel of professional Quantity Surveyors an initial draft was finalized. In order to validate the applicability of IQSEG to the current industry practices, the norms were verified with selected major contracting and consulting organization.

As the first landmark of this process a sample form of Section 'F – Concrete' is published, expecting feedback for its further development. IQSEG is in the progress and other sections including preambles for the Masonry, Concrete, Waterproofing, Metal & Woodwork, Roofing, Finishes and paint work and will be issued as an interim version for feedback in future.

Feedback on this sample form for further improvements is appreciated on behalf of IQSSL in developing the IQSEG with added work sections in future.

Estimating Guide Development Committee

IQSSL



Guidance Notes for Concrete Work

General

1. Work items considered under this section include concrete, formwork, reinforcement and pre-cast concrete elements.
2. Norms given are only for the listed inputs in the rate Build Up and the other inputs required for particular; operational systems, method, location and situation are to be decided and included by the user. Refer to “Inclusions and Exclusions” below for further details.
3. All the norms are given for unit rate pricing unless noted otherwise.
4. Norms include a normative percentage for inherent material wastages as indicated in each “Rate Build Up sheet”. Users may adjust these percentages based on corresponding waste control management systems.
5. Given norms are for work done at ground level unless noted otherwise. Users shall make necessary adjustments for the additional labour and/or material without duplicating pricing or prices in the Preliminaries Bill to suit the level or altitude at which the work is to be constructed.
6. Refer to the “Applicable Table/s” given at the end of the Rate Build Up sheet in this Section for additional information.

Measurement

1. Measurements shall be made in accordance with the applicable SMM, Preambles to BOQ and the dimensions given on the drawings, specifications and other available documents or as specified.
2. Rate Build Ups are prepared on the basis that the measurements are made of the net actual quantity of each item for the purpose of valuations. Any other adjustments for; wastage, bulking, shrinkage, sundries, voids/intersections not deducted, coverage rules under the SMM, Preambles to BOQ and these guidance notes that are required, shall be decided and included by the user.
3. Thicknesses specified in the documents shall be the finished thickness.



Material, Labour and Plant

1. The given norms apply to the mixing of concrete using ordinary Portland cement according to the mix designs as given in "Applicable Table/s".
2. Ready-mix concrete used shall conform to relevant specifications.
3. No separate allowance is made in the norms for the supply of ready-mix concrete for transporting, admixtures, handling, pumping, hoisting and placing at any height or depth.
4. Sand to be river sand, mined sand or manufactured sand as per the relevant specifications.
5. Water used shall be as per the relevant specifications.
6. Labour norms given are for manual mixing/placing and using machinery as noted in the Rate Build Up Sheet for relevant concrete items.

Mixing and Placing of In-Situ Concrete

1. Rates shall include for the supply of materials, mixing, hoisting/lowering, placing in position, packing and tamping around reinforcements including vibration and curing of Concrete elements using necessary 'standard' material. equipment, labour and plant for Site mixed concrete.
2. All concrete mix designs are to be suitable for the purpose for which they are intended and in accordance with relevant specifications and standards.
3. The norms given include the labour required for curing of concrete using water.
4. It is assumed that the water required for curing has been included elsewhere.
5. Compaction is considered to be by hand and / or by mechanical vibration.
6. Norms for plain concrete blinding beds exclude any formwork to the edges.

Inclusions and Exclusions

1. This Estimating Guide provides norms for the work executed under 'standard' conditions only, and the cost impact on the particular work items due to the following variable factors are excluded in the norms given. User shall make necessary allowances in his calculations according to the actual requirements as applicable (next page):



- Operation related costs
- Location related costs
- Method related costs
- Items identified to be measured separately in the applicable SMM
- Lump sum items
- Items separately identified in the Preliminaries
- Rectification work
- Costs incurred in complying with the Conditions of Contract
- Items cost of which are covered in the overheads
- Design where expressly required
- Transportation of materials to site and on site
- Falls, cambers and shaped profiles.

Precast Concrete (Lintel)

1. Norms exclude the following. User shall make necessary allowances in the rate for the same as per the actual requirement:
 - i. Casting with all necessary concrete, formwork, and reinforcement including forming pockets for lifting hooks and the like and filling of such pockets as specified;
 - ii. Loading, unloading, transporting to and in site, handling and stacking;
 - iii. Hoisting to any height or depth, erecting and fixing in position (except labour for same) building in, including bedding and jointing in mortar/concrete as required and necessary strutting and temporary supports; and
 - iv. Complying with applicable specifications, conditions or Preambles to BOQ.

RATE BUILD-UP SHEET					004			
BREAKDOWN REFERENCE - 50mm SCREED GRADE 15					/ F1.040			
RATE APPLICATION GUIDES AND CRITERIA					WORK SECTION : F1 Insitu Concrete			
Guide					SPECIFICATION : Chapter 04			
Criterion					PHRASEOLOGY REF. :			
Input norms are considered for : 10m ² Allowed Wastage Factor : 5% average wastage for materials Exclusions : <ol style="list-style-type: none"> 1. Mixing of concrete 2. Preparation of ground to receive concrete 3. Expansion joints 4. Damp proof membrane 5. Construction joints 6. Formwork 7. Preliminaries 8. Transport (General and specific) Mixing Method : N/A Placing Method : Manual					TYPICAL DESCRIPTION FOR BILLS OF QUATITIES : Placing only of 50mm thick mass concrete in G15 for screed in foundation, poured into ground.			
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G15	0.55	m ³					
	Labour							
	Mason	0.30	day					
	Unskilled labour	0.60	day					
	Tools							
	Small tools		Item					
	Sundries							
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		10.00	m ²					
Placing only of 50mm thick mass concrete in G15 as described		1.00	m ²					
Applicable Table/s : Table No - (Will be provided later)					Applicable Sketch/s : FOOTINGS Sketch No - (Will be provided later)			

REFERENCE

- Method of Measurements** : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification** : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/I)
- Pricing Preambles** : Section 01 - Concrete Works
- Preliminaries** : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET				005				
BREAKDOWN REFERENCE - COLUMN BASE GRADE 25				/ F1.050				
RATE APPLICATION GUIDES AND CRITERIA				WORK SECTION : F1 Insitu Concrete				
Guide				SPECIFICATION : Chapter 04 and 05				
Criterion				PHRASEOLOGY REF. :				
Input norms are considered for : 1m3 (5nrs) Allowed Wastage Factor : 5% average wastage for materials Exclusions : 1. Mixing of concrete 2. Expansion joints (If required) 3. Bonding agents 4. Formwork 5. Preliminaries 6. Transport (General and specific) 7. Provision for services Mixing Method : N/A Placing Method : Manual				TYPICAL DESCRIPTION FOR BILLS OF QUANTITIES : Placing only of reinforced concrete in G25 for column base in foundation, poured into formwork.				
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G25	1.05	m ³					
	Jute hessian (2 time use)	2.50	m ²					
	Labour							
	Mason	0.25	day					
	Unskilled labour	0.66	day					
	Vibrator operator	0.25	day					
	Carpenter	0.25	day					
	Unskilled labour(Curing)	0.10	day					
	Plant							
	Vibrator (Electrical)	0.07	hrs					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.00	m ³					
Placing only of concrete in G25 in column base as described		1.00	m ³					
Applicable Table/s : Table No - (Will be provided later)				Applicable Sketch/s : FOOTINGS Sketch No - (Will be provided later)				

REFERENCE

- Method of Measurements** : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification** : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/1)
- Pricing Preambles** : Section 01 - Concrete Works
- Preliminaries** : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET					006			
BREAKDOWN REFERENCE - COLUMNS UP TO GFL GRADE 25 / F1.060								
RATE APPLICATION GUIDES AND CRITERIA				WORK SECTION : F1 Insitu Concrete				
Guide		Criterion		SPECIFICATION : Chapter 04 and 05				
				PHRASEOLOGY REF. :				
Input norms are considered for				: 1m ³ (10hrs)				
Allowed Wastage Factor				: 5% average wastage for materials				
Exclusions				: 1. Mixing of concrete 2. Bonding agents (If required) 3. Formwork 4. Preliminaries 5. Transport (General and specific) 6. Provision for services				
Mixing Method				: N/A				
Placing Method				: Manual				
TYPICAL DESCRIPTION FOR BILLS OF QUANTITIES :								
Placing only of reinforced concrete in G25 for isolated square shaped columns sectional area less than 0.10m ² - Up to Ground floor level								
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G25	1.05	m ³	12,500.00				
	Jute hessian (2 time use)	13.20	m ²					
	Labour							
	Mason	0.50	day	2,250.00				
	Unskilled labour	1.60	day	1,750.00				
	Vibrator operator	0.50	day	2,250.00				
	Carpenter	0.50	day	2,250.00				
	Unskilled labour(Curing)	0.10	day	1,750.00				
	Plant							
	Vibrator (Electrical)	0.20	hrs	200.00				
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.00	m ³					
Placing only of concrete in G25 in columns as described		1.00	m ³					
Applicable Table/s				: Table No - (Will be provided later)				
Applicable Sketch/s				: FOOTINGS Sketch No - (Will be provided later)				

REFERENCE

Method of Measurements	: SLS 573: 1999 Method of Measurements of Building Works (First Revision)
Specification	: Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/1)
Pricing Preambles	: Section 01 - Concrete Works
Preliminaries	: ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET **007**

BREAKDOWN REFERENCE - SLAB ON GRADE, GRADE G20 / F1.070

RATE APPLICATION GUIDES AND CRITERIA		WORK SECTION : F1 Insitu Concrete
Guide	Criterion	SPECIFICATION : Chapter 04 and 05
		PHRASEOLOGY REF. :

Input norms are considered for	: 1m3
Allowed Wastage Factor	: 5% average wastage for materials
Exclusions	: 1. Mixing of concrete 2. Bonding agents (If required) 3. Expansion joints 4. Compressible filler 5. Formwork (If required) 6. Preliminaries 7. Transport (General and specific) 8. Provision for services
Mixing Method	: N/A
Placing Method	: Manual

TYPICAL DESCRIPTION FOR BILLS OF QUATITIES :
Placing only of reinforced concrete in G20 for beds and slabs on ground, thickness less than 150mm

Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G20	1.05	m ³					
	Jute hessian (2 time use)	10.00	m ²					
	Labour							
	Mason	0.20	day					
	Unskilled labour	0.60	day					
	Carpenter	0.20	day					
	Unskilled labour(Curing)	0.10	day					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.00	m ³		-	-		

Placing only of concrete in G20 in slab on grade as described	1.00	m ³					
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Applicable Table/s : Table No -
(Will be provided later)

Applicable Sketch/s : **Ground floor slab details**
Sketch No -
(Will be provided later)

REFERENCE

- Method of Measurements** : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification** : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/1)
- Pricing Preambles** : Section 01 - Concrete Works
- Preliminaries** : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET					008			
BREAKDOWN REFERENCE - COLUMNS GF TO FF GRADE 25 / F1.080								
RATE APPLICATION GUIDES AND CRITERIA					WORK SECTION : F1 Insitu Concrete			
Guide		Criterion			SPECIFICATION : Chapter 04 and 05			
					PHRASEOLOGY REF. :			
Input norms are considered for : 1.5m3 (5nrs) Allowed Wastage Factor : 5% average wastage for materials Exclusions : 1. Mixing of concrete 2. Bonding agents (If required) 3. Formwork 4. Preliminaries 5. Transport (General and specific) 6. Provision for services Mixing Method : N/A Placing Method : Manual					TYPICAL DESCRIPTION FOR BILLS OF QUANTITIES : Placing only of reinforced concrete in G25 for attached square shaped columns sectional area less than 0.10m2 - From Ground floor to First floor level			
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G25	1.58	m ³					
	Jute hessian (2 time use)	20.00	m ²					
	Labour							
	Mason	0.80	day					
	Unskilled labour	3.15	day					
	Vibrator operator	0.80	day					
	Carpenter	0.80	day					
	Unskilled labour(Curing)	0.20	day					
	Plant							
	Vibrator (Electrical)	0.30	hrs					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.50	m ³					
Placing only of concrete in G25 in columns as described		1.00	m ³					
Applicable Table/s : Table No - (Will be provided later)					Applicable Sketch/s : Column details Sketch No - (Will be provided later)			

REFERENCE

- Method of Measurements** : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification** : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/I)
- Pricing Preambles** : Section 01 - Concrete Works
- Preliminaries** : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET				009				
BREAKDOWN REFERENCE - FIRST FLOOR SLAB GRADE 25 / F1.090								
RATE APPLICATION GUIDES AND CRITERIA				WORK SECTION : F1 Insitu Concrete				
Guide		Criterion		SPECIFICATION : Chapter 04 and 05				
				PHRASEOLOGY REF. :				
Input norms are considered for : 1.5m3 Allowed Wastage Factor : 10% average wastage for materials Exclusions : 1. Mixing of concrete 2. Bonding agents (If required) 3. Expansion joints 4. Compressible filler 5. Formwork (If required) 6. Preliminaries 7. Transport (General and specific) 8. Provision for services Mixing Method : N/A Placing Method : Manual				TYPICAL DESCRIPTION FOR BILLS OF QUATITIES : Placing only of reinforced concrete in G25 for suspended slabs, thickness less than 150mm - In First floor level				
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G25	1.65	m ³					
	Jute hessian (2 time use)	12.00	m ²					
	Labour							
	Mason	0.75	day					
	Unskilled labour	2.75	day					
	Vibrator operator	0.75	day					
	Carpenter	0.75	day					
	Unskilled labour(Curing)	0.20	day					
	Plant							
	Vibrator (Electrical)	0.11	hrs					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.50	m ³					
Placing only of concrete in G25 in slab as described		1.00	m ³					
Applicable Table/s : Table No - (Will be provided later)				Applicable Sketch/s : Slab details Sketch No -				

REFERENCE

- Method of Measurements : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/1)
- Pricing Preambles : Section 01 - Concrete Works
- Preliminaries : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET					010			
BREAKDOWN REFERENCE - STAIRS GF TO FF GRADE 25					/ F1.100			
RATE APPLICATION GUIDES AND CRITERIA					WORK SECTION : F1 Insitu Concrete			
Guide					SPECIFICATION : Chapter 04 and 05			
Criterion					PHRASEOLOGY REF. :			
Input norms are considered for : 1.5m3 Allowed Wastage Factor : 5% average wastage for materials Exclusions : 1. Mixing of concrete 2. Bonding agents (If required) 3. Formwork 4. Preliminaries 5. Transport (General and specific) 6. Provision for services Mixing Method : N/A Placing Method : Manual					TYPICAL DESCRIPTION FOR BILLS OF QUANTITIES : Placing only of reinforced concrete in G25 for stairs, steps and waist - From Ground floor to First floor level			
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Site mixed concrete in G25	1.58	m ³					
	Jute hessian (2 time use)	9.00	m ²					
	Labour							
	Mason	0.65	day					
	Unskilled labour	1.50	day					
	Vibrator operator	0.65	day					
	Carpenter	0.65	day					
	Unskilled labour(Curing)	0.20	day					
	Plant							
	Vibrator (Electrical)	0.11	hrs					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
Total Amount (Excl. VAT)		1.50	m ³					
Placing only of concrete in G25 in stairs as described		1.00	m ³					
Applicable Table/s : Table No - (Will be provided later)					Applicable Sketch/s : Staircase details Sketch No - (Will be provided later)			

REFERENCE

- Method of Measurements** : SLS 573: 1999 Method of Measurements of Building Works (First Revision)
- Specification** : Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/1)
- Pricing Preambles** : Section 01 - Concrete Works
- Preliminaries** : ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities

RATE BUILD-UP SHEET				011				
BREAKDOWN REFERENCE - BEAMS IN FF GRADE 30A				/ F1.110				
RATE APPLICATION GUIDES AND CRITERIA				WORK SECTION : F1 Insitu Concrete				
Guide				SPECIFICATION : Chapter 04 and 05				
Criterion				PHRASEOLOGY REF. :				
Input norms are considered for : 1.5m3				TYPICAL DESCRIPTION FOR BILLS OF QUANTITIES : Placing only of reinforced concrete in G30A for attached beams, sectional area more than 0.10m2 - In First floor level				
Allowed Wastage Factor : 5% average wastage for materials								
Exclusions : 1. Mixing of concrete								
2. Bonding agents (If required)								
3. Preliminaries								
4. Transport [General and specific (If any excluding pump car)]								
5. Provision for services								
Mixing Method : Readymixed delivered to Site								
Placing Method : By Pump car + Labour								
Cost Code	Description	Inputs (with wastage) and Rates			Rate Analysis			Net Unit Rate
		Qty	Unit	Rate	Labour	Material	Plant/tools	
	Materials							
	Readymixed concrete in G30A	1.58	m ³					
	Jute hessian (2 time use)	6.50	m ²					
	Labour							
	Mason	0.80	day					
	Unskilled labour	3.15	day					
	Vibrator operator	0.80	day					
	Carpenter	0.80	day					
	Unskilled labour(Curing)	0.20	day					
	Plant							
	Vibrator (Electrical)	0.11	hrs					
	Pump car	1.58	m ³					
	Tools							
	Small tools		Item					
	Sundries		Item					
	Add: Project specific inputs							
	Total Amount (Excl. VAT)	1.50	m ³					
	Placing only of concrete in G30A in attached beams as described	1.00	m ³					
Applicable Table/s : Table No - (Will be provided later)				Applicable Sketch/s : Beam details Sketch No - (Will be provided later)				

REFERENCE

Method of Measurements	: SLS 573: 1999 Method of Measurements of Building Works (First Revision)
Specification	: Specifications for Building Works - Volume I, 3rd Edition (Revised) July 2004 (SCA/4/I)
Pricing Preambles	: Section 01 - Concrete Works
Preliminaries	: ICTAD/ID/04: Guidelines for Preparation of Bill No.1 - Preliminaries for Building Works (2nd Edition - June 2009) and Preliminary Bill in the particular Bills of Quantities



Construction Specialised Mobile Apps for Effective Project Implementation

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Introduction

Construction industry is a complex and challenging industry, which involves the coordination of many different activities and stakeholders to complete a project on time and within budget (Newman, et al., 2021). Construction 4.0 refers to the application of advanced technologies to the construction industry. It involves the use of robotics, automation, artificial intelligence, and other digital technologies to improve efficiency, productivity, and safety on construction sites. This is part of a broader trend known as Industry 4.0, which refers to the fourth industrial revolution, characterized by the integration of advanced technologies into other industries. Construction 4.0 is expected to lead to significant improvements in the construction industry, including reduced costs and improved project outcomes. A considerable amount of mobile apps are used in the construction industry

Construction Specialised Mobile Apps

A construction specialized app is a mobile application that is specifically designed for a particular aspect of the construction industry. These apps are typically used by construction professionals, such as architects, engineers, project managers, and contractors, to help them perform their jobs more efficiently and effectively (Ekow & Kofi, 2016). Construction specialized apps may focus on a specific aspect of the

construction process, such as project management, estimating, design, or material and equipment tracking. They may also provide access to specialized information and tools, such as construction codes and standards, or provide tools for collaboration and communication within a construction team. Construction specialized apps can help improve productivity, efficiency, and accuracy in the construction industry (PlanGrid Build | The #1 Construction App for Project Management, 2021). There are three main categories of construction specialised mobile apps as detailed below.

Project management apps: Provide tools and features that help construction managers to plan, schedule, and track projects. Allows including features such as project schedules, task lists, and progress tracking.

Estimating apps: Help contractors and project managers to estimate project costs and manage budgets. Facilitate to include features such as cost databases, cost calculators, and bid management tools (Procore Construction Management Software, 2021).

Design and modelling apps: Assist architects and engineers to design and model buildings and other structures. Features such as 3D modelling, rendering, and visualization tools are included (Construction & Floor Plan App For Contractors | magicplan, 2021).



Communication and collaboration apps: Allow construction professionals to communicate and collaborate with team members and clients. Messaging, file sharing, and project management tools are included to the App (PlanGrid Build | The #1 Construction App for Project Management, 2021).

Construction reference apps: These apps provide access to important construction industry information, such as codes and standards. They can include features such as searchable databases and offline access to reference materials.

Leading Construction Specialised Apps and Features

There are variety construction specialized apps available, and the leading apps may vary depending on the specific needs and preferences of users. However, some popular construction specialized apps and their features are identified in Table 1.

Accordingly, PlanGrid, AutoCAD 360, BIMx, MagicPlan, ARki and Procore are identified as most popular construction specialised apps in the construction industry. It was noted that, the state-of-the-art tech-based mobile applications allow the construction project to reduce the unnecessary wastes and complete the project within the given budget. This was further proven by many researchers, stating that the less human intervention reduces the unnecessary wastes in the construction project. Following section discusses the applications of recognised apps in construction projects.

Applications of Recognized Construction Specialised Apps in Construction Projects

Recognised Construction specialized apps can be applied in many different ways to improve efficiency, productivity, and safety on construction projects. The Table 2 represents the areas of recognised constructions apps that can be used in construction projects.

Table 1: Applications of Construction Apps

	PlanGrid	AutoCAD	BIMx	MagicPla	ARki	Procore
Project management	✓	✓	✓	✓	✓	✓
Design and modelling	✓	✓	✓	✓	✓	
Communication and collaboration	✓	✓	✓	✓	✓	✓
Access to construction industry information	✓	✓	✗	✗	✗	✗
Presentations and demonstrations	✗	✗	✓	✗	✓	✗
Estimating and budgeting	✗	✗	✗	✓		✓
Quality and safety assurance	✗	✗	✗	✗	✗	✓

Sources: (PlanGrid Build | The #1 Construction App for Project Management, 2021), (A360 | Project Collaboration in the Cloud, 2021), (BIMx, 2021), (Construction & Floor Plan App For Contractors | magicplan, 2021), (Augmented Reality platform for Architecture, Engineering and Construction, 2021), (Procore Construction Management Software, 2021). (Newman, et al., 2021)



Table 1: Construction Specialised Apps and Features

	App	Functions and Features
1	PlanGrid	<p>PlanGrid is an advanced mobile application that fulfils the requirements in construction management.</p> <p>Features:</p> <ul style="list-style-type: none">✓ Automatically reads sheet names, descriptions and hyperlinks in drawings.✓ Annotation facility for PDF drawings.✓ Cloud-server security for data.✓ Blueprint adjustment facility for variation orders.✓ Present photo archive for progress photos and pinned directly onto construction blueprints.✓ Ability to share the latest plans, progress photos, markups with the entire project team.✓ End-to-end RFI (Request For Information) solution.✓ Report generation.
2	AutoCAD 360	<p>AutoCAD 360 is a design application to draw, edit, and view two-dimensional (2D) Computer Aided Drawings (CAD) across multiple devices based on a web mobile application using cloud storage.</p>
3	BIMx	<p>BIMx is a Building Information Modelling based mobile application that allows users to navigate within drawing sheets and three dimensional (3D) building models.</p> <p>Features:</p> <ul style="list-style-type: none">✓ Photorealistic model of the 3D model.✓ Ability to trace 2D drawings in 3D.✓ Ability to access any building component which has BIM information.✓ Gravity and egress recognition mode.✓ Ability to give location feedback during navigation.
4	MagicPlan	<p>MagicPlan is a state-of-the-art tech-based mobile application that uses inputs from the smartphone device such as camera, gyroscope, and laser distance meters to design complete floor plans automatically in 2D or 3D form within few seconds.</p>



		<p>Features:</p> <ul style="list-style-type: none"> ✓ Allowing the user to measure and sketch interior plans in 2D and 3D form using state-of-the-art tech with an easy-to-use user interface. ✓ Facilitate adding photos, 3600 images, custom forms, markups, and notes to create structured reports. ✓ Ability to automatically calculate pricing by combining take-off and estimate.
5	ARki	<p>ARki is an Android mobile application that allows users to visualize 3D building model files realistically by using Augmented Reality (AR) technology on site.</p> <p>Features:</p> <ul style="list-style-type: none"> ✓ The offline storage model allows the user to store models on a native device to access them without an internet connection. ✓ Ability to import 3D building models in different formats such as SketchUp, ArchiCAD, Revit, and other 3D formats. ✓ Ability to visualise models on any scale using AR.
6	Procore	<p>Procore is an Android application that allows users to access project documents, project details, schedules, and other construction sensitive information and automatically synchronise them in real-time when the device is connected to the internet.</p> <p>Features:</p> <ul style="list-style-type: none"> ✓ Allows the user to view and revise drawings. ✓ Allows tracking on daily logs related to labour, communication, equipment, materials, and job site events. ✓ Allows to capture progress photos and link them to project drawings by location. ✓ Allows creating, editing, and sharing schedules.

Sources: (PlanGrid Build | The #1 Construction App for Project Management, 2021), (A360 | Project Collaboration in the Cloud, 2021), (BIMx, 2021), (Construction & Floor Plan App For Contractors | magicplan, 2021), (Augmented Reality platform for Architecture, Engineering and Construction, 2021), (Procore Construction Management Software, 2021). (Newman, et al., 2021)



Conclusion

The construction industry is constantly evolving, and the future is likely to bring many changes and advancements. Some potential developments in the construction industry include the use of more advanced technology to improve efficiency and reduce waste. The future of the construction industry is likely to be marked by continued innovation and a focus on improving efficiency and sustainability.

Construction apps can be very useful for a variety of reasons. For one, they can help construction workers and project managers to stay organized and manage their projects more efficiently. This can lead to increased productivity and a smoother overall construction process. Additionally, construction apps can help to improve communication among team members, making it easier to share information and collaborate on tasks. This can help to reduce the likelihood of errors and miscommunications, which can save time and money. It can provide access to a wide range of useful tools and resources, such as project management software, estimating tools, and safety guidelines. This can help workers to make more informed decisions and complete their tasks more effectively.

References

- A360 | Project Collaboration in the Cloud.* (2021, July 13). Retrieved from [A360.autodesk.com: https://a360.autodesk.com/](https://a360.autodesk.com/)
- Augmented Reality platform for Architecture, Engineering and Construction.* (2021, July 13). Retrieved from [DARF DESIGN: https://www.darfdesign.com/arki.html](https://www.darfdesign.com/arki.html)
- BIMx.* (2021, July 13). Retrieved from [Graphisoft: https://graphisoft.com/solutions/bimx](https://graphisoft.com/solutions/bimx)
- Construction & Floor Plan App For Contractors | magicplan.* (2021, July 13). Retrieved from [Magicplan.app: https://www.magicplan.app/](https://www.magicplan.app/)
- Ekow, Y., & Kofi, O. (2016). Awareness and Utilization of Construction Related Smart Mobile Device Applications in the Construction Industry. *Science and Technology*, 6(1), 1-7. doi:10.5923/j.scit.20160601.01
- Newman, C., Edwards, D., Martek, I., Lai, J., Rillie, I., & Thwala, W. (2021). Industry 4.0 deployment in the construction industry: a bibliometric literature review and UK-based case study. *Smart and Sustainable Built Environment*, 10(4), 557-580. doi:<https://doi.org/10.1108/SASBE-02-2020-0016>
- PlanGrid Build | The #1 Construction App for Project Management* (2021, July 13). Retrieved from [construction.autodesk.com: https://construction.autodesk.com/products/autodesk-plangrid-build/](https://construction.autodesk.com/products/autodesk-plangrid-build/)
- Procore Construction Management Software.* (2021). Retrieved from [Procore.com: https://www.procore.com/en-sg](https://www.procore.com/en-sg)



New Associate Members - 2022



Mr. A.G.J. Roshan



Mr. A.W.V. Udayanga



Mr. D.D.J.A. Amarasena



Mr. G.D. Dhanitha



Mr. H.L.N.R. Perera



Mr. K.D. Ruwan



Mr. M.D. Wijesinghe



Mr. M.D.D.M. Sumathipala



Mr. P. Kirusanth



Mr. P.P. Ratnapala



Mr. S. Sivakumaran



Mr. T.D. Wickramasekara



Mr. W.C.A. Kumara



Ms. C.J. Munaweera



Ms. S. Thivya

Recent Memories

What:

Visit of IQSSL to PAQS

When:

9th to 15th September 2022

Where:

Singapore



Recent Memories



What:

Signing of Reciprocity with New Zealand Institute of Quantity Surveyors (NZQS)

When:

September 2022 during the PAQS Visit



What:

Signing the Reciprocity with Royal Institution of Chartered Surveyors (RICS)

When:

September 2022 during the PAQS Visit



Recent Memories



What:

EEJ ADR Conference at Bentota Beach Hotel

When:

23rd to 25th September 2022



What:

Strategic planning workshop for IQSSL
at Cinnamon Grand

When:

4th and 5th November 2022



Recent Memories



What:

IQSSL Fundraising Event -
Car Wash at Narahenpita

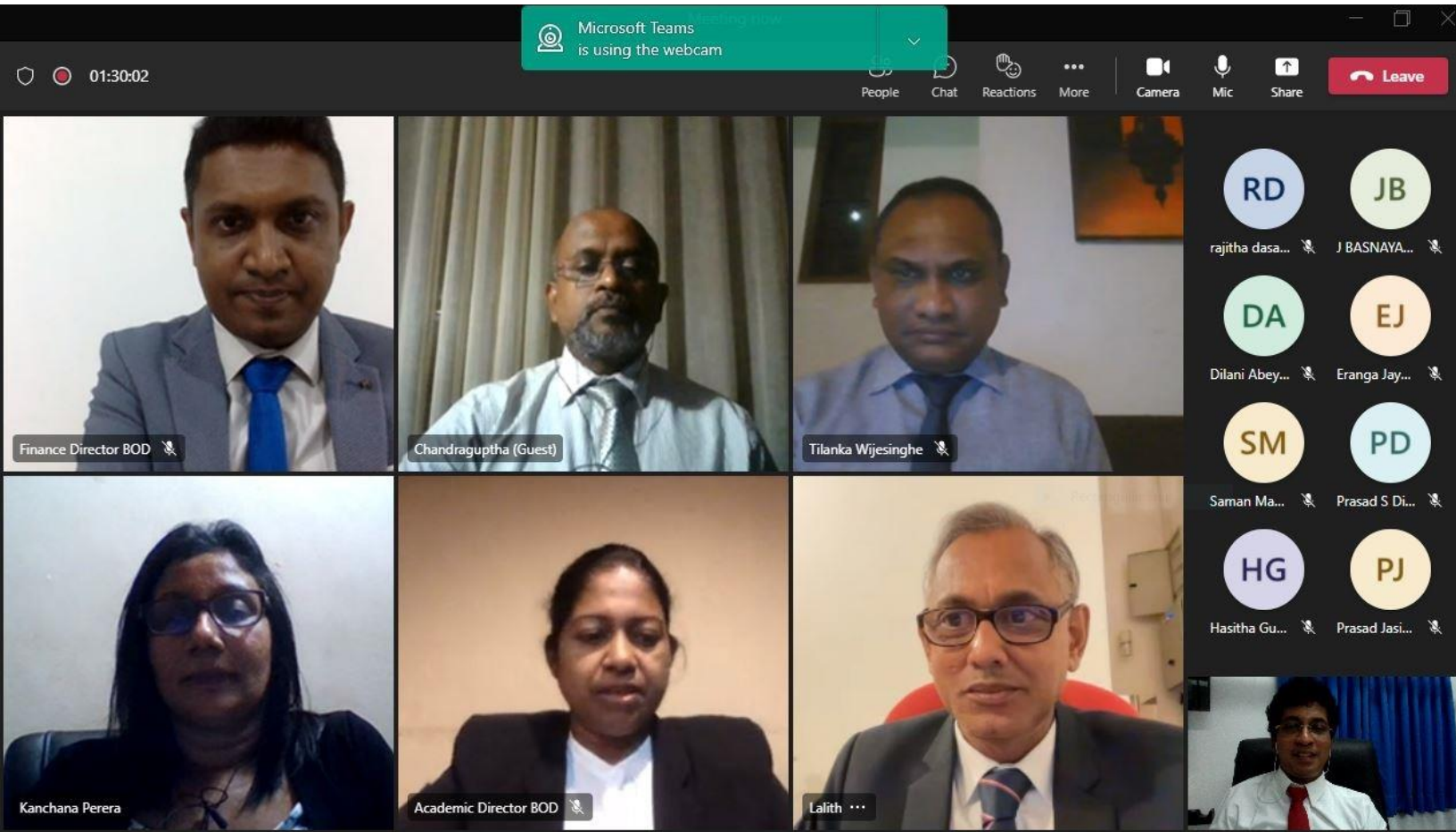
When:

17th December 2022





Recent Memories



What:

AGM of IQSSL College of Quantity Surveying

When:

17th December 2022



www.iqssl.lk