iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** X **Month of publication:** October 2017

DOI: http://doi.org/10.22214/ijraset.2017.10077

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue X, October 2017- Available at www.ijraset.com

Six Lane Flyover

PatelMaharshi[1], MakwanaKomal[2], Gohel Arav[3], Sagar Mohit [4]
[1, 2, 3] *Student, Sardar Patel College of Engineering-Bakrol (Anand)*
[4] *Asst. Prof, Sardar Patel College of Engineering-Bakrol (Anand)*

Abstract: The purpose of present study is to investigate analysis, foundation as well as for the substructure up-gradation of six lane flyover. The overall aim of this project is to identify and to solve problems occurring during construction of flyover as well as estimation and costing with its increment or decrement rate of construction will be represented by us.
Keywords-six lane flyover, bridge, abutment, pile

I. INTRODUCTION

A Flyover is a structure which connects two or more points which are already accessible and is really flying over and/or across manmade structures viz., road, railway, building, and street.
A Bridge is a structure which connects two points separated by a natural phenomenon viz., river, valley, sea, any other water body. Flyover is a bridge that carries one road or railway line above another either with or without subsidiary roads, for communication between the two.

II. OBJECTIVE

To identify variables influencing construction time and cost overrun and to evaluate its relative importance.
To maintain the road so user cannot face any difficulty.
To provide useful design guideline and example for improving the aesthetic and efficiency of substructure for standard flyover system.

III. RESEARCH PROFILE

Sr. no.	Particulars	Descriptions
1	Name of the structure	Flyover bridge
2	Name of the Client	National Highway Authority of India.
3	Name of the design consultant	Stup consultant pvt. Ltd.
4	Name of the Contractor	IRB Ahmedabad-Vadodara Super Express Toll Way Pvt. Ltd.
5	Name of Execution by	Chetan Engineers, Ahmedabad
6	Quality control consultant	Shah Associates, Ahmedabad
7	Type of project	Infrastructure
8	Type of Contract	Item Rate Contract
9	Length of flyover	46m
10	Class of the road	6 Lane
11	Type of foundation	Pile foundation & shallow foundation
12	Sub-Structure	Pile, Pile cap, RCC piers, Pier cap
13	Super Structure	Precast girder& RCC Box girder, Slab
14	Existing location	Aslali circle at SP ring road, NH-8

IV. ABOUT THE TECHNOLOGY ON FLYOVER

All bridges have foundations and abutments, while most have piers, columns, pylons or towers which where they are located below the deck level are collectively known as the substructure. The wide variety of substructures commonly used range from piled to spread footing, abutments, cantilevering piers to fully integral structures. Substructures also bring together structural and geotechnical engineering interacting to support the rest of the bridge. To do justice to all aspects of substructure would require a much lengthier script than we have room for here, but this chapter is to introduce the basic principles constructing the substructure for a bridge. Guidance is given on selecting suitable structural arrangements for the foundations, abutments and piers along with the geotechnical parameters used in their design.

Bridges are usually constructed as part of a road, railway or development project. The cost of the bridges may represent only a small part of the total contract value, but the construction of the bridge substructures can have a major impact on the overall contract system, since this normally occurs at the same time as earth-moving and drainage operations, and is inevitably on the critical path for the construction.

The substructure is usually considered as that part of the bridge below the deck soffit or bearings and includes the piers, abutments and foundations. These elements transfer the load from the deck down to the ground and in the case of abutments provide a transition from the supported deck structure to the approaches. Arches and the pylons and towers of cable-stayed and suspension bridges are an integral part of the superstructure of a bridge and are not considered in this section although they have many aspects in common with substructures in general.

The cost of providing the substructure to a bridge deck often represents more than half of the total bridge price. In spite of this, present design practice and rules often require that as much as 90% of the total design time is spent on the analysis and refinement of the superstructure. One reason for the emphasis on bridge deck analysis is that applied design loads on bridge decks were originally specified by Code of Practice BS 153: Part 3A (British Standards Institution, 1972a) and subsequent design and assessment loadings were continually updated by the Department of Transport over the following 25 years in recognition of the increases in traffic intensity and vehicle weights (Department of Transport, 1977; Highways Agency, 1997; British Standards Institution, 1978a, 1978b).

Poorly designed substructures that cause unnecessary additional direct costs and consequential indirect costs will undoubtedly cause an overall increase in the construction price. As design or detail that leads to a speeding up of the construction process should be welcomed, as the real saving may not necessarily be in the individual price of a bridge. It may, for example, be in a reduction of the operating costs involved in the hire of an earthworks fleet.

This makes concrete an ideal material for these parts of the bridge as it combines inexpensive construction with high capacity, robustness and relatively maintenance free attributes.

The different parts of the substructure and their design are discussed in more detail in the following sections.

A. Abutments

The abutments support the ends of the deck and provide a transition between the bridge and the approach embankment orstructure. These may also be integral with the deck where anticipated movements are accommodated in the design. Piers are used to support the superstructure along the length of the deck and may be built integral with the deck or incorporate a bearing to allow relative movement between the pier and deck to occur. The piers support the deck during the construction and in service and for most bridges are subjected to high vertical loads combined with significant horizontal forces and moments.

The abutments provide the transition from the elevated structure to the approach embankment or approach structure. As well as supporting the end of the deck they usually retain the fill of the embankment and provide means of access into the deck where applicable. There are many different types of abutments, including:

1) Wall abutments
2) Bank seat abutments
3) piled abutments
4) Mass abutments
5) Counterfort abutments
6) reinforced earth abutments

he characteristics of these different types of abutments are described in the BRE report ‘Bridge foundations and substructures’ which provides guidance on their use and arrangement. For decks lengths of up to 60m it is now usual practice to make the abutments integral with the deck although with skew alignments or box girder decks bearings are often provided to simplify the overall structural behavior. For longer lengths of deck the expansion and contraction movements may dictate the need for a non-integral arrangement with bearings to minimize the loading imposed on the abutment. Where bearings and expansion joints occur at the abutments, a suitable size access chamber is required to facilitate the inspection and future replacement of these items.

B. Pile

Because of the limited differential settlements that can be tolerated by most structures, it is likely that many bridge substructures will be supported on piles. There are two key issues in pile design:

The selection of an appropriate type of pile for the ground and groundwater conditions, and taking into account local practice and plant availability.

Design of the pile, to calculate allowable loads and estimate settlements.

1) Many problems occur because of the use of an inappropriate pile type, for example:
2) Lack of pile integrity (cast in situ or CFA piles can be affected by high groundwater conditions).
3) Shaft softening may occur where piles penetrate water-bearing sand/clay (laminated) soils.

The selection of an appropriate type of pile is probably the most important design decision, and is best made on the basis of experience in similar ground conditions, and with the support of piling subcontractors.

C. Pile Footings

Where the founding strata are at depth below the ground surface piles are often used to transfer the load from the substructure into the ground. A pile cap connects the top of the piles and distributes the forces and moments from the piers or abutments to the individual piles.

here are many types and sizes of piles used in bridgeworks, from large diameter bored piles with diameters up to 3m to small mini-piles of a few mm diameter. They can be precast and driven or cast in-situ, and the choice depends largely on the ground conditions, loads imposed, access and equipment available. Tomlinson's book 'Pile design and construction practice' provides comprehensive guidance on the different piling systems available and their design and construction requirements.

Pile caps are designed using a truss analogy or by simple bending theory to derive the tensile reinforcement and shear requirements. Guidance on the design of pile caps is given in BS 5400 part 4 clause 5.7.3 Design of bases.

I. Flyover

V. PROBLEMS OCCURRING DURING EXCAVATION &SCHEDULING OF PROJECT

A. Solve problem regarding potholes on bituminous road and temperature andSoil stabilization.

B. To remove potholes on bituminous road

C. To prevent traffic accidents from potholes during monsoon season.

D. To prepare entry of water into pavement.

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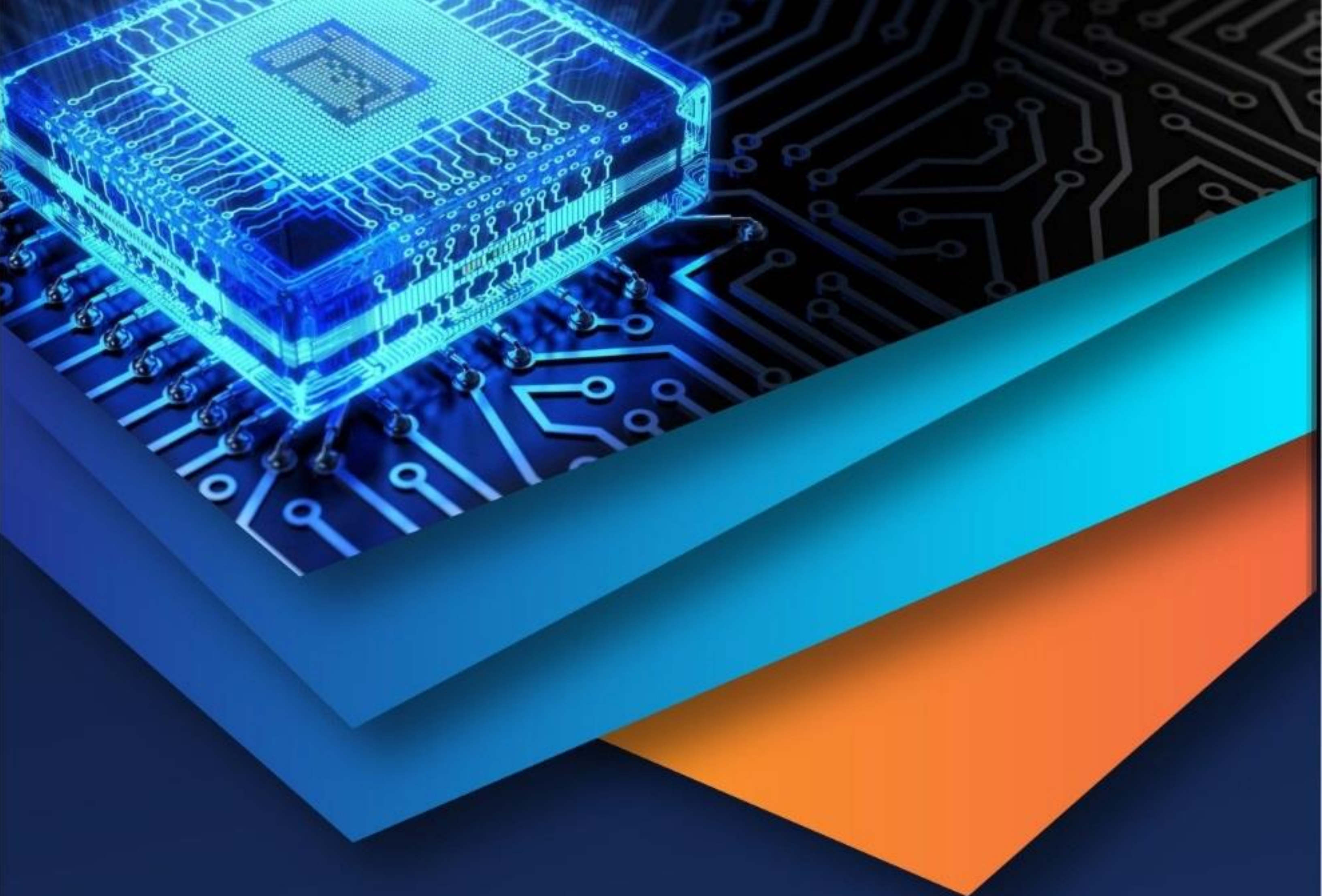

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