Redevelopment of Habibganj Station

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***Abstract*—Habibganj is the first railway station which is redeveloped with the Public Private Partnership under the redevelopment program of railway station. It is India's First ISO certified private railway station. The total estimated cost of redevelopment of station is 100Cr, and the estimated cost of commercial development is 350Cr. The station is being remodeled on the lines of Germany's Heidelberg station. This paper is focusing on the detail study on redevelopment of Habibganj station.**

***Keywords*—Bansal, Dome like structure, Green Building, Habibganj Station, Steel, Waiting lounge.**

I. INTRODUCTION

InHabibganj railway station (Station code: HBJ) is a railway station in Bhopal City and part of the West Central Railway. It is located in Habibganj, Bhopal. It is India first ISO certified private railway station. This station is opened on 1979. There are five platforms and 6 railway tracks in habibganj station. Daily passanger arrival is 26000 per day.

Fig. 1 Visit InHabibganj Redevelopment Site

A. Redevelopment of habibganj

Habibganj is the first station that is developed through public private partnership. The total estimated cost of station redevelopment is Rs.100 Cr and estimated cost towards commercial development is approx. Rs.350. Cr. The lease for commercial development is for 45 years. The new-look of Habibganj is of a glass dome-like structure and have facilities such as food plazas & cafeterias and a plush waiting lounge. The station is being remodeled on the lines of Germany's Heidelberg station. The station is a green building with LED lighting. The redevelopment includes setting up a glass dome structure at the entrance, luxurious waiting lounges, and LED lighting among other features. To decongest the station for exit the underpass is be made for passengers de-boarding trains along with passenger holding area on the platform. On the western side of the station, there is commercial establishments, a bus terminal, and office lobbies. The renovated Habibganj station is likely to witness average 35,000 to 40,000 passengers everyday. Around 85 pairs of trains will be given a stoppage. Before Covid19 the 54 pairs of trains operated here everyday and movement of about 25,000 people was being recorded. At present, 22 pairs of trains are operating from here. The management of the Habibganj railway station was given to the Bansal Group on March 1, 2017. The station will have parking space for 300 cars, 850 two-wheelers, rickshaws, taxis and buses. Two underpass is made for the arriving passenger and departure of passenger.

Fig. 2 Visit InHabibganj Redevelopment Site

B. Features of Redeveloped of Habibganj Railway Station

The Station have central air space concourse of 84m long and 36m wide with Amenities for waiting and seating. To avoideovercrowding.The railway station is a "green building" with LED lighting.

1. To avoid any chance of **accident**, there is a complete segregation between arriving and departing passengers.
2. Provision of 6 number lifts, 11 number escalators and 3 number travelators have made for easy access to platforms and concourse.
3. Two underpasses of 4m each provided for arriving passenger and departure passenger in all weather conditions.
4. Station have a dedicated pick up and drop off parking facilities.
5. Facility of parking for approx. 300 cars, 850 two,

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wheelers, Rickshaws, Taxi & buses have been made.
6. Station is operated and maintained by the private sector concessionaire under the supervision of IRSDC with an ISO 9001:2000 certification.
7. Station will comply with NFPA (National Fire Protection Act) to mitigate any such fire mishap at a station.
8. In case of emergency, the station premises is planned to be evacuated in 4 minutes and passengers can reach respective designated points of safety in 6 minutes.
9. The wastewater is treated for reuse of water is planed with Zero discharge technology being put into place for sewage systems. Approximately 6800sqm is identified for soft land scaping and 7300sqm for hard land scaping.
10. Adequate provision of rainwater harvesting has been made at identified locations.
11. Phased development approach undertaken to ensure revamping and capacity addition in a modular development way at a later period of time when passenger increase.

C. Redevelopment of habibganj

1. After redevelopment, the station will become a "Green building" with LED lighting
2. The new station is being provided with cafeterias and food plaza.
3. A plush waiting lounge will be developed for passenger.
4. The railway station will have a glass dome like structure that will serve as the entrance to the station.
5. To ensure seamless flow of passengers in all weather condition and better passenger movement, two underpasses of 4m each provide for arriving passage.
6. To ensure cleaner energy, solar energy is provided in station.
7. It have parking of 14037sqm
8. It have 6 numbers of lifts, It also have 11 escalators, It also have 3 no. of travellators.

D. Purpose of redevelopment

The main purpose of redevelopment is to control over crowd. The station have center air space Concourse (HALL) with facility of waiting and seating. It also provide passenger a luxury facilities LIKE SPA, SHOPING complex, luxury hotels & gaming zones.

The main purpose of habibganj is to contribute to the smart city.

For increasing daily average of passenger, To increase the arrival and departure of trains, To Provide passengers a smooth flow, To convert a station in a green building.

E. Challenges in redevelopment

The Construction of bridges near/across running tracks required extra care for:

1. **Working in constrained spaces**(lamination of space): The schedule of dimension (SOD) of the railway track which defines the outer limits of the vehicles moving on the railway tracks is required to be respected at all times and must be checked at different stages of construction.
2. **Securing the tracks:** The railway alignments and necessary to provide firm ground support to trains at all times. Whenever the ground is excavated for construction of foundation or for any other purpose, it required that track stability be ensured.
3. **Respecting the overhead electric lines:** The overhead electric lines (OHE) supplies 25,000 volts power to the trains and it is dangerous for any person within 1.5m of equipment, work in constrained time.

II. MATERIAL AND TCHNOLOGY

A. Use of steel

Steelis use in redevelopment of habibganj station. New habibganj station is molded by steel structure. The station concourse (roof and both side) is made by the steel structure. Also the platform truss is made by the steel.

1. Total steel work done is 2550 MT.
2. Total steeling is 30900sqm.
3. Steel fabricator is done by HMM,AMBALA.
4. Steel & Cooperation by Bansal laboratories & equipment pvt.ltd.Concourse launching by R-KAD.

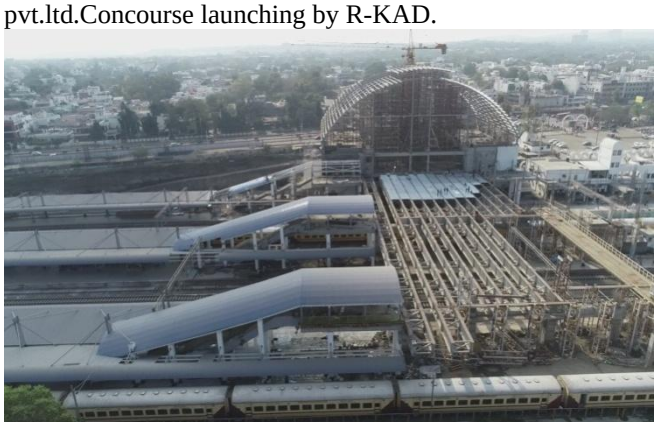

Fig. 3 Steel work in station

Source: IRSDC

B. Concourse

The concourse means to be waiting areas for passengers in the redeveloped station and is 85 m long and 36 m wide, with a connecting bridge of 56 m long which is 15m wide. To provide clearance for trains to move and the Overhead electrical wire, the bottom of girders is 7.4 m above the track. The concourse is provided to avoid overcrowding on platform.

1. Column layout for concourse

Columns are provided only at the platforms locations and hence the total length of concourse is divided into 4spans (36.51m, 36.56m,31.26m, and 30.15m). The steel plate girders were fabricated at HMM workshop in Ambala and transported over road trailers due to which the maximum length of individual piece was 12.5m.The site counnections of girders pieces were with Friction Grip bolts and the composite deck was cast-in-situation.

2. Design of girders for concourse

TYPES OF GIRDER: Welded steel plate girder with composite RCC slab.

MAXIMUM LENGTH OF GIRDER: 47.16M (span 2) [36.56+10.60(cantilever)].

DEPTH OF STEEL GIRDER: 1750 MM.

MAXIMUM LENGTH OF INDIVIDUAL PIECE: 12.5M .

MAXIMUM WEIGHT OF INDIVIDUAL STEEL PIECE: 10.95T.

MAXIMUM WEIGHT OF SINGLE GIRDER IN SAPN LENGTH: 35.42T(Span-2, with cantilever).

C. Technology used in redevelopment

Use of Building Information Modeling (BIM) & Virtual Construction Technology.

By a complex scheme of involving required to transport of heavy girders over running tracks, it was on the stakeholder to clearly understand the complete process.

The team wanted to verify the complete design and resolve any constructability issues. Therefore, Building Model was created for the complete launching structure along with micro simulation show casting the progress of the construction with time, generally known as 4d micro simulation.

The 3D logistics, 4D sequences and instruction diagram were circulated to help all stakeholders to better understand the process flow. This enabled all the agencies could prepare, take all precautions could prepare; take all precautions for smooth working and ensuring safety precautions. All fabrication and drawing for temporary structure were also generated from this BIM Model itself, to eliminate errors during drafting.

III. DISCUSSION

A. Launching Scheme

A temporary launching platform was constructed across the yard parallel to concourse with supports at platforms and temporary supports between tracks wherever space was there. The launching platform height was kept sufficiently high to provide electrical clearance from OHE as per standards. Due to less load, the temporary launching platform could be launched using small 10T capacity Hydra Cranes in traffic shutdowns of small duration.

Launching girders being assembled with both main lines closed – delayed the work by 20 days.

The girder pieces were received in yard near east side station building and a lifting arrangement was provided to place these on the launching platform on dip Lorries. For stability purposes, two girder pieces were assembled before placing on launching girder. The girder pair was pulled across tracks over launching platform using winches.

The sliding platform at the same height are provided, when girder pair arrived at position longitudinal movement is stopped and lateral movement start. After arriving to Position the girder is lowered with the help from winch and jacks. Bringing Girders to proper location and moving along tracks the launching platform.

The Roof structure is prefabricated steel structure, which is being erected simultaneously. This work will commence after all girders are in place and RCC deck casting is complete.

Development Authority (RLDA), a statutory authority under the MoR, has been appointed as master planner. IRSDC has finalized the master plan for the project. In February 2016, Ahluwalia Contracts (India) Ltd, Bansal Construction Works Pvt. Ltd (BCWPL), GMR Group were shortlisted for construction contract. On July 14, 2016, an agreement was signed between IRSDC and BCWPL for the redevelopment and modernization of station. A consortium of BCWPL and Prakash Asphalting and Toll Highways (India) Ltd (PATH India), has formed a special purpose company - Bansal Pathways Habibagnj Pvt. Ltd which has been awarded the contract to build, maintain and operate the station for eight years. On June 9, 2017, construction works on the station commenced with completion scheduled by October 2018. However, the work on commercial facilities is yet to commence.

B. Advertisement Pannel

TABLE I

ADVERTIEMENT PANNEL OF HABIBGANJ STATION

Sno.	Pannel Size	Qty.	Purpose
1	65"	4	For 10 line display board
2	55"	9	For video wall west building
3	85"	4	For air concourse lift block for passenger information
4	43"	18	Advt. & Entertainment
5	32"	9	For Retiring Rooms
6	32"	19	Passanger information

C. Commercial development in habibganj

1. Estimate cost toward commercial development is approx. 350 Cr.
2. Service apartments will be built outside the station along with Hotels, Hospitals, Spas and a Convention center.
3. Bansal One : Specification
4. Majestic ground plus 15 floors tower.
5. Ample parking: 3 basements(with double stacked) and 2upper floors.
6. 4,00,000 sq. ft. of centrally air-conditioned premium retail/ office and dining space.
7. There 8 escalators, 2 passenger and 2 service elevators in retail area.
8. There 8 high speed elevators with 2 separate service elevators for offices.
9. Energy efficient Gold Deemed LED Project.
10. 100 percent 24×7 power backup.
11. Multi layered security with high degree of automation.
12. Latest fire safety measures as per the NBC norms.
13. Concierge desk for offices.
14. Branded retail, coffee shops and restaurants.

D. Key highlights

1. The operation and maintenance of the railway station has been given to Bhopal-based Bansal Group for a period of eight years.
2. The Bansal Group plans to completely overhaul the station and develop four commercial land parcels to make Habibganj a commercial hub with shops, offices

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and hotels, all within three years.

3. The environment-friendly railway station will be powered by solar energy.
4. The station will also have facilities for disabled. It will have lifts, escalators and travelators and underpasses.
5. The station will be redesigned in such a way that the premises, in case of a emergency, can be evacuated in four minutes and passengers can reach designated points of safety in six minutes.

E. Features

Iconic structures with state-of-the-art facilities, Congestion free non-conflicting entry and exit to the station premises, Segregation of arrival/departure of passengers, Integration with other modes of public/private transport systems like a bus, metro, etc., All essential facilities at concourse like catering, small retail, washrooms, cloak rooms, drinking water, ATM, pharmacy, and the internet, User-friendly international signage is understandable by all sections of passengers. Additional facilities like retail, shopping, hospitality, food courts, etc. Medical facilities,Green Buildings, with optimum use of natural ventilation & lighting.

F. Model of habibganj

Fig. 5 Model of habibganj

G. SCOPE

The project involves the redevelopment of a railway station at Habibganj in Bhopal, Madhya Pradesh, India. The US$97 million project includes the following:

Construction of platforms, Construction of a conference hall and two office-cum-shopping complexes, Construction of a business center and a five-star hotel, Construction of retail shops, Construction of a museum and a multi-specialty hospital, Construction of an art gallery, Construction of two underpasses for arriving passengers, Construction of a center for entertainment and cultural activities, Construction of parking facilities for 300 cars, 850 two-wheelers, rickshaws, taxis and buses, Installation of safety and security systems, Installation of six elevators and 11 escalators.

IV. CONCLUSION

A. SUMMARY

The Ministry of Railways (MOR) is undertaking the redevelopment of a railway station in Madhya Pradesh, India. The project involves the construction of a railway station. It includes the construction of platforms, concourse, a conference hall, two office-cum-shopping complexes, a multi-speciality hospital, a five-star hotel, a business center, retail shops, a museum, an art gallery, a restaurant, a center for entertainment and cultural activities, two underpasses for arriving passengers and parking facilities, and the installation of safety and security systems. It will be developed on PPP mode. The commercial facilities in the project will be developed in two phases - two office-cum-shopping complexes in the first phase, and a multi-specialty hospital and a five-star hotel under the second phase. Indian Railway Stations Development Corporation Ltd (IRSDC), a joint venture company of Icon International Ltd (a Government of India undertaking, under MoR) and Rail Land Development Authority (RLDA), a statutory authority under the MoR, has been appointed as master planner. IRSDC has finalized the master plan for the project.

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