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## Review Paper

# Management of the various factors in Widening of Major Arterial Roads like JVLR in Mumbai

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**Abstract:** The effective management of the various factors and hurdles involved in the widening of major arterial roads in big cities, such as JVLR in Mumbai, which is crucial for the success of the project. This involves balancing the need for improved traffic flow with the concerns of local public, daily commuters and finding effective solutions to the challenges posed by land acquisition, traffic management, tackling the underground utilities, co-ordination with the different agencies and BMC's other department's requirements. By working closely with local public, commuters, businesses, and BMC's other departments and implementing effective strategies to minimize the impacts of the project, by keeping rigorous follow up with the agencies involve in risks mentioned above, it is possible to achieve the goals of widening of major arterial road for improved traffic flow and improved quality of life for residents and commuters in Metro Cities, like Mumbai.

**Keywords:** Widening of Major Arterial Roads in Big Cities

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## 1. INTRODUCTION

Mumbai is a Financial Capital of India. Brihanmumbai Municipal Corporation (BMC) is the biggest Municipal Corporation in Asia. It is established in 1889 and works according to the Mumbai Municipal Corporation Act 1888. For seamless working and providing services to the Mumbaikars easily, Mumbai is divided in three divisions namely City Division, Eastern Suburbs and Western Suburbs. These Divisions are further classified as 07 Zones of Mumbai. These seven Zones are further divided into 24 Wards and 24 Wards are divided in 227 beats (Municipal Councillors).

Brihanmumbai Municipal Corporation (BMC) formerly known as Municipal Corporation of Greater Mumbai (MCGM) is executing work of Widening and Improvement of Jogeshwari Vikhroli Link Road (JVLR) and it is one of the important projects of BMC.

The work of Widening and Improvement of Jogeshwari Vikhroli Link Road (JVLR) under work code W-316 in the K/East Ward of Western Suburbs of Mumbai is awarded to M/s Speco Infrastructure after they being found Lowest Bidder in the Online Bidding Process carried out on BMC Portal. The Contract cost of the project is Rs. 66.87 Cr. after a rebate of 12.15% over the original estimate of Rs. 69.84 Cr. The Road length to be widened is 2100 meters on both sides, in a proposed width of 45.47 meters (150 feet) as against the existing width of 27.45 meters (90 feet). This road stretch is

averagely will be widened by 11.25m on both sides. The project began on 10.07.2019 and is expected to be completed on 30.12.2023.

M/s Tandon Urban Solutions Private Limited (TUSPL) is appointed as Design Consultant for the work to tackle the challenges arise during the progress of work and handle the structural design needs of the project in case of Culverts, Drains, Utility Ducts, Retaining Walls, etc.

- ❖ The main components of the project include;
  1. Widening and improvement of the JVLR to 11.25 meters on either side, with a total length of 4.2 kilometers (2.1 kilometers on either side) in Cement Concrete.
  2. Construction of the Storm Water Drains (SWD) at the final road level on both sides of the road (4.2kms).
  3. Construction of the Utility Duct of size 1.50 x 1.50m at North side of JVLR.
  4. Laying of Sewer Line of size 355mm and 500mm dia. at South side of JVLR by using HDD (horizontal directional drilling) method.
- ❖ However, the project faces some major hurdles due to existence of;
  1. Encroachment (Residential and Commercial structures) for a length of more than 500m at North side of JVLR.

2. Trees in alignment of Roads widening, SWD and Utility Duct construction.
3. Water Supply line (H.E. water mains)
4. High Tension / Low Tension Electric supply cables from Adani Electricity, Tata Power, etc.
5. Various Cables and fibres from telecom service providers.
6. Acquiring of setback area of the societies, who's some area of plot affected in widening of JVLR.
7. Acquiring of Majas Bus Depot, who's some area of plot affected in widening of JVLR.
8. Issues related to the widening of Junctions merging on JVLR.
9. Traffic Signals.
10. Street Lights.
11. Mumbai Police CCTV Surveillance Poles.
12. Ongoing METRO Line-6 Project.

There are 04 major Link Roads of Mumbai which connects Western Suburbs to Eastern Suburbs, those are:

- SCLR – Santacruz Chembur Link Road
- AGLR – Andheri Ghatkopar Link Road
- JVLR – JogeshwariVikhroli Link Road
- GMLR – Goregaon Mulund Link Road

### 1.1 Jogeshwari Vikhroli Link Road (JVLR) details:

JVLR is one of the Major Arterial Roads in Mumbai, which connects Mumbai Suburbans from East to West. JVLR is divided in two different wards of “K/East” and “L” Ward. It is connected from Jogeshari to Vikhroli, the two important areas of Mumbai. JVLR being the Arterial Road of Mumbai, as per the Development Plan 2014-34 of Mumbai, the revised width of JVLR is 45.70m. BMC has taken up the work of widening and improvement of JVLR from 27.45 (90 feet) to 45.70m (150 feet) and work is in-progress since 2019.

- Length of JVLR is approx. 3.7kms in K/East ward and Existing width is 27.45m (90 feet)
- Difference of Level in Road is approx. 55 – 60m.
- Steep Gradient of Road with Rocky Profile.
- Heavy Traffic Density Road.
- Majorily used by Heavy and Goods Carrier Vehicles.

## 1.2 Purpose of Project Charter

### 1.2.1 Project Overview:

The main purpose of initiating this project is to study areas of management while constructing a Major Arterial Road in a Metro City like Mumbai, Widening ofJogeshwariVikhroli Link Road (JVLR) area. Expansion/addition of space (area) are a common concern for maintaining continues flow of traffic. Vertical phasing (increase the Road width by adding extra area) is advantageous or perhaps the only option when the land area is limited. A total of two additional areas will be constructed in the JVLR, widening of Road and Construction of Flyover Bridge by Bridge Department of BMC.

### 1.2.2 Purpose of Road Widening:

BMC provides basic infrastructures like Bridges, SWD, Water Mains, Roads, Sewer Network, Hospitals, Schools, etc. Mumbai has a Road network of 2050 kms within the jurisdiction of Brihanmumbai Municipal Corporation (BMC).

### 1.2.3 Challenges in the widening of Road:

There are certain difficulties observed in Improvement and Widening of JVLR which needs to be managed to get the work effectively executed in time:

- Removal of Encroachment on both the sides of the Road.
- Laying of Sewer Line for an unsewered areas.
- Shifting / Lowering of Water Mains laid along JVLR.
- Shifting / cutting of existing trees planted along JVLR existing roadside drains.
- Acquiring of setbacks from private layouts / government / semi-government organizations / agencies to execute DP 2014-34.
- Shifting / removal of other agency utilities of service providers like Airtel, Vodafone, ADANI Electricity, TATA Power, MTNL, etc.

## 2. LITERATURE REVIEW

Table 1

Details of paper	Problem Identification	Paper approach for the problem	Results / dataset
Laura Garach, et.al, “The effect of widening longitudinal road markings on driving speed perception” [1].	Lanes were perceived as being smaller than they actually were if road markers were wider, giving the impression that they were moving more quickly.	The examination of the effect of larger longitudinal road markings on driver perception of lane width and its potential to cause slower driving was conducted in this study.	It was concluded, based on the results, that the use of broader road markers may have assisted in reducing vehicle speed, thereby improving road safety.
Jamal Ahmed Khan, et.al, “A Multidimensional Analysis of Factors Impacting Mobility of Open-Access Multilane Highways” [6].	High access density, inconsistent design, and other operational features set these roadways apart from partially restricted access multilane motorways.	Field observations and the opinions of road users were used in this research to identify the key variables that influence the mobility of open-access roads.	According to the results of multilinear regression, the access density was shown to be the most important variable, followed by flow and pedestrian crossings.

According to Shumank Deep et al. [11], the goal of this research was to assess the cruciality of the components affecting the success of highway projects, given that roads form the backbone of a country. A survey tool was designed and 185 project managers were surveyed.

Represented by Gireesh Babu and Sunil Biradar [12], the effectiveness of a city's road system was deemed crucial for future traffic planning, design, operation, and maintenance, among other things. A widespread issue of traffic congestion in most of India's largest cities was noted, with most of these cities having a mixed pattern of traffic.

A thorough literature analysis determining 39 variables affecting the performance quality of the highway construction

sector in Egypt was conducted, and a questionnaire containing these elements was distributed to 15 consultants, 27 owners of regional roadways, and 13 owners of split highways with the aim of enhancing the management of highway projects, as described in the research by Ahmed Ebrahim Abu El-Maaty et.al [13].

Before a project in the community was begun, the research and advice by Erwin S. Encinares [14] advised that the Department of Public Works and Highways (DPWH) continuously contact the impacted stakeholders. They also advised that the road right of way issue must be addressed and fixed before the projects could be implemented. During the installation of road widening, the DPWH may have offered a remedy to the issues that arose. Similar to this, the efficacy of the tactics used by the DPWH may have been assessed and their alignment with the policies and standards maintained. The impact of environmental initiatives like road widening on the environment may also have been focused on by the prospective researcher.

The average daily traffic (ADT) was sought to be enabled to be produced more accurately by local experts in Gaza City, and improved transportation facilities were sought to be provided, through the giving of data in this study. Continuous traffic flow counts that were done on three specific key streets in Gaza were the basis of the analysis and debate. On each street, data was gathered over 24 hours over the course of seven consecutive days. It was found that over the time period between 7:00 and 16:00, the error margin of the average hourly expansion factors (HEFs) did not exceed 3%. The outcomes also showed that on Sunday and Monday, the maximum margin of error of the average daily expansion factors (DEFs) on the three streets had a margin of error of 3.2% [15].

It was emphasized by Jyoti Joshi and Chandani Arya [16] that the economic and social growth of a place depends greatly on its roads and that transportation is essential to modern existence. It was also noted that roads are crucial both from a strategic and social and economic standpoint and building roads in the steep Himalayan mountainous region is a challenging task.

The higher traffic volumes and speeds as a result of road widening were anticipated by the model proposed by David Metz [18], however, the actual results showed that the traffic speeds were overestimated. A benefit-cost ratio of 2.9, supporting the investment, was obtained from the economic model used to evaluate investment benefits with costs, which utilized the projection of increased traffic speeds as input. The lack of an observed increase in traffic speed raises concerns about the applicability of the long-standing transportation model, as well as the value of investments to increase the capacity of strategic roads heavily used for local trips, despite travel time savings being the primary economic benefit of road investments.

In order to increase the safety of median openings, a full knowledge of sign configuration was sought to be created by

Xu Wang and Peiyu Jian [20], who were represented in this work. A portion of the Binlai Freeway in Shandong, China was chosen as the research location. The safety effectiveness of several signs, arrangement ideas, which included signs for lane-specific speed limits and recommended vehicle types, no lane-changing, and impending median opening warning, was tested using driving simulation studies.

### 3. RESEARCH METHODOLOGY

Widening of Major Arterial Roads, like the Jogeshwari-Vikhroli Link Road (JVLR) in Mumbai, is a critical component of Urban Infrastructure Development. The aim of widening these roads is to improve traffic flow and reduce congestion, thereby improving the overall quality of life for residents and commuters. This can be achieved through the effective management of various factors such as land acquisition, traffic management, environmental impact, and stakeholder engagement.

#### 3.1 Land Acquisition:

One of the most challenging aspects of widening major arterial roads is acquiring the necessary land for the project. This can involve purchasing private land, negotiating with property owners, and dealing with compensation and resettlement issues, offering TDR and other benefits in their redevelopment projects, etc. In this case of JVLR, the Brihanmumbai Municipal Corporation (BMC) has faced challenges in acquiring land (setback areas) from private societies and they have to be compensated with land TDR, extra FSI and other benefits as per the prevailing policy of BMC, at the time of their proposal for redevelopment of the society building.

#### 3.2 Traffic Management:

Another key factor in the widening of major arterial roads is effective traffic management. This includes measures to minimize disruption to traffic flow during construction, as well as strategies to manage increased traffic volumes once the road has been widened. In the case of JVLR, the Brihanmumbai Municipal Corporation (BMC) has implemented measures such as traffic diversions, lane closures, Barricaded areas and temporary traffic signals to manage traffic flow during construction. Additionally, the BMC has worked with local authorities to improve public transportation options and encourage the use of alternative modes of transportation. Also, BMC has put the condition of appointing wardens to manage traffic on behalf of Traffic Police, whose expenses were to be borne by the appointed contractor.

#### 3.3 Environmental Impact:

The widening of major arterial roads can also have significant environmental impacts, such as increased air and noise pollution, destruction of green spaces, and disruption of local ecosystems. To minimize these impacts, the BMC has implemented measures such as planting trees along the road to mitigate air pollution and using sound barriers to reduce noise levels. Additionally, the BMC has worked with local authorities and environmental groups to address the impact of construction on local ecosystems and wildlife.

Also, the trees which are affected in the widening of the road are maintained at site as it is and protected by providing tree guards around the periphery.

### 3.4 Stakeholder Engagement:

Effective stakeholder engagement is a critical component of any major infrastructure project. In the case of JVLR, the BMC has worked closely with local communities, business owners, and other stakeholders to address their concerns and provide information about the project. This has involved regular public meetings, the establishment of a community liaison team, and the provision of regular updates on the progress of the project. Access to the building, commercial hubs, nearby schools, Temples, et-cetra were closely discussed with their representatives and the suggestions are welcomed from them and feasible suggestions were executed at site.

### 3.5 Relocation of Utilities:

The relocation of utility lines and services such as power, water, and gas may be necessary during the construction process if laid at shallow depth. During a construction project, it's common for utilities such as power, water, and gas lines to run through the area where construction is taking place. In such cases, the utility lines may need to be relocated to facilitate the construction process. The process of relocating utilities is known as utility relocation, and it involves moving existing utility infrastructure to make way for construction activities.

There are several reasons why utility relocation may be necessary during construction. One reason is to prevent damage to the utility lines or infrastructure during construction. For instance, heavy machinery and equipment used in construction may cause damage to underground utility lines, leading to service disruptions and safety hazards.

Another reason for utility relocation is to improve the efficiency of the utility infrastructure. For instance, a utility company may choose to relocate its power lines to a more accessible location or to upgrade the existing infrastructure to meet the increased demand for electricity in the area.

Utility relocation can be a complex process that involves several steps. First, a survey of the existing utility infrastructure is conducted to identify the location of the utility lines and services. Then, the new location for the utility lines is identified, and a plan for the relocation is developed. The next step is to obtain the necessary permits and approvals from local authorities and utility companies. The utility companies may need to temporarily disconnect or reroute the utility services to facilitate the relocation.

Once the necessary approvals and permits are obtained, the actual relocation process begins. This may involve digging trenches, laying new pipes or cables, and connecting the new infrastructure to the existing network. Once the new infrastructure is in place, the old infrastructure is decommissioned and removed.

Overall, utility relocation is an essential process in construction projects that require the movement of utility infrastructure. It helps to ensure the safety and efficiency of the utility services, and it is usually conducted in close collaboration with utility companies and local authorities to ensure minimal disruption to the community.

### 3.6 Budget and Financing:

The widening of a major arterial road is a costly project and requires adequate funding to ensure its success. Though the budget was never the constraint for BMC for infrastructure development, but the effectiveness of the project is also to be studied while planning a project with huge cost. Asia's biggest corporation / organisation, BMC prepares an average budget of Rs. 35,000/- Crores consists of Infrastructure development, Education and Health Development, et-cetra.

### 3.7 Project Scheduling:

Planned and effective scheduling is necessary to ensure the project is completed on time and within budget. Occurrence of various utilities during the execution of the work may hamper your work progress. Therefore, BMC at the planning stage itself approaches the utility departments and takes their remarks and plans for upcoming projects through them. In this way we curtail the time period of the project and try to minimise the cost incurred in execution by avoiding repeat of work.

## 4. DESIGNING AND PLANNING OF WIDENING WORK

The Management of various factors in the widening of major arterial roads like the Jogeshwari-Vikhroli Link Road (JVLR) in Mumbai, involves several steps and components. Here is a general system flow for managing these factors:

### 4.1 Planning and Design:

In this stage, the scope of the project is defined and the necessary plans and designs are created. This includes conducting surveys, analyzing traffic flow, determining the alignment of the road, and considering environmental and cultural impact. The Planning and Design stage is a crucial phase in any construction project, particularly in the case of roads, highways, and transportation infrastructure. During this stage, the project's scope is defined, and the necessary plans and designs are created.

The data collected during the surveys is then analyzed to determine the optimal alignment of the road or transportation infrastructure.

Once the alignment is determined, the next step is to create the necessary plans and designs. This involves creating detailed drawings and specifications that outline the project's scope.

During the design phase, the consultants will work closely with the BMC to ensure that the design meets the project's objectives, budget, and timeline.

In summary, the Planning and Design stage is critical to the success of any road or transportation infrastructure project. In this case of JVLR, M/s Tandon Urban Solutions Pvt. Ltd. Having versatile experience of Urban Planning and other services all over in India has been appointed as design consultant, as they are the one of the empanelled consultant of BMC.

#### 4.2 Approvals and Permits:

The necessary approvals and permits are obtained from government agencies like the Ministry of Environment and Forests, and other relevant departments, if required

#### 4.3 Environmental and Social Impact Assessment:

An assessment of the environmental and social impacts of the project is carried out and the necessary mitigation measures are identified. An Environmental and Social Impact Assessment (ESIA) is a critical process that is conducted to assess the potential environmental and social impacts of a proposed project. This assessment is usually carried out as a part of the project's planning and design stage and is required by law in many countries.

#### 4.4 Public Consultation:

Public consultation is a critical process that is initiated during the planning and design stages of any major construction project. The aim of public consultation is to engage with the local community, gather feedback and input, and address their concerns about the project. This process helps to build trust and transparency with the community, and ensures that the project meets their needs and aspirations.

The consultation process is a two-way street, and the project team must communicate how they have incorporated feedback from the community into the project's design and implementation. The process requires close collaboration between the project team and the community and is essential for the long-term success and sustainability of the project.

#### 4.5 Construction and Execution:

The actual construction and execution of the project involves right from the procurement of materials and equipment, the mobilization of personnel and resources, and the execution of the project according to the plans and designs till the final product (constructed road).

Construction and execution also involve managing risks associated with the project. Regular monitoring and reporting are essential during the construction and execution stage.

In summary, the construction and execution stage are critical to the success of any construction / widening of road project. Close monitoring and risk management are essential to ensure that the project is completed on time, within budget, and to the required quality and safety standards.

#### 4.6 Maintenance and Upkeep:

Stretch wise completions and releasing for public use is in progress. However, as per the Tender Conditions, appointed contractor M/s Speco Infrastructure will maintain the road for next 10 years as a part of the project (Free of Cost).

## 5. CHALLENGES AND RISKS INVOLVED IN WIDENING WORK

There are many challenges and improvements observed in Widening of JVLR which needs to be managed and get the work done effectively and completed in given time. For managing such challenges, we have designed such work plans which are beneficial for completing this project with minimum errors.

#### 5.1 Risks:

- What if encroachment on both the sides of the Road is not removed?
- What if permission for removal of trees is not obtained, in time?
- What if shifting / lowering of Water Mains laid along JVLR are not attended, in time?
- What if acquiring of setbacks from private layouts / societies is not obtained, in time?
- What if shifting / lowering of other agency utilities of service providers like Airtel, Vodafone, HT / LT electric cables from ADANI Electricity, TATA Power, MTNL, etc were not removed / shifted, in time?

## 6. CONCLUSION

Concluding the study of ongoing project of widening and improvement of JVLR, a major arterial road of Mumbai city, author experienced that by working closely with local public, communities, businesses around, users of road, other pedestrians need and other stakeholders of the project to minimize the impacts of the project, achievement of goal of widening with smooth execution of the project can be gained. Risks involved, probability of occurring hurdles and implementation of effective management can reduce the delay in any project and Yes, it is possible to widen the in-use and Major Arterial Road of a big city like Mumbai. It is always possible to achieve the goals of improved traffic flow and improved quality of life for residents and commuters in Metro Cities, like Mumbai, just by effective management of the hurdles occurred and by the way they are settled promptly.

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