SITE VISIT REPORT

DATE OF VISIT: 06TH OF APRIL – 2025

LOCATION: METRO STATION, HULIMAVU STATION POINT

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ACKNOWLEDGMENT

I would like to express my sincere gratitude to **Mr. Akash Tatti Sir**, Executive Engineer, BMRCL, for providing us with the valuable opportunity to visit and learn from an ongoing Metro Rail construction project. This internship experience has enhanced my understanding of the technical and professional aspects involved in large-scale infrastructure development. I am grateful to have been a part of this enriching experience.

Akash Sir guided us throughout the site visit and shared deep insights into the construction processes of the Metro Rail system. His guidance has been instrumental in helping me bridge the gap between theoretical knowledge and practical application. This visit has broadened my perspective on civil engineering practices and will undoubtedly support my growth in future professional endeavours. This site visit also offered me the opportunity to closely observe the intricacies of a large-scale project, allowing me to appreciate the complexities involved in construction and the importance of accurate modelling in a BIM environment. Witnessing these real-world applications has deepened my interest in the field and inspired me to strive for excellence in future projects.

I am also immensely thankful to **Mr. Hari Prasad Sir**, HPS BIM Institute, for organizing this site visit and for consistently guiding us with valuable insights. His efforts to connect site-based learning with BIM applications have been incredibly helpful in understanding how on-ground knowledge can be effectively transferred to a virtual modelling environment. This practical approach to learning has been truly beneficial.

Last but not least, I would like to express my heartfelt gratitude to my parents for their unwavering support, belief in me, and constant encouragement throughout my journey.

DETAILS OF THE CONDUCTED SITE VISIT

The Hulimavu Metro Station is an elevated metro station and is the part of BMRCL's Pink Line Route on the North – South corridor in Bangalore. This metro station serves mainly the Christ University (Bannerghatta Road), and the nearby prime locations such as Royal Meenakshi Mall, Sri Meenakshi Sundareshwara Temple, Hulimavu Police Station and Kothanur Metro Depot, which will handle all the Pink Line train sets for maintenance purposes.

As per the latest updates, this metro station, under the first phase, covering a total distance of 7.5km stretch (Kalena Agrahara - Tavarekere), is expected to be operational around December 2025 (Source: Wikipedia).

Figure 1: *Metro Station, Hulimavu Station Point (Source: Google)*

The Hulimavu Metro Station is an Elevated and Double Tracked Station. At the time of visit, this station was said to be 70% completed with finishing works and testing of the span in due. As mentioned earlier, it is a 7.5 Km stretch track and Hulimavu station is considered to be situated at the lowest elevation point along the metro rail span based on the topography of the location.

The metro surveillance office was the first place to visit. We were introduced to the in-charge safety engineer who briefed us about the safety parameters to follow while in the present in the station premises. Mr. Akash Tatti Sir, who is the Executive Engineer of the Hulimavu Metro Station, project briefly showcased and explained us the structural and architectural drawings and pointed out the minute details to look into while reading drawings of such large scale projects. After a short while, Akash Sir gave us the safety helmets and started guiding us towards the station site.

Our first section of visit was the Ground Floor of the station. At this section, Akash Sir discussed about the construction process of metro station. Details such as number of station presently beginning built along the 7.5 Km stretch (5 stations), the span between each stations (2.5 Km as standard; can be varied based on the condition of the site), types of pillar along the

span of the track, types of foundations being used (the present Hulimavu station has a shallow footing type of foundation due the presence of solid rock surface at a shorter depth), size and number of columns constructed, and materials grades used for casting the structural elements (M50 grade concrete, MSand as aggregates, and Fe 550 TMT bars from Tata Steels). While some of the sections are cast-in situ like the beams, staircase, room structures, and slabs, other elements such as pillars, pile caps, piles, and large columns sections are pre-cast in nearby plants for better quality control, faster erection, and to minimise the traffic disturbance.

Figure 2: *Ground Floor Inspection of the Hulimavu Metro Station (Source: By Author)*

While climbing the staircase which leads to the Concourse Level of the Metro Station, Akash Sir explained on the 'Safety comes First, Quality follows next' mantra being followed during the construction. The staircase was yet to be finished with laying of Granite tiles.

At the Concourse Layer, the workers were seen working over the finishing works such as Mullion Placement, Flooring preparation works, and finishing works at the station counter sections. The staircase was yet to be finished and the lift and escalator systems were yet be powered and tested. While coming from the Ground floor to the concourse level, it was observed that the columns in the mid-section of the station has larger sectional area (curvature along the width and flat sections along the length of the column) in the ground floor which has a trapezoidal concrete beam structure at the top, which is connected to the column with an end cap structure, extends in both the directions across the station to support the concourse level and at the concourse level, the rectangular columns with smaller sectional area extends out from the base column (as visible in the Fig.05). This column has the trapezoidal beam structure extending across the span of the track and ends covering the platform section taking the load from the movement of the rail as well as from the users and effectively transfer to the ground. The water supply to the concourse level is supplied by the underground sump system and the

generated waste water is carried through the pipes which is connected to the nearby Waste water discharge pipes laid by BBMP.

Figure 3: *Explanation on Construction of Concourse Level (Source: By Author)*

Figure 4: *Inspection of Mullion Elements (Source: By Author)*

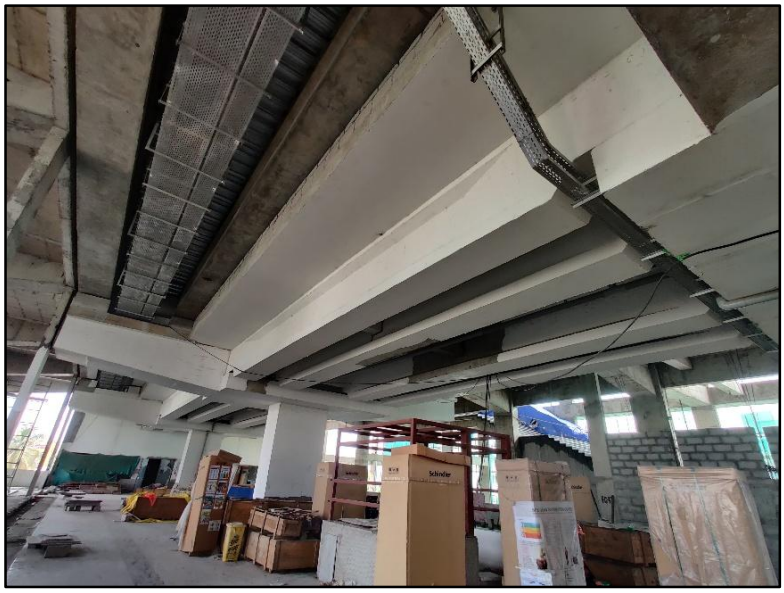


Figure 5: *Concourse Level of Hulimavu Metro Station (Source: By Author)*

We were taken through the Station Counter section, which is usually not allowed to enter by unauthorised. This section consisted of Ticket counters, Data Operation and Storage section, Power supply rooms, and the Inspection & Safety corridor. We started exploring the Ticket counter section. Here, Akash Sir highlighted an interesting fact about this section. While the displays to operate the ticket counter are present the ticket counter section, the power supply and operation power were present in separate rooms with locker facility. Only the cables

connecting the display to the power supply and CPU's are laid under the floor of the ticket counter. This type of design keeps the expensive operational equipment away from direct access in cases of emergencies. Next, we entered the inspection and safety corridor section of the platform. This section is usually not allowed for public users. This section is created for inspection purpose and to act as a safety corridor for quick evacuation during emergency situations. After entering the inspection and safety corridor section, Akash Sir explained us about the process of connecting the station with the tracks. The track sections connecting to the stations are casted in site because of the vary in the length between the station and the consecutive pillars. The base of the track consisted of Sacrificial Stainless Steel form (as highlighted in the Fig.06) which acts as formwork to place the concrete and provides additional support.

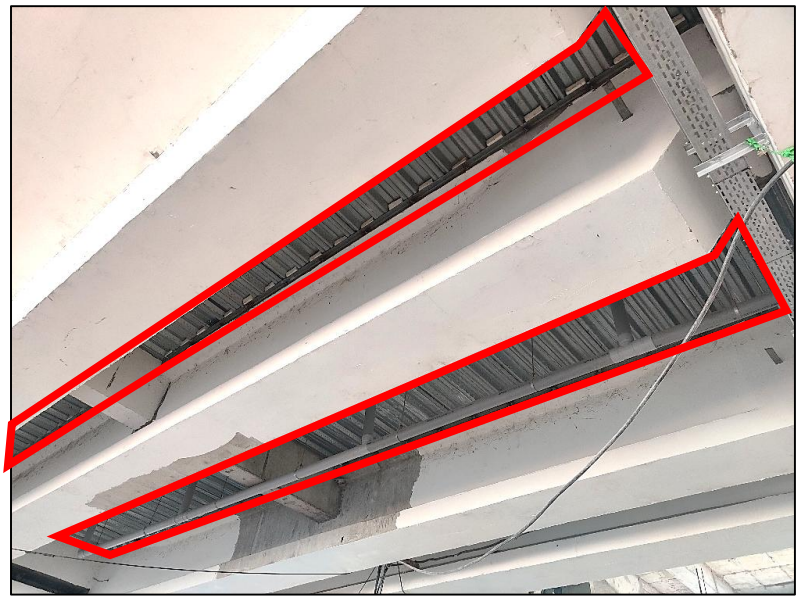


Figure 4: *Stainless Steel Sacrificial Formwork (Source: By Author)*

Figure 5: *Inspection and Explanation on Power Generation and Transformer Equipment (Source: By Author)*

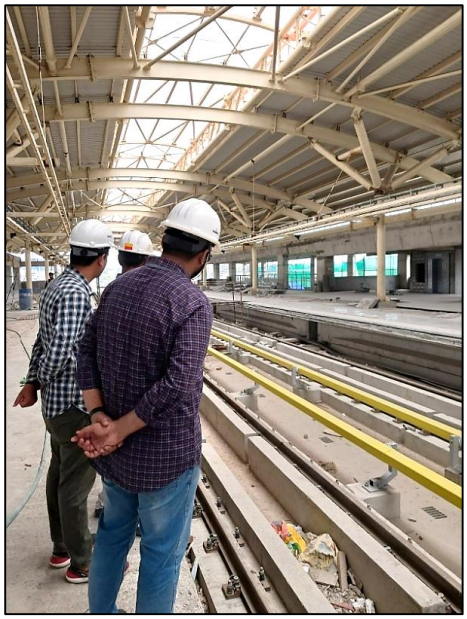
With the completion of visiting the ticket counter section, we visited the Power Generation and Transformer room which was present at the opposite end of the ticket counter. This room consisted of electric power generation and transformation equipment which were imported by Germany. During the visit, Akash Sir pointed-out the difference in the flooring construction process in this room when compared to the other sections to compensate the heavy load and vibration caused by the equipment. It is a Screed Flooring which does not consist of placement of tiles for finishing layer, instead the screed concrete laid and once it is completely dried the surface is polished to provide smooth finish using mechanical concrete polishers. Later, we discussed about the power generators and transformer equipment, about the way the energy is transmitted from the electrical grid (which comes in the form of DC current and it is converted to AC in the station by transformers) to recharge the metro rail and to provide power for the station based operations like lighting, ticket counters, gateways, MEP & HVAC systems, audio systems, safety systems, etc. When we looked over our head, there was a maze of cable trays designed and attached to the ceiling of the room to aiding in proper cable management. Akash sir highlighted the difficulty faced when translating from design to in-field execution of placing the cable trays. At this time, the discussion pointed out the importance of gaining knowledge in other domains in addition to civil engineering as it will help in effectively communicate and conduct the execution work while minimising the chance of clashes.

After discussing about the placement of earthing-lines for the heavy electrical equipment, we exited the room and continued towards the first floor level. On the way, we discussed about the column constructed in the inner sections of the stations, about the connection made between the track portion and the station platform portion with an expansion joint to prevent transition of vibrational loads to the station platform, about the placement of elevators & the related equipment, also about the flooring materials used (i.e., Black granite for station flooring and a special patterned tile to aid visually-disabled users).

The first floor of the metro station represents the platform level for the users to ingress and digress the metro rail. The platform level can be segmented into to three parts: (i). The platform, (ii). The Track, and (iii). The Steel Structure.

(a)

(b). 

(c). 

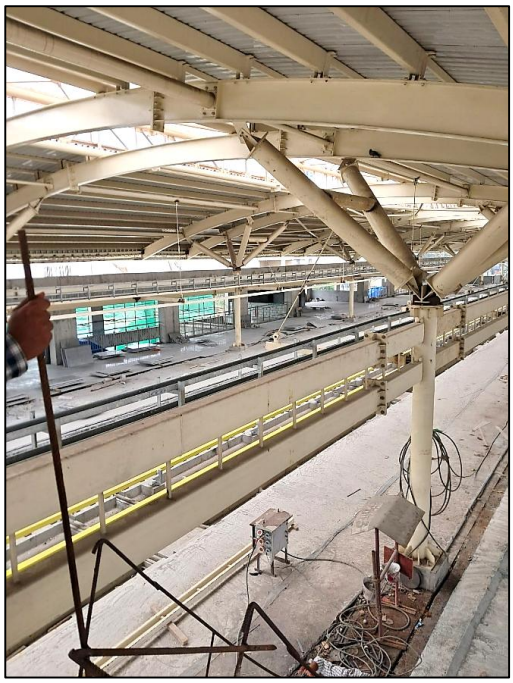
(d). 

Figure 6: *Inspection of First Floor Level of the Hulimavu Metro Station (Source: By Author)*

(i). The Platform is an RCC structure allowing the user to get in and out of the metro rail. This floor is accessible in 3 ways: Staircase, Escalator, and also by lift. The Platform will consist of seats for the users to sit till the rail arrives at the platform. There are tiles with special patterns which are laid along the staircase section, from the lift, as well as along the length of the platform to allow users with visual disability to easily navigate towards the required points in the platform with any harm. The rest of the floor is laid with black granite flooring. At the time of visit, the finishing works were yet to be conducted, thus allowing us to look into finer details of the floor structure. Such as, the point of contact between the track truss structure and the platform is insulated with a thick rubber based insulation material (approximately 15 to 20 mm

thick) to avoid electrocution of people over the platform due to any electrical issues. Also, the expansion joints between the track and the station structure was clearly visible at this level.

(ii). The Track section consisted of two tracks and had a yellow electrical housing line running from one end of the track to the other end. The track also had the drain sections to divert the water towards the rain water harvesting pipe. Akash Sir explained us that the train enters the station it starts charging and when it exits the station, the power supply is disconnected and the train runs over the span through the stored energy in the battery till it reaches to the next station. The batteries of the train are not the conventional ones. These special batteries are made up of different chemical composition when compared to the conventional Li-ion batteries, making it store and release energy at faster rate. Thus, when the train arrives that the station, the arms at the bottom section of the train connects with the yellow electrical power line to draw electricity to charge the batteries and retracts back the arms into the body of the train once the train exits the station. These were some fascinating information gained at this section.

(iii). The Steel Structures were mainly used to create the roof section for the station. It was a roof canopy structure which consisted of chords running from one end to the other end across the track span and every two chords were connected with steel webs to a steel circular column which in-turn was bolted onto the platform using studs. Roof steel battens supported the curved roof sheets. Few large diameter bracing ran through the span of the roof, while few cross bracings were attached at selected sections for torsional rigidity. The mid-section was raised using a truss structure and fibre-based shaded roof sheets are added to allow air and light to enter the station. The overhanging sections consists of the drain system to revert the rainwater towards the rainwater harvesting pipes. The steel columns were connected to each other through two steel rectangular beams which are connected with each other with equally spaced steel circular rods, as visible in the Fig.08. (d). The steel circular columns also support the wire tray, lightings, alert systems, and the fire suppression pipes. All the steel elements were coloured in crème colour to provide airy feel to the station users.

Later, we visited the roof section of the station where the top view of the roof system was visible with the rain water drain gutter attached at the end of the roof. The pipes connecting to the sloped end of the drain gutters are directed towards the rain water harvesting tanks which is located at the basement floor of the station. While present at the roof section, Akash Sir highlighted that BMRCL are planning to add solar panels over the roof surface such that the energy captured from the system will aid in powering certain electrical elements of the station grid. Also, we were able to look at the Fire Suppression system which consisted of Red coloured High pressure Steel pipes. These pipes will carry the fire hydrant fluid which is pumped from the storage tank with high pressure pumps which is located at the ground floor section of the station, to which a series of perpendicular pipes with discharge nozzle at the end are attached for effective spread of the fluid throughout the station in cases of emergency. As these pipes are operated at high pressures, pressure testing will be conducted to inspect the reliability of the pipes as well as the joints and also assess for any leakage in the system. This test will run for 24 – 48 hrs based on the requirement and the pressure in the fire suppressant system will be monitored for evaluation. At present, the testing of the fire suppressant system

was yet to be conducted. With this, our inspection of the super-structure of the Hulimavu Metro Station was completed.

Next, we headed towards the sub-structure section of the station, which was the underground sump section for water storage and rain water harvesting. This section stores the water required for the operation of the toilets in the concourse level. In addition, the rain water collected is also directed towards this section to be filtered and stored. This section is created in the underground to keep the temperature lower such that it aids in running the pumps at optimal temperature and also maintain the temperature of the stored water. And, this marked the end of our site visit to the Hulimavu Metro Station. We headed back to the surveillance office, handed over the safety gears, and exited the site with good collection of knowledge and experience.