INTERCHANGE
ASPECTS OF RAIL TERMINAL IFBC MUMBAI INDIA

by

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ABSTRACT

Since the opening of the world’s first railway line the Stockton and Darlington Railway in 1825, railways and rail stations have always maintained an important role in public life. Railways and rail stations have always played the role of being catalysts for urban development and growth. Many stations worldwide are magnificent architectural creations. Railways and rail stations have played an important role in the growth and development of Mumbai city. This thesis tries to investigate the issue of how railways and rail station can still be a catalyst for urban growth and renewal. The historic Victoria Terminus, being the birthplace of Indian Railways, has been selected for this case study. A photographic study conducted for the whole day at various exit points of Victoria Terminus reveals a unique pattern of activities in and outside the Victoria Terminus. These activities are so unique that they can be identified as the train culture of Mumbai. These activities and their relation to the rail station are responsible for making the station and its surroundings a very vibrant and thriving urban area. A proposed elevated railway line passing through the International Business and Finance Center and its proposed rail station in the complex, has been selected as a project site for the thesis. Architectural design and design process of rail station is used to study the
potentials of the rail station for being a catalyst of urban growth and development. An urban diagram will show how a railway station can influence urban renewal and growth, and how it can help development of surrounding areas. Two stations, Victoria Terminus with its historical significance, and Interchange, the contemporary and newly proposed elevated railway station, are compared and seen as equally important. Victoria Terminus still standing tall as a vibrant urban center and Interchange station represents the new and contemporary face of Mumbai, preserving the train culture of Mumbai and benefiting from the urban issues of Victoria Terminus will ensure a thriving urban center and catalyst for urban growth.
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CHAPTER: 1

INTRODUCTION

Railway stations of the nineteenth century have often been called the cathedrals of the Industrial Revolution. As public spaces they drew crowds of all social strata. The great rail terminals with their impressive head buildings and glass covered sheds inspired many. They established themselves at the very center of commerce, communication and culture.

The Mumbai suburban railway system and its many stations have evolved through history. Railways have played an important role in shaping present day Mumbai, carrying 6.1 million people daily. The railways are the lifeline of Mumbai city.

We are once again in an era that celebrates rail travel. Many exciting stations have been created worldwide and these new buildings have expanded missions bringing transport interchange under one roof. Some stations celebrate the technological potential of high-speed rail and others have ambitious goals of serving as catalysts of urban renewal and development.

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The city of Mumbai, presents one more opportunity to revisit and question the process of “How railways and railway stations can be catalysts of urban growth and development?”

An architect and architectural design can play a sensitive role in areas of social issues such as, the relationship between train stations and people, people and hawkers. The architect can also influence public domain issues like education, public health and awareness, as well as democratic issues concerning politics, cities, public spaces and their planning.

With the help of case studies done around the historical Victoria Terminus and with a unique insight of train culture of Mumbai city, this thesis will explore a process through the architectural design development of a railway station situated in the International Finance & Business Center (IFBC) at Bandra Kurla Complex in suburban Mumbai. This design aims to be more sensitive to social issues, as well as celebrate railway station design and preserve the culture of train travel in Mumbai. At the same time, the intent is to find new opportunities to weave in existing cultural patterns as well as to be more contemporary in design. In addition, by creating a new public realm and urban center, the train station will generate enough energy to be a catalyst for further urban development.
The thesis will enable, as documented through urban diagrams, future growth possibilities in and around the railway station.

An architectural design of a fully developed train station has been presented in this thesis.

I call this station, **INTERCHANGE**, as it is an interchange between transportation networks, between new and old, between people, between past and present, between various social strata, between old and new culture; it presents new opportunities for public spaces, business and technology which will arise daily, once completed during 2017 AD.
1.1 Brief History of Mumbai

Mumbai (Bombay) city is situated on the west coast of India. It is the commercial capital of India having cosmopolitan culture and history and a population of approximately 16 million people.
Mumbai, a vernacular name derived from “Mumba Devi” Goddess of Mumbai, was earlier seven islands, which were later reclaimed to form present day Mumbai city.

Figure 1.2: Map of Seven Islands of Mumbai, 1873
Source:  http://www.mumbainet.coFigure 1m/template1.php?CID=15&SCID=5

Mumbai city, surrounded by the Arabian Sea, has always been a natural harbour. It also formed part of the kingdom of great Emperors like Ashoka. After his death Mumbai was ruled by many Hindu rulers until 1343 and thereafter the Mohammedans ruled until the Portuguese came in 1534. The Portuguese named Mumbai as “Bom Baia” meaning Good Bay. One Hundred and Twenty years later, in 1662, these islands were given to the English King, Charles-II as a marriage gift. Later in 1668, these islands were leased to the East India
Company for 10 Pounds. Much of the reclamation of the seven islands was finished during the British rule. Mumbai has always enjoyed a cosmopolitan culture including the Parsi community, who came to India approximately 900 years before from Iran and were mainly ship builders and the Gujarati community who came as traders. Mumbai’s history has seen some important constructions such as the bridge linking the two main islands Bandra and Mahim that was completed in 1845 with a generous donation of Rs.157,000 from a rich Parsi lady (Jeejibhoy) and with a condition of not charging toll to residents. The opening of the Suez Canal in 1869 brought Mumbai closer to Western countries. The population of Bombay also grew from 13,726 in 1780 to 644,405 in 1872 to almost 977,822 in 1906.  

Today Mumbai, a megapolis with a growing population of 16 million, enjoys the status of being the commercial and financial center of India.

Figure 1.3: Colaba Causeway, 1835
Source: Anchoring A City Line, page no.34

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Figure 1.4: Outer Churchgate entrance to the fort before its demolition in 1860 and future site of Churchgate Terminus
Source: Anchoring A City Line, page no. 18

Figure 1.5: Fort, 1870
Source: Fort Walks, page no. 26-27
1.2: History of Railways in Mumbai

Prime motivating factor for introducing railways in Mumbai was the facilitation of cotton exports a trade that was already flourishing in Mumbai. Due to failure of American cotton crop in 1846, it created an urgent need among textile manufacturers of Manchester.
and Glasgow, England to seek alternate markets and they promptly procured cotton from India. These manufacturers collectively requested the British Government to expedite the authorization of funds for the development of railways in India, mainly to facilitate movement of cotton to important ports, from where this commodity could be exported; thus establishing a link from the hinterlands to the already developed ports for movement of cotton was crucial. This move gave Mumbai its first railways in India, before Calcutta, which was then the capital city of India.  

The idea of developing railways in India was debated for many years before it actually arrived in 1853. The British Government was not able to gauge the financial returns of their huge investments in developing infrastructure like railways in India. Although, increasing demand for alternative supplies of cotton from India, finally favored the development of railways in India. Furthermore, other cities in the world like London and Paris were already in the process of implementing better urban and regional transport infrastructure. Thus the East India Company in India was also under pressure to develop railways in India. Mumbai was a prime case, where faster connections and reliable modes of transport were becoming increasingly necessary to move goods to and from the port and to also disperse and organize its growing population, both in areas in the proximity of the old Fort settlement and also in the developing northwestern suburbs of Mumbai.

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5 Ibid. 9-10.
All these factors resulted in the birth of Great Indian Peninsular (GIP) railway, which was inaugurated on April 16, 1853 and stretched 21 miles long from Bori Bunder or Victoria.
Terminus, (now known as Chhatrapati Shivaji Terminus (CST)) to Thane. GIP railway is now known as Central Railway.

The inaugural run of a train had 14 boggies, 3 locomotives named Sindh, Sultan and Sahib, and with 400 guests left Bombay at 15:35 hours. This was India's first rail run. The train left Bori Bunder for Thane with a 21 gun salute and the Governor's band to see it off. The journey took an hour and fifteen minutes. 1864 saw the start of another railway line, Bombay Baroda and Central India railway (BB&CI), now Western Railway, which stretched from Churchgate station to Utran Station to the North.

Figure 1.8: Victoria Terminus, 1882
Source: Anchoring A City Line, page no.50-51

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The first inaugural run of the GIP railway was welcomed with great joy and awe. Most of the people could not believe that a locomotive could be pulled by steam engine without any horses or bullocks. The train was also called “Aag gadi” (Steam Engine) The day the railway opened from Mumbai to Thane was declared a public holiday and natives lined
up along the 21 mile long stretch of tracks to witness this event. They offered coconuts to this unearthly power of the steam engine and were ready to worship it too.

During the five years of the American Civil War, which began in 1861, cotton exports from southern ports of America to England were stopped and textile manufacturers of England were forced to buy cotton grown in India from Mumbai markets. It was estimated that approximately £81 million came to Mumbai during these five years. During this economic boom Mumbai saw major expansion, such as the GIP railway. This reinforced the movement of cotton from hinterland to Mumbai city and also drew a clear map for the growth of Mumbai city. Immense benefits and profits from GIP railway lines became evident to British authorities prompting them to introduce new railway lines of another railway company, Bombay Baroda and Central India (BB&CI) railway.7

Figure 1.10: Churchgate Station, 1876
Source: Anchoring A City Line, page no. 38-39

BB&CI railway line from Utran to Grant Road in Mumbai was opened on November 28, 1864. Though the inaugural run was commenced from Grant Road station to Utran, it was clear that Grant Road Terminus was not appropriate for the large population living further south. Thus the line was extended to Churchgate station and later to Colaba in 1873. The Bombay Central Terminus was constructed in 1930 for long distance trains and Church gate became the terminus for the BB&CI railway (Now Western Railway). The areas between GIP railway Line and BB&CI railway Line saw further development and it was practically impossible to have the same termini building for both railway lines. This saw development of two individual termini buildings for GIP and BB&CI railway lines and thus paved the way for future growth of Mumbai city to its present form. Work on the Terminus at the Bori Bunder and GIP Railway offices commenced in 1878, and the station was opened for traffic on January 1, 1882, later on Jubilee Day, June 20, 1887, it was formally named as Victoria Terminus.\(^8\)

After the first railway line was opened, development of railway in India followed the course of least resistance. The increase in mileage was as per the chart below.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MILEAGE OPENED</th>
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<td>20</td>
</tr>
<tr>
<td>1860</td>
<td>838</td>
</tr>
<tr>
<td>1870</td>
<td>4791</td>
</tr>
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<td>1930</td>
<td>41724</td>
</tr>
<tr>
<td>1937</td>
<td>43128</td>
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</tbody>
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*Table 1.1 Mileage of tracks opened yearly*

*Source: www.irfca.org/articles/vikas/stamps.html*

1.3: Railways shaping Mumbai city

Both GIP railway (Central Railway) and BB&CI railway (Western Railway) have played an important role in shaping today’s Mumbai city. The railways running as the lifeline of Mumbai city grew mainly in a North-South direction due to the geographical conditions of Mumbai. The numerous local stations on both railway lines contributed to the growth of the city, making it more linear city. The railways have stretched Mumbai from North to South and it also forms a dividing line, dividing the city into East and West. The eastern part of Mumbai, due to the port and various mills, saw more labor class population, and the western part of Mumbai, due to its proximity to the Arabian Sea, saw more upper class residential developments.

The first suburban steam train was introduced on November 1, 1865 from Grant Road station to Bassein Road, with trains provided in either direction. In 1866, the Grant Road line was extended to Back Bay in the south, mainly due to the Back Bay Reclamation scheme, to carry basalt stone from Santa Cruz for Back Bay Reclamation Company, which started work on Back Bay Reclamation scheme during the commercial boom of 1861 which gained force due to American Civil War. When the American Civil war ended, the company went into liquidation and the Government took over the project of reclamation, but completed only part of the scheme, which facilitated train tracks from Churchgate to Colaba.9

Further development of Mahim Station and Bandra station took shape in 1865 and 1867. Bandra station, named after “Bunder” (Harbour Port), still stands with its magnificent Porebunder stone and steel truss roof.10

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10 Ibid. 29-31.
The linking of Bandra station and Mahim station played an important role in the development of Mumbai city, as Bandra station lies across the Mithi River, hence forming a unique divide between suburb and city.

Figure 1.11: Bandra Station, 1930
Source: Anchoring A City Line, page no. 103

Figure 1.12: Dadar Station, 1930
Source: Anchoring A City Line, page no. 104
1.4: Present Day Railways in Mumbai

Today in Mumbai, the railway is still one of the main forms of mass transportation, carrying almost 6.1 million people daily\textsuperscript{11}. Railways and rail stations attract various activities, and are urban centers of commercial activities. Important rail terminals of Mumbai are in the business districts, attracting large number of people, with important Government offices, institutions, cinema halls, market places, different commercial activities, street vendors, etc. They are vibrant commercial and social urban centers.

Figure 1.14: Present route map of Suburban Railways, Mumbai
Today suburban trains in Mumbai carry almost 35% over crush capacity in peak hours, with trains running every three minutes. Many projects are underway to improve the infrastructure of railways. Many of these projects are funded by the World Bank along with financing from Railways and the Government of India.

Many projects involving the redesign of rail stations and the exploitation of the potential of real estate of rail stations are underway.

Figure 1.15: Churchgate station during peak hours
Source: Anchoring A City Line, page no. 118
This thesis is also part of the ongoing development of the railways under Mumbai Urban Transport Project (MUTP) funded by the World Bank. Government and railway authorities in Mumbai have realized the importance of mass transportation and are continuously in the process of development and improvement of railway infrastructure for the city of Mumbai.

Today the railways in Mumbai have become an easy target for terrorists' attacks, as it was evident by the blasts on July 11, 2006.
V S Naipaul described the typical Indian railway terminal in 1964:

...the shouts of stunted, sweating porters, over-eager in red turbans and tunics, the cries of tea vendors with their urns and clay cups (the cups to be broken after use), the cries of pan-vendors and the vendors of fried curried messes (the leaf-plates, pinned together by thin dried twigs, to be thrown afterwards on to the platform or on the tracks, where the pariah dogs, fierce only with their fellows, will fight over them...), the whole scene – yet animated only in the foreground, for these stations are heavens as well as social centers, and the smooth cool concrete platforms are places where the futile can sleep the whole scene ceilinged by low fans which spin in empty frenzy. 12

Railways, rail stations and train journeys form a very unique culture in Mumbai. This culture is seen repeatedly at different suburban stations with different programs. They are predominantly transport interchanges with many different activities woven in and around them, forming an urban network with the train stations as their nuclei, which cater to the needs of the population around that particular station. This network of activities repeats itself

at different scales at various stations, depending on the size and type of the population in that particular suburb.

The case study of the historical Victoria Terminus will give an insight into this unique train culture of Mumbai.
CHAPTER: 2

CASE STUDY: VICTORIA TERMINUS

Victoria Terminus (VT), now also known as Chhatrapati Shivaji Terminus (CST) and World Heritage site, stands tall after more than 100 years. Situated in the southern part of Mumbai, it is in close proximity to various business districts like Nariman Point, Flora Fountain, and Ballard Estate.

Victoria Terminus, a starting point of the GIP railways was designed by architect F.W. Stevens and was inaugurated on January 1, 1882. Later on Jubilee Day, 1887, it was formally named Victoria Terminus to commemorate Queen Victoria. Victoria Terminus has the typical layout of end stations with a train shed on one side and the head or administrative buildings on one side. Well-proportioned, ornamental arches, spires and domes, give it the dignity like a cathedral. The crowning point of the whole building is the central dome carrying, at its apex, a colossal 16'6" high figure of a lady pointing a flaming torch upwards in her right-hand, and a spoked wheel low in the left-hand, symbolizing 'Progress'. This dome has been reported to be the first octagonal ribbed masonry dome that was adapted to an Italian Gothic style building. The construction of the interior of the dome is entirely open, and exposed to view from the ground floor, and the dome-well which carries the main staircase, has been artistically decorated. On the facade are also large bass-reliefs of the 10 Directors of the old Great Indian Peninsula railway company, two of whom were Sir Jamsedji Jijibhoy and Sir Jagannath Shankarseth, well known philanthropists. Old records show that most of the bass-relief and some of the statuary was executed by Indian craftsmen, and students of the Bombay School of Arts, from models supplied and designed by an Indian teacher. Only the statues denoting 'Progress', 'Engineering & Science', 'Shipping &
"Commerce' and 'Agriculture' were sculpted in England out of Indian Purbunder sandstone. The entrance gates to Victoria Terminus carry two main gate columns, which are crowned; one with a Lion (representing the United Kingdom) and the other with a Tiger (representing India), both sculpted in Purbunder sandstone. The Victoria Terminus station building is considered as one of the finest station building of the world, and architecturally one of the most splendid and magnificent design.

Its neo-Gothic style architecture in stone with gargoyles designed in the shape of animals, with a magnificent hall structure and a large train shed designed in steel trusses that span across the train platforms. The train shed is designed with large steel trusses that are repeated, like symmetrical railway tracks and wooden sleepers spanning between two tracks. The columns carrying these steel trusses are carved in iron with beautifully designed capital on its top.

Figure 2.1: Victoria Terminus (VT) & Municipal Corporation of Greater Mumbai building.

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\[\text{13 Vikas Singh, Indian Railways in Postal Stamps, } \text{"100 years of Victoria Terminus, Bombay,} \]
VT Station still stands tall in Mumbai's urban environment. It reminds one of the history of the Colonial Era in India. It is surrounded by important Government buildings like the Municipal Corporation of Greater Mumbai (MCGM) building, General Post Office (GPO), Times of India Press building, Sir JJ College of Arts and Architecture, and market places like Crawford Market. VT being a terminus, and close to business districts, attracts a large number of people and is witness to various activities in and around it. It is a start and end point of daily travel. Victoria Terminus, being in close proximity with and surrounded by business districts, also attracts various small scale commercial activities, like photocopy centers, Desk Top Publishing and Typing shops, stationery shops, food courts, telephone booths, etc. These activities are concentrated close to the entry and exit points of the station. The exit gates close to the station also attract various small vendors, hawkers, and nomads, selling various items on streets and pavements close to the station. The hawkers and small vendors are given licenses by Municipal authorities to operate their business at fixed locations, whereas nomads are people who do not have license to operate their business and hence they do not have fixed location to operate their business from and hence their business set up is also carefully planned so as they can wind up fast and easily in case if authorities plan to raid them. These hawkers and nomads line up along the path of people's movement, forming a street market. The station, its exit gates, and its surrounding form a perfect location to find their customers. Mumbai city has unique love and hate relationship with small vendors and hawkers. But they also form an important part of Mumbai's economy.

Two entry and exit points each of Victoria Terminus were studied for the whole day to see and understand this unique pattern of activities. The photographic study was conducted...
at the two exit gates of Victoria Terminus, throughout the day. Each photograph is represented with a graphic time line, representing the different times of the day.

Figure 2.2: Land use of Victoria Terminus (VT) & surrounding area with exit gates & movement of people

- Movement of People
- Victoria Terminus
- Govt. Buildings/Education Institutes
- Cinema Halls/Entertainment
- Exit Gates for VT
- Green spaces
- Times of India Press
- Markets
Figure 2.3: Figure showing movement of people and activities around exit gates.

2.1: Exit Gate 2

This exit gate is unique in its program and layout. It is located across from the Victoria Terminus via pedestrian subway and close to the Municipal Corporation building. The exit has commercial enterprises, which are associated with activities of Government authorities, like Data Processing shops, typists, photocopying shops, stamp paper vendors, notaries, etc. There is also a secondary level of commercial activities, which supports these primary programs at exit gate 2. These are public phone booths, tobacco vendors, food stalls, fruit vendors, newspaper vendors, etc. This exit was studied photographically throughout the day, to see the vibrancy of activities and how they contribute to making Victoria Terminus a vibrant urban center in Mumbai.
Figure 2.4: Early morning outside VT, permanent stalls seen in the background.

Figure 2.5: Tea stall nomad seen with his stall, early morning only.
Figure 2.6: Fruit vendor sets up his stall, later part of the morning

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.

Figure 2.7: Nomads setting up their stalls

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.
Figure 2.8: Mobile van selling books

Figure 2.9: VT seen in backdrop with vendors lining up against the pavement
Figure 2.10: Fresh fruit juice stall nomad seen on a busy afternoon

Figure 2.11: Evening rush hour, newspaper stall remains open throughout the day
Figure 2.12: Fresh fruit and tobacco stall vendor remains open till late evening

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.

Figure 2.13: Late evening, nomads selling cooked food

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.
2.2: Exit Gate 1

This exit has a different program, which is milder in its activities. It is an entry and exit to the main hall building of Victoria Terminus; a porch with arches defines this exit. Victoria Terminus is now designated a World Heritage site and it is protected from encroachment by hawkers, never the less the nomads and other small vendors line up along the pavement just ahead of the Victoria Terminus administration building. They sell all kinds of items ranging from hair clips to shirts, leather belts to bags, pencil cells to digital cameras, from books to compact discs, from music cassettes to DVDs, you can buy anything and everything from these nomads. They line up along the main route of the movement of people to and from VT station to various offices and work places. The nomads are under constant fear of Municipal authorities raiding their stalls and seizing their goods. These activities are changing and more dynamic in nature than at exit gate 2, as there is a constant change in terms of the items sold at different parts of the day. Few hawkers and vendors are permanent and though they are seen daily they remain more dynamic in terms of their business and the items they sell. These items can vary daily and are sometimes dependent on the various festivals and seasons in Mumbai. These vendors sell items, that are priced reasonably, and they are also open to bargaining. This entire schedule of activities is more like a street market with a commercial center in its background. It is this repetitive organised chaos, which takes place in and around the railway station that constitutes the unique train culture of Mumbai.
Fig. 2.14: Figure showing movement of people along with activities like nomads, street vendors, hawkers, etc. lined up outside the exit gate of VT.
Figure 2.15: Early morning at VT, fisher women boarding train with fish

Figure 2.16: Streets and pavements outside VT are cleaned daily early in the morning
Figure 2.17: Pavement outside VT administration building

Figure 2.18: Vendors and hawkers occupy pavements outside VT
Figure 2.19: Hawkers and vendors line up along pavements outside VT

Figure 2.20: Morning rush hour, pavement outside the VT administration building
Figure 2.21: Afternoon hours, street vendors and hawkers seen busy with their business outside VT.

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.

Figure 2.22: Afternoon hours, street vendors and hawkers seen busy with their business outside VT.

A.M. 7:00  9:00  11:00  1:00  3:00  5:00  7:00 P.M.
Figure 2.23: Evening rush hour keeps nomads and hawkers busy with their business outside VT

Figure 2.24: Late evening outside VT shows hawkers and street vendors
2.3: Case Study Analysis

Mumbai city is a growing and vibrant metropolis. It is a city where everyone comes with a dream to achieve and the city embraces them willingly. Since 1991, liberalisation has helped in attracting more investments and more job creation in Mumbai. India today is one of the largest growing markets of the world. Mumbai is also witnessing tremendous boom in exports, diamond market, IT and outsourcing of services. This commercial and economic boom is seeing new job creations, new opportunities for all classes of the population. The middle class population of Mumbai is experiencing major growth in its income and has more disposable income available; there is a huge economic growth of consumer goods mainly driven by the large middle and upper-middle class population of the city. With interest rates falling, Mumbai is also seeing tremendous growth in its real estate market. The general level of confidence in people is high and very upbeat. The economy of India is growing at the rate 9.2% per year and its future is bright. To satisfy these new opportunities and needs, Mumbai is seeing a large influx of people from rural and different parts of India. Mumbai, historically being a trade and commercial hub, has always created equal opportunities for all segments and classes of its population. Mumbai, with a population of close to 12 million also has a large semi-skilled and unskilled labor class population. They form a huge percentage of Mumbai’s population. They earn their livelihood through blue-collar jobs like hawkers, street vendors, cab drivers, mechanics, construction workers, and other labor-intensive jobs. But this segment of the population also plays an important role in Mumbai’s


economy. As it is difficult for the Government to provide jobs for everyone, these people are more enterprising in nature and create jobs for themselves. Railway stations become a very important location for their business as street vendors, hawkers, cab drivers, etc. As railway stations and their surroundings attract large numbers of people daily traveling to and fro, potential customers are easily available for these hawkers and nomads. Hawkers and vendors will occupy pavements and locations close to railway stations and pedestrian route leading to rail stations. This leads to the formation of market places close to rail stations. This is seen repeatedly in Mumbai, as the majority of the population travel by suburban trains. Stations become more a nuclei of all activities. This is a train culture of Mumbai, where the railway station is the key element of growth and activities. Rail stations are nodes of development in Mumbai, since people like to reside close to rail stations and shopping, transport interchanges and street markets located close to the station. These relations of different activities form vibrant urban centers, which are repeated at different stations at different scales. One can see the similarity as well as distinctive differences in the activities surrounding the stations, depending on whether stations are in a business districts or in a residential suburbs, whether expansive and affluent residential western suburbs or in eastern suburbs with a more labour class population. Railways and rail stations link all these growth centers and run through the whole city, like a river of growth. Victoria Terminus is a perfect example for studying this train culture in Mumbai, as it is an architectural masterpiece standing tall for more than 100 years now and how well it embraces the changing times of Mumbai and developments and activities occurring daily in and around it. These activities envelop themselves around Victoria Terminus. This is seen at mostly all rail stations in Mumbai, making each station like a small development node each connected to the other with the help of the railway; and
rail stations become like town centers or public squares of a very vibrant nature. Making this city more alive and urban.

Figure 2.25: Matrix showing different activities of Mumbai’s train culture
**Chapter: 3**

**HYPOTHESIS**

“How can railways and rail stations be catalysts for urban growth and development?”

‘In the second half of this century, airports have assumed the monumental character once unique to the great railroad stations. In turn, the new stations created by the rail revival of the 1980s and 90s have an expressive quality which has nothing to do with hiding the train away; they act as a necessary celebration of the survival and revival of the rail travel.’

We are once again in an era of celebrating rail travel. Many new and exciting railway stations have been created around the world. These new buildings have expanded the mission of being a transport interchange under one roof. Some stations celebrate the technological potential of high-speed rail travel while others are more ambitious to serve as catalyst for urban growth and renewal.

A proposed elevated railway line passing through new International Finance and Business Center (IFBC), Mumbai presents us once again with an opportunity to revisit and question the process of “How can railways and rail stations be catalyst for urban growth and development?”

An architect and architectural design can play an important role in railway station design. The architect can also influence public domain issues of education, public health and awareness, as well as democratic issues concerning politics, cities, public spaces and their planning.

With the help of case studies done around the historical Victoria Terminus and with a unique insight of Mumbai City’s train culture, this thesis will explore process through the

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architectural design development of a rail station of a proposed elevated railway line, situated in the new International Finance & Business Center (IFBC).

This design aims to be more sensitive to social issues, as well as celebrate railway station design, and preserve the culture of train travel in Mumbai. At the same time, the intent is to find new opportunities to weave in existing cultural patterns as well as to be more contemporary in design. In addition, by creating a new public realm and urban center, it aims to enable the train station to generate enough energy to be a catalyst of future urban development.

The thesis will demonstrate, through urban diagrams, future growth possibilities and will present an architectural design of a train station.

I call this Station, INTERCHANGE, as it is an interchange between transportation networks, between new and old, between people, between past and present, between various social strata, between old and new culture, presenting new opportunities for public spaces, business and technology which will arise daily, once completed in 2017 AD.

3.1: Proposed Elevated Railway through International Finance and Business Center.

Mumbai initially was planned as a trade and commercial hub by foreigners. Being a natural harbour, Mumbai was developed to help export of cotton from Indian hinterlands to the British textile mills. It was never planned or oriented around a sacred place or public squares. It was developed mainly to maintain trade links between India and Britain; hence it also saw development of Railways first although Calcutta was capital of India then. In effect Mumbai grew more looking towards the ocean to the west and its quay was its focal point. Today Mumbai still lives up to its expectations of being the bustling financial and
commercial capital of India. A city of approximately 12 million people, Mumbai is a host to economical and cultural activities and is shaping itself to be a megapolis.

Today in the era of globalization, Mumbai is developing itself to be a more service oriented destination, be it in Information Technology, the finance sector or outsourcing. Due to globalization and the immense powerhouse of skilled labor available, Mumbai is seeing a tremendous boom in the outsourcing sector, both of semi skilled and high skilled services. This has resulted in the creation of more jobs. Mumbai is also home to Bollywood, Hindi film industry with large film studios, employing a large percentage of people. Mumbai also hosts two of India’s largest stock markets and acts as a gateway for foreign direct investments. The economy of Mumbai is growing and the general mood in Mumbai is very upbeat about its future. Government and authorities are also trying to keep pace with the growth of Mumbai. Hence, the Government has planned an ambitious project of International Finance and Business Center (IFBC) to further the growth of Mumbai, which will help identify Mumbai as a dominant financial and commercial center of Asia.
To promote international finance and business, a new International Finance and Business Center (IFBC) is conceptualized in the heart of Mumbai's suburb, Bandra-Kurla Complex. The complex is designed by world-renowned architect B.V. Doshi. IFBC is planned on 130 hectares of land in Bandra-Kurla complex. IFBC positions itself in the center of two suburbs, Bandra station on Western railway and Kurla station on Central railway, with "Mithi River" running in its backdrop.

IFBC an ongoing development is an important landmark and the most coveted business address of Mumbai, with the majority of national and multinational banks and
foreign institutions having their corporate head quarters situated there. A modern glass and steel façade buildings symbolizing economical powers and strength, shows the changing face of Mumbai in global and Asian perspective. IFBC portrays itself as contemporary and new with a mix of land uses like international schools, the Consulate General of United States of America, residential, commercial, institutional, entertainment, health etc. Being a business center, IFBC also attracts many foreign business travelers; various trade exhibitions and trade fairs. A five star hotel and international convention center is planned in the heart of IFBC complex, surrounded by a large diamond bourse and other commercial and institutional developments. The complex also has large open grounds in which various exhibitions and trade fairs are held. Open spaces and green spaces are planned to enhance the entire experience of the complex with Mithi River running along the IFBC.

Mumbai a city of dreams and ambitions, is where an individual becomes a part of it’s unique style, culture, and cosmopolitan society and calls himself ‘Mumbaikar’ or ‘Bombayite’. The city with its port attracts a majority of India’s exports and imports. The city whose history is as magnificent as the city itself. IFBC, once when complete, will have unique programs like finance, commerce, retail, entertainment, education, health, residential, etc. IFBC will generate more then 200,000 new jobs. It will be an important destination in the era of globalisation.
An elevated railway line is proposed through the complex connecting two important suburban railway stations Bandra station on the Western Railway and Kurla station on Central Railway. This proposed elevated railway corridor is one of the important aspect in the planning of IFBC.

This proposed railway line is one of the ongoing projects of suburban railways of Mumbai Urban Transportation (MUTP), which is funded by the World Bank. This proposed elevated railway line is an important East-West link in Mumbai and will run along the Mithi River and IFBC in its background. This will be a new urban site in Mumbai as due to its unique position. It is part of a larger plan of Mumbai Metro Railway and has tremendous potential for growth.
This thesis identifies one of the stations of this elevated railway line at IFBC and will try to answer the thesis question through the language of Architectural Design.

3.1.1: International Finance and Business Center (IFBC)

Figure 3.3: Existing office buildings in IFBC

Figure 3.4: (Top right) Diamond Bourse & (bottom left) Citibank Building, IFBC
Figure 3.5: Two faces of IFBC, one showing new bank building (top right) & other with slums (bottom left)

Figure 3.6: Office buildings (top right) & (bottom left) bank building, IFBC
CHAPTER: 4

PROJECT SITE AND SITE ANALYSIS

Figure 4.1: Site plan of IFBC showing land use

1. Mithi River
2. Commercial/Institutional
3. Green spaces/Parking
4. Convention Center & Hotel
5. Residential
6. Encroachments
7. Exhibition grounds
8. Utilities and services
9. Project site

Parking
4.1: Land Use Pattern as suggested in “Urban Design Guidelines” IFBC, Bandra-Kurla Complex, Mumbai, Report Stage-III, by the Vastu-Shilpa Foundation, for Studies and Research in Environmental Design, Ahmedabad, India

4.1.1 Finance and Institutional

International Finance and Business Center (IFBC), is conceptualized on 130 hectares of land with a major percentage of land to be used for commercial and institutional development. Almost 42% of the total land is planned for commercial and business activities. A Floor Space Index of 2.0 facilitates various developments on different sizes of plots within the complex. Retail, commercial and support services are also planned within the complex to give an interesting street character to the complex.

4.1.2 Open Spaces

A large percentage of land is reserved for open spaces, to an extent of 23.12 hectares. Open spaces requirements are calculated based on per capita requirement of 0.9sqm per working population and another 3sqm per residential population. In addition to this, a certain amount of open space will be generated within the individual plots through proper organization and planning of the built spaces. Four different types of open spaces are planned, with large level open spaces in the form of grounds will form a major chunk of open space. Linear greens, which will crisscross through the complex and join major nodes and open spaces will act essentially as pedestrian pathways. A third level of typology will include opens spaces planned for schools within the residential areas; these open spaces will be accessible to the general public in the evening hours. The fourth type of open space will be envisaged within the cluster of plots.
4.1.3 Parking

Personalised modes of transportation will account for a large number of work trips made to and within the complex. The complex will also generate a large percentage of visitor car parking. Parking for both complex users and visitors is planned with underground and multistoried car parks.

4.1.4 Utilities and Services

Utilities and services are important activities and their location becomes crucial. A large utility complex, which will house many of the utilities like fire station, police station, post office, ambulance bay, bus bays, taxi stand etc. has been proposed. Other utilities proposed will include telephone exchange, petrol pumps, electric sub stations, etc. These are conceptualized as smaller individual plots.

4.1.5 Residential

Residential development will cater mainly to the needs of individuals and companies who are the primary users of the complex. Residential developments are planned at crucial locations within the complex so as to have their own identity in the whole master plan. Residential developments will have a Floor Space Index of 1.5. These complexes will also generate open spaces within individual plots. This mixed land use will help IFBC become a more vibrant urban center.

4.1.6 Convention Center and Hotel Complex

A large International Convention Center and a Hotel complex are planned within the heart of IFBC. This is mainly to cater to the needs and demands of many international business travelers who plan their business trips to IFBC in particular and Mumbai in general.
4.1.7 Exhibition Grounds

IFBC will also convene various national and international exhibitions and trade fairs. The large open grounds to the north side of the complex are designated to hold these fairs and exhibitions throughout the year. These open grounds also play an important role in offering large open spaces for the complex.

4.1.8 Other land uses

A state-of-the-art hospital complex is planned in IFBC along with a cultural center and other retail and commercial activities like shopping, cinema halls, etc. Multistoried car parks are conceptualised with shopping, entertainment, restaurants, etc.

4.1.9 River Front

One of the best features in the development of IFBC is that it is surrounded by a water body of Mithi River, that runs along the south side of the complex. Most of its edges would be skirted by a perimeter road, which will have wide footpaths serving as a promenade. Separate jogging tracks will be provided along the riverfront, and pathways will lead to the water and provide viewpoints. Existing mangroves will be preserved along the waterfront. The master plan also keeps in mind the effects of this new complex on the existing infrastructure like roads and railways. IFBC positions itself between two important railway stations Bandra station and Kurla station, situated 3kms and 1.5kms away respectively from the proposed complex.
4.1.10 Rail Network

An elevated railway is proposed which will run along the south part of the site and along the river. A rail station is proposed within the IFBC complex to meet the demand of public transportation for the complex. This elevated railway line will be connected to Bandra station on the western railway and Kurla station on central railway and is an important and much awaited East-West link for the suburban railways. IFBC rail station would account for almost 83,000 work trips that will be terminated at the proposed station. A secondary level of public transportation in the form of buses and taxis will be provided at the station to cater to the peak hour traffic of passengers.
Figure 4.4: Diagram showing existing and proposed bus and taxi route with reference to proposed railway station in IFBC

1 River
3 Greens spaces
2 Existing commercial development
9 Proposed project site

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4.1.11 Road Network

IFBC is planned with two major wide roads of 30m running within the complex and forming a loop. The primary movement of vehicles will be on these major roads and will then be distributed to the internal roads. The proposed IFBC is located about 7kms from the international airport and is currently connected via 45m wide Bandra-Kurla road. IFBC is also linked regionally by means of Western-Express highway and the Eastern-Express highway.
IFBC is also well connected with other modes of mass transportation, like the government run BEST buses and taxis, connecting IFBC with both Bandra and Kurla station and also to other various destinations in Mumbai. It is estimated that over 62,985 work trips would be made by bus. This will require 1105 bus-runs to be made to IFBC with at least 461 of them during morning peak hours. Bus routes are planned in such a way that 60% of the buses would run along the 45m wide road and 40% of the buses on 30m wide road. The bus stops and bus routes are planned in such a manner that any place in the IFBC will be within 3-5 minutes walk from the nearest bus stop. A large bus stand is proposed near the proposed elevated railway station.

Figure 4.5: Diagram showing proposed arcades along 30m wide road, IFBC
4.1.12 Arcades

Arcades are the most powerful unifying element of the plan, giving a coherent form and distinctive character to the whole complex. The arcades are conceptualized along the 30m wide road where most of the pedestrian traffic will occur. The arcades also act as a connecting link between buildings within the complex. These arcades will serve as a transition zone between private and public realm. The arcades will also have different program and will provide rhythm by responding to various settings like entrance of the buildings, bus stops, road crossings, telephone kiosks, ATM centers, street furniture, street lighting, notice boards, advertisement hoardings, etc.

The arcades thus become an important architectural and urban planning feature. Designers and architects will have free will to design these arcades along their buildings, but would require maintaining the basic proportions of the arcades. This will create an interesting experience within the whole IFBC complex.

Figure 4.6: Sectional study through 30m wide road, showing arcades
4.2: Project Site

Proposed project site measures 38,500 sqm. The site is mainly flat in topography with the river front to the south side and abutted by a 30m wide road to the north. A proposed elevated railway passes through the site and a railway station is proposed on the site. This site positions itself at the southern tip of the IFBC complex and overlooks the Mithi River and is surrounded by the suburban development of Mumbai city. The riverfront being on the south side also facilitates wind movement.

On the north side of the site and across the 30m wide road is a proposed large green open space and a site for international convention center towards the east of it. The site has a potential to become a link between the large open space to the north of it and the riverfront on the south, creating a unique urban character. A 30m wide road will act as transport interchange for various public transportation systems like buses and taxis. The proposed
elevated railway line and its station will cater to almost 83,000 passengers daily, and hence will be a hub of pedestrian and other activities.

The site is also unique in its character, as this will be the first instance in Mumbai city where an elevated railway is proposed with a station situated on the riverfront. These sites of an elevated railway and the other glass and steel façade buildings show an emerging face of contemporary India in this era of globalization and symbolizing economic development of India.

Figure 4.8: Figure showing Mithi River running along south of IFBC
Figure 4.9: Figure showing sun path and wind direction for proposed site in IFBC

Figure 4.10: Figure showing green spaces of IFBC with reference to proposed project site for rail station and proposed elevated railway
Figure 4.11: Proposed station as new urban center and nuclei of growth
CHAPTER: 5
DESIGN CONCEPT AND PLANNING PROCESS

Today we are in the 60th year of Indian Independence. India today has two faces, one with its glorious history and culture, and the other of a new and contemporary India, which is emerging as a developed nation with its legs firmly grounded and dreams to fly. In this era of globalisation, Mumbai plays an important role in the growth of Indian economy. Mumbai with its rich history and cosmopolitan society and culture, is still the thriving business and commercial capital of India.

Mumbai has come a long way from being a cluster of seven islands with its natural harbour to developing into a city, which the British developed for exporting cotton from hinterlands to Britain, to a textile-manufacturing city to a bustling commercial capital of close to 12 million people. Today Mumbai is a thriving business and commercial capital, with its booming economy and banking system expanding by leaps and bounds. Mumbai today is a host of business and trade activities, with its service sectors like Information Technology and the outsourcing industry booming. It still exports and imports the largest percentage of goods for India. Mumbai is developing to become a megapolis.

Railways in Mumbai have traveled its long glorious history from April 16, 1853 to the present day overcrowded suburban railways. Victoria Terminus, one of the architectural wonder and is still standing tall since its inauguration date of January 1, 1882. Suburban Railways of Mumbai have come a long way, with its first 21-mile long journey in 1853, to numerous stations developing and shaping present day Mumbai. Railways and rail stations along with their unique culture in and around them have been one of the key factors in the development of Mumbai city.
Today we are once again in an era, where rail travel is celebrated. Railway station design today sees a tremendous potential of being an important catalyst of urban development. Beautiful stations are being designed worldwide to serve as transport interchanges and thriving urban centers. Mumbai and its developments, once again presents us with the unique opportunity of a proposed elevated railway line running through the ambitious and contemporary International Business and Finance Center (IFBC).

As an architect, I strongly feel that architectural design can play an important role in shaping urban environment, by being more sensitive to various social and cultural issues governing the city of Mumbai and its society.

The proposed elevated railway line with its rail station in IFBC, is a unique challenge for an architect and urban planners. This railway will also form an important East-West link for the Mumbai suburban railways.

This Thesis design and concept will have to be equally new and contemporary so as to enhance the entire experience of rail travel through IFBC and at the same time be a landmark in the city of Mumbai.

With the help of a case study done in and around Victoria Terminus and by studying the activities around Victoria Terminus, a series of questions and tasks have been highlighted that need to be addressed when planning this new railway station at IFBC. There are several social and economic issues in Mumbai. The large percentage of Mumbai’s 12 million people are living in slums. It is not possible for the Government and the private sector to employ most of the population. People of the Mumbai are enterprising in creating their own livelihood. Although they are a semi-skilled work force, they are equally important in the economic development of the city and in turn the country. These people try to earn their
livelihood as hawkers, street vendors and nomads and line up outside the rail stations and sell items of daily use. They turn to driving taxis and auto rickshaws and form an important link in the mass public transportation system. They also become vendors selling fresh food, fruits, tobacco, etc. Some, who are skilled, prefer to run businesses of data processing, Cyber cafés, photocopying, etc.

An architect and architectural design can be more sensitive to these issues, and plan and organize these activities in more democratic manner and try to give an equal opportunity to all.

The onus is on the architect to make the railway station more contemporary in design, celebrating rail travel as well as creating a thriving urban center that will also be a transport interchange.

Thus, the architect has to answer the very crucial question of “How can railways and rail stations become a catalysts for urban growth and development?”

5.1 Design Concept

Rail stations in Mumbai have a typical growth pattern around them. There are two kinds of rail stations in Mumbai, one being an end terminal and other being a transit station. The proposed station in IFBC is an elevated transit station in a business district, setting itself against a new urban environment of a riverfront. Being situated in the new and contemporary settings of IFBC, this station design should celebrate architectural design. It should be more contemporary and new, it should become a landmark in the city. The new station should be more sensitive to various social and economical issues, and cater to all strata of society. It should be a transport interchange as well as a host to various commercial and cultural
activities. It should also create new opportunities of growth and business. The station should also create public spaces and reinvent existing patterns of activities in and around the station. It should be a public square and new urban center.

5.2 Design Sketches

Figure 5.1: Design sketch showing typical pattern of development around rail stations in Mumbai
Figure 5.2: Sketch showing movement of people from station and existing bus and taxi route in IFBC, Mumbai
Figure 5.3: Sketch showing different activities around proposed station, at IFBC
Figure 5.4: Sketch explaining the design development process for proposed rail station in IFBC
Figure 5.5: Design ideas of large roof for rail station with climatic study for proposed rail station design, in IFBC
Figure 5.6: Design ideas for the development of rail station over the period of 10 years IFBC
Figure 5.7: Design and concept for the proposed elevated rail station in IFBC
5.3 Planning Process

A proposed rail station being an urban planning issue requires that a planning strategy should be devised to implement it. India being a developing nation means that many urban planning decisions are governed by availability of funds. Hence I propose a ten-year development plan for the proposed rail station and its complex.

Figure 5.8: Drawing showing design development process of ten years for the proposed Interchange station

5.3.1: Concept of ten-year development plan for the proposed rail station:

5.3.1.1: Present years

To begin the process of development, site location of the proposed rail station should be earmarked and developed as riverfront garden and open space. Introducing a large roof
will help in signifying the future presence of large public structure and to create a sense of public space. Activities like transport interchange of a bus stop; taxi stands, etc. should be developed. This accessibility will bring the site into the public sphere. Other activities like hawkers and street vendors will start cropping up around the large roof, which should be organized as per the master plan of the entire station when complete.

5.3.1.2: Five years

Two railway tracks of the proposed elevated railway line will bisect the large roof, creating a rail station. Large open spaces around the central hall of the rail station will be formed as a new public realm and real estate below the railway tracks will be planned for various commercial activities. The large roof will become the main hall of the rail station with different activities pertaining to rail travel emerging as per the plan. Hawkers, nomads, and street vendors will be organized, and different transport interchange modes like bus stops and taxi stands will be set up. The riverfront garden will become part of this entire new urban space.

5.3.1.3: Ten Years

Two more tracks will be added to the existing railway station, thus completing the entire master plan for the proposed rail station, Interchange. More opportunities will be created, in the form of real estate below the new tracks. The entire complex of Interchange will emerge as a thriving urban center with new public spaces, creating an interesting urban space within the IFBC complex and along the riverfront. Many existing activities will be reinvented, such as a newspaper stall within the station hall can be developed as a public
library, the railway canteen can become a meeting place, a shoe polish boy can advertise various products, etc. Large open spaces around the station will become public spaces where public awareness campaigns can be conducted. New opportunities will be created; the Interchange will become a hub in the global scene, connected via Internet. A large amphitheater is planned in the public open space to cater to various social and political awareness programs like health, education, science, etc. A glass bubble is planned in the public open space to play host to the needs of different cultural activities.

The riverfront garden will have public promenade, jogging tracks, with part of the river allowed to invade this public space.

Interchange, when complete, will be a thriving urban center, a landmark within the city of Mumbai.
5.4: Architectural Drawings of Interchange Rail Station

Hall/Public Plaza/shops 0.0m level

Figure 5.9: Plan of Interchange rail station at main hall level

Ticket Hall +5.0m

Figure 5.10: Plan of Interchange rail station at ticket hall level
Figure 5.11: Plan of Interchange rail station at train station level

Figure 5.12: Circulation diagram for passengers within Interchange rail station
5.4.1: Brief of Plan

Plan of Interchange rail station at 0.0m level will house mainly the following:

Site: ................................................................. 38,500 Sqm.

Main Hall of station: ............................................ 5,200 Sqm.

Shopping and other commercial activities: ............... 5,600 Sqm.

Open space/courtyard/amphitheatre/space bubble: ........... 8,000 Sqm.

Bus stop/ Taxi Stand: ........................................ 1,600 Sqm.

Hawkers/ Vendors/Nomads zone: ........................ 1,200 Sqm.

Riverfront garden: .......................................... 15,000 Sqm.
Plan at +5.0M level will house mainly the following:

Ticket hall 2nos. and administration office: .................................. 5,600 Sqm.

Public utilities washrooms 8nos.................................................. 400 Sqm.
Plan at +10.0m level will have mainly the following:

Train platforms 4nos, 80m long and 5.5m wide......................1,760 Sqm.

Train tracks:.................................................................4 pair

Escalators/stairs:.........................................................20 nos.

Elevators:.................................................................8 nos.
Figure 5.16: Elevations of Interchange rail station

Figure 5.17: Sections through Interchange rail station
5.5: Architectural Renderings of Interchange Rail Station

Figure 5.18: Architectural rendering showing roof plan of Interchange rail station.

Figure 5.19: Computer rendering showing view of Interchange rail station seen from riverfront
Figure 5.20: Computer rendering of Interchange rail station seen from riverfront Green space

Figure 5.21: Architectural rendering of Interchange rail station in background and public open space with an amphitheatre
Figure 5.22: Computer rendering of Interior view of Interchange rail station’s main hall area

Figure 5.23: Architectural rendering of Interchange rail station and large public open space with street vendors, hawkers, etc.
Figure 5.24: Architectural rendering of Interchange rail station showing large public open space with space bubble, hawkers, street vendors and transportation arcade

Figure 5.25: Computer rendering of Interchange showing rail station's bus stop with informal street market
Figure 5.26: Computer rendering of Interchange rail station seen from riverfront garden

Figure 5.27: Computer rendering showing interior view of Interchange rail station's platforms with trains and people
5.6: Urban Center – Growth opportunities

Interchange, when complete, will cater to a large number of people traveling daily to and from IFBC. It will also be one of the important railway stations in the East West link of Mumbai suburban railways. The thesis on this elevated railway and its station is part of a larger Mumbai Urban Transportation Plan (MUTP) project and will also form part of the Metro Railway project for the city of Mumbai. The proposed elevated railway line has tremendous potential for growth and development. It is planned to connect the new proposed international airport in Navi Mumbai via Kurla station. Hence IFBC will be directly accessible to international business travelers by railways through Interchange station.

Interchange, once complete, will emerge as a thriving urban center with new public spaces and will create an interesting urban space within the IFBC complex and along the riverfront. Many existing activities will be reinvented. Large open space around the station will serve as a public squares. New opportunities will be created; Interchange will gain access to a global scene, connected 24 hours, seven days a week via the Internet. It will be an urban center, that will cater to various social and political awareness programs like health, education, science, etc. The design of a public square with different cultural activities and a riverfront garden with promenade, jogging tracks, etc. will make Interchange a thriving urban center.
Interchange, being a new public domain and urban center, will generate growth opportunities around IFBC. One such growth opportunity is seen across the river, where at present the land is encroached by slum dwellers. To facilitate this growth a simple architectural devise of a pedestrian bridge is proposed across the river, making Interchange and IFBC more accessible. This will generate tremendous growth opportunities in the area across the river. The slum dwellers, who encroach on this area, will be relocated in better social housing and the area across the river will be available for re-development. This re-development will mainly be commercial and residential. The commercial activities will act as supporting services to the Interchange station and IFBC. Large public spaces and a plaza will be developed across the river, creating an interesting urban environment on both sides of the Mithi River. Residential developments will be enhanced by this new and unique urban environment.
center, where a rail station, public spaces, riverfront garden, riverfront plaza, and the river itself will form part of the new urban center program.

Hence Interchange, being a rail station, will generate enough energy to be an urban center for growth and development.

Figure 5.29: Image showing future growth potential across the river in 2050 due to Interchange rail station.
CHAPTER 6

CONCLUSIONS: VICTORIA TERMINUS AND INTERCHANGE TWO FACES OF MUMBAI

Figure 6.1: Collage of different activities in and around Victoria Terminus

The thesis with the help of case study of Victoria Terminus, tries to answer the question of “How can railways and rail station become catalysts for urban growth and development?” The architectural design of Interchange demonstrates the potential of how architect and architectural design to influence urban and social issues and also be contemporary in its design and planning. The urban diagram shows the future possibilities of growth and development and shows how Interchange station can influence the future growth possibilities and become a thriving urban center. The case study of Victoria Terminus helps in the design process of Interchange station at IFBC. Both Victoria Terminus and Interchange being rail stations and transport interchanges and are thriving urban centers.
Victoria Terminus, the product of a British architect and Indian artisans, with the administration building in stone and large steel structure for the train shed, was a iconic building but devoid of open spaces and public spaces, it never the less attracted various activities like government and institutional buildings, education centers, market places, cinema halls, commercial activities and people, street vendors, hawkers, etc. All these activities together form the train travel culture of Mumbai that surrounds Victoria Terminus, creating a thriving urban center.

Victoria Terminus with its grand and imposing design finds the changing trends of train travel in fragments within the terminus itself. The terminus acts as a stage for many social and political issues and programs like health awareness drive, polio drive and other programs organised by NGOs and the Government. The terminus periodically gets redecorated with new advertisement hoardings, neon signs, etc. It also plays host to shoe polish boys, newspaper stalls, and tea stalls, elements that are always part of the train station in Mumbai and it has been the identity of Mumbai over the last 125 years.

It will continue to dominate even in the future and will remain an urban landmark for the changing face of Mumbai.
In comparison, Interchange, an elevated rail station situated in new and contemporary settings of IFBC, represents the emerging face of India’s economy in the era of globalization.

Interchange station is a contemporary architectural design with a conscious effort to create a new public realm and urban space. It has a contemporary design intended to reinvent the rail station in Mumbai by giving it different activities like commercial, retail, transport interchange, public squares, open courtyards, space bubble, an amphitheatre, a river front garden, informal street markets with street vendors, hawkers, nomads, etc. This will help it become a thriving urban center. It is designed to celebrate rail travel and exploit the potential
of high-speed rail travel. It has an expanded mission of being a transport interchange as well as a thriving urban center for growth and development.

Interchange, being a thriving new urban center, will influence future growth and developments. It will act as a catalyst for urban renewal and growth. It represents the new and emerging India, full of confidence and vigor.

It will be a new urban landmark for the thriving megapolis, Mumbai.
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Fig.1.16: Hameer Smart

Fig.1.17: Ms. Krutika Mody. Photographer, Mumbai, 2006.

Fig. 2.1 - 2.25: Hameer Smart

Fig. 3.1 - 3.6: Hameer Smart, MMRDA sale plans

Fig. 4.1 - 4.5: Hameer Smart
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Fig. 4.8 - 4.11: Hameer Smart

Fig. 5.1 - 5.29: Hameer Smart

Fig. 6.1 & 6.2: Hameer Smart