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CAWANGAN PERAK  
DEPARTMENT OF BUILDING**

**FACULTY OF ARCHITECTURE, PLANNING  
AND SURVEYING**

**DEPARTMENT OF BUILDING**

**TITLE: TOTAL QUALITY MANAGEMENT FOR SITE SUPERVISION**

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**2017206564**

## STUDENT'S DECLARATION

I, Muhammad Aiman Bin Abd Jaafar hereby declare that this report is my own work, except for extract and summaries for which the original references stated herein, prepared during my practical training in Jabatan Kerja Raya (D) Kulai, Johor. Starting on 5<sup>th</sup> of August 2019 and ended on 20<sup>th</sup> of December 2019. The fulfillment of purposes and objectives, also the attachment in this report have never been previously used in other institutions or any other award. This report is only for requirement of BGN310 and for obtaining the Department of Building.

.....  
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Date :

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It always a pleasure to remind the people who gave me the possibility to finish this report. Gratefully to thanks my practical coordinator, Dr. Hafizah Mohd Latif for giving me stimulating suggestions and encouragement especially in writing and finishing my report.

Next, I would like to thank my supervisor incharge, Puan Wan Hasmida Binti Wan Hassan for allocating time to advice and guide me during my practical training at JKR (D) KULAI. Also the good facilities and kindness for giving me opportunities to gain experience.

Also not to forget,I would like to thank my family for encourage and provided me with unconditional love and support so I am able to finish this report in efficient way. As they also guidance in whatever I pursue.

I grab the opportunity as a big milestone in my career development. I will strive to gained skills and knowledge in the best possible way, and I will continue to work on their improvement, in order to obtain desired career objective.

## **ABSTRACT**

Total quality management in construction ensures quality and productivity. It was basically a way of thinking about the concept, visualization and achievement of goals. TQM was a concept in which organizations, processes and people are interwoven in the correct format so that right things were done rightly at the correct time. TQM gave emphasis on innovation and adaptation of new technology to improve quality. The aim was to improve an organization's ability to deliver quality to its customers on a continuously improving basis. The data were collected by observations on site, documents review and interviews session. The results that can be gained by the supervision was improvised the project with the references from the master work program and how its helps to the completion of project. And also, the issue and problems while carried out inspections and confronts with workers and suppliers can be solved by referred the TQM. Those problems occur and the TQM gave the solution on how to fix it. All those things were important to ensured the QA and QC aspects in the TQM achieved the target for the project.

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## **CHAPTER 1 :INTRODUCTION**

Total quality management (TQM) was a theory of management the purpose of which is to improve an organization's ability to deliver quality to its customers on a continuously improving basis.(Biggar, J L.American Association of Cost Engineers." Transactions of the American Association of Cost Engineers" by Morgan town, 1990). There were several differences between TQM and a traditional management system. TQM was a process-oriented as opposed to a result-oriented approach, and prioritizes quality, flexibility and services rather than cost and technical efficiency(Michael F. Matthews; and Satyanarayana N. Kalidindi. "Journal of Construction Engineering and Management",June 1985)

TQM involved a more horizontal organizational structure rather than the traditional vertical management structure. The emergence of total quality management (TQM) applications in the construction industry was a significant finding of the interviews.(James L. Burati, Jr,Michael F. Matthews and Satyanarayana N. Kalidindi,"Quality Management in Construction Industry" June 1991). The results indicate that substantial improvements in meeting quality requirements can be achieved by the use of TQM in the construction industry.(James L. Burati, Jr,June 1985). Implementation techniques and attributes of effective quality-management systems were identified and categorized.(James L. Burati, Jr,Michael F. Matthews and Satyanarayana N. Kalidindi,"Quality Management in Construction Industry" June 1991)

The testing and inspections were scattered throughout the contract's specification. To develop a firm plan, the testing and inspections can be combined into a new division of the specs.(James J. O'Brien Springer," Construction Inspection Handbook", Apr 1997). The quality management were divided into 2 section. The Quality of Assurance(QA) and Quality of Control(QC).QA was all planned and systematic actions necessary to provide adequate confidence that a structure, system or components will perform satisfactorily and conform with project

requirements(James J. O'Brien Springer," Construction Inspection Handbook", Apr 1997).

Meanwhile, QC was specific procedures involved in quality assurance process. To determining if a project is just constructed completely and correctly, quality assurance and quality control are both essential to enforcing safety standards on a project. In particular, QA will test equipment, materials and processes to help safeguard against any major hazards.(Biggar, J L.American Association of Cost Engineers." Transactions of the American Association of Cost Engineers" by Morgan town, 1990) Proper quality assurance should also involve comprehensive training for workers to further mitigate construction risks(James J. O'Brien Springer," Construction Inspection Handbook", Apr 1997)

The advantages of Total Quality Management were cost reduction. When applied consistently over time, TQM can reduce costs reductions throughout an organization, Since these cost reductions flow straight through to bottom-line profits without any additional costs being incurred, there can be a startling increase in profitability. Next, the defect reduction. TQM has a strong emphasis on improving quality within a process, rather than inspecting quality into a process and not only reduces the time needed to fix errors but make it less necessary to employ company(Jerald L. Rounds, M. ASCE; and Nai-Yuan Chi,"Total Quality Management for Construction",June 1985)

Last but not least, the advantages was client's satisfaction. Since the company has better products and services, and its interactions with client are relatively error-free, there should be fewer customer complaints. Fewer complaints may also mean that the resources devoted to client service can be reduced.A project's end quality means way more than personal pride. Poor quality means delays, rework and cost overruns, not to mention the potential to damage the company's reputation and legal disputes. With a comprehensive quality plan with the right processes and tools to measure it, the project is more likely to be successful..(Jerald L. Rounds, M. ASCE; and Nai-Yuan Chi,"Total Quality Management for Construction",June 1985)

## **1.1 OBJECTIVES**

1. To investigate on the concept of Total Quality Management(TQM) that lead to the completion of the project work as following master work programme.
2. To analyse the important aspects of construction supervision which are Total Quality Management(TQM) by using specific methods of working on project.
3. To determine the problems when on supervision with used of Total Quality Management(TQM)

## **1.2 SCOPE OF STUDY**

The study case is carried out at built-up school in Bandar Putra, Kulai, Johor. The study are focusing on how to make sure the Total Quality Management (TQM) aspects define the main areas that must be considered when undertaking project work as it were the essentials to achieve project success. Supervision are need to ensure the project get done by its time frame and work done smoothly. Key to construction work development was the Total Quality Management(TQM) aspects as these influence and constrain how and when works were to proceed and to be undertaken. The method use to oversight the Total Quality Management(TQM) aspects, construction supervision can formed a Quality Plan Project as there also include the machineries and materials that need to monitor as well.

### **1.3 RESEARCH METHOD**

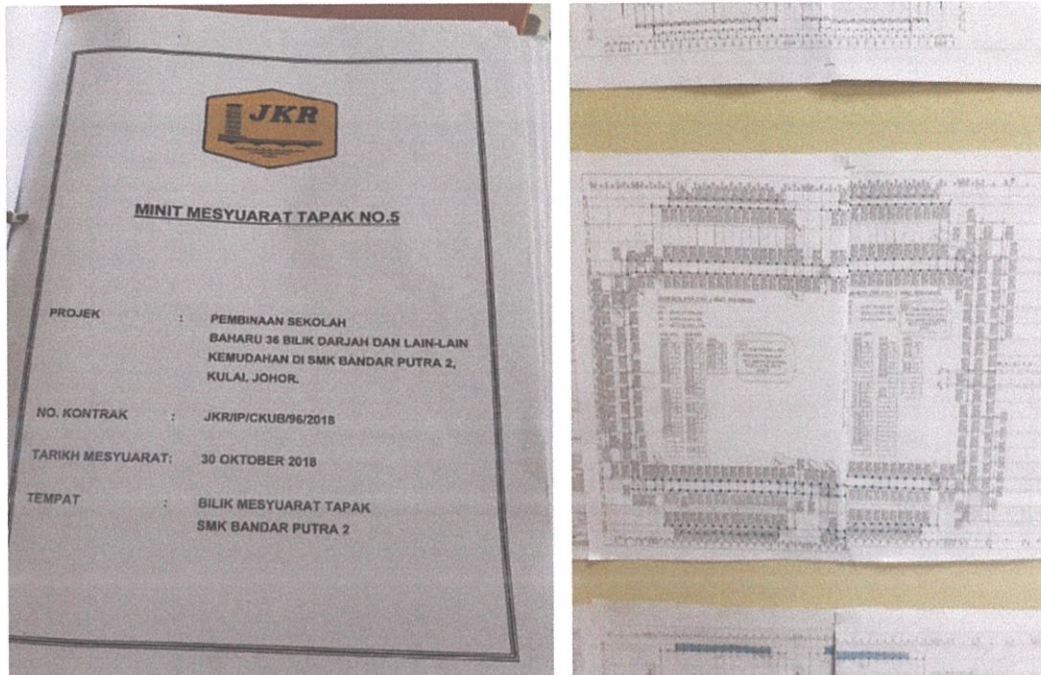
The data were collected by using 3 method that were:

- OBSERVATION

The observation were more focusing on how the inspection of structure was carried out and how supervision work was conduct. The inspection of structure are usually takes 30 minutes and the head supervisor will be assist by site engineer while carried out the inspection works. The observation on inspection were all collect by snapping pictures and also by writing the notes.

- DOCUMENTS REVIEW

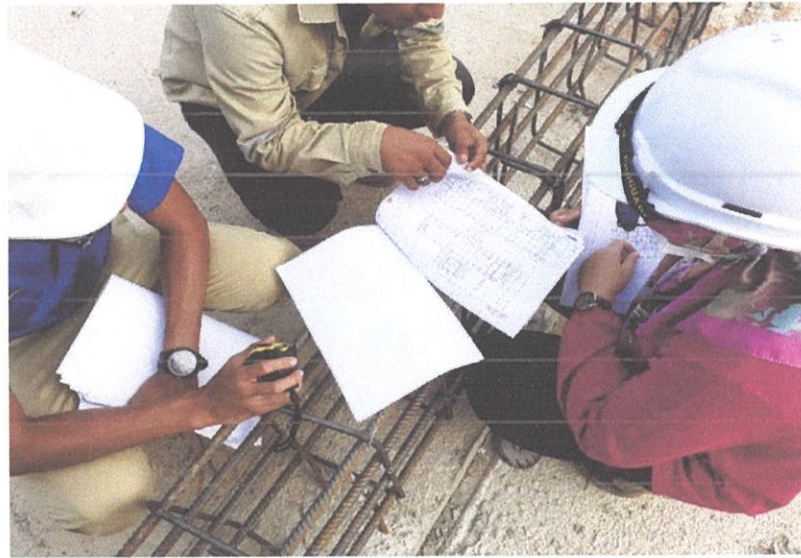
Construction drawing and progress report were used to help me collect the data and also learn how to understand plan project. The structure plan project were hold by the engineer and also supervisor while doing inspection. All detail and specification must be follow as the contractor have been given the detail guideline of structure including the measurement of materials by the architecture and designer. The architect of the client have produce the structure design so that all the contractors have to do are just following the guideline.



**Figure 1 :** The documents and plan of SMK Bandar Putra 2

- INTERVIEWS

The interviews were involved the site engineer, site supervision and contractors on site. The engineer on site was Encik Amirul who in-charged for the site task and inspection regarding the project. All schedule were updated and hands off by site engineer. The site engineer were very particular and experienced in the project. The problems and solution were settled down by the engineer before its got critical issued then submitted to management to be checked. Many of the question were answered by site engineer. It helped to understand the method and problem solving in the project.



**Figure 2 :** The inspection and observation on SMK Bandar Putra 2

## **2.0 COMPANY BACKGROUND**



Jabatan Kerja Raya was established in 1972 with Major J.F.A. McNair as the first head of the organization. JKR is the federal government department in Malaysia under Ministry of Works Malaysia. This department responsible for construction and maintenance of public infrastructure. In addition, JKR's main objective is to deliver projects that have good quality, time and cost. JKR is committed to producing quality products that meet the satisfaction of its customers based on the best practices of professionalism.

In JKR Kulai, the company have to ensure that public utilities development and infrastructure projects can be completed within a reasonable time frame, at the desired quality and in line with socioeconomic needs.

Specifically, JKR has their own mission and vision that has to be achieve. JKR's vision is to be a world-class service provider and center of excellence in asset management, project management and engineering for the country's infrastructure development based on creative and innovative human capital as well as the latest technology.

Other than vision, the mission also need to be achieve as well as they need to contribute to national unity. They will helping clients realize their policy goals and delivering services through collaboration as strategic partners. And also, JKR standardize their processes and systems to provide consistent service outcomes. They



will provide effective and innovative asset management and project management services including strengthening existing engineering competencies.

They also need to develop human capital and new competencies as well as prioritize integrity in providing services. Last but not least, JKR is able to contribute to the development of the country by establishing harmonious relations with the community. Also, JKR does put responsibility towards the environment in providing services.

## 2.1 LIST OF COMPLETED PROJECT

Table 1

<b>PROJECT DESCRIPTION</b>	<b>OWNER</b>	<b>CONTRACT VALUE</b>	<b>ACTUAL TIME COMPLETED</b>
Build and construct School structure at SRJK TAMIL Kulai Besar.	KPM	RM799,795.00	3 / 7 / 2014
Constructed project of multipurpose hall at FELDA Bukit Permai,Kulaijaya.	JKR	RM730,000.00	28 / 6 / 2013
Construction project of Kampung Murni Jaya Mosque, Kulaijaya .	MAIJ	RM1,681,866.80	19 / 7 / 2013



**Figure 3.1 :** The completed hall FELDA Bukit Permai , Kulaijaya



**Figure 3.1 :** The completed of Kampung Murni Jaya Mosque, Kulaijaya

## 2.1 LIST OF ONGOING PROJECT

JKR has currently only on one project as shown in table 2

Table 2

<b>PROJECT DESCRIPTION</b>	<b>OWNER</b>	<b>CONTRACT VALUE (RM)</b>	<b>CONTRACT START DATE</b>
The redevelopment of build up the new secondary school of SMK Bandar Putra 2, Kulai Johor.	JKR	46,246,997.88	3 / 5 /2018





**Figure 4 : SMK Bandar Putra 2**

## 2.2 ORGANIZATION CHART

As shown in the figure 1, organization chart of JKR(D) Kulai on 2019 is led by a district engineer, Mr Mohd Hanif Bin Abdullah. And there are 3 engineering units consisting of facilities unit, road unit and building unit under the jurisdiction of district engineer. However, for this new school construction project it is under observation of the building unit. The building unit is headed by the building's civil engineer, Puan Wan Hasmida Bte Wan Hassan. He was assigned to monitor and audit the contractor's work on the school's construction site.



**Figure 5 :** The organization chart of JKR (D) Kulai

The chart on figure 1 above is the building unit that was conducted the school project of SMK Bandar Putra 2 in Kulai, Johor. In the chart there were the scope of work in building department or unit accordingly. Which stated there were plan, project, preparation and arrangement and, building maintenance. All the branches or department were had specific task for structure also roads and facilities.

For building maintenance, they were focusing on how to maintain all the building and structure that were constructed or handled by JKR. The maintenance works were carried out by the contractor of JKR and supervisor in charged for the maintenance works. The clients were complained for the damages or problem that involved structures that may lead to danger or exposed to uncomfortable condition for the clients uses. The inspections and checking were carried out to investigate and searched the problems. For example, the building had a damaged roof in certain area. The roof was torn off by the storm and may fell down. So the roof fixed and replaced it with the new roof.

Next, the preparation focused to calculate the cost of the government project that handled by JKR matched the value and expenses that JKR received from a single project were fair and specific and also fulfill the characteristics of public accountability. The services that were conducted by this department was more to act as adviser that related with economy construction cost, prepared plan cost and conducted checking on primary cost for designation and construction. This department also prepared the document tender and valued material and labor cost that included in the tender of a project as cost prime and temporary cost. This department will summarized and made a report of the project for the process to start the initial step on contractor to handle the project.

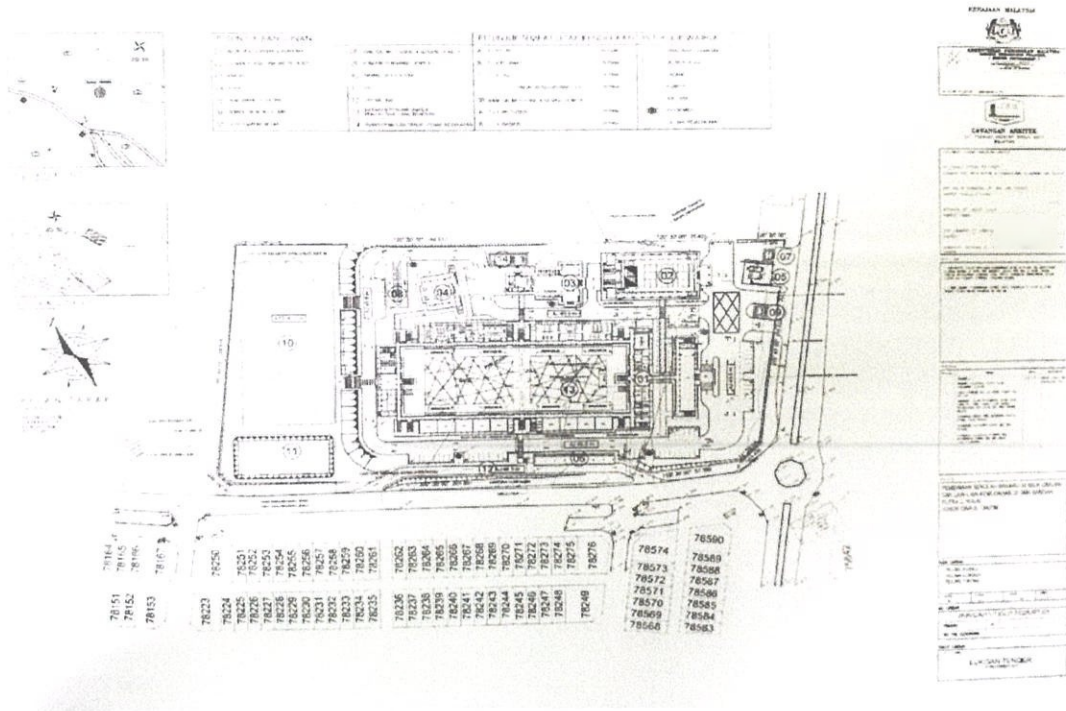
Last but not least the plan and project. Both of the item were carried out by the department of building in JKR. This department carried out the construction projects for Special Building or Government Quarters that funded by Government of State or

Federal. This also including the building that involved with State Agency and federal for public uses. Such as schools and government offices where the cost was funded by federal allocation. Not to forget, the roadside and bridge were also monitored by this department. The pavement and the landscaping on the roads were handled by this department that involved structuring, maintaining and cleaning works.





### CHAPTER 3 : CASE STUDY



**Figure 6 : The drawing plan of SMK Bandar Putra 2**

The case study is a development project of SMK Bandar Putra 2 located in Bandar Putra, Daerah Kulai, Johor. This project area are surrounded by residential area and located next to SJK (C) Pei Cheng. The project area is 9.34 acres and specifically 3.78 hectares. The date of completion of this project was on 30<sup>th</sup> September 2020 . The cost of this project is RM46,246,997.88. JKR JOHOR was the Project Director of this project and being handle by District Engineer JKR (D) KULAI as Deputy Chief Executive Officer. Figures below shows the location, key and site plan of SMK Bandar Putra 2.



Figure 7.1 : The location plan of SMK Bandar Putra 2

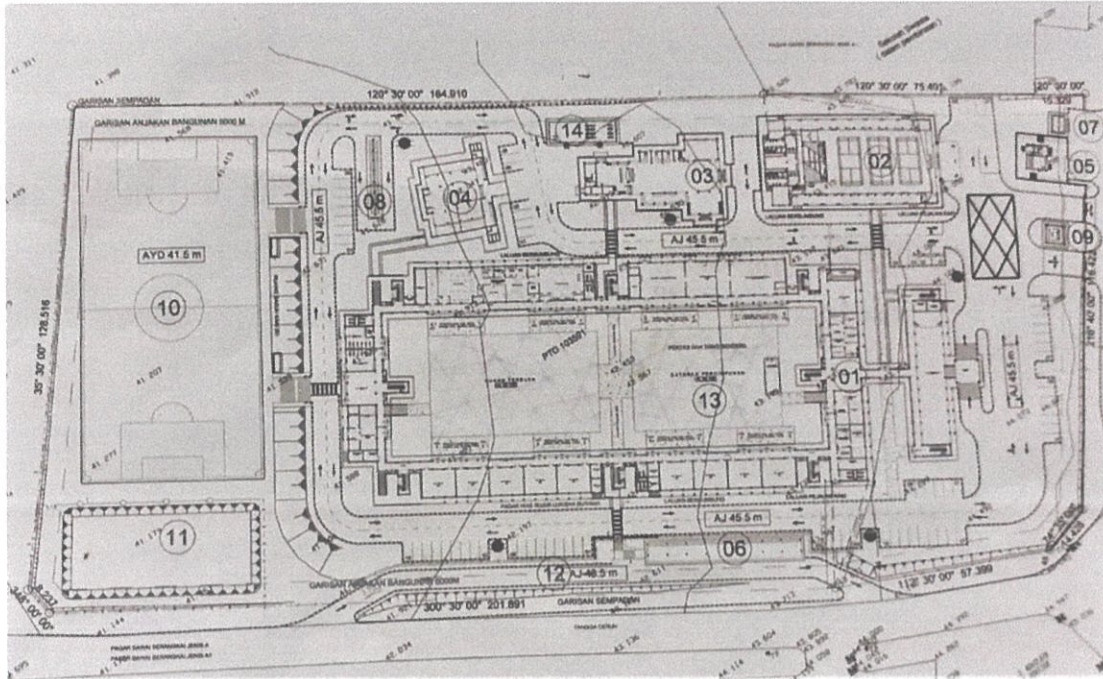


Figure 7.2 : The location plan of SMK Bandar Putra 2

The red line mark was the area of the the school project. As shown above, the project had constructed the structure progressively and still keep on build up. The arrangement of the building were properly arranged and placed strategically. The school also located near to the main road and highway. The function of the main road was made the delivery of construction material more easier and smoothly moved.



Figure 7.4 : The key plan of SMK Bandar Putra 2



**Figure 7.5 :** The site plan of SMK Bandar Putra 2

However, the project still needs 68% to complete. As can be seen, the cost of this project was influenced by the construction materials. This is because, this project is an IBS project where 70% of the material used on structure are IBS materials. The cost also affected by the numbers of building section. The more building were constructed so the cost will be increased. The cost of the temporary structure also take part on preliminaries cost for site preparation and earthwork. The table 3 shows the description of project on SMK Bandar Putra 2.

Table 3 : The description of work progress SMK Bandar Putra 2

<b>NO</b>	<b>TASK NAME</b>	<b>COST</b>	<b>DURATION</b>
1.	SCHOOL PROJECT OF SMK BANDAR PUTRA 2	RM43,629,243,28	601 DAYS
2.	INITIAL WORKS (PRELIMINARIES )	RM1,644,150.00	600 DAYS
3.	PILING WORK	RM3,327,202.00	120 DAYS
4.	STRUCTURING WORKS	RM23,371,383.80	400 DAYS
5.	WORKS AROUND BUILDINGS	RM4,067,544.77	524 DAYS
6.	ENVIRONMENTAL PROTECTION WORKS	RM69,800.00	541 DAYS
7.	MECHANICAL AND ELECTRICAL WORKS	RM7,476,770.00	500 DAYS
8.	PRIME COST WORKS	RM7,476,770.00	500 DAYS
9.	TEMPORARY COST WORKS	RM7,476,770.00	500 DAYS

### 3.1 OBJECTIVES

How the roles of the construction supervision may lead to completion of the project. The site supervisor main duty was provided by the schedule of the workers and assign task to construction labourer. Site supervision liaise with the contractor, manager and others, ensuring that all parties remain on task given without delay or left off. Also not to forget the project development on every parts being monitored so the project can be done by the time frame stated. The proper method and effective work management were the important aspect in ensured project success. In this terms, the supervision had to manage the project effectively and make sure if there any problems occur were solved without affected the completion of the project.

As building projects get larger and more complex, clients were also increasingly demanding higher standards for their delivery. Total quality management (TQM) has been recognized as a successful management philosophy in the construction industries. TQM can likewise be embraced in the construction industry to help raise quality and productivity. The benefits experienced include reduction in quality costs, better employee job satisfaction because they did not need to attend for defects and client complaints, recognition by clients, work carried out correctly right from the start, subcontractors with proper quality management systems, and closer relationships with subcontractors and suppliers. TQM performance measures were also reflected through top management commitment, customer involvement and satisfaction, employee involvement and empowerment, customer-supplier relationships, and process improvement and management.

TQM were controlled by 2 variables and it needs properly monitored and followed to achieve the completion of the project. It were Quality of Assurance(QA) and Quality of Control(QC). According to Building Professionals, QA is, “The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled”. QA services are primarily used by owners, owner’s representatives and developers to evaluate how likely a

contractor is achieving specified conditions and design standards. Quality assurance is either measured before a project begins or while a building is undergoing construction.

Whereas quality assurance was process focused on quality control as product oriented. Quality of Control looks into the final product and determines whether it has been built or implemented correctly. Designers defines QC as the part of quality management that ensures products and service comply with requirements. It was a work method that facilitates the measurement of the quality characteristics of a unit, compares them with the established standards, and analyzed the differences between the results obtained and the desired results to make decisions which will correct any differences. While QA ensures all the processes are following standards, QC is the final quality check of the result and is conducted after the product has been completed.

This is how Quality Assurance and Quality Control were measured? As quality control and quality assurance were also measured in distinct ways and by different management and advised by supervisor. Management will measure QA more diligently than others, while some may not even want to measure it at all, especially if requirements and were used by contractors to ensure their work achieves the designers' specifications. Quality control may even include activities like qualifying subcontractors, reviewing subs' bids and submittals and providing through supervision. This concepts of management helps ensured the completion of the project as following the master work programme in Total Quality Management.

The TQM was have been managed by the management to be handled. All the documents and materials were compliance. The TQM must be inspects and checked. The managements and the supervisor get the advice on the project briefing. Supervision made a schedule for proper handling in activity on site. The workers followed the task given by the management. All the requirements were labeled and draft through the process in getting the tender on the project. The specifications of the cost on material and labour also the machineries need to be set on the tender. The method used in carried out also shown and recorded by the workmanship on work area. The rules and regulation were followed on getting the completion of the project.



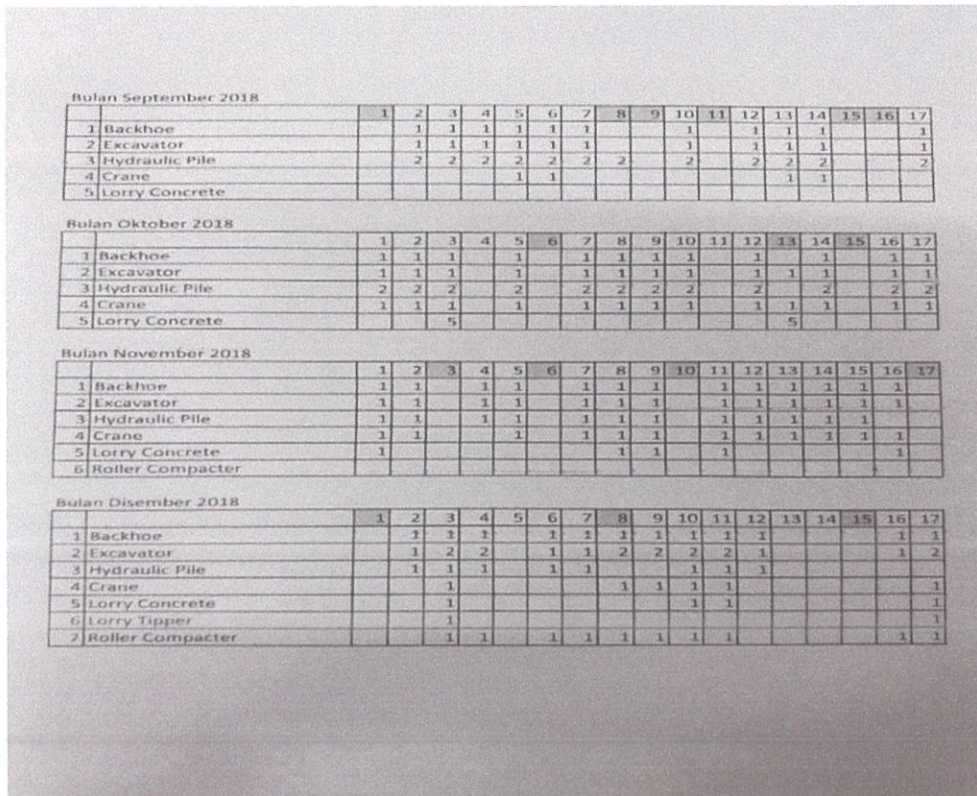


Figure 8.1 : The schedule of machineries on SMK Bandar Putra 2

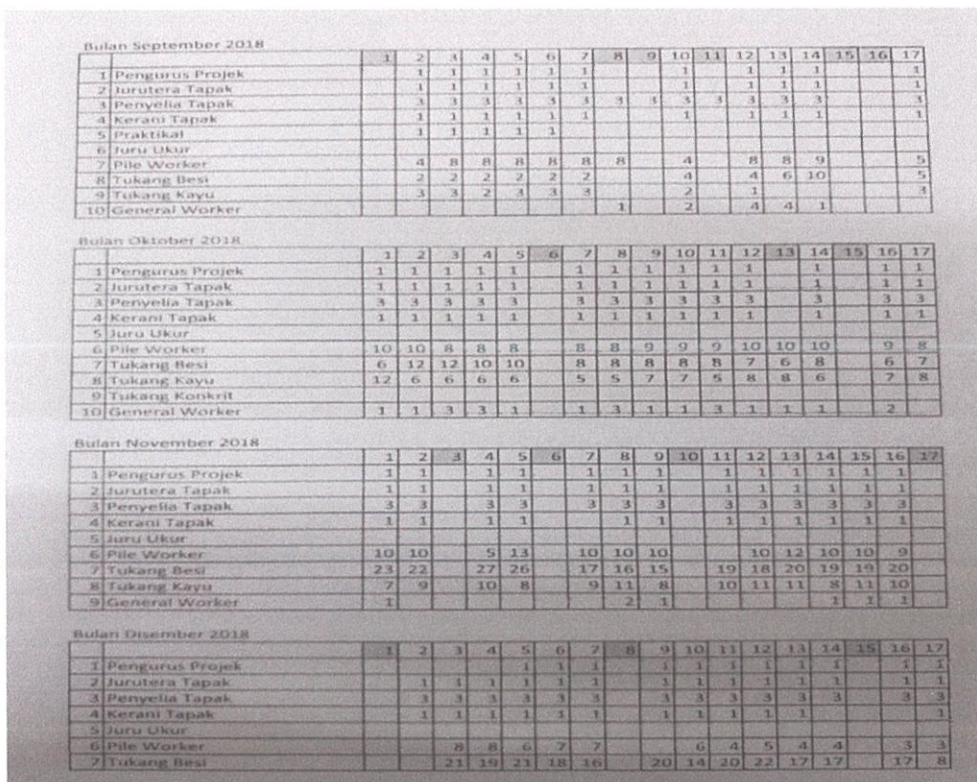


Figure 8.1 : The schedule of labour on SMK Bandar Putra 2

### 3.2 OBJECTIVES

There were specific methods of working on project in Total Quality Management(TQM). First and foremost, supervisor translate the plans, organizing the equipment and manpower necessary to complete the project. The RFI plans are the guidelines when comes to inspection works. RFI means Request for Inspection to act as the partnering tool to eliminate the need for costly corrective measures while carried out inspection works. All the measurement and detail were in the RFI. Its the duty for supervisor to make sure the specification and detail were followed and make sure the labour or workers done it correctly. Another RFI plans is Request For Information that give information to the management if there was any issue involving design issue from architecture or notice for defect issue on structure of a project. It works as the report for an inspection that carried out before. So, the management had to take an action for the problems or issue stated in the Request For Information.

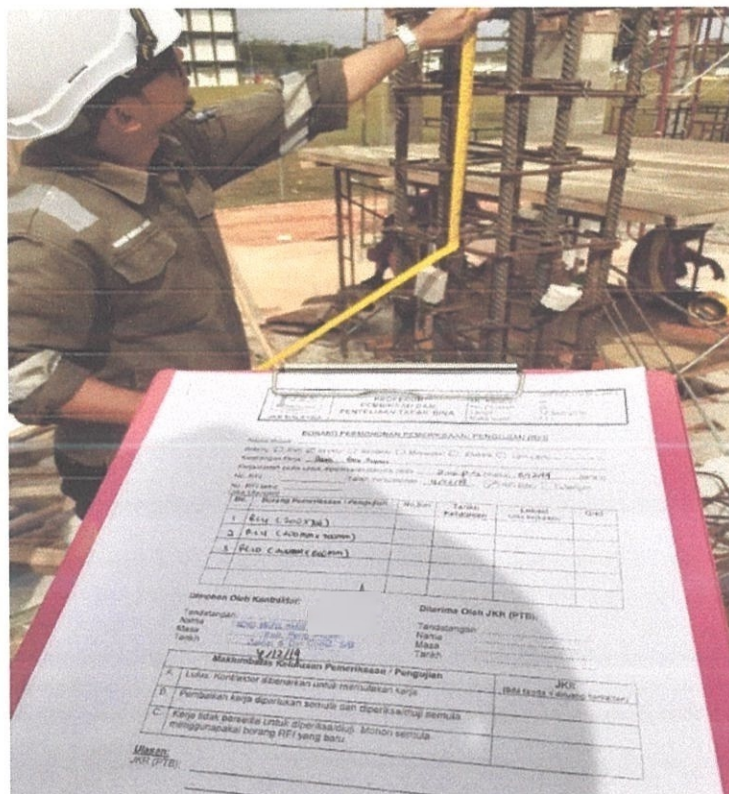



Figure 9.1 : The Request for Inspection (RFI) on SMK Bandar Putra 2

	Project: PEMBINAAN SEKOLAH BAHARU 36 BILIK DARJAH DAN LAIN-LAIN KEMUDAHAN DI SMK BANDAR PUTRA 2, KULAI, JOHOR DARUL TAKZIM <b>REQUEST FOR INFORMATION (RFI)</b>	Ref: SBP2/RFI.../21 Rev: ... Date: ...
	Location/level: <u>Pelecewng Electric</u> Grid line: _____ Dwg No./Spec No: <u>JKR/EXAS/11/135/217/025 (PW)/PEL/02</u> Date answered required: <u>11/11/2018</u> Works Affected: _____	
<b>INFORMATION REQUIRED</b>		
Kindly please confirm to us these discrepancy → Pihak kami mendapati dalam lokasi trenches digunakan pipe 2" diameter upvc pipe pada kawasan trenches. Tetapi di tidak dinyatakan kedalaman / tinggi pipe daripada Sked trenches. Malah bagaimanapun, pihak kami juga mengemul past 0.4m di dalam past tersebut juga tidak dinyatakan kedalaman & juga ketinggian ppe tersebut → Di harap pihak tuan dapat memastikan maklumat tersebut secepat mungkin untuk mengelakkan kelewatan kerja-kerja kemudi		
Write or sketch queries on the above space		
Requested by : _____ JKR reply	MOHD AMRUL HAKIM BIN MOHD ZAILAN Pen. Peng Projek Signature : Zainal & Din Const. S/B Date : 8/10/2018	
Write or sketch queries on the above space		
Replied by : _____ Signature : _____ Date / Time : _____		

**Figure 9.2** : The Request for Information (RFI) on SMK Bandar Putra 2

(Source : CPM of JKR(D) KULAI)

Other than that, the supervision also responsible for maintaining safety and quality standards , as well as keeping detailed records of construction site activities. The task and activities that have been carried out recorded in the site diary. The site diary is a document where supervisor initially records any occurrences on site. Its also acts as the quick referencing of the on going project. For safety aspects and to maintain the safety, supervisor proposed and handle the site regulation towards the workers and management itself and follow the terms to ensure the safe and smooth work goes. As an example, supervisor can put on fine for unsafe condition or acts that occur in the site such as workers did not appeal PPE while carry on task or activity.



No	Kod WBS	Aktiviti/Kerja	Status Kemajuan			Lokasi Aktiviti/Kerja	Mula	Masa Tamat
			Mula	Sedang-laksana	Selesai			
1.1.4		Kerangka Gas blok surau			Surau			
1.1.4.1		Kait bes. Gas blok terminal			Blok terminal		08:00 - 09:00	
1.1.4.2		Pemancangan tiang & platuk			Blok dayah			
1.1.4.3		Ises blok dayah			Pondok pengawal			
1.4.2		Kait bata pondok pengawal						

No	Jenis Kerja	Warganegara		Warga Asing
		Bumiputera	Bukan Bumiputera	
<b>Kontraktor</b>				
	Kerangka Gas blok surau			2
	Kait bes. Gas blok terminal			13
	Pemancangan tiang & platuk ises blok dayah			3
	Kait bata pondok pengawal			3
	<b>Jumlah</b>			<b>21</b>
<b>Subkontraktor Dinamakan (NSC)</b>				
	<b>Jumlah</b>			

Figure 10 : The site diary of SMK Bandar Putra 2

To make sure the quality, time, cost and scope of the project were achieved by supervisor, they monitored the work progress of project by using the CPM. The development of the project were being constructed according to the Constructed Path Method (CPM) prepared by contractor so that the project were on their own schedule to be develop. Figure 4 shows the CPM work progress on SMK Bandar Putra 2.

1 PKUJKA PEMBINAAN DAN KUALITI BAHARU 30 BILIK DAKJAM DAN LAIN LAIN KEMUDAHAN DI SMK BANDAR PUTRA 2, KULAI, JOHOR DARUL TAKZIM		RM45,243,443.28	601 days	Thu 5/3/18	Wed 6/10/20	0%	0%		
1.1	ITEM A. KERJA-KERJA AWALAN	RM1,644.50	600 days	Thu 5/3/18	Tue 9/29/20	3%	3%		
1.1.1	General Preliminaries	RM1,644.50	600 days	Thu 5/3/18	Tue 9/29/20	3%	3%		4FS-565 days
1.2	ITEM B. KERJA CERUCUK	RM1,202.00	120 days	Mon 6/25/18	Sun 12/16/18	0%	0%	3FS-565 days	7FS-10 days
1.3	ITEM C. KERJA BANGUNAN	RM20,383.61	475 days	Wed 9/26/18	Wed 8/19/20	0%	0%		
1.3.1	ITEM C.1. BLOK PENTADBIRAN & AKADEMIK	RM7,878.80	475 days	Wed 9/26/18	Wed 8/19/20	0%	0%		
1.3.1.1	C1.a. Blok Pentadbiran - 2 Tingkat Dan Anjur	RM1,240.00	364 days	Mon 12/3/18	Mon 5/18/20	0%	0%	4FS-10 days	8FS-380 days, 7FS-3
1.3.1.2	C1.b. Bilik Guru dan Laluan Berbumbung (3 TR	RM1,237.00	400 days	Thu 11/8/18	Wed 6/17/20	0%	0%	7FS-380 days	9FS-430 days, 6FS-2
1.3.1.3	C1.c. Bilik Darjah - 4 Tingkat	RM1,518.00	460 days	Wed 9/26/18	Wed 7/29/20	0%	0%	8FS-430 days	10FS-450 days
1.3.1.4	C1.d. Blok Makmal/Bengkel - 4 Tingkat	RM1,578.30	460 days	Wed 10/10/18	Wed 8/12/20	0%	0%	9FS-450 days	11FS-400 days, 6FS-
1.3.1.5	C1.e. Blok Pusat Sumber (3 Tingkat)	RM1,802.00	400 days	Tue 1/8/19	Wed 8/12/20	0%	0%	10FS-400 days	12FS-355 days
1.3.1.6	C1.f. Tangga dan laluan Sambungan	RM1,670.00	360 days	Thu 3/14/19	Wed 8/19/20	0%	0%	11FS-355 days	13FS-300 days
1.3.1.7	C1.g. Tangga Luar	RM1,670.00	300 days	Wed 6/12/19	Wed 8/19/20	0%	0%	12FS-300 days	14FS-300 days, 21FS-
1.3.2	C2. Dewan Serbaguna	RM2,047.00	300 days	Wed 6/12/19	Wed 8/19/20	0%	0%	13FS-300 days	15FS-300 days
1.3.3	C3. Kantin	RM829.30	300 days	Wed 6/12/19	Wed 8/19/20	0%	0%	14FS-300 days	16FS-300 days, 63FS-
1.3.4	C4. Surau	RM1,837.00	250 days	Wed 6/12/19	Wed 6/10/20	0%	0%	15FS-300 days	24FS-60 days
1.4	ITEM D. KERJA SEKITAR BANGUNAN DAN BANGUNAN SOKONGAN	RM2,947.77	524 days	Thu 5/3/18	Wed 6/10/20	2%	2%		
1.4.1	EXTERNAL WORKS	RM1,223.86	524 days	Thu 5/3/18	Wed 6/10/20	3%	3%		
1.4.1.1	D1. Site Preparation & Earthworks	RM1,018.00	120 days	Thu 5/3/18	Wed 10/24/18	13%	13%		25,74FS-60 days
1.4.1.2	D2. External Water Reticulation	RM223.00	90 days	Mon 5/27/19	Sun 10/6/19	0%	0%	21FS-70 days	22FS-90 days
1.4.1.3	D3. Sewerage	RM112.72	90 days	Thu 4/25/19	Thu 9/5/19	0%	0%	13FS-330 days	20FS-70 days
1.4.1.4	D4. Surface Water Drainage	RM112.72	90 days	Mon 5/27/19	Sun 10/6/19	0%	0%	20FS-90 days	23

Figure 11 : The CPM of work progress SMK Bandar Putra 2.

(Source : CPM of JKR(D) KULAI)

Contractor following the CPM to make sure the work development were in the time frame as scheduled. The coding of the every task were different as every task were programmed automatically in the CPM. For supervision works, the CPM helps to ensure the TQM achieved the target. Therefore, that were the important aspects that ensured the completion of project by the supervisor and achieved TQM target acquired in the project. The CPM also known as the Master Work Programme that helps to the completion of the project.

### 3.3 OBJECTIVES


The problem that occur when supervision works carried out was schedule arrangement for the workers sometimes were not followed properly. The handling of workers communication also was the main problem in the schedule of work for the workers. A few of the workers were not following the rules and schedule of work even though the brief task have been given by the construction supervisor. They were on purposely disobey the instruction and tried to do the task in simplest way according to their own way. And most of the things that they done was not really following the specification detail that have given by the main contractor. This affected the TQM aspect and project due date and also regarding the safety of work that been carried out.

So, supervisor took the action very strictly and followed the rules and regulation on site project. Supervisor explain the affects to the workers so that they will not made the same mistake which can caused the delay of the project to be done. And also, that can occur hazard and unsafe acts while carried out task. Once a week the site supervisor and site safety officer will conduct a briefing or called “toolbox” for the workers.



**Figure 12 :** The toolbox or brief by site safety officer at SMK Bandar Putra 2

If the workers still disobeyed the instruction of task, the NCR will be given towards the workers. The NCR is the document or record of non-compliance activity done by the workers when involved the safety aspects on site project. Not just the safety of workers, the defects of the building structure such as honey comb or the issue of non-approval delivery order of construction material caused the the NCR imposed. The NCR also divided by 2 section that were major and minor error. The NCR was imposed by the management towards the contractor. Figure 5 shows the example of Non-compliance Record.

 <b>JKR MALAYSIA</b>	<b>PROSEDUR KAWALAN PRODUK YANG TIDAK MEMENUHI SPESIFIKASI</b>	No. Dokumen	JKR.PK(P).04-1
		No. Keluaran	05
		No. Pindaan	00
		Tarikh	1 Jun 2017
		Muka Surat	1 / 3

**LAMPIRAN 1**

**BORANG NCP (NON-CONFORMANCE PRODUCT)**

No. NCP: 4      Tarikh: 18/3/2017

Kepada (Staf JKR/Kontraktor): \_\_\_\_\_

Piawaian	<input type="checkbox"/> ISO 9001	<input type="checkbox"/> ISO 14001	<input type="checkbox"/> OHSAS 18001	<input type="checkbox"/> ISO 50001
Ruj. Seksyen (MSPB)	8.7			

**BAHAGIAN A: MAKLUMAT PROJEK** (Untuk di isi oleh wakil JKR)  
Tajuk Projek: Pembinaan SEKALAH BAKU 36 Blok D tingkat dan Lantai KEMUDAHAN SMK BANDAR PUTRA 2

**BAHAGIAN B: KENALPASTI KETIDAKPATUHAN PRODUK** (Untuk di isi oleh wakil JKR)  
Butiran Ketidakpatuhan: \_\_\_\_\_  
(Sila guna lampiran borang verifikasi/pemeriksaan/audit/aduan jika perlu)

1) terdapat tanah dipernikahan yang hendak dikontrol tidak dibersihkan

Lokasi: Blok Surau A1 - B / 1-9

Rujukan spesifikasi/piawaian/lukisan/prosedur/kontrak/brief projek: JKR (KRA21/135/31/025C30) KPI/SA/PEL/01


**Punca-punca yang mungkin:**

<input type="checkbox"/>	Rekabentuk (nyatakan)	<u>tidak dibersihkan selepas pemasangan formwork</u>
<input checked="" type="checkbox"/>	Pembinaan (nyatakan)	
<input type="checkbox"/>	Salahguna (nyatakan)	
<input type="checkbox"/>	Lain-lain (nyatakan)	

**Pelapor**  
Staf/wakil JKR/Perunding (Tandatangan, Nama, Cap) \_\_\_\_\_

Figure 13 : The NCR of work progress SMK Bandar Putra 2.

(Source : Courtesy of JKR(D) KULAI)

 <b>JKR MALAYSIA</b>	<b>PROSEDUR KAWALAN PRODUK YANG TIDAK MEMENUHI SPESIFIKASI</b>	No. Dokumen	JKR.PK(P).04-1
		No. Keluaran	05
		No. Pindaan	00
		Tarikh	1 Jun 2017
		Muka Surat	2 / 3

<b>BAHAGIAN C: ARAHAN PEMBETULAN SEGERA (CORRECTION)</b> (Untuk di isi oleh wakil JKR)	
Kategori NCP:	
<input checked="" type="checkbox"/> Utama (Major)	<input type="checkbox"/> Kecil (Minor)
Sila ambil tindakan sebagaimana berikut:	
<input type="checkbox"/> Dihapuskan/ Dilupuskan/ Diasingkan	<input checked="" type="checkbox"/> Diperbaiki/ diperbetul semula mengikut spesifikasi/ piawaian/ lukisan/ proseduri kontrak. (sila kemukakan cadangan tindakan untuk persetujuan HOPT/ HODT/ PP/ PD/ WPP/ WPD).
<input type="checkbox"/> Diterima dengan kelulusan untuk tujuan/ aplikasi/ spesifikasi lain. nyatakan .....	
Tarikh siap yang dipersetujui: 19/11/2019	
Tarikh keluar arahan HOPT/ HODT/ PP/ WPP/ PD/ WPD/ KUB (Tandatangan, Nama, Cap)	

<b>BAHAGIAN D: TINDAKAN PEMBETULAN (CORRECTIVE ACTION)</b> (Untuk di isi oleh staf JKR/kontraktor)	
Dengan ini saya mengesahkan tindakan pembetulan terhadap ketidakpatuhan produk di atas telah dibaiki dengan sempurna pada (tarikh) 19/11/2019 saya juga mengesahkan ketidakpatuhan serupa tidak akan berulang.	
Punca ketidakpatuhan: Tindakan segera selesai	
Tindakan pembetulan: memecah icon-con dan ganj @ DPM kepada saiz 0.5mm	
Staf JKR/ Wakil Kontraktor (Tandatangan, Nama, Cap, Tarikh)	

Figure 15 : The NCR of work progress SMK Bandar Putra 2.

(Source : Courtesy of JKR(D) KULAI)

Secondly, the problem for the construction supervisor was the inspection that been carried out by the JKR. The most problems when the inspection carried out was the cover of pile were not closed appropriately that can damaged the piles. Other than that, cleanliness and housekeeping works were not being monitored on the inspected area. The construction waste such as rusty nail, used wood and damaged form work. The food waste such as food container was also the problem when inspection been carried out.





**Figure 16 :** The inspection on reinforment bar of the RC wall at Blok Makmal of SMK Bandar Putra 2

So, the supervisor gave instruction to the housekeeping team before the inspection to make sure the cleanliness of the area. The housekeeping team prepared the garbage bin at each construction sector. The construction waste moved to the waste bins for construction materials. Next, the piles cover were sealed properly and fixed. The conduit pipes were replaced with the new conduit pipe if those pipes broke or damaged. The damaged of conduit pipes usually happen when concrete works been carried out or the workers either step-on it or accidentally hit the conduit pipes when work on the area. The conduit pipes were either electrical or water pipe for internal uses on the building structure.

## CONCLUSIONS

In conclusions, the total quality management will give better control of processes in construction sector and achieved the completion of project. TQM has been recognized as a successful management philosophy in the manufacturing and service industries likewise be embraced in the construction industry. It needs properly monitored and followed to achieve the completion of the project by measured 2 aspects which were Quality of Assurance and Quality of Control. To improve overall quality on a project, it's essential to have both a quality assurance plan and a specific set of standards for overall quality control. Even forming a dedicated QA team will help to ensure a project's results meet expected and needed quality. A project cost overruns, not to mention the potential to damage your management's reputation and legal disputes. Next, the methods on supervisor used from TQM helps to make the project completed successfully. The document and references was important in supervision to achieve the target in project with following the TQM. Every single documents have their functions and reduces the risk of delaying work in the project. To avoid delay work, the CPM was used to make sure the project completed in its time frame. Last but not least, in construction may lead occurs on problems such as arranging schedule arrangement for the workers, safety of workers, the defects of the building structure and the cleanliness of the area that need inspections. Either the rules and regulation from the management and the imposed NCR made the problems can be solved smoothly by the construction supervisor. TQM is a proven method for implementing a quality conscious culture across all the vertical and horizontal layers of the management and helps the construction supervision works on achieved completion of project.

## REFERENCES

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