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STUDY THE DIFFERENT QUALITY CONTROL PARAMETER SYSTEM FOR PAVEMENT QUALITY CONTROL (PQC) IN NATIONAL HIGHWAY CONSTRUCTION

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ABSTRACT

The main focus of the construction industry is to ensure that projects are successfully completed within the constraints of best quality, stated period and at minimum cost possible. The implementation of Quality Control System in Construction Industry is meant to assist the industry to improve the efficiency and effectiveness of the organization management system in ensuring successful objectives of company. In the area of globalization where economic competition is intensifying, the implementation of Quality Control System will improve the overall construction process and subsequently lead to the formulization of successful business strategies to meet international requirements. But the main problem with quality control system implementation in construction industry is that the check parameter is not easy to understand for employees.

The growth in infrastructure increases in our country which leads the construction of new roads Pavement Quality Concrete (PQC) is one most the key elements in this Initially the checklists are observed from different site the defects will identify in check lists and suggest new checklists for each items of construction. This study also examines root causes of plastic shrinkage cracks to Six Sigma Problem solving approach by taking suitable case study By taking suitable case study modify checklists are implemented

Keywords: Construction Industry, Quality Control System, Checklist

1. INTRODUCTION

A process through which a business seeks to ensure that product quality is maintained or improved and manufacturing errors are reduced or eliminated. Quality control requires the business to create an environment in which both management and employees strive for perfection. This is done by training personnel, creating bench marks for product quality and testing products to check for statically significant variation.

A major aspect of quality control is the establishment of well defined controls. These controls help standardize both production and reaction to quality issues. Limiting room of error by specifying which production activation are to be completed by which personnel reduces the chance that employees will be involved in tasks for which they do not have adequate training.

As the market economy has developed, market competition has had an important role of the law of survival of the fittest in every corner. The pressure of construction enterprises from the market and competitors will be greater and greater, as well as the increasing requirements of customers of quality assurance, which require the construction companies to improve their internal quality, strengthen management, in particular, pay close attention to quality control

Significance: The quality parameters should easy to understand specially checklists should be easy to understand and easy for implementation In this study is carried out to analyze the scenario of Quality Control System application, to identify factors affecting the construction organization and to issue recommendations on how to improve the implementation of Quality Control System in Construction Industry. The growth in infrastructure increases in our country which leads the construction of new roads concrete road is one most the key elements in this Initially the checklists are observed from different site the defects must be identify in check lists and suggest new checklists for each items of construction

2. LITERATURE REVIEW

Ahmad Huzaimi (2016) Authors find out that the simultaneous implementations of Sustainable Construction (SC) and Lean Construction (LC) concepts/practices are feasible in a strategic approach to accomplish improvement in reducing waste, which resulted in both positive environment and economic outcomes. Paper States that for both concepts/practices are capable of attaining significant environmental and economic benefits, organizations still experiencing difficulty to integrate the concepts successfully. Paper Conclude that the construction industry in many countries have encountered poor implementation and integration of both concepts. Ahmed S. Agha (2016 Author finds that total quality management (TQM) is a management philosophy which has been widely implemented in the

manufacturing and other services industries, and it shows how significant it can improve the quality in these fields. Further it is stated few articles and studies attempted to bring the benefits of this philosophy to construction industry. The findings of this paper is to point out the latest studies which focused on increase the business quality through implementing TQM in construction industry and its suitable applications in the different phases of project construction. M.S. Abd-Elwahed (2018)." This paper measure the level of knowledge, understanding, and implementation of quality management tools in a sample of the industrial sector in Saudi Arabia, and to monitor the different policies to implement the quality strategies and the extent of their integration into the industrial management systems in general. Author carried out the questionnaire to cover key elements, including knowledge and understanding of the various quality management (QM) approaches and the accompanying tools, is implemented. The impact of using each QM approach on the level of actual growth of the industrial organisations is verified, along with the impact of the executive method of management and its compatibility with the proper implementation of quality tools

3. OBJECTIVES

The following are the objectives of research work

- To study the need of quality control system and different aspects of quality control system in infrastructure projects To observe the different checklist from site identify the defects in that checklists.
- To identify & analyze the root causes of these defects and give remedial measure to overcome it .
- To Propose a new check sheet for problem solving of cast in situ road construction.

4. METHODOLOGY

For this project, the following flow of work followed –

Step 1- To study the need of quality control system and different aspects of quality control system in construction industry by literature review.

Step 2- By site visits to infrastructure construction sites observe the different checklist from site identify the defects in that checklists

Step 4- Prepare check sheet for problem solving of cast in situ concreting process for road construction and observe & map the process for construction work by suitable study .

Data Collection: The current checklist used for quality control on site are observed from different sites adjoining the Mumbai – Goa National Highway Projects the defects are found in that checklist by removing that defects the new checklist are prepared for Pavement Quality Concrete (PQC) Construction.

Data Analysis: The current checklist used for quality control on site are observed from different sites adjoining the Mumbai – Goa National Highway Projects the defects are found in that checklist by removing that defects the new checklist are prepared for Pavement Quality Concrete (PQC) Construction

EXCAVATION

DEFETS

Following are the defects at the time of excavation:

1) The fall or dislodgement of earth or rock.
2) The instability of any adjoining structure caused by the excavation.
3) Any previous disturbance of the ground including previous excavation.
4) The instability of the excavation due to persons or plant working adjacent to the excavation.
5) The presence of or possible inrush of water or other liquid
6) Vibration and hazardous noise.

REMEDIES

Following are the remedies for above defects:

1) Excavation shall be kept to the minimum. The limits of the excavation shall not extend more than 1.0 meter beyond the footprint of the footings.
2) Under winter conditions, the Contractor shall remove frost from the base of the excavation.
3) Excavations shall be dewatered and maintained dewatered so that the material is excavated in its natural state and construction of the foundations is completed in the dry.

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CHECK LIST:

ACTIVITY- EXCAVATION				
SR NO	TO BE CHECKED	YES	NO	REMARK
PRE-EXECUTION CHECKS				
1	Are the latest "good for construction" drawing available?			
2	Is the soil investigation report kept on-site?			
3	Have TBMs been established?			
4	Storage or intermediary storage identified for superficial mass of earth excavated?			
5	Are access routes available?			
6	Are tress present?			
7	Is a possible to display larger excavation machinery?			
8	Is a ramp for vehicular movement required?			
9	Has a grid line marking been done at the neighbouring construction activities?			
10	Is a first aid kit available on site?			
11	Are all the requirement met for maintaining dewatering?			
12	Is it possible to employ water pumps?			
13	Does the depth excavated include the depth of the construction of work?			
14	Has the consultant inspected the site before commencement of work?			
15	Are the required tools available?			
CHECKES DURING EXECUTION				
16	Has the block level register been maintained?			
17	Are the layout and alignment as per drawing?			
18	Has the required depth of cut been achieved?			
19	If the excavation is beyond 1.25m are there steps provided?			
20	Has proper shoring and shuttering been done in loose soils?			
21	Is the excavation barricaded at a distance of 1m?			

EMBANKMENT WORKS

CHECK LIST:

ACTIVITY- EMBANKMENT				
SR NO	TO BE CHECKED	YES	NO	REMARK
1	Are the under laying embankment layer require retest on field density?			
2	Have the previous layer testing approved and can proceed to the next layer?			
3	Are the survey level aligned and in control for the next placement of material?			

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4	Does the soil are from the approved source?			
5	Have the loose thickness of the material been checked after levelled?			
6	Are the fill material been properly graded and to the approximate camber?			
7	Are the moisture of the material sufficient and in control so that rolling can be carried out?			
8	Is the vibratory roller having adequate capacity and capable of giving the required number of passes, control of speed and rolling pattern?			
9	Have the compacted layer inspected and approved to carry out FDT?			
10	Have the QC laboratory been informed and given the request for inspection for FDT?			

SUBGRADE WORKS

CHECK LIST:

ACTIVITY- SUBGRADE				
SR NO	TO BE CHECKED	YES	NO	REMARK
1	Is the source of soil approved from borrow area?			
2	Is the under laying sub grade first layer approved?			
3	Are there adequate grade and survey takes available for control of placement layers?			
4	Is the placing of material appropriate?			
5	Are there adequate number of graders available for spreading and levelling fill?			
6	Is checking of loose thickness of layer done?			
7	Are there adequate amounts of suitable rollers available for the compaction operation?			
8	Is the layer free from any segregation?			
9	Is the finished compacted layer of the specified thickness?			
10	Is a first aid kit available on site?			
11	Are there any localized wet, soft and under compacted areas?			
12	Is there any arrangement for protection of the finished surface?			
13	Is the control of moisture during rolling as per method?			

Granular Sub base (GSB)

CHECK LIST:

ACTIVITY- GSB				
SR NO	TO BE CHECKED	YES	NO	REMARK
1	Is the job mix formula approved?			
2	Is the under laying Sub Grade layer approved?			
3	Are there adequate grade and survey stakes available for control of placement layer?			

4	Is the Placing of material appropriate?			
5	Are there adequate numbers of graders available for spreading and leveling of fill?			
6	Is checking of loose thickness of layer done?			
7	Are there adequate amounts of suitable rollers available for the compaction operation?			
8	Is the layer free from any segregation?			
9	Is the finished compacted layer of the specified thickness?			
10	Are there any localized wet, soft and under compacted areas?			
11	Is there any arrangement for protection of the finished surface?			
12	Is the control of moisture during rolling as per method?			

Dry Lean Concrete (DLC)

CHECK LIST:

ACTIVITY- DLC				
SR NO	TO BE CHECKED	YES	NO	REMARK
1	In the mix design of DLC approved?			
2	In the under laying GSB layer approved?			
3	Are there adequate grade and survey stakes available for control of placement layer?			
4	Is the Placing of material appropriate?			
5	Is there paver available for laying of DLC?			
6	Is arrangement for curing available?			
7	Are there adequate amounts of suitable rollers available for the compaction operation?			
8	Is the layer free from any segregation?			
9	Is there any arrangement for protection of the finished surface?			
10	Is there adequate arrangement of light for night work?			
11	Is the received batch sheet as per approved mix design?			
12	Whether the workers and staff have proper personal protection equipment (PPE)?			

Pavement Quality Concrete (PQC)

SAFETY: During construction works, adequate safety and traffic signs will be installed adjacent to the road shoulders to protect the ongoing works.

All tippers / tankers shall be provided with reverse horns.

Flagman shall be provided at exit points of the trucks / tippers.

The speed of vehicles plying in the work area shall be restricted to 20kmph maximum.

All labours being used in the job shall be trained and safety helmets and vest jackets will be provided.

The proper driving licenses shall be available with all the driving operators.

The Safety Officer will make frequent patrols along the highway to ensure that the safety equipment and signs are operational at all time.

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CHECK LIST:

ACTIVITY- PQC				
SR NO	TO BE CHECKED	YES	NO	REMARK
1	Is the Plan & Profile approved?			
2	Is the Mix design of PQC approved?			
3	Is the under laying DLC layer approved?			
4	Are there adequate grade & survey stakes available for control of placement layer?			
5	Is guide wires supported on stakes at 5 m interval?			
6	Is the placing of material appropriate?			
7	Is there paver available for laying of PQC?			
8	The paver available for laying Is working properly?			
9	Is the arrangement for curing available?			
10	Is the sufficient Qty of curing compound available at site?			
11	Is the adequate no of skilled & unskilled labors available for laying?			
12	Is the DLC layer tested for 3m straight edge test?			
13	Is the DLC layer free from any undulation?			
14	Is there any arrangement for protection of the finished surface from rain?			
15	Is there proper arrangement of light for night work?			
16	Is the received batch sheet as per approved mix design?			
17	Is there QC team with required equipment available at site for laying?			
18	Is there temperature meter available at site?			
19	Whether the works & staff have proper personal protection equipment (PPE)?			
20	Is the adequate no of dowel bars, tie bars sleeves & separation membrane available at site?			
21	Is the separation Membrane, dowel bars, tie bars, sleeves are approved?			
22	Is there initial grove cutting saw machines & team available for the next day activity?			
23	Is there additional vibrator available?			
24	Is the texturing brush properly cleaned?			
25	Is the dowel bars & tie bars coated with epoxy coating?			

5. CONCLUSION

It concludes that checklist should not only be used as theoretical concept but also put into practice on construction site quality control needs to be put quickly into practice in Construction industry specially cast in situ concreting process for PQC so as to achieve its benefits in terms of customer satisfaction, economy, time factor etc.

1) Checklist is to be implemented successfully on construction of cast in situ concreting process for PQC the inhibitive issues that have been identified from the literature and the contractor survey is need to be addressed on comprehensive integrative basis.
2) Checklist has positive effects on construction teamwork satisfaction, quality of construction project, implementation, client satisfaction and construction project implementation so checklist can increase the performance of construction project by reduce time, cost and increase the quality of project implementation.
3) Checklist is helps to ensure consistency and completeness in carrying out a task. Checklist is used to tell the user if there is certain thing which must be checked. Implementing checklist will help he firm to improve productivity of process compared the resources used and also increase quality of construction and hence satisfy customers. Checklist is used to improve the chances of achieving the desired result.

6. FUTURE SCOPE

This research can extend in other construction sector like bridge construction, building construction , and all types of constriction work . Further can be apply for all types of construction activities on site

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