**Mumbai Vadodara Expressway Project Details**

**INTRODUCTION**

The Vadodara-Mumbai Expressway is a proposed eight-lane / six lane fully access controlled expressway under Bharatmala Pariyojana. The reason behind the proposal of this expressway is that maximum sections of the current routes from Mumbai to Vadodara have been reached to their maximum capacity. It is a part of Delhi Mumbai Expressway.

Maharashtra, Gujarat, and the Union territory of Dadra & Nagar Haveli are all part of this proposed Mumbai Vadodara Expressway. The expressway will be approximately 379 kilometres long and will follow roughly parallel to the existing NH-8. Approximately 90 kms of the expressway will be initially constructed as 6 lane (with a provision of future expansion up to 8 lanes) and the remaining majority length of the expressway will be constructed as 8 Lane.

The prime objective behind this Expressway is to provide a seamless and efficient transport system encompassing all mobility and logistics requirements to ensure smooth and uninterrupted flow of the traffic.

**SOCIO ECONOMIC PROFILE OF PROJECT INFLUENCE AREA**

The alignment of this package passes through plain cultivated barren areas. It mainly passes through the Vadodara district which is rich in industrial production. There are many industrial estates and factories in this area.

**ROUTE ALIGNMENT SECTION**

The identification of the route was done in 1990s by the MORTH with the help of Asia Development Bank. The NHAI has appointed the consultant SECON for the desk study to see if the route was passing through any problematic area and then finding the solution for it. This was done through Google imagery, reconnaissance work at site, topographic survey between GPS stations, Environmental reconnaissance, study of alignment of Dedicated Freight Corridor of railways, gas pipeline and crossing of Major rivers were considered before finalization of alignment.

**TOPOGRAPHIC SURVEYS**

The Topographic survey was conducted in a width of 200 m on either side of alignment to capture the ground levels and all the existing physical features like rail, road, river, canals, houses etc. The main points were fixed through Global Positioning System (GPS).

**TRAFFIC SURVEY AND TRAFFIC ASSIGNMENT**

The Traffic survey was conducted on NH8 and surrounding area network to estimate the traffic inflow in VM Expressway. The traffic survey was conducted on various locations and then based on traffic volume it was decided that expressway should be developed with 8 lane facility.

**SOIL AND MATERIAL INVESTIGATION**

It includes investigation for foundation soil of road embankment along proposed alignment and investigation for construction material. Required test were carried out on BIS standards and MORTH specification. The soil from the borrow are alongside of project road was examined. Then it was identified that stone quarries required for construction are easily available nearby.

**HYDRAULIC AND HYDROLOGICAL INVESTIGATION**

Hydrological and hydraulic investigation involved collection and analysis of field data including past performance of the nearby bridge on NH8 and all roads across the stream crossing (Upstream/downstream) the proposed alignment, historical flood (Discharge, HFL etc as available) from Irrigation department of Gujarat.

The hydraulic information of canals likely to cross the road was collected from Sardar Sarovar Narmada Nigam Limited. The IRC codes and guidelines of Inland Waterway Authority of india was followed for hydraulic calculation. Usually, 100 year adopted return period of flood were used for design.

**DRAINAGE STUDY AND PRELIMINARY DESIGN OF CULVERTS**

Suitable bridge and culvert openings have been proposed across natural drainage channel with a view to pass the discharge with minimum disturbance. Drains and additional culverts were proposed to divert the overland flow into the nearest natural drainage channel. Box culverts were preferred over pipe culverts easy access for inside the culverts for cleaning and the same may be used by cattle to cross the road in dry weather. Box culverts have been proposed with a minimum size of 2\*2m.

The 24 hour maximum rainfall of 25 year return period has been taken as a design rainfall.

**GEOMETRIC DESIGN STANDARDS FOR EXPRESSWAY**

The expressways were designed to cater large volume of traffic at high speed and at the same time being safe. The International standards like a policy by ASHTO, the standards prevalent in UK and Australia were also considered to finalize the standards for expressway design. The Terms of Reference (TOR) specifies 120kmph design speed for the proposed expressway.

The interchange comprises of grade separated structures for straight movement and a combination of loops and ramps to accommodate turning movements (Entry and Exit to & from the Expressway).

**PAVEMENT DESIGN**

The Pavement design has been carried out for both the carriageway including interchanges and connecting roads.

The Option studies are:

**Option 1:** Conventional flexible pavement

**Option 2:** Flexible pavement with cement treated base and sub base.

**Option 3:** Rigid-pavement.

Design period of the proposed Expressway has been considered as 20 years for the flexible pavement and 30 years for rigid pavement. The design traffic for the flexible pavement for the main carriageway is about 300 MSA. The flexible pavement of connecting roads is designed for a maximum traffic load of 10 MSA. The flexible pavement is designed using IIT PAVE software for stress & strain calculation.

Keeping in view the high intensity of design traffic Cement treated base (CTB) would be considered to fully replace the conventional granular base like wet mix macadam (WMM).

Even though the construction cost of rigid pavement is high but still preferable due to low maintenance cost and less susceptible to construction quality control during construction.

**STRUCTURES**

Deck configuration of the structures is kept based on road cross section. There are two independent carriageways of 4 lanes each with 19.5 m wide median between the two carriageways considering the future widening of the expressway in this median space. Deck width of each carriageway has been kept of 21.25m. The types of structures selected should be innovative, cost effective and suitable for construction by locally available material and technology in shortest span of time.

**TOLLING STRATEGY AND PLANNING OF TOLL PLAZAS**

There is no Toll Plaza on the mainline except at start and end point of the expressway. It will avoid the through traffic to stop at various toll plazas on the route. This system of tolling is called closed tolling system. In this system Toll Plazas are provided at interchange locations over Entry & Exit ramp/loop. The user will register at entry and pay at exist. Hence the user will be charged for the exact distance travelled on the expressway.

**USER FACILITIES AND ROAD FURNITURE**

Wayside amenities are provided at a distance of 75-100km since the speed is 120 kmph. The wayside amenities are mainly comprises of the need of road users. These are Food Plaza, toilets, petrol pumps and parking.

Metal beam barriers are provided on the outer side at the top of embankment to protect any out-of-control vehicle from falling and guiding them back on the road.

**ADVANCED TRAFFIC MANAGEMENTS SYSTEM (ATMS)**

The ATMS will have the complete capability of incident management and to meet the requirements of the safety of users. ATMS will provide information to the users on real time basis for the traffic flow conditions and incidents ahead, and for this purpose, there would be a control centre and outdoor equipment located at strategic locations along the entire corridor and connected through a transmission medium.

**ECONOMIC ANALYSIS**

The importance of Delhi Mumbai Expressway is that it reduces the transportation costs, improve connectivity, and boost trade and commerce, thereby providing a major impetus to the overall economic growth of the country.

It will also connect several other cities and towns along the way, which will help to promote economic growth and development in those regions. It will reduce the travel time drastically.

**CONCLUSIONS AND RECOMMENDATIONS**

With rapid economic development taking place in the States of Gujarat and the planned Delhi-Mumbai industrial corridor there is a need to develop a high speed corridor wherein the movement of large volumes of passenger and goods vehicles can take place at a fast pace. The proposed expressway will fulfil the objective and also reduce the travel time.

Considering the final revised design the following major recommendations are made

1) Based on the traffic estimates and the volume to capacity ratios it is recommended that this package be developed to eight lane facility in the opening year.

2) To minimize delays to the through traffic a closed type tolling system is recommended with toll plazas at the entry and exit of the interchanges. Mainline toll plazas are recommended only at the start and at the end.

3) Based on life cycle costing rigid pavement is recommended for the entire length of the Expressway.

4) It is recommended that, the project be undertake on EPC mode/HAM for Implementation.