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Necessities of Constructing an Expressway Corridor in the Srinagar City to Overcome the Issues of the Transportation System

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ABSTRACT:
The present system of transportation in Srinagar City of Jammu & Kashmir in India is highly inadequate, with the area covered by transportation being only 3% against 10%–1 4% in metro cities. The length of roads above 12 m in width is approximately 233 km, but the conditions of these roads are below desirable standards. Traffic flows at different locations are observed beyond the capacity of the existing roads, thereby reducing the level of service on the road and causing congestion.

All major government, commercial and transport terminals are located in the central business district (CBD). The CBD extends from Dal Gate to Batamaloo and passes through Jehangir Chowk. Airport Road meets this road perpendicularly at Jehangir Chowk. The location of the High Court and the Secretariat on the west of Jehangir Chowk makes this intersection a very important hub. Apart from smaller bus stands scattered all over the city, the main bus terminal and several taxi and auto stands are located in the CDB. Several schools and colleges are also located in the CBD and its vicinity. Even though the roads have been widened to their maximum possible extent (i.e., from four to six lanes at different locations), the number of conflicting usages and the high vehicular and pedestrian volumes still result in considerable congestion and delays to pedestrians and vehicles. The high levels of traffic and the lack of suitable pedestrian space result in congested pedestrian walkways and overflow onto the road.

Keywords: Central Business District (CBD), congestion, traffic, transportation

INTRODUCTION:

The Economic Reconstruction Agency (ERA) has undertaken the Jammu and Kashmir Urban Sector Development Investment Program (JKUSDIP), financed by the Asian Development Bank (ADB) through a multi tranche financing facility (MFF). The total estimated cost of the program is about $485 million, out of which $300 million will be financed by ADB.

The primary objective of JKUSDIP is to promote economic development in the State of Jammu and Kashmir (J & K) through expansion of basic services such as water supply, sewerage, sanitation, drainage, solid waste management, urban transport, and other municipal functions in Jammu, Srinagar, and other important urban centers of the state.

The program is to be implemented in 4–7 tranches over a period of 8 years. Each tranche constitutes a separate loan. Tranche I (project 1) of JKUSDIP (Loan 2331–IND) is under implementation. One of the subprojects identified under tranche 2 (project 2) of JKUSDIP is the construction of an elevated expressway corridor (flyover) from Jehangir Chowk to Rambagh-Natipora to improve the urban transportation system.

The major objectives of constructing the expressway corridor are: (i) decongestion of traffic on the road junctions from Jehangir Chowk to Rambagh-Natipora; (ii) quick access to the airport from the city center; and

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(iii) improved long-term traffic management in Srinagar City. The proposed flyover is expected to have the following benefits: (i) immediate positive impact on the area by significantly reducing the number of vehicles passing through the area by approximately 58% (as per traffic surveys) from the current number of 11,686 vehicles per 12- hour period; (ii) reduction of traffic, which is expected to reduce the number of accidents and potential conflicts that occur within the area, thus saving human life as well as the economy of the region; (iii) reduced traffic also resulting in land gains, which can be utilized to enhance the pedestrian space and increase pedestrian amenity; (iv) improvement and increase in size of pedestrian sidewalks and footpaths, as well as general urban design elements to create an environment that is conducive to pedestrian activity; (v) reduced traffic congestion, conflicts, and land gains resulting in a safer and more efficient circulation of traffic; and (vi) future development and events need will have better access to and from the city.

Proposed Subproject:
The subproject area is located on the southern part of Srinagar City. The proposed flyover is expected to have the following benefits:

i. immediate positive impact on the area by significantly reducing the number of vehicles passing through the area by approximately 58% (as per traffic surveys), from the current number of 11,686 vehicles per 12-hour period;
ii. reduction of traffic, which is expected to reduce the number of accidents and potential conflicts that occur with the area, thus saving human life as well as the economy of the region;
iii. reduced traffic also resulting in land gains which can be utilized to enhance the pedestrian space and increase pedestrian amenity;
iv. improvement and increase in size of pedestrian sidewalks and footpaths, as well as general urban design elements to create an environment that is conducive to pedestrian activity;

The proposed flyover is planned to start from Jehangir Chowk and pass along Airport Road, passing landmark places like Iqra Masjid, Dr. Sir Mohammad Iqbal Park, Bakshi Stadium (none of these is an ASI or state-protected site/monument), and Rambagh Bridge over the flood channel, terminating at Rambagh after Natipora Y-junction on Airport Road. The proposed flyover will pass through congested commercial establishments on both sides of the road, which include shops, malls, industrial establishments, schools, religious places, parks, offices (government and private), and residences.

The construction of the expressway (flyover) will use a pile/well foundation, framed substructure and precast, and pre stressed superstructure. It will have footpaths and crash barriers on both sides, and entry and exit ramps at appropriate intersections as well as both ends to integrate the merging and diverging traffic. Approach ramps are of reinforced earth (RE).

The construction is designed with a pile/well foundation, with a view to minimize the collateral damage to the existing buildings/bridge on both sides of the flyover, and a framed substructure to minimize use of concrete, as well as to minimize the seismic effect. Precast, pre stressed superstructure will help in taking the construction activity to uninhabited areas, thus providing relief to inhabited areas on both sides of the flyover, while also reducing concrete quantity. For road safety, footpaths, crash barriers, and an adequate number of signposts have been provided as per codal provisions. Entry and exit ramps at appropriate locations help in integration of traffic along the sides and also at the ends of the flyover. Reinforced earth approach ramps are eco friendly, and give substantial land gain advantages.

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Design feature	Description
Total length	2,410 m
Carriageway width	7.5 m
Vertical clearance	5.5 m
Loading	Two lanes of IRC Class – A or single lane of 70R[2]
Seismic zone	Zone V
Cross-sections	Two carriageways with two lanes configuration
Span arrangement	One continuous module of four spans, with a length of 84.2 m
Superstructure	Precast prestressed concrete girders with monolithic reinforced cement concrete (RCC) deck slab over the girders for general sections, and for individual carriageways and ramp sections, prestressed concrete deck slabs have been proposed.
Foundation	Pile foundation of 1 m-diameter piles
Life span of subproject	50 years

Table 1 DESIGN FEATURES OF THE SUB PROJECT

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Description of the Environment:

Physical Resources

i. Administrative Boundaries

The subproject sites are located in the built-up area of Srinagar City. Srinagar, the summer capital of Jammu and Kashmir, is situated at an average altitude of 1,600 m above mean sea level (MSL) and located in the heart of the oval-shaped valley of Kashmir. Srinagar City is situated around 34 05' N latitude and 74 56' E longitudes. It is well connected by air and road.

ii. Topography, Drainage, and Natural Hazards

Topography: The subproject area stretches from southwest to northwest in the city of Srinagar. Physiographic ally, it constitutes a part of the flood plain of Jhelum, which is largely flat and featureless with sub recent alluvial deposits. The topography shows gentle terrain slope from east to west. General elevation of the subproject corridor varies between 1,585 m and 1, 590 m above msl.

Drainage: Srinagar City is located on flatter terrain. Therefore, the drainage system of the city relies on a lift system through drainage pumping stations, which lift storm water from wet wells and discharge it into the adjoining water bodies. Majority of the drains are covered with RCC slabs, with manholes provided at suitable intervals to facilitate maintenance of the drainage system. The city has about 65 drainage pumping stations.
The project is located in a seismically active part of Kashmir Valley. Keeping in view the maximum credible earthquake magnitudes in the region, the site area is classified as Zone V as per the Bureau of Indian standards (BIS) Code of Practice (IS-1893-2002). These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault, based on the current understanding of regional geotectonic**.**

Floods: The subproject area is located in the central business district, Srinagar, where floods are not a regular phenomenon, owing to its topography and the presence of natural drainage in the form of the river Jehlum and numerous water channels. The construction of the Doodganga flood spill channel in 1904 by the then Maharaja relieved the strain on the Jhelum in the city of Srinagar, thereby making the city safer from floods. This flood channel takes two-thirds of the total flow from the river, thus helping the Jhelum regulate its water level while passing through the city, and thus saving it from flooding.

Methodology:

Pile driving methods (displacement piles)

i. **Drop hammers**: A hammer with approximately the weight of the pile is raised a suitable height in a guide and released to strike the pile head. This is a simple form of hammer used in conjunction with light frames and test piling, where it may be uneconomical to bring a steam boiler or compressor on to a site to drive very limited number of piles.

ii. **Pile driving by vibrating**: Vibratory hammers are usually electrically powered or hydraulically powered and consists of contra-rotating eccentric masses within a housing attaching to the pile head. The amplitude of the vibration is sufficient to break down the skin friction on the sides of the pile. Vibratory methods are best suited to sandy or gravelly soil.

iii. **Jetting**: To aid the penetration of piles in to sand or sandy gravel, water jetting may be employed. However, the method has very limited effect in firm to stiff clays or any soil containing much coarse gravel, cobbles, or boulders.

Boring methods (non-displacement piles)

i. **Continuous Flight Auger (CFA)**: Equipment comprises of a mobile base carrier fitted with a hollow-stemmed flight auger which is rotated into the ground to required depth of pilling. To form the pile, concrete is placed through the flight auger as it is withdrawn from the ground. The auger is fitted with protective cap on the outlet at the base of the central tube and is rotated into the ground by the top mounted rotary hydraulic motor which runs on a carrier attached to the mast. On reaching the required depth, highly workable concrete is pumped through the hollow stem of the auger, and under the pressure of the concrete the protective cap is detached. While rotating the auger in the same direction as during the boring stage, the spoil is expelled vertically as the auger is withdrawn and the pile is formed by filling with concrete. In this process, it is important that rotation of the auger and flow of concrete is matched that collapse of sides of the hole above concrete on lower flight of auger is avoided. This may lead to voids in filled with soil in concrete.

ii. **Under reaming**: A special feature of auger bored piles which is sometimes used to exploit the bearing capacity of suitable strata by providing an enlarged base. The soil has to be capable of standing open unsupported to employ this technique. In its closed position, the under reaming tool is fitted inside the straight section of a pile shaft, and then expanded at the bottom of the pile to produce the under ream shown in fig. 3.Normally, after installation and before concrete is casted, a man carrying cage is lowered and the shaft and the under ream of the pile is inspected.

Experimental Investigation:

Load Test on Piles

Pile load test are usually carried out that one or some of the following reasons are fulfilled:

I. To obtain back-figured soil data that will enable other piles to be designed.
II. To confirm pile lengths and hence contract costs before the client is committed to overall job costs.
III. To counter-check results from geotechnical and pile driving formulae
IV. To determine the load-settlement behavior of a pile, especially in the region of the anticipated working load that the data can be used in prediction of group settlement.
V. To verify structural soundness of the pile.

Test loading

i. **CRP (constant rate of penetration):** In the CRP (constant rate of penetration) method, test pile is jacked into the soil, the load being adjusted to give constant rate of downward movement to the pile. This is maintained until point of failure is reached.

Failure of the pile is defined in to two ways that as the load at which the pile continues to move downward without further increase in load, or according to the BS, the load which the penetration reaches a value equal to one-tenth of the diameter of the pile at the base.

ii. **MLT, the maintained increment load test:** The maintained increment load test, kentledge or adjacent tension piles or soil anchors are used to provide a reaction for the test load applied by jacking(s) placed over the pile being tested. The load is increased in definite steps, and is sustained at each level of loading until all settlements has either stop or does not exceed a specified amount of in a certain given period of time.

Conclusions and Recommendations:

The project has assessed the environmental impacts of all elements of the infrastructure proposed under the elevated expressway corridor subproject in Srinagar City. Potential negative impacts were identified in relation to pre- construction and operation of the improved infrastructure, but no environmental impacts were identified as being due to either subproject design or location. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the designs for the infrastructure. This means that the number of impacts and their significance have already been reduced by amending the design.

The subproject's grievance redress mechanism will provide the citizens with a platform for redress of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

The EMP will guide the environmentally sound construction of the subproject and ensure efficient lines of communication among the DSC (engineer), contractors, PIU, and PMU/PSC. The EMP will (i) ensure that the activities are undertaken in a responsible and non-detrimental manner; (ii) provide a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance onsite; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with.

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A copy of the EMP will be kept onsite during the construction period at all times. The EMP will be made binding on all contractors operating on the site, and will be included in the contractual clauses. Noncompliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

REFERENCES

1. International Symposium on “INNOVATIVE WORLD OF CONCRETE” Vol-II, IWC-98 proceedings
2. High Performance Concrete: Properties and Applications - by **SP SHAH & SHAHMAD**
3. Proceedings of Seventh International Conference on Fly Ash, Silica Fume, Slag and Natural Pozzolans in Concrete - Vol-II Editor **- V. M. Malhotra**
4. The Indian Concrete Journal, Vol.80, June 2006.
5. Magazine of Concrete Research, Vol.58, June 2006.
6. Concrete technology by **M. S. Shetty**
7. Field Measurements, Inc. (2000), Letter to R.A. Francoeur Marine, Inc., Regarding Pile Load Test Program, Compression Pile Load Test Results, Pile I90EB South, CA/T C08A1, September 19, 2000
8. **Rausche, M.F**.; **Goble, G.G**.; and **Likins, G.** (1985), "Dynamic Determination of Pile Capacity." Journal of Geotechnical Engineering, 111(3), 367-383.

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