QUALITY EVALUATION ON UTP CHANCELLOR HALL BY USING CONQUAS STANDARDS AS BENCHMARKING TOOLS

By

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Dissertation submitted in partial fulfilment of
the requirement for the
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(Civil Engineering)

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CERTIFICATION OF APPROVAL

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Approved by,

_____

(Assoc. Prof. Dr. Abdul Nasir bin Matori)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2015

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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MD NUR FAKHRUL RADZI BIN MOHAMAD NOR

ABSTRACT

Owners of house today are demanding on having a quality house. The higher the quality achieved in housing projects ensures future marketability and enhances the confidence of owners of higher real estate value. The construction industry is influenced by substantial external factors which are different from the manufacturing industry where the goods are produce under supervise and controlled conditions. Construction is essentially an outdoor activity which cannot be confined under controlled environment like a workshop nor a factory. It demands the involvement of many stakeholders to ensure the timely completion of work under sound quality and desired economic value. Quality and workmanship of finish product are the primary concern in each construction projects as poor quality work and failure of structure may claim huge lost and in extreme scenario may even result in loss of human life. Amongst the tools that have used by most class A contractor in Malaysia to improve the quality of the construction products is Construction Quality Assessment System (CONQUAS).

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Alhamdulillah, thanks to Allah S.W.T., whom with His willing giving me the opportunity to complete this Final Year Project.

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CHAPTER 1

INTRODUCTION

1. Background of Study

Quality workmanship plays an important role in today construction industry. As it is among the important factor in satisfying the clients needs. Construction companies have long recognised the pivotal role quality plays for their business existence where client satisfaction through product excellence proves to be of the uttermost importance (Dikmen, Talat Birgonul, & Kiziltas, 2005). The high quality achieved in building projects ensures future marketability and enhances the confidence of clients. The primary concern in each construction projects are the quality and workmanship of finish product as lack of attention given in these particular matters may claim huge lost and in extreme scenario may even result in loss of human life. Amongst the tools that have been widely used by most of Class A contractors in Malaysia to improve in this quality aspect is Construction Quality Assessment System or CONQUAS.

Although defining quality is a subjective matter, the need to promote quality standards for design and construction through to commissioning and maintenance has given rise to the need for quality assurance (QA) in the industry (Labib, 2010). The author tries to adapt the CONQUAS standards towards UTP building specifically Chancellor Hall since there are no records found mentioning that UTP using any established quality standards towards its building during the construction period. Thus "Quality Evaluation on UTP Chancellor Hall by Using CONQUAS Standards as Benchmarking Tools" is chosen as the title for Final Year Project (FYP). In this research, the author will prioritize in assessing quality of the building focusing only in architectural element marking scheme. Upon the completion of this research, it is anticipate that this can be the starting point for UTP in adapting the CONQUAS Standard towards the development inside UTP area.

1.1. Problem Statement

1.1.1. Problem Identification

Chancellor Complex was designed by Foster and Partners with gross floor area of 40,000 square meters. Conceived as the signature building of the campus, this complex is 21 meters high and around 150 meters in diameter. The circular building is separated into two 'crescent-shape' halves. One half accommodates the resource centre, where the crescent shape is filled with a four-storey-high display of books, visible through a vast steel and glass façade. The other half houses the Chancellor Hall, which has with five tribunes, retractable seats and loose chairs and an excellent acoustic performance. The two halves are connected by a covered public plaza. (Kara, 2007). This project already completed in 1997. Thus to evaluate the building will be difficult work considering the age of the building itself.

1.1.2. Significant of the Project

In this study, the author wanted to do assessment to the UTP Chancellor Hall by using CONQUAS standard marking scheme focusing in the architecture element only. This will be easier to be done as architectural element on the building will be most visible and quality workmanship can be assessed by visual inspection.

1.2.Objective

i. To use CONQUAS Standards for the evaluation of UTP Chancellor Hall Finishing quality

1.3.Scope of Study

In this study:

i. Identify Architectural criteria in CONQUAS Standards marking scheme used in building assessment.
ii. Conducting assessment in UTP Chancellor Hall by following the Architectural element in the CONQUAS Standards.
iii. Analyse the marking scheme and conclusions.

CHAPTER 2

2. LITERATURE REVIEW

Development process of a country always been reflected by its construction industry as the industry itself plays an important role towards the overall economic growth. Nevertheless, an important factor to the achievement of sustained competitive advantage is a strong quality culture through the continuous delivery of high quality products and services as well as clients satisfaction (Labib, 2010).

The construction industry is influenced by substantial external factors which are different from the manufacturing industry where the goods or products are produced under supervision and controlled conditions. Construction is essentially an outdoor activity which cannot be confined under controlled environment like a workshop nor a factory. To ensure the timely completion of work under sound quality and desired economic value it demands the involvement of many stakeholders.

Quality and workmanship of finish product are the primary concern in each construction projects as low quality work and failure of structure may claim huge lost and in extreme scenario may even result in loss of human life. Generally poor workmanship brings many criticisms to the industry as the criticisms not only comes from the final products but the processes and parties involved are under high pressure for better quality in construction (Labib, 2010).

In delivering a quality project, all party involved needs to play their role effectively as failure to do so will greatly affect the quality of the final product (Abdul-Aziz, 2002).

The construction industry tends to define quality as the ability of products and processes to conform to the established requirement (Labib, 2010). During the

design period and the construction phases of the project the party involved can determine the quality standard of the construction project. As matter of fact, the main sources of quality deviation are usually identified during the undertaking of these two phases which means corrective actions made in these stages of the project will bring significant impact on the quality of the product.

2.1.CONQUAS

The Construction Quality Assessment System (CONQUAS) was introduced in Singapore since 1989 to evaluate the quality performance of building contractors in the public sector (Tang et al., 2005). As de facto national yardstick for the industry, CONQUAS has been periodically fine-tuned to keep pace with changes in technology and quality demands of a more sophisticated population. In the fifth edition launched in 1998,known as CONQUAS 21, Building and Construction Authority (BCA) included the assessment of Mechanical and Electrical (M&E) to replace the External Works component to make CONQUAS scoring more accurate and customer oriented (Chiang et al., 2005). Industry concerns and end-user feedback continued to shape CONQUAS 21 (BCA, 2005).

By using CONQUAS as a standardized method of quality assessment, developers are able to use the CONQUAS score to set targets for contractors to achieve and also assess the quality of the finished building. Today, CONQUAS is widely recognised and also accepted internationally as a benchmarking tool for quality. Indeed, countries like UK and Hong Kong have successfully adapted CONQUAS to their construction industries. CONQUAS is now a registered trademark in Singapore, Malaysia, China, Hong Kong SAR, United Kingdom, Australia, South Africa and India (BCA, 2005).

2.2. Objectives of CONQUAS

The Construction Quality Assessment System or CONQUAS was developed by Building and Construction Authority (BCA) in conjunction with major public sector agencies and various leading industry professional bodies, organizations and firms to measure the quality level achieved in a completed project. CONQUAS was designed with three objectives:

i. To have a standard quality assessment system for construction projects.
ii. To make quality assessment objective by;
    a. Measuring constructed works against workmanship standards and specification.
    b. Using a sampling approach to suitably represent the whole project.
iii. To enable quality assessment to be carried out systematically within reasonable cost and time.

CONQUAS is an independent assessment. Unless specified in the building contract, project engineers or architects should not use CONQUAS to decide if the building or parts of the building projects are acceptable.

2.3. Scope of CONQUAS

CONQUAS sets out the standards for the various aspects of construction work and awards points for works that meet the standards. These points are then summed up to give a total quality score called the CONQUAS Score for the building project. CONQUAS covers most aspects of general building works. The assessment consists of three components:

i. Structural Works,
ii. Architectural Works and
iii. Mechanical & Electrical (M&E) Works.

Each component is further divided into different items for assessment. However, the assessment excludes works such as piling, heavy foundation and sub-structure works which are heavily equipment-based, buried or covered and usually called under separate contracts or sub-contracts. The building is assessed primarily on workmanship standards achieved through site inspection. The assessment is done throughout the construction process for Structural and M&E Works and on the completed building for Architectural Works. Apart from site inspection, the assessment also includes tests on the materials and the functional performance of selected services and installations. These tests help to safeguard the interest of building occupants in relation to safety, comfort and aesthetic defects which surface only after sometime (BCA, 2005).

2.4. CONQUAS Assessors

The CONQUAS assessors consist of independent BCA assessors who had undergo vital training programme. The assessors are required to attend BCA's CONQUAS training and the calibration programme to ensure capability and consistency in assessment.

2.5. CONQUAS: Component & Building Category Weightage Distribution

Table 2.1: Weightage System by CONQUAS

Components	**CAT A** Commercial, Industrial, Institution & others	**CAT B**		**CAT C**		**CAT D** Landed Housing
		Commercial, Industrial, Institution & others	Private Housing	Public Housing (Sold Flats)	Public Housing (Rental Flats)	
Structural Works	20%	25%	20%	30%	40%	25%
Architectural Works	60%	65%	70%	65%	55%	70%
M&E Works	20%	10%	10%	5%	5%	5%
CONQUAS	100%	100%	100%	100%	100%	100%

The weightage system, which is aimed at making the CONQUAS score objective in representing the quality of a building, is a compromise between the cost proportions of the three components in the various buildings and their aesthetic consideration. The CONQUAS score of a building is the sum of points awarded to the three components in each category of buildings (BCA, 2005).

2.6. Criteria for quality assessment from CONQUAS

Based on the quality assessment systems that have been used by the developer and contractor in measuring the quality of building projects in industry as stated in literature review which are CONQUAS, the author has chosen several criteria that are suitable to be used in this research in assessing quality for UTP Chancellor Hall. Below is the list of criteria which set by the author based on CONQUAS to measure the quality for UTP Chancellor Hall. In this project the author had chosen only the architectural component for the assessment as it is easier to evaluate rather than the other components.

Table 2.2: List of criteria to measure quality for UTP Chancellor Hall

No.	Criteria to measure quality of UTP Chancellor Hall
ARCHITECTURAL COMPONENTS	
1)	Floor & Internal Wall
1	No cracks & damages on the finishing
2	No sign of Hollowness & Delamination
3	Tiles Joints Aligned and with consistent size
4	Consistent, smooth & neat painting of finishing
5	Edges of the wall finishing is aligned
2)	Door & Window
6	No visible gap between frame and leaf or wall
7	Leaf and frame corners maintained at right angles
8	Easy in opening & closing without squeaky sound
9	No sign of rain water leakage & corrosion on Leaf/frame
10	No visible damages on the frame or leaf
3)	Roof
11	No leakages, rust, stains, cracks, chip & etc. on roof
12	All openings are sealed to avoid pest invasion
13	Good falls in right direction
14	No sign of chockage & ponding
15	Proper dressing for any protrusion
MECHANICAL AND ELECTRICAL COMPONENTS	
1)	Plumbing & Sanitary Fittings
1	No visible damages to plumbing & sanitary fittings
2	Fittings firmly secured & joints properly sealed
3	No leakages at joints
4	Fittings in working condition
5	Accessible for maintenance
2)	Mechanical & Electrical Works (Power point, lighting, conduit,etc.)
6	Fittings is aligned and in correct positions
7	No exposed wiring within reach
8	No visible damages
9	Conduits properly secured

3) Air Conditioning	
10	Ensuring drainage is provided for air conditioner
11	Air conditioner unit is slightly tilted for condensation
12	Air conditioner drain pipe connected to drain pipe
4) Fire Alarm	
13	Location of fire alarm panel, breakglass & bell is correct
STRUCTURAL COMPONENTS	
1) Structural Works	
1	No visual exposure of groups of coarse aggregates resulting from grout leakage
2	Cold joint & formwork joint must be smooth
3	No bulging, cracking, and damages of structural element
4	No roughness on column & beam finishing
5	Rebar cannot be seen from soffit of the slab and properly secured/no exposed rebar
6	Sufficient cover and according to the specification
7	No deviation of beams from their specified positions
8	No deviation of columns from their specified positions
9	Columns are constructed within acceptable verticality

Chapter 3

3. METHODOLOGY

The proposed method for this study which is by Quality Inspection for the Assessment of Quality on UTP Chancellor Hall as it takes author own understanding on Architecture element in the CONQUAS marking scheme. This Architecture element marking scheme will be used to evaluate the building. The reason of choosing quality inspection as the method for this study is because the data that will be collected in this study will be the score obtained in the UTP Chancellor Hall in according to CONQUAS standard based on Architectural Element.

3.1. Data Collection Method

The choice is important as it related to costs and quality of data. The data collection method used in this research is quality inspection. The inspection is run through the interior and exterior of Chancellor Hall based on the CONQUAS marking scheme for Architectural element. The areas covered in the Chancellor Hall are divided into parts to make the inspection easier. The author has chosen this method because he has the experience to do the inspection during his internship period.

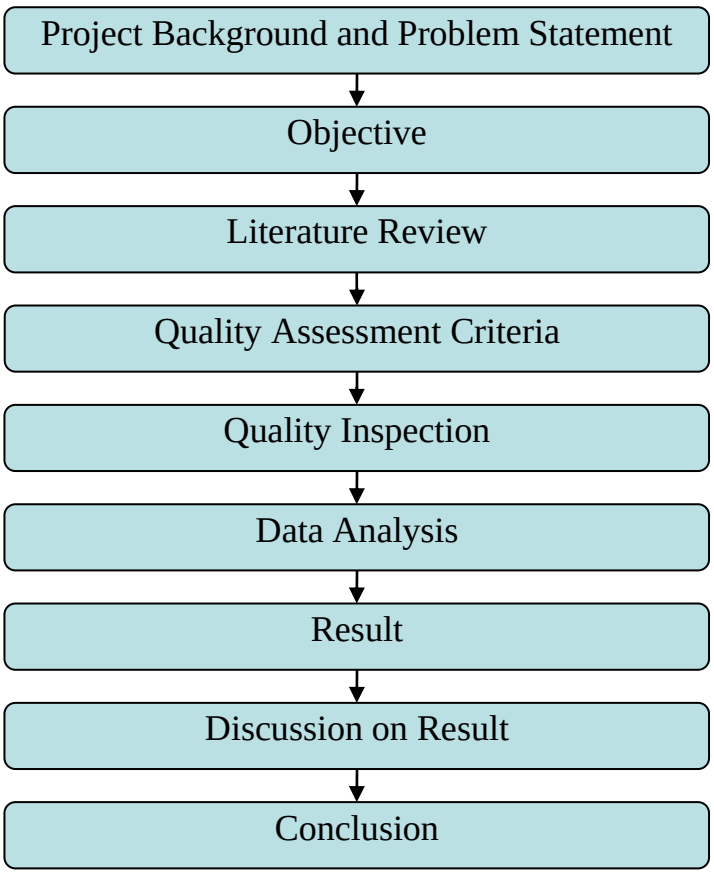
3.2. Method of analysis

Analysis of data is conducted using existing marking formula in the CONQUAS Standards.

Architectural Works	Weightage %	Score
Floors	16	9.3
Internal Walls	16	9.0
Ceilings	6	5.8
Doors	6	3.6
Windows	6	4.1
Components	6	4.6
Roof	4	2.5
External Walls	11	9.3
External Works	6	4.5
Pre-packed Plaster	1	1.0
Field Window Water-tightness Test (WTT)		
- BCA Testing	7	5.8
- Self-Testing	2	1.4
Wet Area Water-Tightness Test		
- BCA Testing (NA as <20 nos for non-residential)	-	NA
- Self-Testing	1	1.0
Internal Wet Area Waterproofing Process	2	2.0
Pull-Out-Test for Internal Wall Tiles	4	3.2
Cladding Facade	1	1.0
Internal Wall Partition (Drywall or Precast Panel Partition)	1	0.0
Sub-total = (100-4)	**96**	**68.1**
Pro-rated Total **= (68.1/96)**	**100**	**70.9**
100% Prefabricated Bathroom		1.5
Architectural Total	**100**	**72.4**

Figure 3.1: Example of computation of architectural scores.

3.3.Flow chart of research process methodology



3.4.Gantt Chart

Final Year Project 1														
No	*Item/week*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1	Project title selection														
2	Study on research background and literature reviews on CONQUAS Standards														
3	Getting permission to assess UTP Chancellor Hall														
4	Identify the suitable criteria to be assess on UTP Chancellor Hall														
5	Identify the suitable area to be assess in UTP Chancellor Hall														
6	Assessment on UTP Chancellor Hall														
Final Year Project 2															
1	Assessment on UTP Chancellor Hall														
2	Analyzing and compile the results														

Chapter 4

4. RESULT AND DISCUSSION

4.1. Result discussion

Table 4.1: Weightage System by CONQUAS

Components	CAT A	CAT B		CAT C		CAT D
	Commercial, Industrial, Institution & others	Commercial, Industrial, Institution & others	Private Housing	Public Housing (Sold Flats)	Public Housing (Rental Flats)	Landed Housing
Structural Works	20%	25%	20%	30%	40%	25%
Architectural Works	60%	65%	70%	65%	55%	70%
M&E Works	20%	10%	10%	5%	5%	5%
CONQUAS	100%	100%	100%	100%	100%	100%

As been mention in the CONQUAS 8th edition 2014, project with central cooling system having cooling tower, chiller system, etc. are classified under category A. Thus UTP Chancellor Hall are under Category A.

Table 4.2: Architectural Elements Weightage by CONQUAS

Architectural Elements	Weightage %	
	Total	Breakdown
Internal Finishes	**56**	
Floor		16
Internal Wall		16
Ceiling		6
Door		6
Window		6
Component		6
Roof	**4**	4
External Wall	**11**	11
External Work*	**6**	6
Design, Material & Functional Tests	**23**	
Pre-packed Plaster		1
Field Window Water-Tightness Test (WTT) (BCA Test 7 pts + Self-Testing 2 pts)		9
Wet Area Water-Tightness Test (BCA Test 4 pts + Self-Testing 1 pt)		5
Internal Wet Area Waterproofing Process		2
Pull-Off-Test for Internal Wall Tiles		4
External Facade (Precast or System Formwork or Cladding Facade)		1
Internal Wall Partition (Drywall or Precast panel partition)		1
Total		**100**

Throughout the survey carried out in the UTP Chancellor Hall, there are a few places found that would reduce the evaluation marks. Those places with known defects such as cracks, unevenness, rough surfaces and etc. will be the one that would deduct the CONQUAS score.

Figure 4.1: Cooling System Unit (Basement)

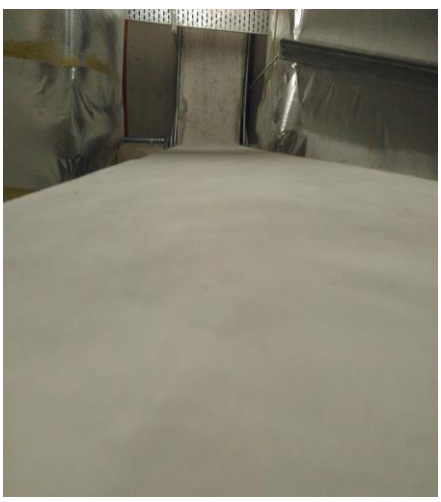


Figure 4.2: Smooth Column (Basement)

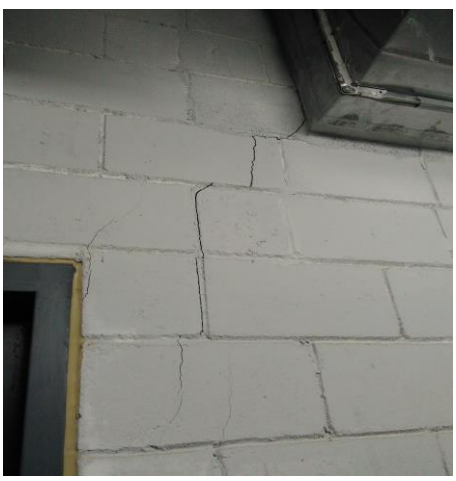


Figure 4.3: Visible Crack (Basement)

Figure 4.4: Smooth Steel Welding (Basement)

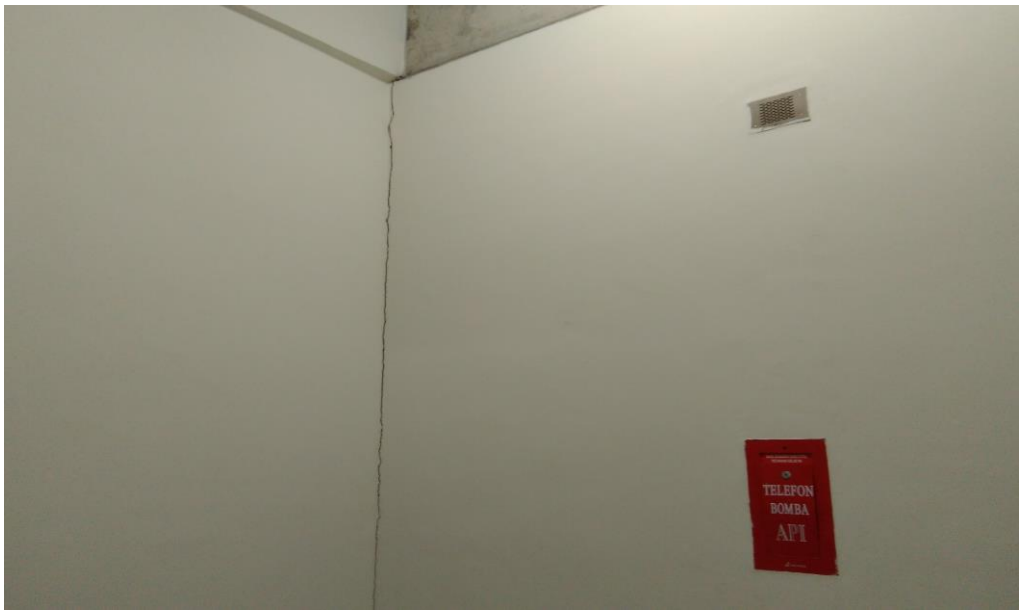


Figure 4.5: Joint Crack visible on one of the room inside Chancellor Hall. (Ground level)

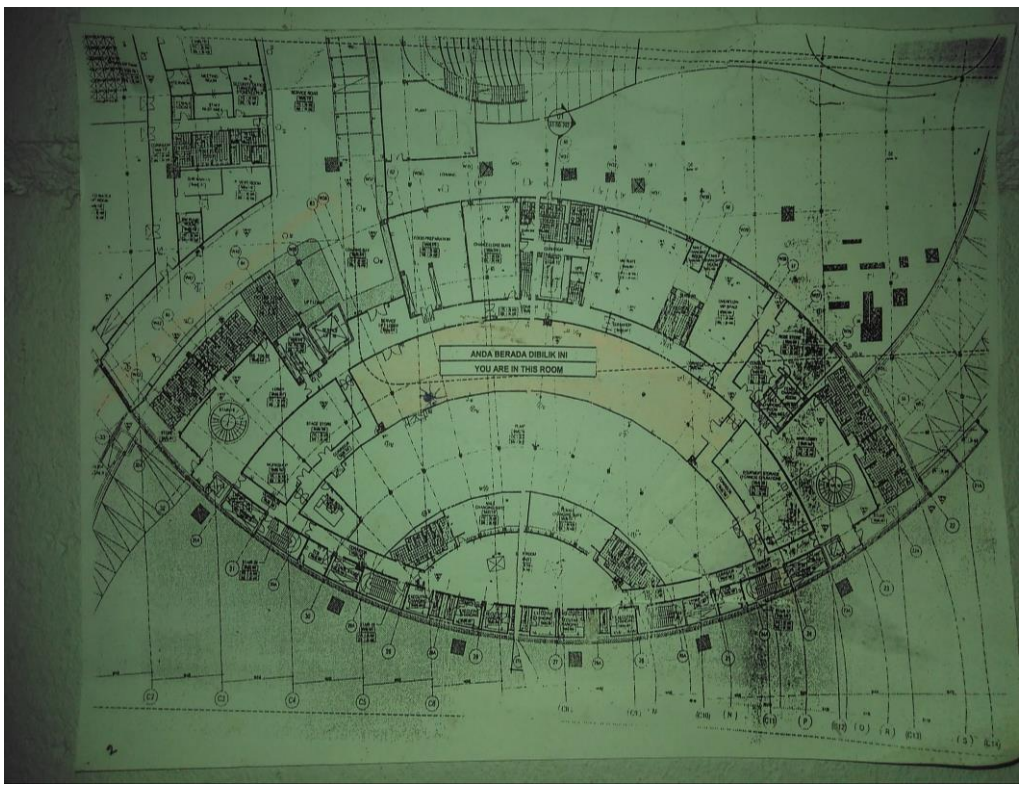


Figure 4.6: Layout Plan for Chancellor Hall

4.2.Architectural Score list in UTP Chancellor Hall

Location / Architectural Element	Floor					Wall					Ceiling					Door				
	Finishing	Alignment & Evenness	Crack & Damages	Hollowness	Jointing	Finishing	Alignment & Evenness	Crack & Damages	Hollowness	Jointing	Finishing	Alignment & Evenness	Crack & Damages	Roughness	Jointing	Joints & Gap	Alignment & Evenness	Material & Damages	Functionality	Accessory Defects
Store Room Level Basement	✓	✗	✗	✓	✗	✓	✓	✗	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✓	✓
Lift Section Level Basement	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓
Green Room Open Area	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✓	✓
Green Room Changing Room	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓
Stage Area	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✓	✓
TCR Room	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓
Electrical Room	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓
Glass Frame Wall						✓	✓	✓	✓	✓						✓	✓	✓	✓	✓
Staircase	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✗	✓	✗	✓	✗	✓	✓	✗	✓	✓

4.3. Computation of Architectural Score in UTP Chancellor Hall

Architectural Item	Weightage (%)	Defect Category	Defect Weightage	Scores
Floor	22	Finishing	6.6	6.6
		Alignment & Evenness	3.85	3.37
		Crack & Damages	6.6	0
		Hollowness	2.2	2.2
		Jointing	2.75	1.03
Wall	10	Finishing	1.75	1.75
		Alignment & Evenness	1.75	1.75
		Crack & Damages	3.0	0.33
		Hollowness	1.75	1.75
		Jointing	1.75	1.75
Ceiling	6	Finishing	0.9	0.68
		Alignment & Evenness	0.9	0.9
		Crack & Damages	1.8	0
		Roughness	1.5	1.13
		Jointing	0.9	0.113
Door	20	Joints & Gap	2.0	2.0
		Alignment & Evenness	2.0	1.56
		Material & Damages	6.0	0.67
		Functionality	6.0	6.0
		Accessories Defects	4.0	4.0
Total	58			37.583

From the result, it is shown that the assessment of UTP Chancellor Hall obtain the score of 37.583% over 58% of the weightage. Although the building already ages for almost 20 years, to be able to obtain the architecture score of 64.8%, which is an average score for CONQUAS is a good sign of a good quality building.

Chapter 5

5. CONCLUSION AND RECOMMENDATION

The conclusion from this assessment, UTP Chancellor Hall obtain a score of **64.8%**. This score is an average mark for an institutional building because to gain CONQUAS STAR the evaluation score need to have 95 points or higher.

To obtain a good quality building, the contractor needs to have a standardize quality standard to follow before the construction even began. Get it right at first time became the slogan for CONQUAS as it is easier to control the construction as soon as it is start rather than fixing the aftermath.

The assessment of CONQUAS should be able to determine the quality of the building itself by combining the three major criteria. Thus by implementing this standard from the beginning of project will ensure the quality of the building meeting with the customer needs.

It can be concluded from above, that all of the objective of the research have been achieved.

Based on the research that has been completed, there are recommendation to be done in order to improve and expand this research in the future. It is recommended for the researcher to collaborate with government or private firm specialized in construction industry for example Building and Construction Authority (BCA) in Singapore or Construction Industry Development Board Malaysia (CIDB) as they have more experience in evaluating quality of a building.

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Appendices

https://www.corenet.gov.sg/homeowners/listsql/default.asp?category=T1ZFUlNFQVMgUFJPSkVDVFM=

OVERSEAS PROJECTS

CONQUAS

The "CONQUAS ★ " rating is for projects scoring 95 points or higher.

S.No	FY	PROJECT	CONTRACTOR	DEVELOPER	SUBSIDIARY

CONQUAS PROJECTS

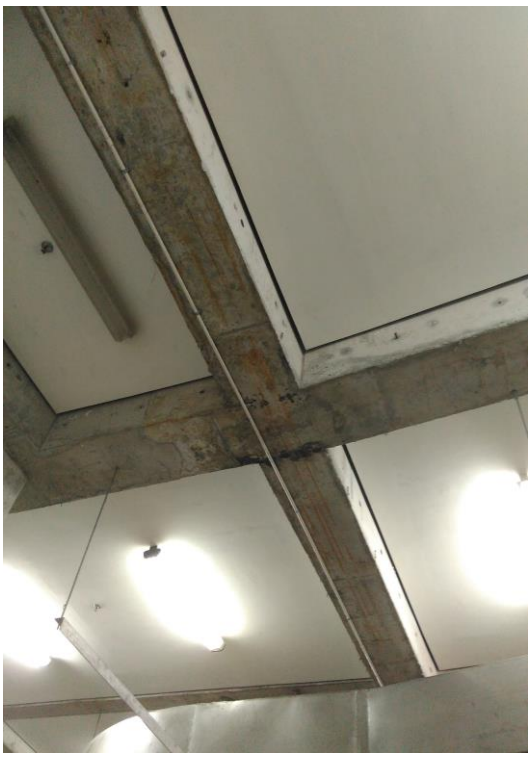
click on the column names to sort in order

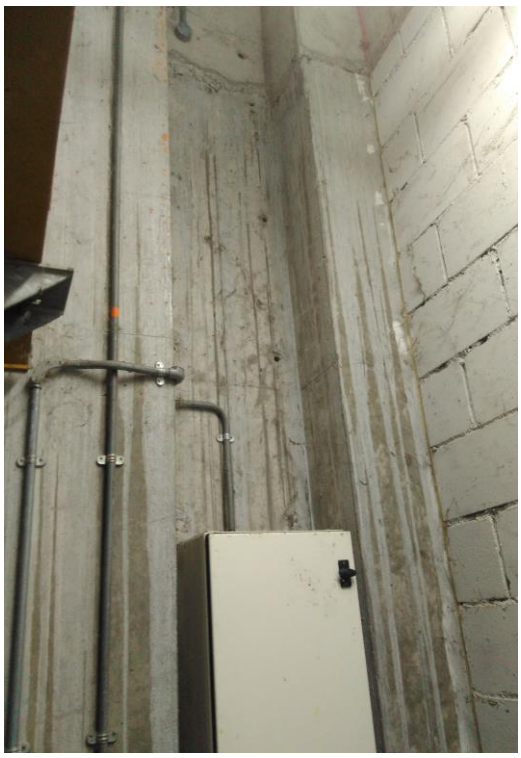
S.No	FY	PROJECT	CONTRACTOR	DEVELOPER	SUBSIDIARY	STRUCT SCORE%	ARCH SCORE%	M&E SCORE%	CONQUAS SCORE
1	2008	10 Baiduri at Subang Jaya (Malaysia)	Road Builder (M) Sdn Bhd Pembinaan Duta Idaman Sdn Bhd	IJM Land Berhad	NA	NA	77.3	NA	NA
2	2009	10 Mont Kiara (Malaysia)	Aston Star Sdn Bhd	Sunrise Berhad		NA	81.8	NA	NA
3	2011	11 Mont Kiara (Malaysia)	Shimizu Corporation	Sunrise Berhad		NA	79.2	NA	NA
4	2012	2 Permai Phase 3	Private	BSG Property	Taman Sri Setia Sdn Bhd	NA	83.0	NA	NA
5	2010	20 Trees (Apartment) (Malaysia)	Malinta Corp Sdn Bhd	SDB Properties Sdn Bhd		NA	88.8	NA	NA
6	2010	20 Trees (Landed) (Malaysia)	Nissin Builders Sdn Bhd	SDB Properties Sdn Bhd		NA	88.8	NA	NA
7	2012	20trees West	Inta Bina Sdn Bhd	sdb properties sdn bhd		NA	81.0	NA	NA
8	2014	21 Unit Bungalow - Cabana, Marbella, Samanna	Pamir Development Sdn Bhd	Setia Indah Sdn Bhd		NA	82.4	NA	NA
9	2012	22 Units Link Bungalow Venus	Psycon Sdn Bhd	Bukit Indah (Johor) Sdn Bhd		NA	78.8	NA	NA
10	2010	22 Units Link Bungalow, Orion (Malaysia)	Psycon Sdn Bhd	Bukit Indah (Johor) Sdn Bhd		NA	74.2	NA	NA
11	2012	25 Units Double Storey Bungalow at Ph 2A & 2B, East Ledang, Nusajaya	Kimlun Sdn Bhd	UEM Land Berhad		NA	74.0	NA	NA
12	2012	28 MontÂ Kiara	Aston Star Sdn Bhd	UEM Land Holdings Berhad		NA	77.9	NA	NA
13	2013	30 Units Semi - D (RB - 1) Zone 14 Bukit Indah Johor	Dover Construction Sdn Bhd	Bukit Indah (Johor) Sdn Bhd		NA	80.6	NA	NA
14	2011	4 Units Show Bungalows at Taman Desa Tebrau	Watek Bina Sdn Bhd	Plentude Tebrau Sdn Bhd		NA	72.3	NA	NA
15	2013	46 Unit Double Storey Semi -Ds - Perla	Dover Construction Sdn Bhd	Bukit Indah (Johor) Sdn Bhd		NA	74.8	NA	NA
16	2012	50 Units Semi - D Phase 2D, East Ledang, Nusajaya	Julung Cipta Sdn Bhd	UEM Land Berhad		NA	71.6	NA	NA
17	2012	54 Units Semi - D Phase 2C, East Ledang, Nusajaya	Siecon Technology Sdn Bhd	UEM Land Berhad		NA	74.0	NA	NA
18	2012	55 Units Bungalow (Ph 12B) Taman Desa Tebrau, JB	Watek Bina Sdn Bhd	Plentude Tebrau Sdn Bhd		NA	76.7	NA	NA
19	2013	6 CAPSQUARE	HAB Construction Sdn Bhd	Capital Square Sdn Bhd		NA	73.4	NA	NA
20	2014	8 Ceylon	Al - Ambia Sdn Bhd	Symphony Life Berhad		NA	70.9	NA	NA
21	2014	72 unit Semi D (Rusello)	Tan Ngee Hong Construction Sdn Bhd	Kesas Kenangan Sdn Bhd		NA	80.8	NA	NA
22	2013	AIRIE, Sri Damansara	Loh & Loh Constructions Sdn Bhd	Loh & Loh Development Sdn Bhd		NA	78.4	NA	NA
23	2010	Aman Perdana Parcel B3 (Malaysia)	Sri Binaraya Sdn Bhd	Intramewah Devt		NA	73.8	NA	NA
24	2012	Aman Perdana Parcel Eb	Pembinaan Bintang Baru Sdn Bhd	Intramewah Development Sdn Bhd		NA	69.8	NA	NA

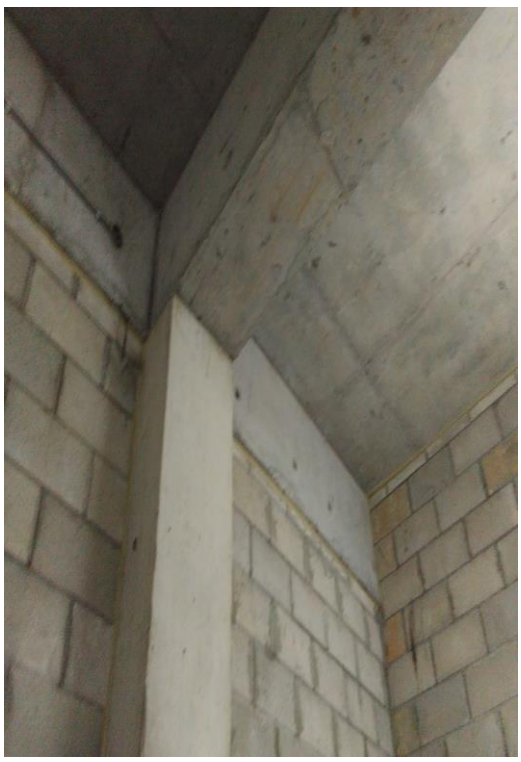
CONQUAS 21

THE BCA CONSTRUCTION QUALITY ASSESSMENT SYSTEM

Building and Construction Authority





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