



HYDERABAD DIARIES

A CIVIL ENGINEERING EXPERIENCE



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Introduction

This report is a documentation of a visit to Hyderabad by my friends - Jujhar and Anantu and I. What's special about it is that, Dr. V.R. Raju, Professor of Practice at IIT Madras, offered us a chance to this visit to have a discussion on civil engineering and see the large-scale construction ongoing in the HITEC City. Insightful discussions with highly experienced individuals and an exhaustive site-visit to a high-rise township were the major highlights. The report provides detailed information of the experiences by us on 12th and 13th December. Following this, a personal note on the infrastructure of Hyderabad is shared before concluding the report.

Learning about the Civil Engineering from experts on field

12th January

Our group reached Hyderabad Station at 5 am and took a cab to L&T Serene County. The stay was arranged in Daffodils 48, a flat for the employees at VSR Consultants. Following was a brief round of introductions with the Geotechnical Engineers at the consultancy - Er. Chinna Reddy, Er. Jaswant Reddy and, Er. Hritik Singh. After freshening up, we had the opportunity to visit the consultancy and interact with the employees.

Er. Balaji, a senior engineer at the firm, presented the various projects they were working upon and the importance of geotechnical engineering to build a structure. An interesting topic that came up during the discussion was - Metros are being built at a good pace and there is a certain need for the same then why are they struggling to find consistent ridership and profits? This is discussed later in the section for Hyderabad's infrastructure.

The discussion reached its climax when graced by the presence of Prof. V.S. Raju. Professor, as everyone calls him, is one of the best geotechnical engineers in the country if not the best with an experience of over 60 years in the field and holding respectable positions at IIT Madras and IIT Delhi before starting his consultancy in 2003 - VSR Consultants. Shortly, his son, Dr. V.R. Raju joined the discussion. He holds a double PhD, one in structural engineering and the other in geotechnical engineering and has over 30 years' experience in the field. He is currently a senior advisor at Keller and a Professor of Practice at IIT Madras.

The experts in the industry gave their views on the ever-changing nature of the world, rapidly advancing with innovation in technology and where does civil engineering lie amidst all of this. It is a common understanding amongst all people in the civil engineering fraternity that it is a rewarding profession provided one is in for the long run. The first 5 years should be focused on learning after which the person would become an asset a company would love to have.



Figure 1: Discussion with Prof. V.S. Raju at VSR Consultants

Following this was a group discussion comprising experienced engineers, a 1st year civil undergrad - Charan Reddy, his mother - Ms. Bhagya and us on what can be done to spark the interest of the upcoming generations in civil engineering. It was clear that people don't know what is civil engineering. Is it just cement, brick and mortar? No, definitely not, its much beyond that. It encompasses the built environment around us, the homes, schools, transportation networks, water network, dams, bridges, power plants, etc and begs for innovation through technology to cater to the ever-increasing demand that far exceeds the supply of skilled professionals. The idea that came up in the discussion was to create a forum that is the go-to platform for anyone interested in or wants to know about civil engineering.

The platform would try to touch upon the following:

- What is civil engineering and what are its sub-domains
- What are the career possibilities in this field
- Showcase success stories in civil engineering and inspiring structures
- Enlist handpicked internship and job opportunities
- Myth busters about the profession
- FAQs to answer common queries

Post the meetup at VSR Consultants, we headed to Aarvee Associates. A group from Aarvee associates presented what types of projects the firm was handling and the domains they offered their services in. It was interesting to see the firm advocate the use of technology to improve their processes and do things better today than they were doing previously.

Some of the people I have met in the civil engineering industry, they seem to be somewhat against “coding”, “AI”, “Tech” and all the stuff that you actually can't see physically. Hence, it was a really great to hear from Er. Sneha Redla, Director at Aaree Associates, about the company's take on this. She said, “You want to code? Come to Aarvee, let's see how we can use it to build civil engineering solutions.” The mindset of the company

is one thing that I would like to keep with me forever: “We did a task previously in so and so way, if we have to do it again, how can we do it better and faster.” This constant urge for improvement and perfection is what has led to the firm’s success in infrastructure consultancy in India as well as globally from when it started 35 years ago by Er. R.V. Chakrapani, an IIT Madras alumnus.

The team at Aarvee Associates talked about their experience working in the company and the projects they handled. Er. Chakrapani shed some light into how he started the company, his vision, constantly trying out different domains of civil engineering and face challenges by stepping out of the comfort zone.



Figure 2: Presentation by Aarvee Associates

After the informative discussion at Aarvee Associates, Dr. V.R. Raju talked about how his career panned out, why did he choose to do a double PhD, how did he get into Keller and today as a Professor of Practice at IIT Madras. There was a brief discussion on when should one choose to pursue masters: Immediately after bachelor’s or after getting some on-field experience and which would be the better option: USA or Europe.

13th January

The day was planned for a construction site visit of a high rise residential cum commercial township being developed by My Home Group. Before going to the site, there was a meetup with Dr. G.V.R. Raju, ex-MD of AECOM India. He shared his experience working in the industry and what project he handled as a part of AECOM. He too talked about the importance of striving to be in the industry for a long time to get substantially rewarded. The project manager and the QA/QC expert for the project informed that they tried to do precast construction as much as possible and completely adopted BIM for the project. Clash detection and drawings for fabrication and construction were done using BIM. The site had a huge precast plant which was automated to a large extent.

Observations from the site visit:

- Precast manhole drain covers made using ultra-high performance concrete. It made use of steel fibres which eliminated the risk of corrosion. It is cheaper than the current solutions and can lead to large-scale adoption with the right marketing.



Figure 3a: High strength manhole covers



Figure 3b: Fibre reinforced concrete

- Large grouting couplers used to connect two structural elements to enable precast construction. The gap between the rebars and the couplers would be filled with grout from the bottom. Proper grouting is confirmed through its overflow from the hole on the sides.



Figure 4a: Grouting coupler



Figure 4b: Hole to insert rebar

- Rebars were bent and tied as per the drawings in the BIM model and the cage hence made was transferred to the next location for concreting via a hoist. Reinforcement for all structural elements from columns, beams, slabs and even walls had designated location for production and storage.



Figure 5a: Rebar cage making facility

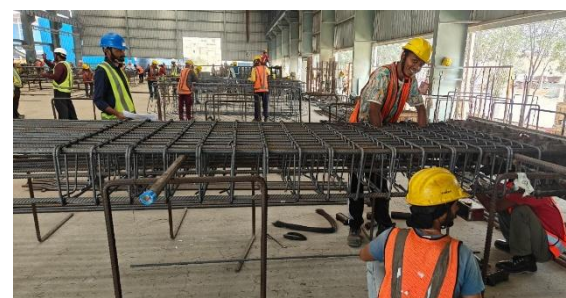


Figure 5b: Rebar cage preparation

- Automatic concrete transport via overhead rails. After production of concrete, it is put into cylindrical tubes that carry it all around the facility for use wherever needed. The factory design and equipment are provided by Elematic, a Finnish Company that excels in precast concrete technology.



Figure 6a: Concrete Production



Figure 6b: Concrete pouring for Hollow Core Slabs

- Huge Precast utility ducts for underground cables being cast and transferred by hoists to the storage.
- Two overhead crane girders, one to carry the reinforcement cage and the other heavier one to carry the RC elements. It was operated remotely and with some effort that could have been automated too.

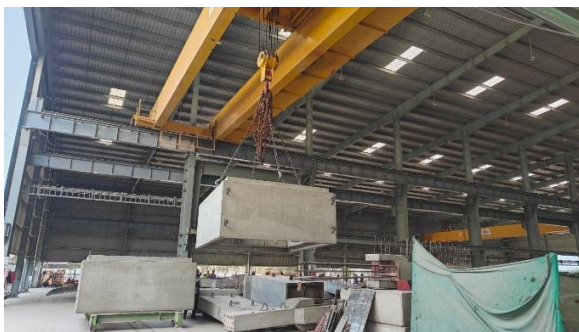


Figure 7a: Hoists lifting the utility ducts



Figure 7b: Precast utility ducts

- Hollow Core Slabs were cast in long continuous tracks. A concrete mix with low water to cement ratio was poured over prestressed cables via an overhead dumper. The dumper was replenished via the cylindrical tubes that transported the produced concrete all around the facility.
- After pouring the concrete onto the track, it is vibrated using a machine and it achieves sufficient strength such that one can stand on just as soon as a location is complete. The continuous slabs are cut into desired lengths using a huge cutter and are maintained such that the prestressing is not lost which would otherwise render the element useless and cause losses in lakhs.



Figure 8: Hollow Core Slabs



Figure 9: Casting and vibration of hollow core slabs



Figure 10: Prestressing strands for casting of slabs



Figure 11: Concrete mix with w/c ratio 0.18



Figure 12: Cutters to cut slabs to desired size



Figure 13: Wastage

- There was a facility to test the strength of the elements and a robust QA/QC procedure was followed to ensure that the structural elements comply with the relevant standards.

After the site tour and the detailed explanation of the facility, Dr. V.R. Raju invited us to his home. He gave a small presentation on career prospects for civil engineers, results from survey of civil engineers with varied experiences and what they had to say about the profession and the high demand for skilled professionals in the industry now more than ever.



Figure 14: My Home Group construction site at Neopolis

Hyderabad's Infrastructure

The discussion shall be incomplete without sharing the personal experience of Hyderabad's beautiful architecture and infrastructure that is growing at an unprecedented rate.

- The huge crowd that came in to see the Charminar daily certainly meant that it has a large cultural and historical significance. Built in the 1500s, it is a popular tourist attraction today which makes it lucrative for informal sellers to setup their shops there. I personally could not understand the frenzy about the structure since it did not seem to me as jaw-dropping as something like the Lotus Temple at Delhi. One of the two things are certain: My inexperience denied me to see the beauty it exuberates or the Government can certainly maintain and commercialize it better to further amplify its grandeur.
- HITEC City or Cyberabad is the IT hub of Hyderabad and lives up to its name. Towering residential complexes, IT parks hosting the biggest names in the world and seamless connectivity with metro and other social amenities like malls, schools, hospitals, etc. We think of best infrastructure in the country, Mumbai and Gurugram comes to our mind but it is not far off that Hyderabad will join them if not surpass considering the crazy amount of development going on in the city.
- The Secretariat at Saifabad, Hyderabad in Telangana is a majestic building featuring beautiful domes, lush landscapes and a 125 ft statue of Dr. B.R. Ambedkar. Designed for 150+ years, it catches one's eyes from a distance and is a must visit if you are in Hyderabad.



Figure 15: The Secretariat, Hyderabad

- With approximately 70 km of Metro rail coverage which is only going to increase in the coming future, Hyderabad Metro connects critical locations in the city catering to the need for an environmentally friendly and efficient transit system. However, its complete adoption faces one serious challenge, that is, consistent profitability and ridership. There are non-fare revenue streams like offering commercial space, leasing out station names, advertisement, etc but it is not enough to cover the large capital costs and annual maintenance of the assets.
- Many users are discouraged from using the metro facility due to the lack of first and last mile connectivity. Users located substantially away from the station find that it takes more time and is often costlier to take a metro than a private vehicle, auto, etc. If the connectivity to metro stations can be improved there shall be certain increase in number of users who were previously discouraged from doing so. The idea should be to ensure the buses and autos complement the metro for transport with data driven decisions for route optimization rather than compete for passengers.
- While perhaps the ring roads of Hyderabad may go unnoticed by the common man, it has been a remarkable engineering decision. The network comprises 8 lane outer ring road with design speed of 120 kmph to divert the trucks away from the residential area and prevent congestion into the city core. An inner ring road helps for faster intra-city travel and radial roads connecting the city centre with the ring roads in all directions boosts the overall connectivity. To say the very least, this planned network of ring roads and radial roads has allowed for controlled traffic flow and economic growth of Hyderabad.

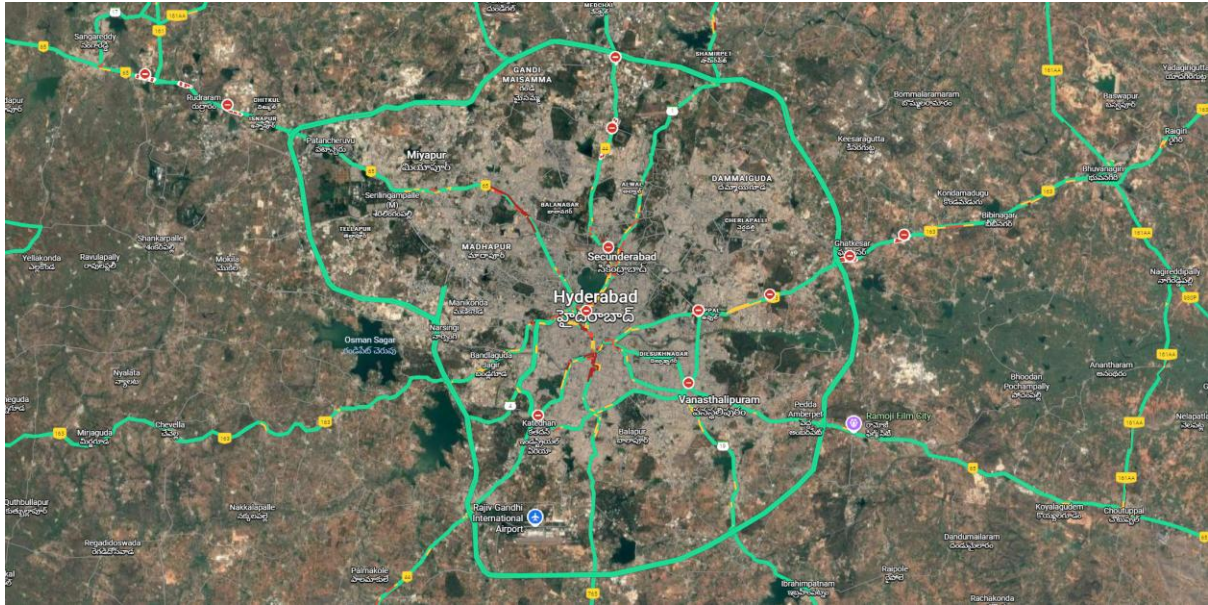


Figure 16: Ring roads network in Hyderabad

Conclusion

India needs to build almost the same volume of infrastructure in the next 25 years that she has built since independence up to today. The need of the hour is skilled professionals to take up this challenge and capacity building to meet the shooting future needs. With perhaps this in mind and his passion for the subject, Dr. V.R. Raju took it upon himself to inspire students like me and my friends to build our career in this field.

The experience in Hyderabad, talking to accomplished individuals in the field with experience beyond my age was extra ordinary. The crazy construction going on and the eye-opening discussions on the civil engineering is bound to inspire anyone into the subject. One should not fear the boom of AI, Blockchain or automation, it is the mere outcome of a world whose demand is performance and productivity. We should leverage the use of these tools into our profession much like we did with the computer and software programs that made construction easier. The future of Civil Engineering is promising and in a country like India, there will be a serious challenge to meet the demand. What better way to grow and make a name for yourself than face a challenge head on.