

Reducing duration and cost of construction by shifting the activities in night time

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ABSTRACT

For this report the methodology adopted is first prepare the objectives and problem statement for the project. As stated in problem statement the main objective of project is decided as the effect of night time construction on total duration and total cost of project by considering quality and productivity of work then collect all the data in forms of journals, research papers, articles and prepare literature review with consideration research work. For this about 5 researches paper were collected and their summary report submitted in this report. Select the flyover site and collect all the data required for the project, analyze the data and find out activities which are suitable for night time construction, Also by analyzing the data find out the total change in duration and change in cost of project, Published a research paper in journal, Prepare the final report and presentation for dissertation work.

Keywords: Construction, Duration, Cost, Quality, Productivity, Flyover.

1.INTRODUCTION

Construction of flyover projects in the city areas usually causes disruption to traffic, which resulting in delays, increasing fuel consumption, some negative impacts on environment and comparative higher construction cost. Therefore scheduling some construction activities during night time is beneficial to overcome those problems. But all the activities are not carrying out during night time because of the several risks like safety risk, cost risk, productivity risk, schedule risk, quality risk and technical risk. The selection of activities should be such that it minimizes the different types of issues related to the night time construction. There are some issues like traffic, construction, social, economic and environmental that impacts on the feasibility of night time construction work.

1.1. Different risks related to night time construction:

The different types of risks and its causes are:

1. Safety risk- It is due to the intrusion of vehicle into work zone, intrusion of construction equipment on road traffic lane, poor visibility during night time, mental condition of labour. In addition the risk of driver error is higher at night. Human factor is one of the major factor in safety which includes sleep, stress, work, social or domestic issues
2. Cost risk- It is increased by need for more traffic control equipment, labour premiums, and extra salary of labours during night time, good illumination system. It is decreased by less delivery cost, less user cost due to fewer delays and construction time saving due to speedy work.
3. Productivity risk- It may be because of inadequate lighting, difficulty for achieving good supervision and inspection, extra time required to set up and take down traffic control devices.
4. Schedule risk- Workers accidents may cause this risk Also lack of co-ordination among different stakeholders regarding day activities on projects with night work.

1.2. Different parameters affect on night time construction:

In order to accurately assess the potential of a project for night-time operations it is important to identify the issues and parameters that affect night work. Following is a description of each factor.

1.2.1. Traffic Related Parameters:

Safety: The safety of the travelling public should be a leading factor in the decision to work at night.

Congestion: The impact of the proposed construction on the traffic flow through the site.

Traffic Control: Traffic control affects both safety and congestion.

Work Time Restriction: Any operating hour restrictions that have been placed on the project through local, state, and federal agencies as well as contract restrictions.

Lighting: Construction lighting must be arranged in a manner that minimizes glare to the travelling public while still adequately illuminating the job site.

Enforcement: Traffic control and construction speed limits must be enforced in order to be effective. This is generally achieved through local or state police departments.

New Technology: Signage, message boards, channelling devices, etc. that is more conducive to night-time construction.

1.2.2. Construction Related Parameters:

Quality: The effect night work will have on the quality of the final product.

Productivity: The effect night work will have on the productivity of the contractor.

Safety: Methodologies employed for night operations may differ from identical daytime operations for safety reasons.

Work Operations: Whether night-time conditions require different procedures or methodologies than daytime operations.

New Technology: The effect improved equipment and methodologies can have on night operations.

Schedule Limits: Restrictive schedule limitations. Possibility of decreasing completion time through double shift work.

Blasting: Careful considerations should be made concerning blasting operations at night.

Material Availability: Arrangements for the delivery of materials to the job site. Also added expenses for night-time material production and delivery may be incurred.

Equipment Repair: Contingency plans for dealing with the breakdown of major pieces of equipment should be developed.

Work Lighting: Lighting can affect nearly every aspect of night work.

Communication: During night operations communication between field and office personnel is difficult at best.

1.2.3. Social Parameters:

Driver Condition: Drivers at night are more likely to be fatigued or under the influence of drugs or alcohol.

Worker Condition: Workers are more likely to be fatigued at night.

Business Disturbance: The effect (noise, traffic, dust, etc.) that night operations will have on surrounding businesses.

Public Disturbance: The effect (noise, traffic, dust, lighting, etc.) that night operations will have on the surrounding residential areas.

Local Events: The presence of local community events (church functions, sporting events, concerts, etc.). If necessary, work may have to be suspended during the function.

1.2.4. Economic Parameters:

Business Losses: The economic impact on surrounding business (including trucking and shipping) due to inaccessibility and construction interference.

Road User Cost: The road user cost (day and night) should be calculated for the area of the project.

Accident Costs: The costs associated with motorist accidents and their impact, both financial and traffic wise, on the project and surrounding community.

Maintenance Costs: Costs associated with equipment maintenance activities to be performed

Construction Cost: The contract price of the project.

Liquidated Damages: Financial losses resulting from the late completion of the project.

1.2.5. Environmental Parameters:

New Technology: Equipment or methodologies that reduce the environmental impact of

Night-time construction including improved mufflers, reduced working time, etc.

Lighting Pollution: Excessive illumination caused by over-lighting a site.

Fuel Consumption: Generally at night less fuel is burned through idling vehicles in congestive situations.

Air Quality: Pollution from automotive exhaust emissions could be lessened by reducing Congestive situations.

Worker's Health: Health issues arising from the inhalation of automotive exhaust fumes.

1.2.6. Cabinet Issues:

Personnel Assignment: Selecting the personnel to work at night based upon employee satisfaction, family disruptions, supervisory problems, etc.

Resources: The ability of the Cabinet to staff and operate both day and night operations.

Decision Making: The ability of onsite field personnel to make decisions regarding the project.

Public Relations: Activities undertaken to inform the public about the nature of the work, why it is being performed at night, what delays are expected, and the availability of alternate routes.

Time Limitations: Employee work hour limitations.

Type of Work: Activities which the state has deemed unacceptable for night work or activities in which the state encourages night work.

1.2.7. Legal Issues:

Local Ordinances: Legal policies or rules established by the local government regarding the performance of construction work at night.

Local Restrictions: Restrictions imposed by non-governmental organizations such unions, materials suppliers, etc.

In case of the flyover projects which are constructed in India disruption in the working zone and the disruption of construction equipment on road is the major problem. It may cause the accident on site which ultimately delays the project, which increases the total cost of construction. Then this total cost and total duration of project is compare with the actual cost and duration.

2.OBJECTIVES

1. To identify different construction activities during night time by considering quality and productivity.
2. To study the impact of night time work on total duration of project compared to work completed in the day time.
3. To study the impact of night time work on total cost of project compared to work completed in the day time.

3. PROBLEM STATEMENT

The literature suggests that there is no any specific procedure or specific guidelines to decide that whether to carryout activities during night time or not. This evaluation is necessary to reduce the time and cost of construction.

4.METHODOLOGY OF WORK

For this report the methodology adopted is as follows.

1. First prepare the objectives and problem statement for the project. As stated in problem statement the main objective of project is decided as the effect of night time construction on total duration and total cost of project by considering quality and productivity of work.
2. Then, collect all the data in forms of journals, research papers, articles and prepare literature review with consideration research work. For this about 5 researches paper were collected and their summary report submitted in this report.
3. Select the flyover site and collect all the data required for the project.
4. Analyze the data and find out activities which are suitable for night time construction
5. Also by analyzing the data find out the total change in duration and change in cost of project.
6. Published a research paper in journal.
7. Prepare the final report and presentation for dissertation work.

5.SELECTION OF NIGHT TIME ACTIVITIES

The selection construction activities for night time are one of the important tasks of this project. For the selection of activities during night time a questionnaire is distributed to the site engineers who are working on the site. The questionnaires is based on the general survey, quality of construction, safety during construction, nuisance during construction (like noise, dust, vibration), illumination, productivity and cost of construction. From the different site engineer the we get the different answers. The questionnaire and its answers are as follows:

5.1 Questionnaire based on general survey

1. Does your company use night time construction?
2. At what project development stage does your company perform night time construction?
3. What are the factor that affect your choise to use night time construction?
4. Dose your company have specification for performing night time construction?
5. Do you encounter any problem associated with a night schedule?
6. In your opinion ,do the following general areas contribute problem to night construction ?
7. How important do you fell about the following disadvantages of performing night time construction

5.2 Questionnaire based on night time construction aspect :Quality

1. Based on your experience ,do you think night time work significantly impact construction quality

2. Identify the impact on quality for each activity completed during night time
3. Do the specification for night time construction quality differ from the daytime construction
4. Are there any innovation method of quality control being applied by your company when performing night time construction

5.3 Questionnaires based on night time construction aspect: safety

1. Are construction related accident more likely to occur in night time work zones?
2. Which are the different causes of accident on site during night time construction ?
3. Based on the following scale ,how safe do you feel working during night time ?
4. Which are the different techniques adopted for safety during night time

5.4 Questionnaires based on night time construction aspect: nuisance

1. Rate the following items as sources of night time construction nuisances.
2. Does your company uses specific noise control strategies and methods to minimize the noise during night time operations?
3. How often does your company receive complaints of the following source of night time construction nuisances?

5.5 Questionnaire based on night time construction aspect: Illumination

1. Are contractors required to provide lighting plans prior to starting night time construction activities?
2. Are there any innovative methods of lighting being applied by your company when performing night time construction?

5.6 Questionnaire based on night time construction aspect: Productivity

1. Does night time work significantly impact construction productivity?
2. In your opinion, do the following night time factors impact productivity of night time operations?

5.7 Questionnaire based on night time construction aspect: cost

1. Has your company compared the cost between daytime and night time construction?
2. In your opinion, does the following construction cost impact night time operations?
3. Does your company have night time cost control guidelines for night time construction?

This site is located near CoEP college and Sancheti chowk which is one of the crowdest place in Pune. Therefore RMC truck requires more time to reach the destination, which ultimately delays the project. So it is necessary to shift some of the critical activities in night time which require more manpower, material and equipments. For this construction all the activities are completed during day time, therefore for analysis of duration and cost of project all the concreting work is shift to night time and reinforcement placing work is complete during day time and night time by increasing the men resource.

The selected activities for night time and its durations are as follows:

1. Placing of reinforcement of foundation during day time and night time
2. Concreting of foundation during night time only
3. Placing of reinforcement of pier day time and night time
4. Concreting of pier during night time only
5. Placing of reinforcement of pier cap day time and night time
6. Concreting of pier cap during night time only
7. Placing of reinforcement of girder day time and night time
8. Concreting of girder during night time only
9. Placing of reinforcement of deck slab day time and night time
10. Concreting of deck slab during night time only

6.CONCLUSION

By shifting some activities in night time the following conclusion may be expected.

1. The selection of activities for night time depends on rate of traffic, resources available, site location. For the flyovers we can carry out concreting and reinforcement placing during night time because it require more time and more work space.
2. The total duration of project is definitely decreases by shifting some day activities during night time, which increases the total cost of project; because the labour charges are more at night than day time and night there should be a good illumination system is required.
3. The construction project is delayed due to accident happened on site, which increases the cost of project that is more than the cost of project which are carry out during night time. Therefore to avoid the delay of project, accident on site due to traffic and for more working area it is necessary to shift some activities to night time for flyover project.

Based on the literature survey the recommendations to improve the night time construction are:

1. A detailed night time work plan should be prepare to improve the work.
2. The lighting plan and traffic control plan should be design before the work started.
3. Special sign board should be erected on the night time construction site with flash light mounted on it.
4. A night time construction training program should be arrange to train all the labours who are working during night time. Generally this program should be arranged in night time.
5. The use balloon lighting is better than the conventional lighting for good illumination.
6. Bid the night time pay items separately. The night time work includes the extra things like lighting equipments. Bidding night time items separately, prevents contractor from complaining about prices and results in more accurate bid.

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