

PORSCHE ELECTRIC CAR PLANT, VIZAG

A thesis submitted in partial fulfilment of the requirements for the award of the

Degree of

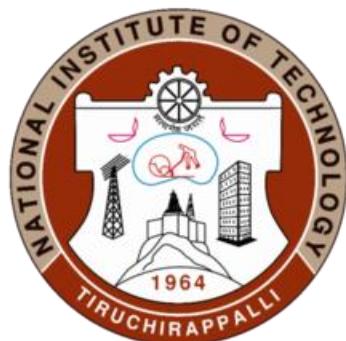
B.Arch

In

Architecture

By

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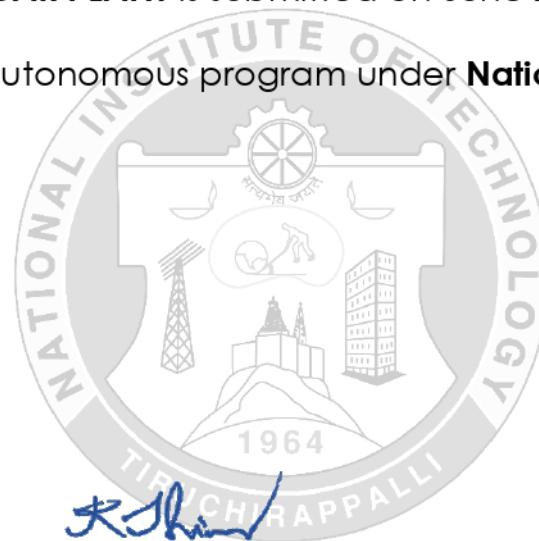
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The dissertation entitled **PORSCHE ELECTRIC CAR PLANT** is submitted on June 2020 in partial fulfilment of the requirement for the **Degree of Bachelor of Architecture**, an autonomous program under **National Institute of Technology, Tiruchirappalli**.

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ACKNOWLEDGEMENT

An architectural thesis show casts the culmination of years of study and learning and is viewed as the final measure of ones professional capability and qualification. I'd be hard pressed to justify how this book fits into the category of what is mentioned above. However, for all that is isn't, this thesis is still the final product of a long journey that began five years ago. It is an attempt, an experiment, an idea nurtured over time. It probably deserved a lot more of my time and attention, but as such it still is what I leave behind as the final outcome of my time here.

It is also not an individual effort, I couldn't have done it without the help of lot of people and I'd like to thank every body who helped me along the way.

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PORSCHE ELECTRIC CAR MANUFACTURING PLANT
VISAKHAPATNAM

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INTRODUCTION

PART 1
INTRODUCTION

BRIEF

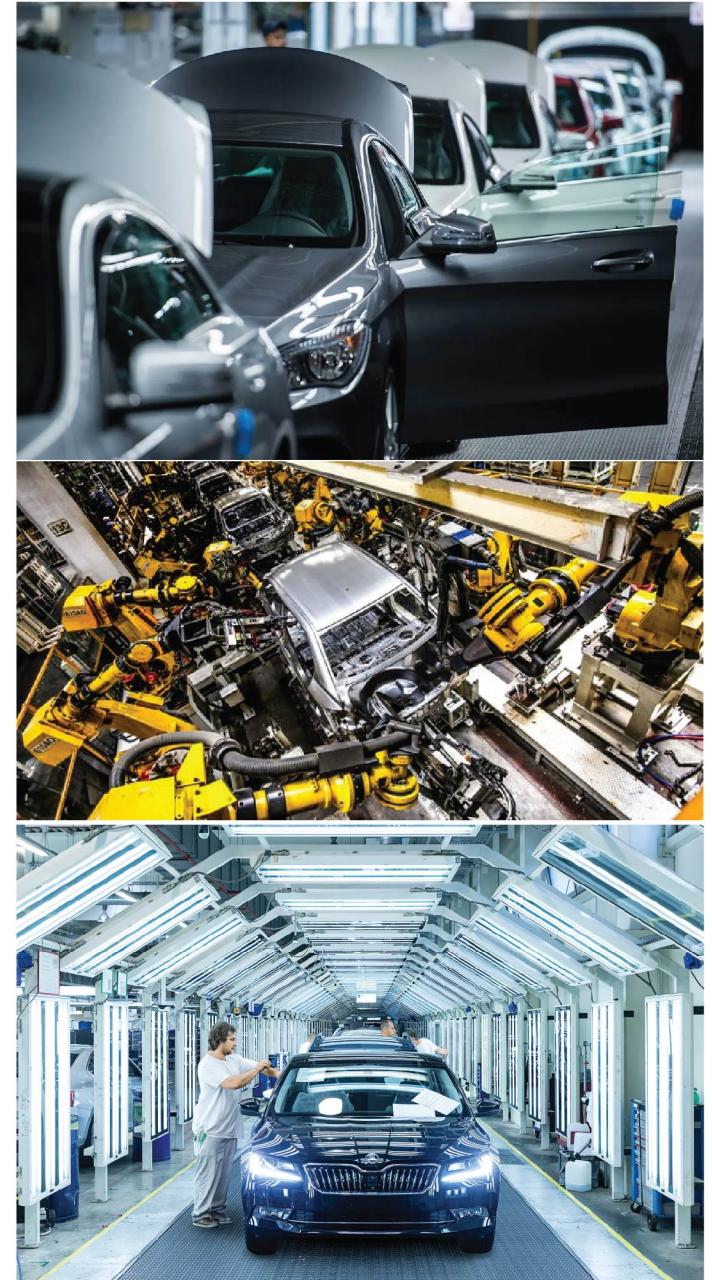
To design an automobile manufacturing plant that accommodates a hybrid of fuel & electric based production of cars and to take all important measures of services and safety provisions for the safe and secured nature for output of manufacturing and working staff.

AIM

By proposing the same, there will be an increase in the development of Automotive industry with alternative energy source in our country which will lead to a holistic and healthy economical community. By doing so, we can tap the potential areas for renewable energy and to provide the society an initiative for electric cars where they can realize and become aware of the degradation of world environment. The manufacturing unit will provide a platform for innovations and excellence to take the field of automotives to a next level and thus providing a base for community to avail the opportunity to shift to electricity based vehicles.

ABSTRACT

Spatial reorganization of production conditions, on both, a large and a small scale, implies that an important effort from industrial companies has been made to develop new concepts for the working environment. Many companies, such as IBM, Renault or Olivetti, have already invested large amount of money and research time in the definition of their future factories, involving architects, sociologists, economists, etc. As a consequence, new and different requirements have been formulated that have to be considered by architects and engineers in charge of the design. Flexibility, and a deep concern about protecting future design possibilities, in order to make the best adaptation to the market, lead these thoughts. Because a car assembly plant involves a wide range of different techniques, in the production area, and allows the definition of building and design criteria for the construction industry, it has been chosen as a case study.



PART 1

SCOPE :

ENTRANCE

1. Security verification
2. Security personnel zone
3. Security staff longue
4. Walkin In check ups
5. Visitor waiting zone
6. Server room
7. Toilets

ADMIN BLOCK

1. Entrance space
2. Reception space
3. Development gallery
4. Waiting lobby
5. Various office spaces
6. Server room
7. Surveillance room
8. Meeting rooms
9. Conference boards
10. Director panel rooms
11. Pantry room
12. Toilets

CANTEEN

1. Eating space
2. Serving space
3. Washrooms
4. Kitchen
5. Washing space
6. Staff space

PRESS SHOP

1. Truck stop decks
2. Forklift zones
3. Godowns for storage
4. Loading / Unloading docks
5. Truck parking
6. Press moulds
7. Sheet cutting zone
8. Sheet pressing zone
9. Assorting space
10. Surveillance cabin
11. Resting rooms & Toilets

BODY SHOP

1. Truck stop decks
2. Forklift zones
3. Godowns for storage
4. Under body zone
5. Chasis zone
6. Family joining
7. Part fixation
8. Bolting & Joinery
9. Assorting space
10. Surveillance cabin
11. Resting rooms & Toilets

PAINT SHOP

1. Truck stop decks
2. Forklift zones
3. Storage
4. Paint preparation zone
5. Phoretic coating well
6. Seam line coating
7. Shine & Polish zone
8. Light tunnel test
9. Assorting space
10. Surveillance cabin
11. Resting rooms & Toilets

ASSEMBLY SHOP

1. Truck stop decks
2. Forklift zones
3. Storage
4. Interior line
5. Door function line
6. Underbody line
7. Exterior fix line
8. Engine Pre setup
9. Marriage line
10. Fluid filling line
11. Car wiring line
12. Wheel mounting line
13. Internal testing zones
14. Assorting space
15. Surveillance cabin
16. Resting rooms & Toilets

SUSTAINABLE GENERATION

1. Solar power plant
2. Overhead solar plant
2. Waste management plant
3. Storm water management
4. Grey water management
5. Power grid
6. Gas station

EXPERIENCE CENTRE

1. Purchase section
2. Hand over section
3. Merchandise store
4. Reception & Lobby
5. Forum hall
6. Club rooms
7. Board rooms
8. Race view decks
9. Auditorium
10. Gallery
11. Restaraunts
12. Exhibition deck
13. Store rooms
14. Emergency exits
15. Toilets



PART 1

INTRODUCTION

TOOLSTEIN

PART 2
CASE STUDIES

KIA MOTORS

LOCATION : PENUKONDA, ANDHRA PRADESH
SITE AREA : 2 SQ KM / 540 ACRES
PLANT DESIGN BY : NAMYANG DESIGN CORP.
OUTPUT : 3 LAKH UNITS / YEAR



ABOUT THE PLANT

The plant is established in Association with the Andhra Pradesh State government to bring a automobile industry plant as a part of development scheme by the year 2020. The provision of site is located in a dry district of Anantapur by which development has been brought out because of establishment of a huge industry like this.

SITE ACCESS

The site is accessed through NH 44 highway. A small diversion from the main road is taken from where a left turn leads you into the site. The site has a recessed entry. There are 7 verified entrances in to site that allow only staff and workers. There are 3 entries for stock inflow. 4 large parking zones for staff and dealers.

SERVICES AND PARKING

The site is installed and equipped with all the important services like RW collection, fire safeties, drainage lines, water facilities, emergency systems, navigations and a huge area is given at the opening for ample amount of parking for the users

ZONING & CIRCULATION

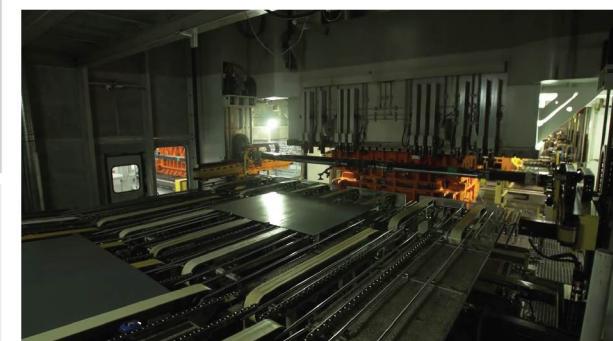
The zoning is sorted as per the manufacturing process of the car from the scratch to the track testing. The units are assorted in terms of the flow of materials needed for the manufacturing. All the spaces are well inter connected in the site with roads and walk bridges to all units within the plant.

LANDSCAPING

A lot of green cover is maintained on the site wherever possible. For now the plantation is less as the plant is newly opened, but the officials are planning to increase the landscape in the near future.

SITE USABILITY TO MEET EFFICIENCY :

- > The planning has been done in order to create a level of integrity between various units within the site by which the connections between various blocks is established with the gridiron pattern for transportation.
- > The rear part of the site is utilised for vehicle testing and supervision place where there is the test track of nearly 2 kilometres and is also with crash testing unit of the vehicle.



> Additional facilities such as canteen for the members and wastewater management plant along with grey water treatment plant are also installed in the site to enhance the environmental benefits.

> The entire site is well installed with navigation and signages to improve the flow of staff and workers from one part of the factory to another. The footpath on the outer periphery itself denotes a proper way for the circulation within the plant.

SUSTAINABILITY

The plant aims on having the best level of relation with the nature and its resources. A lot of green renewable methods are followed in the site to establish the concept of sustainability.

- > Rain water management
- > Solar power for office usage
- > Promotion of recycle paper
- > Street lighting with surplus solar power

The construction of the units bodies is done with basic fabrication that reduces the carbon footprint throughout the KIA plant.

ARCHITECTURE & DESIGN

The design of this building modern. It is very simple and yet keeps the core concept and use in focus. It is a stadium design to conduct aquatic events so the concept is flow of water and water is general. This is seen in the building façade, building interior as well as in the landscaping of the site.

The site is zoned and designed in a simply way with wavy patterns and segregated different parking areas for different types of crowd with simple landscaping. The main driveway forms a simple curve around the building leading to different entrances along the way.

The façade of the building is cladded with panels of colours blue, grey and steel. Light wave like creases are created all along the façade to give a dynamic look to the building. The grey panels are used under the overhanging while the blue and silver are used all along the circumference.

The interiors of the building have also been designed to represent the same concept. It can be seen in little details like little patterns on some of the walls and in the signage and boards.



MATERIALS

There are a lot of materials that were used from the main entrance of the plant to the very last testing track. Few of them are listed as follows :

- > The entrance is decently finished with ACP cladding with glass fixings and PCV furnished fittings to all openings.
- > The flooring are all vitrified tiles with variations in white and cream colors that are mild for visuals and also help reflect more light within the space
- > The open areas are covered neatly with paving blocks that help the rain water to seep off easily into the drain lines.
- > Generic carpet grass cover is given in the landscape zones to play the color contrast in the site.
- > The interiors in the main office is all white, this is done in order to enable more reflectivity of white light with less light fixtures.

CONSTRUCTION

This plant is established by the KIA Motors in association with the state govt. of Andhra pradesh with an investment of about 1.1 billion dollars.

- > The bases of all the unit buildings are treated with proper concrete base that forms the floor of the block.
- > The super structure is all fabricated steel structures that are installed in the site during the process of construction.
- > Establishment of long span structures is very crucial for this type of plant construction.
- > The roads are well finished with wear off technology that sustains the paths even in the worst climatic situations.
- > The coverings of the unit segments is done with corrugated covers that are coated with teflon to enable easy run off of the water and dust particles on the surface.

INFERENCES

The KIA motors plant has been developed with a lot of care and understanding towards the sustainability in the coming years.

Zero emission control and zero water wastage are very important factors here that denote the life of this space that it relates its development with environment protection.

As this space is busy with machines working and a lot of people supervising the work, special care has been taken to equip the plant with high level security systems and emergency surveillance bodies that ensure the security of the workers.

Stringent and secured entrances are a vital role here to safely guard the inflow of people and materials into the plant.



PART 2

MERCEDES BENZ MOTORS
LOCATION : CHAKAN, PUNE
SITE AREA : 4,75,000 SQM / 120 ACRES
PLANT DESIGN BY : MERCEDES PLANNING LTD.
OUTPUT : 75,000 UNITS + CUSTOM ORDERS



Mercedes-Benz

ABOUT THE PLANT

The site is developed in the region allocated by the Maharashtra Industrial Development Corporation. This plant was established to manufacture various models of mercedes vehicles and also custom made orders for various models available around the world. Since its opening the plant is successfully running its units that meet the demands from the customers all over India.

SITE ACCESS

The site is accessed through the inner corridors of Maharashtra Industrial Development Corporation region. The site has a recessed entry. There are 2 verified entrances in to site that allow only staff and workers. There are 2 entries for stock inflow. 2 large parking zones for staff and dealers.

SERVICES AND PARKING

The site is installed and equipped with all the important services like RW collection, fire safeties, drainage lines, water facilities, emergency systems, navigations and a huge area is given at the opening for ample amount of parking for the users

ZONING & CIRCULATION

The zoning is sorted as per the manufacturing process of the car from the scratch to the track testing. The units are assorted in terms of the flow of materials needed for the manufacturing. All the spaces are closely clubbed to maintain the same proximity.

LANDSCAPING

A lot of green cover is given prime importance on the site wherever possible. The plantation is considered to be a serious issue and taken up as an initiative by the company to plant more trees in the site with yearly targets so that they can contribute to some extent in saving the world pollution.



BLOCKS IN THE PLANT

Constructing a multiple flooring system within a site for a manufacturing plant is very challenging job, as many services and equipment has to be installed within the same space. Here are few important units that are a part of this Merc production plant.



PART 2

MATERIALS

There are a lot of materials that were used from the main entrance of the plant to the very last testing track. Few of them are listed as follows :

- > The main block of the plant is the administration block that is completely furnished with blue glass glazing along with long column structures
- > The flooring are all vitrified tiles with variations in white and cream colors that are mild for visuals and also help reflect more light within the space
- > The open areas are covered neatly with paving blocks that help the rain water to seep off easily into the drain lines.
- > Generic carpet grass cover is given in the landscape zones to play the color contrast in the site.

CONSTRUCTION

This Mercedes Benz plant was easy to setup with the help of Maharashtra government to establish a commercial car manufacturing plant in the state.

- > The bases of all the unit buildings are treated with proper concrete base that forms the floor of the block.
- > The super structure is all fabricated steel structures that are installed in the site during the process of construction.
- > As the area of the plant is very limited the concept of having multiple floors within the same block is followed here to accommodate the Services within the site
- > The roads are well finished with wear off technology that sustains the paths even in the worst climatic situations.
- > Heavy infrastructure with steel and iron section fittings are done in the block to give a structure that is similar to a floor to establish the services

INFERENCES

The Mercedes Benz plant has taken up major initiatives to develop the area around the plant to be a green belt zone in order to fight the modern day pollution situations.

As lighting is a very important feature in industrial areas a lot of semi open roofing structures are established in the building so that maximum light can be taken inside the block during the working hours.

As this space is busy with machines working and a lot of people supervising the work, special care has been taken to equip the plant with high level security systems and emergency surveillance bodies that ensure the security of the workers.

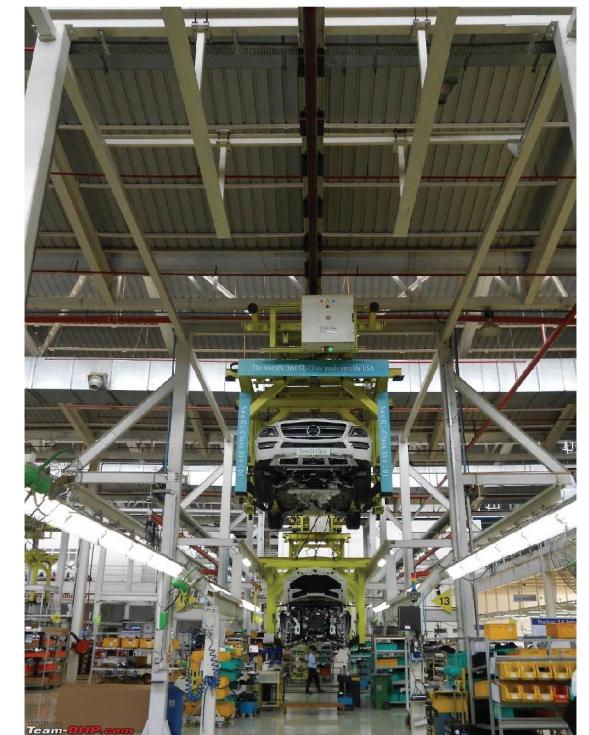
The plant is under supervision by cameras and security personnel to guide the people to various blocks in the site.



PART 2

ARCHITECTURE & DESIGN

- > As per the site study of various blocks in the site the planning has been done in a very efficient way to accommodate maximum Services within the same located area.
- > Significant amount of breathable spaces are also given within the building blocks to maintain the safety standards in order to prevent various hazardous accidents in industrial zones.
- > Multiple roofing system within the block enabled the company to expand vertically as the area is less this type of construction enables more services to be accommodated within the Limited area.
- > North light roofing system is being installed maximum in all the places so that daylight can be efficiently used within the plant
- > Small parametric roofing system is installed at the area where the press and the customer visiting Centre is located in order to create some interest for the few words while experiencing the place.



TESLA MOTORS

LOCATION : FREMONT, USA

SITE AREA : 1.2 SQ KM / 300 ACRES

PLANT DESIGN BY : TESLA DESIGN LTD.

OUTPUT : 1 LAKH UNITS + CUSTOM ORDERS



The Fremont Tesla factory is located in a very jam-packed industrial Valley of America.

The site is surrounded by multiple ways of road networks and the small Rail Network that brings in the goods and services from various places around America. The site totally consists of all the units that are needed to manufacture a car from its ground level.

SITE ACCESS

The site is accessible through the main 880 highway that runs through the Fremont Silicon Valley in America. The plant is access on all the four sides with important roads that help in transportation of various services and goods that are required for the manufacturing of the car in the plant.

ZONING & CIRCULATION

The area that the plant is setup is very small thus so many of the services are clubbed up together to create interactivit between various zones of manufacturing. The circulation within the plant is restricted to two non emission based vehicle such as cycles and electric mopeds that enable workers to travel from place to place.



LANDSCAPING

As the plant itself is based upon generating electric manufac- tured vehicles, percentage of green cover present in the plant is very less compared to any other automobile factory in the world. But the strategies followed by the company e are very crucial and efficient in producing zero emissions and zero carbon footprint from the plant.

SERVICES AND PARKING

The frontal area of the plant is totally left for the parking services of various staff and dealer persons and the same place is also used to store the stock of vehicles that are manufactured and produced out of the plant. Various mechanical and security services such as fire fighting equipment, wastewater management, Solar Power Plant, air refueling unit, battery charging point and many more services that are related for the safeguard of the plant are installed properly and have shown excellent efficiency throughout its life time.



The production of Tesla electric cars is considered to be one of the significant innovations in the modern world where sports type Sedan vehicle is manufactured totally from aluminium frame work to provide the customers with fuel efficient and fuel free automobile on roads.

> Working and construction of the plant it is considered to be the best Green ways for establishing large scale industries in the world.

The typology of services that are offered in the place, the amount of area covered by the plant and simultaneously being used to provide and generate Solar Power Plant within the manufacturing plant it is a marvelous effort.

the plant is totally zero wastage of energy efficient building as the generated solar energy is directly used to manufacture the plant from A to Z.

The type of construction and the Waves of renewable energy installed in the site premises of the campus are very efficient in the modern day pollution scenarios.

ASSEMBLY

Assembly Putting together the pieces of the car's body is an area that all automakers automate to varying degrees. However even state-of-the-art factories tend to rely on people to transport parts and load them onto the machines. Car parts are packed together for storage and shipping, and picking them back up is difficult without human fingers.

This is one area that Tesla may have gone too far, too fast. In April, Musk acknowledged that he had to rip out a complex conveyor system for parts and replace it with workers. Various robots throughout the line met a similar fate or had to be reprogrammed. Even so, Tesla says the Model 3 body line is now 95 percent automated, including the transfer, loading, and welding of parts.

SEATS & PARTS

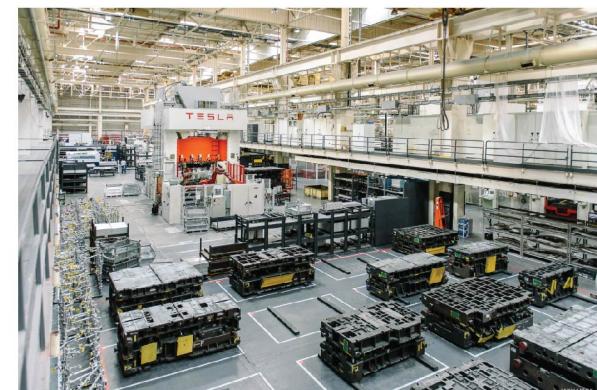
Seat Factory Car manufacturers hate seats. They're tedious to make and require different skills and materials than the rest of the car. It's easier to outsource, and no major manufacturer does it all themselves. But relying on suppliers got Tesla into trouble with the Model X, when its engineers designed an extremely difficult-to-make "monopost" seat and an impossible-to-hit timeline. Problems with suppliers set production back by months, and Musk decided he wasn't going to put up with it again.

In just a few years, Tesla built its own seat factory to handle all of its seat production. These are the first images published from the new factory, which Tesla says already has more capacity than it needs for its 2018 production goals—with plenty of space for additional expansion.



ARCHITECTURE & DESIGN

- > The main feature that attracts in this factory is the colour combination with a pleasant white and vibrant red.
- > Huge amount of open roofing and glass covering roof allows maximum sunlight to flush into the entire space of the factory making the space more vibrant and as the interiors are white in colour the reflectivity of the sunlight within the factory limits is very high.
- > The nature and the workflow within the campus is very pleasant and spacious and is itself designed in a way bi a hierarchical process.
- > Long span structures and Truss frame structures are crucial design role elements in this factory that accommodate various amounts of Services within a similar client of block.
- > Restricted number of entries into the plant makes it to more easy to supervise and control the inflow of people and services into the site.
- > combining of various blocks and spaces of the site enables easy transportation and communication between various departments in the time of manufacturing of the vehicle.
- > The efficiency of the site usage increases with the amount of details that are given to the site planning in a large scale as the plant is a campus based design the various amounts and proximities of spaces that are managed within the site give the best efficiency output.
- > The treatment of basic working spaces, walking spaces, industrial spaces, staff interactive spaces, cycling zones how their own respective treatment of materials that enhance the aesthetic nature of the space.



PART 2

BMW LEIPZIG PLANT

LOCATION: LEIPZIG, GERMANY

ARCHITECT: ZAHA HADID

TOTAL AREA: 270,000 SQUARE FEET (25,000 SQM)

BUILDING COST: \$60 MILLION

PARKING: 4,100 SPACES

COMPLETION: MAY 2005



PIONEERING MOBILITY MADE IN LEIPZIG.

The BMW Leipzig Plant is one of the most modern and sustainable car plants in the world. BMW cars for customers all over the world are produced here since 2005. More than 960 vehicles per day roll off the production lines.

Up to 860 cars of the BMW 1 and 2 Series are manufactured in the classic production every day. In addition, two trendsetting vehicles with alternative drive systems and innovative light weight carbon bodies are produced; the BMW i3 (since September 2013) and the BMW i8 (since May 2014). Green energy for the production of these cars is provided by four purpose-built wind turbines on site.

The award-winning architecture encourages encounters and exchange between our teams and combines both form and function in several respects. The central building plays a crucial role in this by serving as a communication and nerve centre, while effectively connecting the production areas. Around 5 300 employees work in different areas, ranging from production to IT and even health management. After work, you can stroll down the Mädlerpassage of Leipzig and take in its world city flair, or enjoy a spectacular panoramic view over the city from the Monument to the Battle of the Nations at the top of a 364-step climb.

CONCEPT

The BMW factory prior to the construction of the central building existed as three disconnected buildings, each playing an integral part in the production of BMW 3 Series vehicles. These three production buildings were designed in-house by BMW's real estate and facility management group, housing separately the fabrication of raw auto bodies (645,000 square feet (59,900 m²)), the paint shop (270,000 square feet (25,000 m²)), and the final assembly hall (1,075,000 square feet (99,900 m²))[3]. A competition was held for the design of a central building to function as the physical connection of the three units. It also needed to house the administrative and employee needs spaces.



Hadid's design took this idea of connectivity and used it to inform every aspect of the new building. It serves as a connection for the assembly process steps and the employees. Designed as a series of overlapping and interconnecting levels and spaces, it blurs the separation between parts of the complex and creates a level ground for both blue and white collar employees, visitors, and the cars.

Is it possible that a certain kind of architecture can positively influence teamwork and productivity within a plant? The Central Building of the BMW Leipzig Plant, designed by the famous architect Zaha Hadid, is the implementation of this idea. This unique building is the centre of communication and it connects all production areas.

The building is the centre of the plant and of all processes. It accommodates large parts of the administration and quality functions and it also connects the production areas. Form and function are combined here. The car bodies are visible from the entrance hall while they are being transported from one production area to the next. The bodies are transported past the desks of managers, designers and specialists and high above the heads of the visitors.

Everything is open and in constant movement. The office area is easily accessible which promotes the exchange of ideas. These transparent structures facilitate quick responses and coordination – a decisive advantage for BMW quality and efficient processes.

The concept and the design of the Central Building have received a lot of recognition. Among others, the building also received the "Deutsche Architekturpreis 2005".



THE CENTRAL BUILDING

The Central Building is the heart of the BMW plant in Leipzig, acting as both the physical link between the three manufacturing areas and as the communications hub for the entire plant. A deliberate feature of the commission for the architects was that during the production process the car bodies should be transported through the Central Building on specially constructed conveyors as the functional procedure required, thereby making the production process and the products real to employees and visitors at all times. Another condition was that the building had to represent openness and transparency – features that the BMW plant wants to endorse in a sustainable manner in its role as a new neighbour. The three winners of the international design competition (in each case one architect and one landscape architect) were

1st prize: Zaha Hadid with Patrik Schumacher (both London) and Gross.Max

2nd prize: Lab architecture studio (Melbourne/London) and Karres en Brands

3rd prize: Peter Kulka (Dresden) and Peter Kluska (Munich).

Comments from the jury: "We the jury are impressed by the harmonious solution which convinced us in terms of its high levels of functionality and design. The design for the Central Building is an impressive answer to the requirements of integration and communication both in the external language of the building and internally, and it creates an appealing working environment with good workplace quality and safety. This is successful whilst at the same time taking into consideration the broader aspects of finance, structural engineering and building law."

SUSTAINABILITY

OPEN TO COMMUNICATION – FLEXIBLE FOR THE FUTURE.

> The sustainable and flexible production structures at the BMW Leipzig Plant are a great advantage, because it facilitates the adaption towards future challenges.

> The plant's basic structure can be easily modified and extended for future challenges. The production buildings are arranged in a circle around the Central Building. The distances are short and there are many options for future extensions or the integration of new production technologies.

> The Central Building is the heart of the plant and the centre of communication. The administration and the quality centre are located here and it offers space for associates and visitors alike.

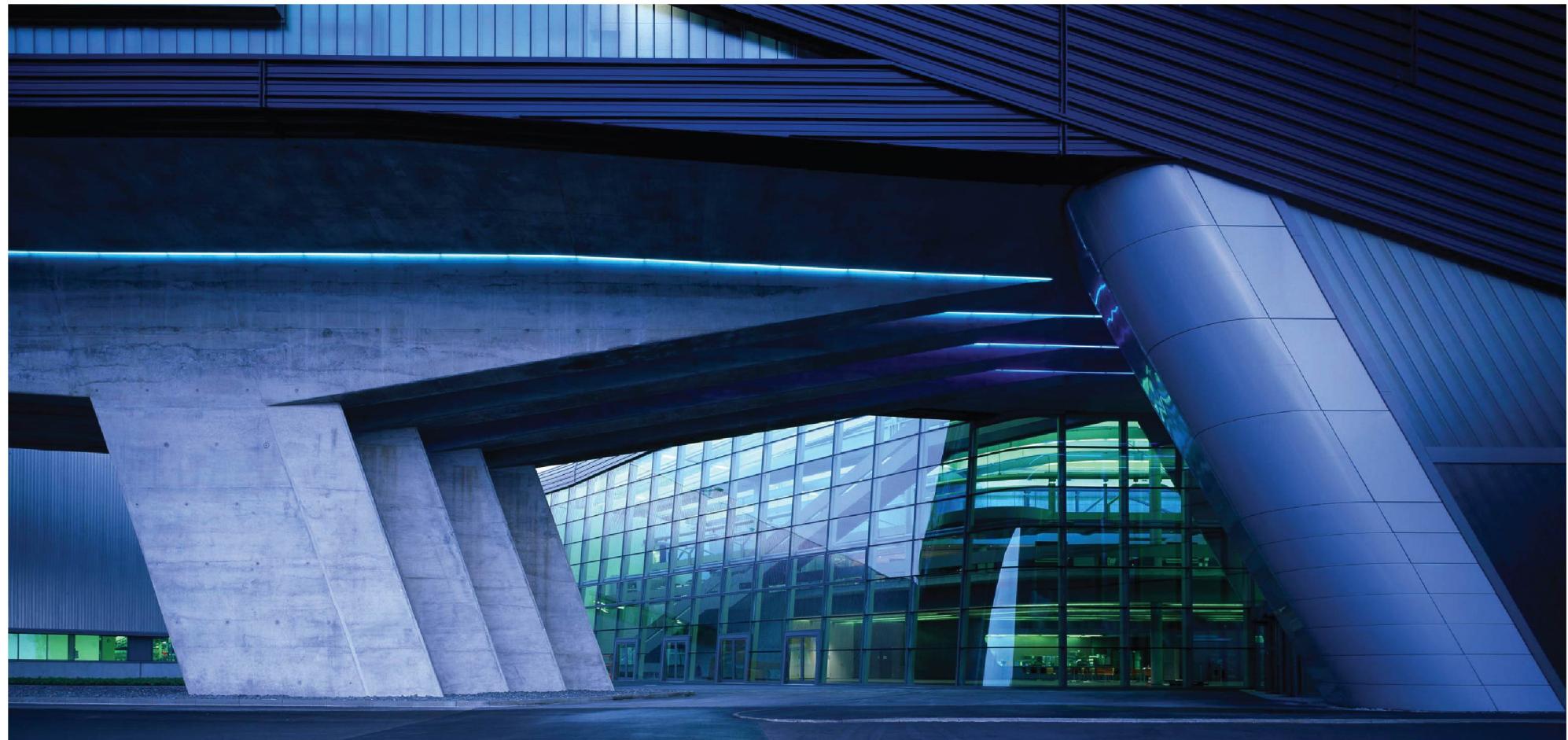
> The supply centre is right next to the assembly. Suppliers and partners undertake the pre-assembly of components. These components are delivered to the assembly lines just in sequence.



> The assembly is structured like a comb or the fingers of a hand. Specially designed extensions to the buildings facilitate the delivery of material with lorries to all places of assembly. The integration of new assembly steps is also possible by adding a new finger, making the assembly ready for the future.

> The whole concrete base and the flooring gives the plant a rustic finish and the lights that are installed have a vibrant role in illuminating the plant in the evenings.

> The moment of dynamic flow has been followed in the entire space by the designers to give the touch of contemporary nature in the production plant.



PART 2

VOLKSWAGEN TRANSPARENT FACTORY

LOCATION : GERMANY

ARCHITECT : GUNTER HENN

OPENING : 2002

TYPOLOGY : ASSEMBLY UNIT + ELECTRIC PRODUCTION

OUTPUT : 1,20,000 GENERIC + 75,000 ELECTRIC



ABOUT :

The Transparent Factory is car factory and exhibition space in Dresden, Germany owned by German carmaker Volkswagen and designed by architect Gunter Henn. It originally opened in 2002, producing the Volkswagen Phaeton until 2016. As of 2017 it produces the electric version of the Golf.

WHY TRANSPARENT ?

The prime location of this Volkswagen factory is supposed to be in middle of a city limits that has lot of working class people moving for various jobs and other daily activities.

After placement of this plant is in between the city centre the idea of being open to the public created much more interest to attract people to come and visit the facility.

the concept of being transparent and having Aluminium panel shielding on the outside it give it a dynamic look with contemporary style in the City Centre.

CONCEPT

The concept was taken pretty simple from the architect Gunter henn. a combination of linear layout of the plant with curvature Outlook for the people to visit was taken into consideration.

The curvature part of the plant it is finished with curved glass glazing to maintain the concept of transparency for visual appearance to the crowd.

The rest of the linear part of the building used also done with glass glazing so as to make more and more of sunlight to fall into the interiors of the place.

the design team and marketing officials believe that the concept of manufacturing the car right in front of the customers and public gives them more Belief in the life of people and the quality of production of automobiles in the company.



PART 2

MATERIALS

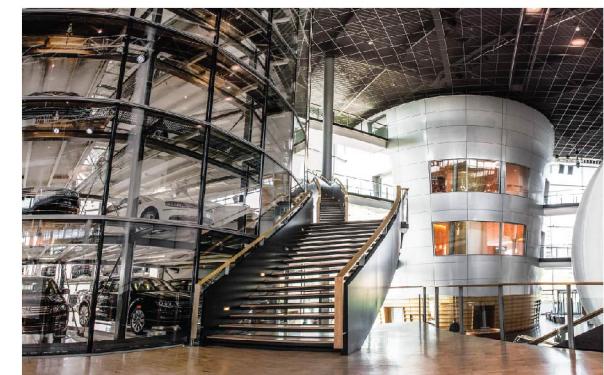
- > The entire external Framework is done with stainless steel and iron segments that are manufactured under fabrication for the production company.
- > The external is a toughened 20 mm reinforced Glass that is installed in order to protect the glazing from heavy winds in the City Centre.
- > The floor of the building is a totally done with treated wooden panels that absorb sound and give minimal acoustical treatment inside the plant.
- > The rest of the outer structure is covered with concrete or ACP panelling with grey and white textures.



> All the electrical, lighting, HV AC, Civil Lines are taken in the false ceiling directly to the visible eye to create the raw nature of the plant.

ARCHITECTURE & DESIGN

- > This is a new concept taken by the architect and the design team to combine both the production process and the visual appealing to the customers and the public of the city.
- > This concept of mixing both the services together gave a noble revolution to the car manufacturing industry in Germany.
- > In order to create a more appealing nature the plant is covered with glass glazing on all the external surface to allow sunlight into the space.
- > Account rafting variation of superstructure and the flooring is brought about by using the shades of White and Brown wood textures.
- > As the space is very small the design and planning team came up with the idea of having vertical mechanized motion of various segments in the production of the vehicle.
- > To accommodate The functioning of assembly line the entire floor of the plant is made on dynamic rotation cabins that rotated through the process of production of a car.
- > The plant generates its illumination power from the solar panels that are installed above the production plant.



TOOLSTUDIO

PART 3
SPECIAL STUDIES

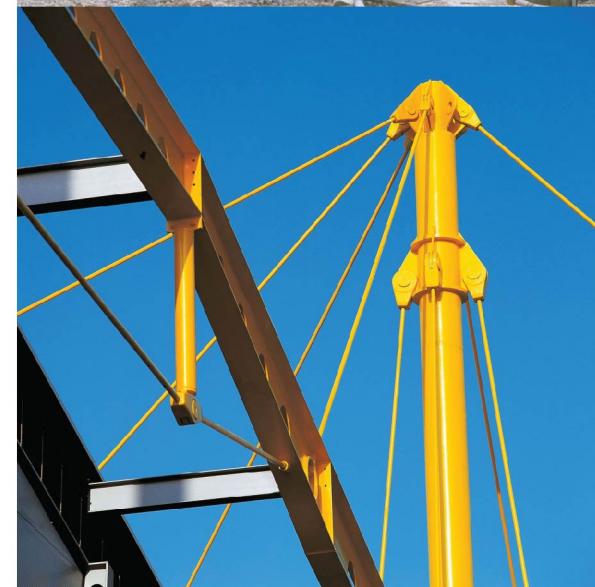
RENAULT WAREHOUSE BY FOSTER + PARTNERS

FABRICATION OF METAL STRUCTURES

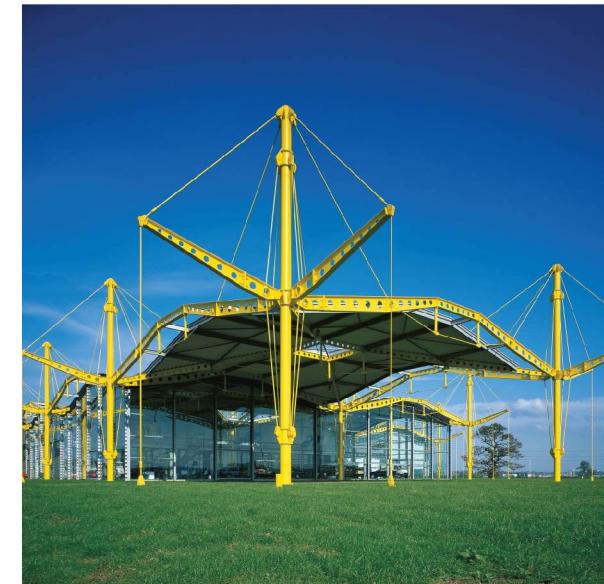
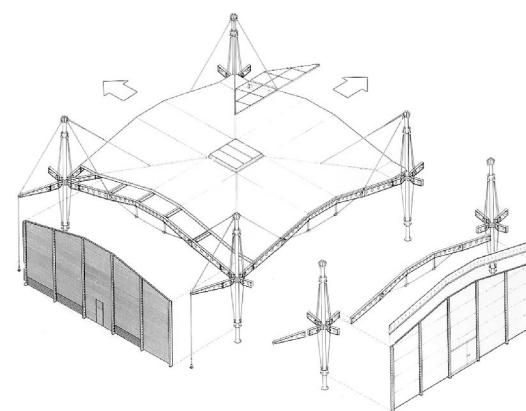
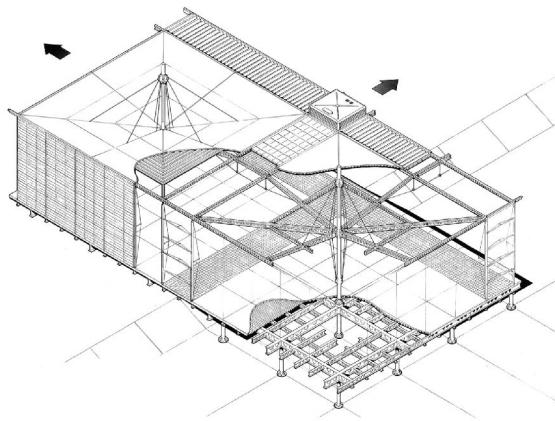
ABOUT :

The Renault Centre has been described as the practice's most playful structure. However, its development owes much to earlier, perhaps more reticent schemes for clients such as Reliance Controls and Fred Olsen, which delivered inexpensive, flexible buildings to tight schedules. The Centre was commissioned as the French car manufacturers main UK distribution facility. In addition to warehousing, it includes a showroom, training school, workshops, offices and a staff restaurant. The notion that good design pays has almost become a cliché, but in this case it is quantifiable: on the strength of the design, supportive local planners increased their site development limit from 50 to 67 per cent, allowing a floor area of 25,000 square metres. This is housed within a single enclosure supported by brightly coloured tubular masts and arched steel beams, forming a striking silhouette within its surrounding landscape.

The structural system that repeats itself to form this external outline is based around a 24 by 24 metre bay a much larger than usual planning module developed so as to maximise the planning flexibility of the internal spaces. This expansive horizontal span is combined with an internal clear height of 7.5 metres, allowing the Centre to accommodate a range of uses from industrial warehouse racking to its subdivision into office floors. Enveloped by a continuous PVC membrane roof, pierced by glass panels at each mast, the building is also stepped at one end, narrowing to a single, open bay that forms a porte-cochère alongside a double-height gallery. Primarily a showroom – as signified by suspended car body shells – the gallery was used by Renault as a popular venue for arts and social events, encouraging wider community involvement in the building.



As much as its internal spaces, however, it is the buildings almost festive Renault-yellow skeleton that gives the Centre such an identifiable character. Significantly, this created such a memorable image that the building, alone among the company's facilities, did not need to carry the Renault logo. In fact it is so closely associated with the brand that for many years Renault used it as a backdrop in its advertising campaigns.



PORSCHE ELECTRIC CAR PLANT, VIZAG

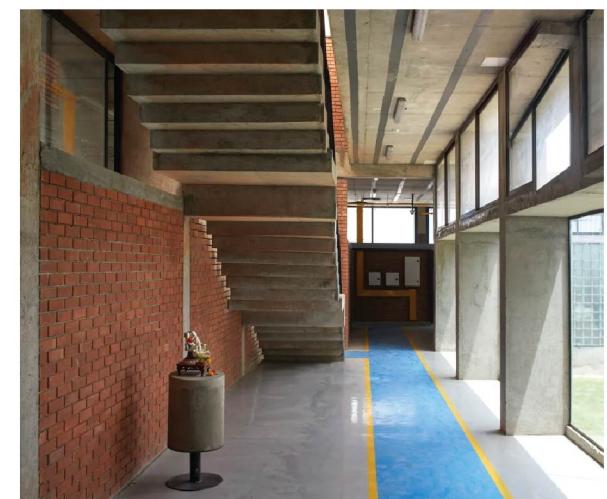
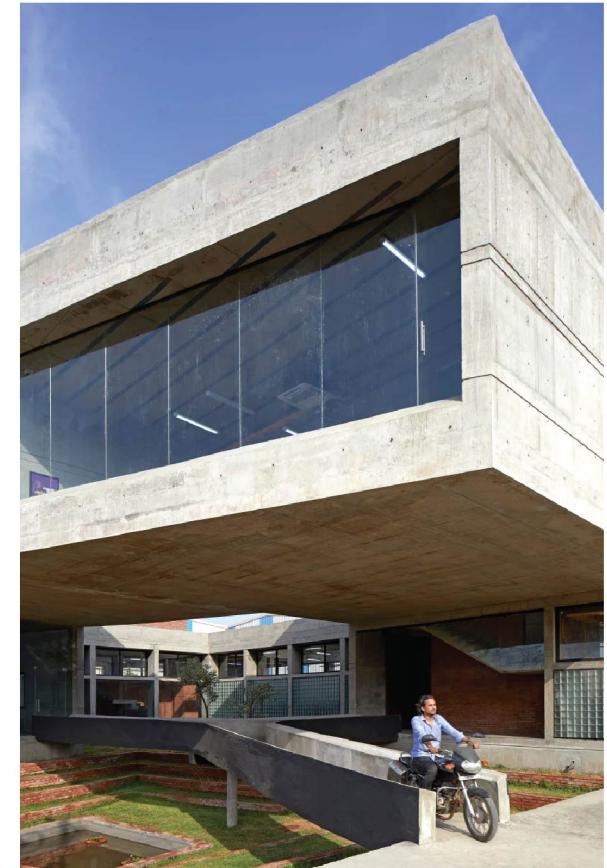
PROJECT INFO:

NAME: CONCRETE VOID (VIJAY TRANSTECH FACTORY)
ARCHITECTURE FIRM: SAMEEP PADORA & ASSOCIATES (SP+A)
COMPLETION YEAR: 2018
BUILT AREA: 2,000 SQM / 21,528 SQF
LOCATION: BHIWANDI, MAHARASHTRA, INDIA

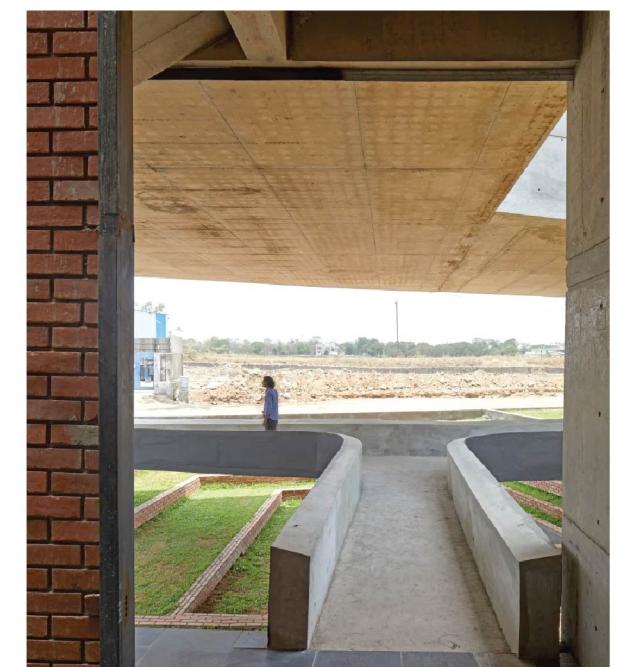
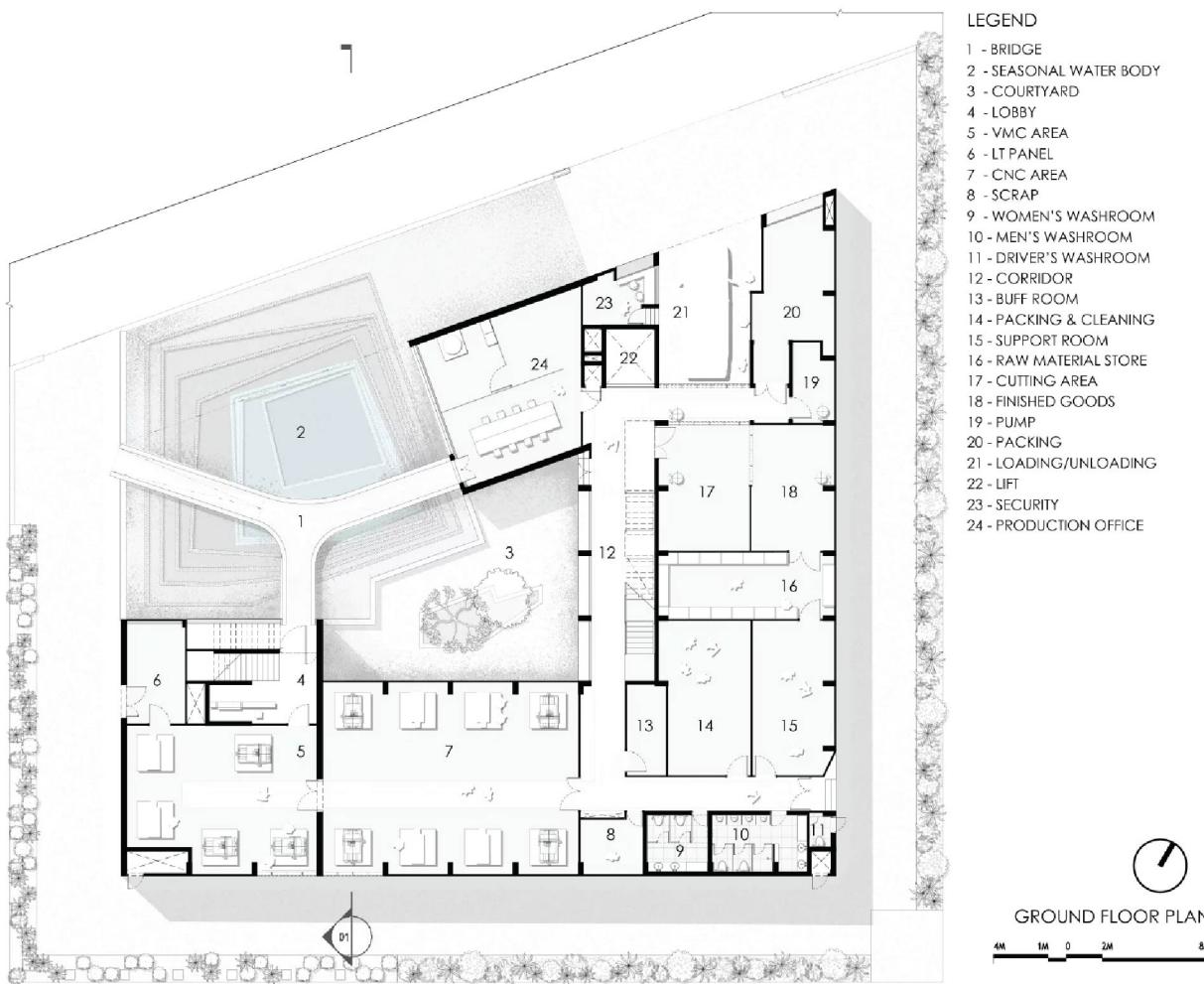
ABOUT :

Indian architecture firm sP+a has completed a concrete factory building on the outskirts of mumbai. rather than its surrounding structures, which are opaque and create a hard edge with the passing street, the building seeks to enter into a more open dialogue with its context. at the north-west corner of the plot, the architects created an opening in the concrete façade, which not only provides views inside the structure, but also contains a sunken void.

Located on a part of the site prone to seasonal flooding, this void allows monsoon waters to flood in and out of the site — without disrupting the building or its workers. when it is not filled with water, the space can be used as a shaded breakout space for employees. to traverse this chasm, a bridge connects the street to the building. a court-yard is positioned at the center of the site, with the factory's production floors organized around it.



The building itself contains a variety of spaces that range from production and dining areas to shipping docks. meanwhile, relatively thin floorplates ensure well-lit work spaces. externally, the heavy concrete appearance of the building exists in sharp contrast to the lightweight but opaque steel sheathing of the surrounding buildings. ‘the corner void connecting to the central void courtyard creates an extroverted factory type, visually linking to the access road beyond the site as well as offering relief from the impenetrable adjoining building masses,’ explains sP+a.



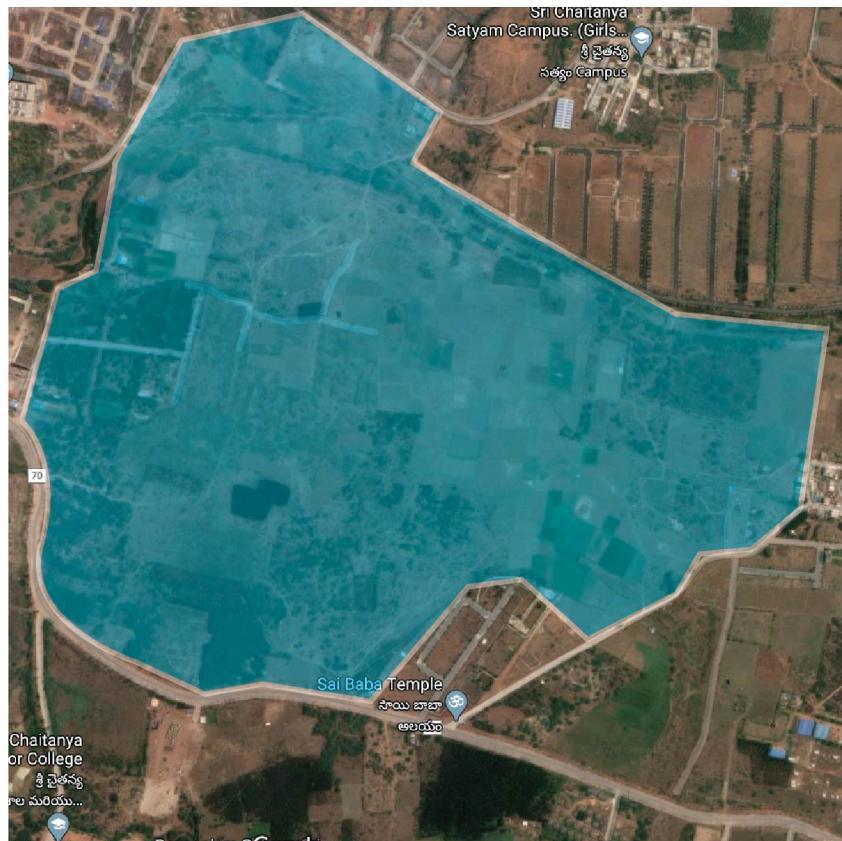
TOOLKIT

PART 4

SITE ANALYSIS

SITE SELECTION PROCESS :

COMPARITIVE STUDY OF SITES



LOCATION 1: KAPULAPADA, VIZAG.

EXTENT : 244 acres

LAND USE : Vacant Land near kapulapada industrial zone

ACCESS POINTS : Accessed by a main road

TOPOGRAPHY : Plain land with little dry vegetation

SHAPE : irregular type

SURROUNDING AREA TYPE : Empty grounds with scarce households

VEGETATION : Sparse random vegetation

VIEWS : None

CLIMATE : Hot and dry climate. Annual mean temperature range between 28–35 °C. Minimum temperatures ranges between 25–28 °C.

DISTANCE FROM MAIN AREAS : 35 kms from the city core

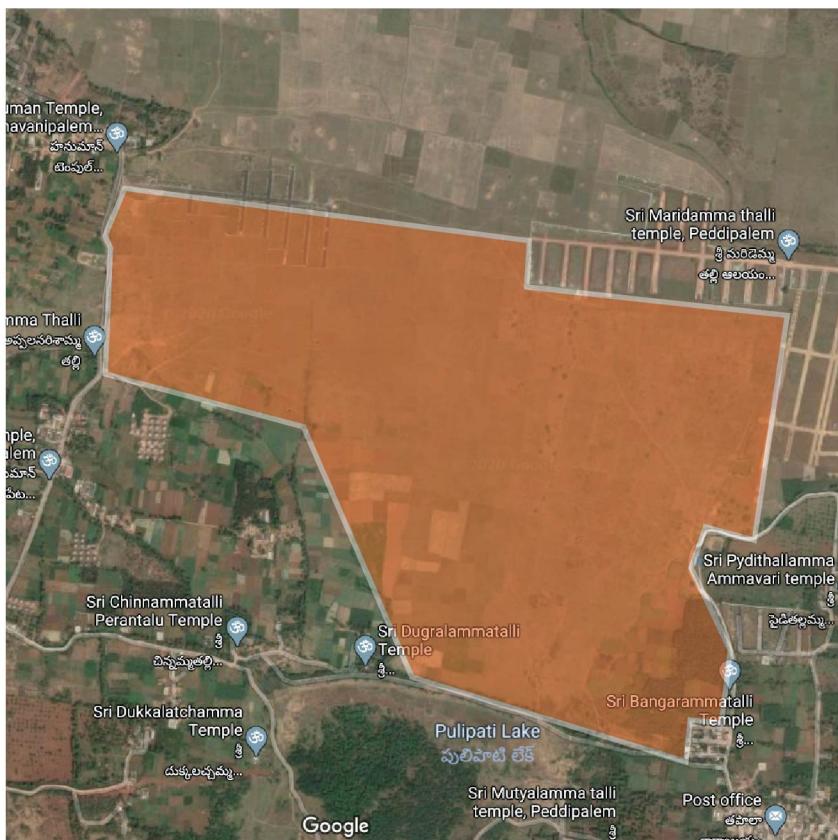
ASSETS : Flat barren land

LIABILITIES : Little distant from the city main area

INFERENCE : Can be used for manufacturing center but not ideal

SITE SELECTION PROCESS :

COMPARITIVE STUDY OF SITES



LOCATION : GAMBHIRAM, VIZAG

EXTENT : 210 acres

LAND USE : Govt. Industrial sector

ACCESS POINTS : Accessed by a main highway road

TOPOGRAPHY : Plain land with little plantation plots

SHAPE : Irregular

SURROUNDING AREA TYPE : Very minimal residential space with lot of heavy size vehicle plants

VEGETATION : Sparse random vegetation

VIEWS : None

CLIMATE : Hot and dry climate. Annual mean temperature range between 28–35 °C. Minimum temperatures ranges between 25–28 °C.

DISTANCE FROM MAIN AREAS : 30 kms from city core

ASSETS : Quiet area and good for industrial establishments

LIABILITIES : Little distant from the city main area

INFERENCE : Can be used for manufacturing center but not ideal

SITE SELECTION PROCESS :

COMPARITIVE STUDY OF SITES



LOCATION : VIMAN NAGAR CORRIDOR, VIZAG

EXTENT : 308 acres

LAND USE : Dry vegetation land bounded by industrial sectors

ACCESS POINTS : Accessed by a national highway

TOPOGRAPHY : Plain land with little vegetation with seasonal occurring ponds.

SHAPE : Trapezium type

SURROUNDING AREA TYPE : Industrial sector by VUDA, small scale residential spaces randomly.

VEGETATION : Sparse random vegetation

VIEWS : Highway & Open lands

CLIMATE : Visakhapatnam lies on 28m above sea level Visakhapatnam has a tropical climate. Annual mean temperature range between 24.7–30.6 °C. Minimum temperatures ranges between 20–27 °C. The highest maximum temperature ever recorded was 42.0 °C.

DISTANCE FROM MAIN AREAS : 8Kms from the city core

ASSETS : Logistics hub, Railway line, Airport, National Highway

LIABILITIES : very minimal

INFERENCE : Ideal for manufacturing plant as it has many supporting services that improve the functioning of the plant.

DETAILED SITE ANALYSIS :

1. LOCATION –

The site is located in vimaan nagar abutting the main national highway that runs along the city's main centres.

2. NEIGHBOURHOOD CONTEXT –

The site is in the main concentrated industrial zone of vizag city. In the closest proximity to the site exists the central logistics hub of vizag, opposite to the site on the other side of the highway is the airport. The site's back is bound by the hill of the megadri reservoir.

3. ZONING AND SIZE –

The plot measure 1Km deep inside and 1.5km along the highway. The back end of the site is curved with small seasonal water ponds. The site is estimated to cover an area of 1.75 Sq Kms that is well set for the establishment of projects such as a car manufacturing plant.

4. LEGAL INFORMATION –

The land is under the provision of the VUDA. The site is currently arid and dry, the government of AP has given up the proposal to make this zone as industrial sector of Vizag. Thus came up with future plans to establish a car plant or car assembly unit.

5. NATURAL PHYSICAL FEATURES –

The site has a medium size seasonal pond and a small stream that has chances to fill during the monsoons. The site is covered with dry vegetation with very small number of trees.

6. MAN MADE FEATURES –

The site has no traces of man made structures in the present conditions.

7. ACCESS / CIRCULATION –

The site can be reached by the National Highway 16 that abuts the site. An internal road from the NH 16 leads us into the site from the other side.

8. UTILITIES –

The site has easy access to the electricity as the logistics hub is in a very close distance. The site is well connected with roadways, there is also a railways line that runs behind the site. This particular rail line is used by many companies that are existing in this industrial corridor.

9. CLIMATE –

Visakhapatnam has a tropical wet and dry climate. The annual mean temperatures ranges between 24.7–30.6 °C (76–87 °F), with the maximum in the month of May and the minimum in January; the minimum temperatures ranges between 20–27 °C (68–81 °F). The highest maximum temperature ever recorded was 42.0 °C (107.6 °F) in 1978, and the lowest was 20.0 °C (68 °F) in 1904. It receives rainfall from the South-west and North-east monsoons and the average annual rainfall recorded is 1,118.8 mm (44.05 in).

The climate is hot. Jun–Oct is rainy monsoon season, with possible small cyclones. Dry season (Dec–May) is the peak travel time.

10. HUMAN AND CULTURAL –

Over the years, Visakhapatnam has turned from a fishing village into a commercial city with busy streets. Visakhapatnam is ranked 122 in the list of fast-growing cities in the world. The population crossed two million mark after expansion of the city limits and stands at 2,035,922. Telugu is the most predominantly spoken language by the native speakers. Hindi is also spoken widely in this city by localities also.

A cosmopolitan population of Visakhapatnam comprise Tamils, Malayalis, Sindhis, Kannadigas, and also Odias.

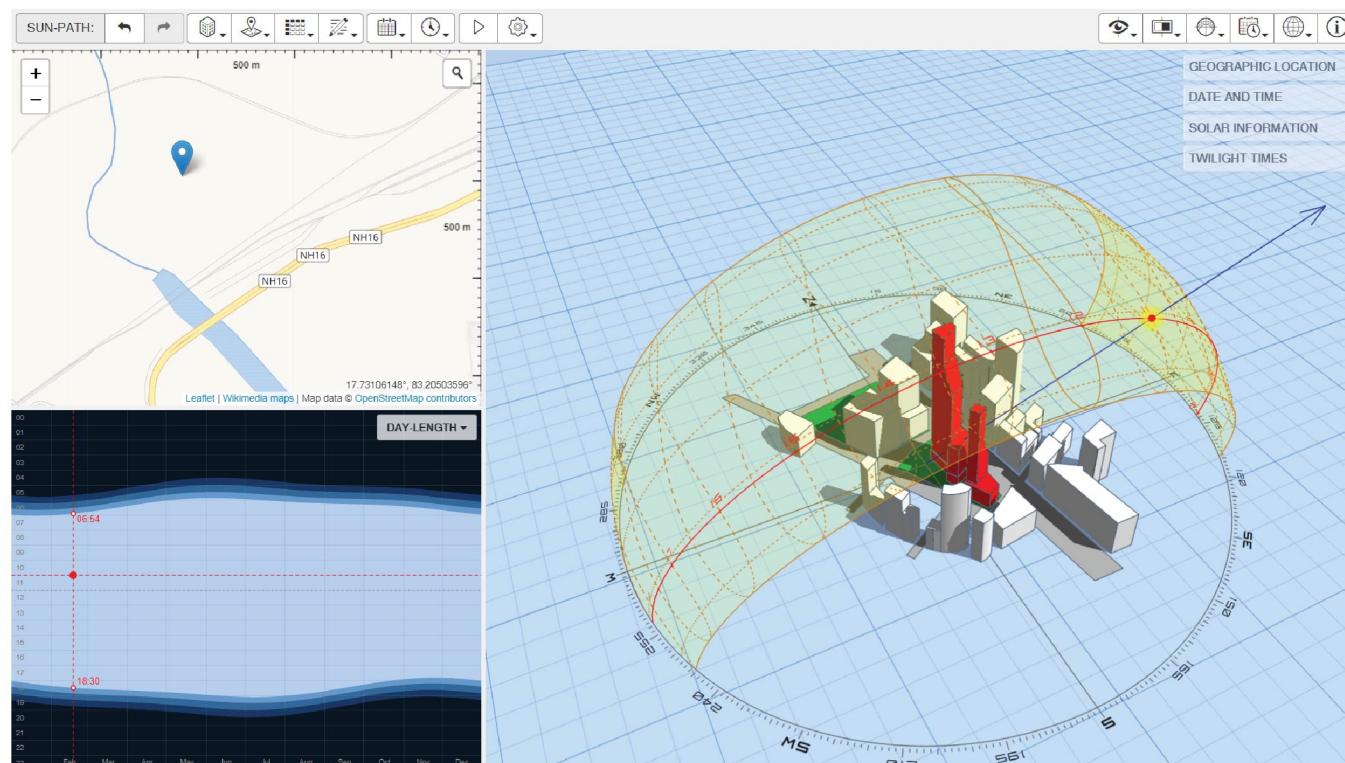
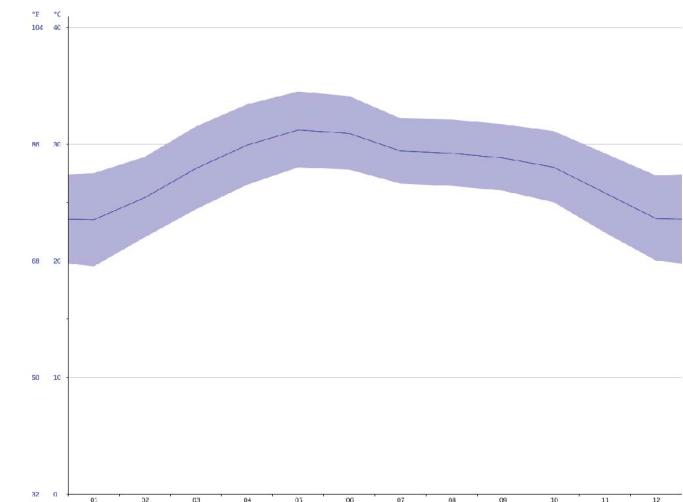
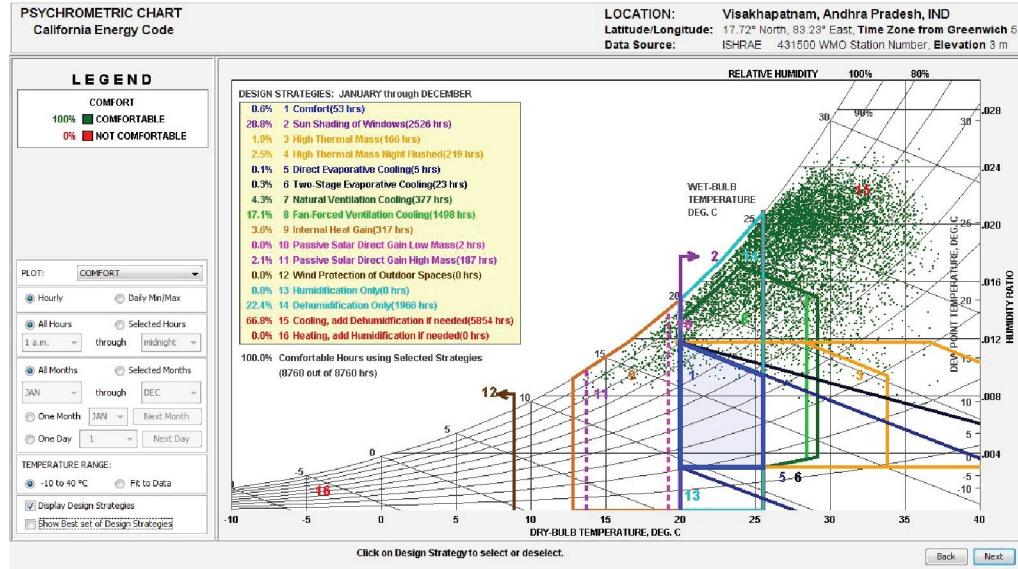
There is also an Anglo-Indian community, regarded as the first cosmopolitans of the city.

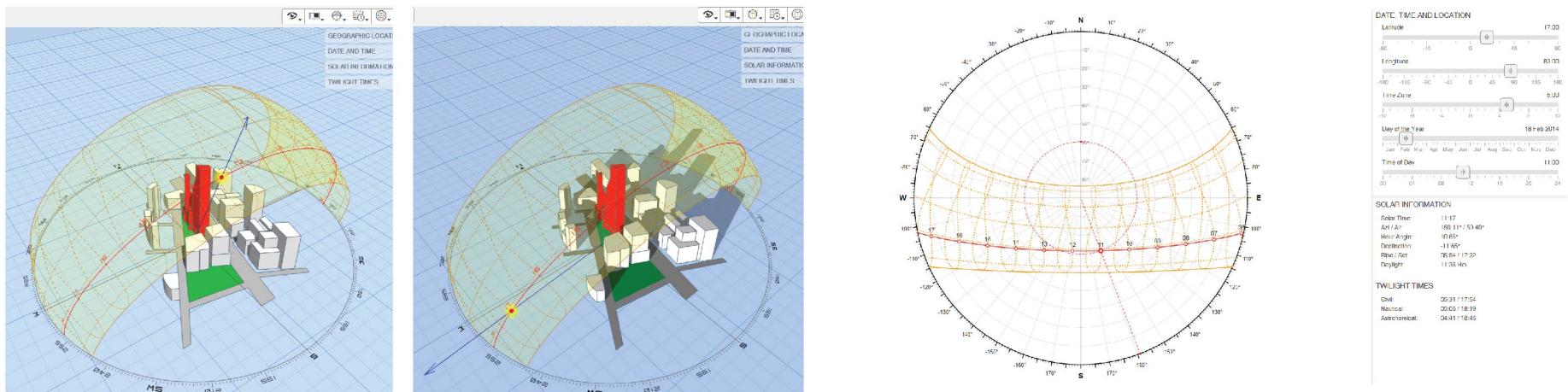


VISAKHAPATNAM WEATHER BY MONTH // WEATHER AVERAGES

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	23.6	25.4	27.8	29.9	31.2	36.0	38.1	38.2	38.8	38.1	35.8	33.6
Min. Temperature (°C)	19.6	22	24.4	26.5	28	27.8	26.8	28.4	28	25	22.4	20
Max. Temperature (°C)	27.5	28.9	31.5	33.4	34.5	34.1	32.2	32.1	31.7	31.1	29.2	27.3
Avg. Temperature (°F)	74.3	77.7	82.2	85.5	88.2	97.6	100.9	100.6	103.8	102.4	102.6	94.5
Min. Temperature (°F)	67.1	71.6	75.9	79.7	82.4	92.0	98.9	97.5	98.0	77.0	72.3	68.0
Max. Temperature (°F)	81.5	84.0	88.7	92.1	94.1	93.4	90.0	88.8	89.1	88.0	94.0	83.1
Precipitation / Rainfall (mm)	10	9	12	21	52	106	136	147	177	269	73	6

The difference in precipitation between the driest month and the wettest month is 253 mm. The variation in annual temperature is around 7.699999999999999.





INFERENCES

The study of sunpath gives us inferences about various objectives :

- It gives us the sun orientation details, by which we can position the solar panels in a proper direction to grasp the maximum solar light.
- Provisions of clerestory lighting and efficient positioning of openings can be done
- Can also give us information of shade factors, which can help us in placement of buildings by understanding concepts such as mutual shades and wind corridors.

THE SITE PREMISES > > >



USER ACTIVITY ANALYSIS :

Security entry	Nature	Activity	Users	Time of usage	Environment
information desk	Public	Enquiry	Visitors, Officials	Working Hours	Standard
security personel cabin	Private	Control operations	Security personel	All time	Secured
security personel longue	Private	Casual space	Security personel	Working Hours	Secured
server room	Restricted private	Data room	Technical personel	Working Hours	Secured
equipment storage	Private	Material storage	staff & security	Working Hours	Standard
waiting lobby	Public	Waiting	Visitors, Officials	Working Hours	Standard
cabinet spaces	Restricted private	Storage	staff & security	Working Hours	Standard
small scale work desks	Private	working	Officials	Working Hours	Standard
drinking water provision	Public	water facility	Public	Working Hours	Standard
Toilets M & F	Private	Washrooms	Visitors, Officials	Working Hours	Sterile

Admin block	Nature	Activity	Users	Time of usage	Environment
Help desk	Public	Enquiry	Visitors & officials	Working hours	Welcoming & neat
Waiting lobby	Public	Waiting	Visitors & officials	Working hours	Luxurious & Cozy
Company gallery	Public	Observation	Visitors & officials	Working hours	Luxurious & Cozy
Awards display	Public	Observation	Visitors & officials	Working hours	Welcoming & neat
BoD office	Private	Meetings	Executive officials	Working hours	Classic & Cozy
Team leaders office	Office	Working space	Office & staff	Anytime	Classic & Cozy
Dealer relation office	Executive	Meetings	Executive officials	Working hours	Luxurious & Cozy
Marketing and media office	Restricted public	Meetings	Executive officials	Working hours	Classic & Cozy
Press meeting office	Restricted public	Press release	Office & staff	During releases	Welcoming & neat
Retail statistics office	Private	Office	Office & staff	Anytime	Classic & Cozy
Conference room	Private	Meetings	Office & staff	Anytime	Luxurious & Cozy
Logistics management office	Private	Working space	Office & staff	Anytime	Classic & Cozy
Stationery office	Office	Working space	Office & staff	Anytime	Standard
internal cafeteria & pantry	Private	refreshments	Office & staff	Anytime	Standard
Small meeting rooms	Private	Meetings	Office & staff	Anytime	Classic & Cozy
relaxation longues	Private	Relaxation	Office & staff	Anytime	Classic & Cozy
Audit & document office	Executive	Working space	Executive officials	Working hours	Classic & Cozy
Mini hospital	Private	Hospitality services	Office & staff	Anytime	Sterile & Hygenic
Plant surveillance office	Private	Observation	Office & staff	Anytime	Standard
Toilets M & F	Private	washrooms	Office & staff	Anytime	Sterile & Hygenic

USER ACTIVITY ANALYSIS :

Press Shop	Nature	Activity	Users	Time of usage	Environment
Truck unload deck	Semi Private	unloading	dock staff	Working Hours	Safe & Industrial
Steel roll garage	Private	Storage	Maintainance staff	Working Hours	Stacks & Garage
Machine loading station	Restricted	Machinery hub	Press staff	Working Hours	Safe & Industrial
Cutting ports of parts	Restricted	Cutting	Press staff	Working Hours	Safe closure
Conveyer belt to press	Semi Private	transportation belt	Press staff	Working Hours	heavy machinery
Press shop for parts	Restricted	Machinery hub	Press staff	Working Hours	heavy machinery
Mould storage garage	Staff entry only	moulds store	Office & staff	Anytime	mould storage section
Stacking for finish parts	Staff entry only	Storage	Office & staff	Anytime	Storage of parts
Surveillance hub	Security	observatory	Security personel	Anytime	standard
Staff entry cabin	Security	staff registration	Office & staff	Working Hours	standard
Staff longue & lockers	Staff entry only	Relaxation	Press staff	Working Hours	standard
First aid	Private	Hospitality	Office & staff	Anytime	sterile & clean
Toilets	public	Washrooms	Office & Staff	Anytime	sterile & clean

Body Shop	Nature	Activity	Users	Time of usage	Environment
Verification port of parts	Restricted private	Verification	Office & Staff	Working Hours	Storage
Machine loading station	Restricted private	Loading dock	Body staff	Working Hours	Heavy machinery
Door joinery line	Restricted private	Door fixing	Body staff	Working Hours	Heavy machinery
Bonet & front line	Private	Bonet fixing	Body staff	Working Hours	Heavy machinery
Back line	Private	back parts fixing	Body staff	Working Hours	Heavy machinery
Main chasis joinery	Private	Main body chasis	Body staff	Working Hours	Heavy machinery
Underbody joinery	Private	Sub structure chasis	Body staff	Working Hours	Heavy machinery
All parts marriage	Restricted private	Overall fixtures	Body staff	Working Hours	Heavy machinery
Conveyer bridge to paint shop	Semi private	Transportation to paint	Office & Staff	anytime	Heavy machinery
Surveillance hub	Private	observatory	security personel	anytime	Security hub
Staff entry cabin	Private	staff registration	Office & Staff	Working Hours	standard
Staff longue & lockers	Semi private	Relaxation	Office & Staff	Working Hours	standard
First aid	Private	Hospitality	Office & Staff	anytime	sterile & clean
Toilets	Public	Washrooms	Office & Staff	anytime	sterile & clean

USER ACTIVITY ANALYSIS :

Other Spaces	Nature	Activity	Users	Time of usage	Environment
Canteen / Mess	Semi Private	Food provision for workers	Workers & Staff	Anytime	Standard
Solar feeder plant	private	Solar energy from the plant	Electricity department	Anytime	Isolated & Protected
Electricity distribution yard	private	Electric board for distribution	Electricity department	Anytime	Isolated & Protected
Water treatment plant	private	Waste water and treatment plant	WWTP staff	Anytime	Isolated & Protected
Testing tracks	Semi Private	Vehicle on & off road testings	Inspection staff	Working hours	Supervised
Cycle stands	Semi Private	Cycles for in plant movement	Workers & visitors	Working hours	Standard

Paint Shop	Nature	Activity	Users	Time of usage	Environment
Car body loading station	Restricted private	Loading car to dipping	Heavy machine operators	Working Hours	Heavy machinery
Electro Phoretic coating	Isolated	Basic cleaning & base paint	Press shop staff	Working Hours	Electro dipping tank
PVC Lining	Private	Sealing the opens	Press shop staff	Working Hours	Standard & Workable
In and Out paint coat	Private	Manual painting	Press shop staff	Working Hours	Standard & Workable
Base coat line	Private	Mechanised base paint	Press shop staff	Working Hours	Standard & Workable
Clear coat line	Private	Mechanised clear coat	Press shop staff	Working Hours	Standard & Workable
Shine & gloss station	Private	Manual shine application	Inspection staff	Working Hours	Standard & Workable
Light tunnel & inspection	Restricted private	Manual inspection of shine	Inspection staff	Working Hours	White light observatory
Conveyer bridge to assembly	Restricted private	Transportation to assembly	Press shop staff	anytime	Machinery transport
Surveillance hub	Private	Observatory	Security personnel	anytime	Security hub
Staff entry cabin	Private	Staff registration	Office & Staff	Working Hours	Standard
Staff longue & lockers	Private	Relaxation	Office & Staff	Working Hours	Standard
First aid	Private	Hospitality	Office & Staff	anytime	sterile & clean
Toilets	Public	Washrooms	Office & Staff	anytime	sterile & clean

Rail freight Dock	Nature	Activity	Users	Time of usage	Environment
Platforms for service	Restricted staff	Platform for transportation	Freight staff	Anytime	Rail platforms
Managing office	Private	Activity statistics centre	Office & Staff	Anytime	Standard office
Loading platform	Private	Export vehicles loading point	Freight staff	Anytime	Rail platforms
Staff entry cabin	Private	Staff entry cabins	Office & Staff	Working Hours	Secured
Staff lockers	Private	Lockers for the staff	Office & Staff	Working Hours	Standard
Surveillance rooms	Restricted staff	Observatory of unit	Security personnel	Anytime	Standard
Toilets	Public	Washrooms	Assembly staff	Anytime	Sterile & Clean

USER ACTIVITY ANALYSIS :

Assembly Line	Nature	Activity	Users	Time of usage	Environment
Interior line	Private staff	Fixing the internal circuits	Assembly staff	Working Hours	Ergonomically standard
Door line	Private staff	Attaching the door units	Assembly staff	Working Hours	Ergonomically standard
Under body line	Private staff	Attaching the under body	Assembly staff	Working Hours	Ergonomically standard
Exterior line	Private staff	Fixing lights & sensors	Assembly staff	Working Hours	Ergonomically standard
Engine pre assembly line	Private staff	Installation of engine units	Assembly staff	Working Hours	Ergonomically standard
Marriage line	Private staff	Fixing of main engine to body	Engine staff	Working Hours	Fixing junction
Engine wiring	Private staff	Wiring to engine and body	Assembly staff	Working Hours	Ergonomically standard
Seat assembly	Private staff	Fixing the seats	Assembly staff	Working Hours	Ergonomically standard
Oils filling port	Private staff	Lubrication to parts	Mechanic staff	Working Hours	Fixing junction
Wheel mounting	Private staff	Fixing the wheels to body	Mechanic staff	Working Hours	Fixing junction
Interior testing line	Semi Private	Internal car testing	Assembly staff	Day light time only	Isolated testing pit
Exterior test track	Semi Private	Track testing	Inspection staff	Day light time only	Drive track
Rain shower test	Private staff	Heavy sprinkle testing booth	Inspection staff	Day light time only	Isolated testing pit
Car control test	Semi Private	Checking the controls in the car	Inspection staff	Working Hours	Isolated testing pit
Vehicle audit & approval	Private	Authorization and registering	Audit staff	Working Hours	Isolated testing pit
Staff entry cabin	Private	Staff entry registration	Assembly staff	Working Hours	Standard
Staff lockers	Private	Lockers for staff materials	Assembly staff	Working Hours	Secured
Changing rooms	Private	Dress changing rooms	Assembly staff	Working Hours	Secured
Relaxation room	Semi Private	Relaxation in breaks	Assembly staff	Working Hours	Standard
First aid room	Private	Hospitality services	Assembly staff	Anytime	Sterile & Clean
Surveillance rooms	Private	Observatory of unit	Security personnel	Anytime	Standard
Toilets	Public	Washrooms	Assembly staff	Anytime	Sterile & Clean

Parkings	Nature	Activity	Users	Time of usage	Environment
Staff parking	Private	parking facility for workers	Staff	Anytime	Ample parking
Dealers parking	Private	parking facility for externals	External vendor officials	Anytime	Ample parking
Company vehicles for staff	Private	Bus parking for company	Company service	Working hours	Ample parking
Visitors / customers	Public	parking facility for visitors	Visitors	Working hours	Ample parking
Stock trucks zone	Private	Truck parking lanes for plant	Vendor materials suppliers	Anytime	Ample parking

USER ACTIVITY ANALYSIS :

Customer Expo	Nature	Activity	Users	Time of usage	Environment
Reception	Public	Enquiry & Information	Public & Visitors	Working Hours	Welcoming & Cozy
Waiting lobby	Public	Waiting zone	Public & Visitors	Working Hours	Classy & Cozy
Purchase section	Public	Vehicle purchase dealings	Customers & Officials	Customers visits	Luxurious & Cozy
Sport vehicle section	Restricted Public	Sport vehicle purchase section	Customers & Officials	Customers visits	Luxurious & Cozy
Merchandise shop	Public	Company merchandise store	Public & Visitors	Working Hours	Classy & Cozy
Custom made project space	Restricted Public	Bespoke purchase dealings	Customers & Officials	Customers visits	Luxurious & Cozy
Car handover office	Restricted Public	Company handover to client	Customers & Officials	Working Hours	Classy & Cozy
The franchise lounge	Private	Company executive spaces	Company executives	Working Hours	Merchandise sales
Terrace view	Public	Public & customers view zone	Public & Visitors	Working Hours	Safe & Protected
Executive board room	Private	Company executive spaces	Customers & Officials	Meeting hours	Luxurious & Cozy
Club room	Restricted Public	Executives relaxation space	Customers & Officials	Working Hours	Classy & Cozy
Auditorium	Public	Releases and new exhibits	Public & Visitors & Media	During events	Elegant & Cozy
Restaurant & Kitchen	Public	Continental dining services	Customers & Officials	During events	Classy & Cozy
Snacks bar	Public	Snacks provision for users	Customers & Officials	During events	Standard
Surveillance hub	Private	Observatory unit	Security personnel	Anytime	Standard
Staff entry cabin	Private	Staff entry cabins	Expo staff	Working Hours	Standard
Staff longue & lockers	Private	Relaxation in breaks	Expo staff	Working Hours	Secured
First aid	Public	Hospitality services	Public & Visitors	Anytime	Sterile & Clean
Toilets	Public	Washrooms	Public	Anytime	Sterile & Clean

AREA ESTIMATES :

Main entry			
Sr. No	Space	Area in sqm	Qty
1	information desk	16	1
2	security personel cabin	15	1
3	security personel longue	35	2
4	server room	25	1
5	equipment storage	15	1
6	waiting lobby	30	1
7	cabinet spaces	15	1
8	small scale work desks	10	1
9	drinking water provision	2	1
10	Toilets M & F	30	required

Sr. No	PRESS SHOP	Area in sqm
1	Truck unload deck	
2	Steel roll garage	
3	Machine loading station	
4	Cutting ports of parts	
5	Conveyer belt to press	
6	Press shop for parts	
7	Mould storage garage	
8	Stacking for finish parts	
9	Surveillance hub	
10	Staff entry cabin	
11	Staff longue & lockers	
12	First aid	
13	Toilets	

19800

PART 4

DOMESTIC

PART 5 AREAS

AREA ESTIMATES :

Sr.No	BODY SHOP	Area in sqm
1	Verification port of parts	37500
2	Machine loading station	
3	Door joinery line	
4	Bonet & front line	
5	Back line	
6	Main chassis joinery	
7	Underbody joinery	
8	All parts marriage	
9	Conveyer bridge to paint shop	
10	Surveillance hub	
11	Staff entry cabin	
12	Staff longue & lockers	
13	First aid	
14	Toilets	

Sr. No	PAINT SHOP	Area in sqm
1	Car body loading station	28000
2	Electro Phoretic coating	
3	PVC Lining	
4	In and Out paint coat	
5	Base coat line	
6	Clear coat line	
7	Shine & gloss station	
8	Light tunnel & inspection	
9	Conveyer bridge to assembly	
10	Surveillance hub	
11	Staff entry cabin	
12	Staff longue & lockers	
13	First aid	
14	Toilets	

Sr. No	FREIGHT PORT	Area in sqm
1	Platforms for service	1500
2	Managing office	
3	Loading platfrm	
4	Staff entry cabin	
5	Staff lockers	
6	Surveillance rooms	
7	Toilets	

Parkings			
Sr. No	Space	Area in sqm	Qty
1	Staff parking	14000	2
2	Dealers parking	5200	1
3	Company vehicles for staff	4200	1
4	Visitors / customers	5200	1
5	Stock trucks zone	3000	1
Total		31600	

Other spaces		
Sr. No	Space	Area in sqm
1	Canteen / Mess	1200
2	Solar feeder plant	over the blocks
3	Electricity distribution yard	10350
4	Water treatment plant	7,000
5	Testing tracks	1,50,000

PART 5

AREA ESTIMATES :

Admin block			
Sr. No.	Space	Area in sqm	Qty
1	Help desk	25	2
2	Waiting lobby	75	1
3	Company gallery	100	1
4	Awards display	75	1
5	BoD office	100	1
6	Team leaders office	150	1
7	Dealer relation office	100	1
8	Marketing and media office	220	2
9	Press meeting office	120	1
10	Retail statistics office	100	1
11	Conference room	220	2
12	Logistics management office	100	1
13	Stationery office	30	1
14	internal cafeteria & pantry	30	1
15	Small meeting rooms	180	3
16	relaxation longues	100	2
17	Audit & document office	150	2
18	Mini hospital	300	1
19	Plant surveillance office	250	1
20	Toilets M & F	80	required
Total Area		2505	

Sr. No	ASSEMBLY LINE	Area in sqm
1	Interior line	
2	Door line	
3	Under body line	
4	Exterior line	
5	Engine pre assembly line	
6	Marriage line	
7	Engine wiring	
8	Seat assembly	
9	Oils filling port	
10	Wheel mounting	
11	Interior testing line	
12	Exterior test track	
13	Rain shower test	
14	Car control test	
15	Vehicle audit & approval	
16	Staff entry cabin	
17	Staff lockers	
18	Changing rooms	
19	Relaxation room	
20	First aid room	
21	Surveillance rooms	
22	Toilets	

36000

Sr. No	CUSTOMER EXPO	Ground cover
1	Reception	
2	Waiting lobby	
3	Purchase section	
4	Sport vehicle section	
5	Merchandise shop	
6	Custom made project space	
7	Car handover office	
8	The franchise lounge	
9	Terrace view	
10	Executive board room	3850
11	Club room	
12	Auditorium	
13	Restaurant & Kitchen	
14	Snacks bar	
15	Surveillance hub	
16	Staff entry cabin	
17	Staff longue & lockers	
18	First aid	
19	Toilets	

PART 6

THE SITE

CONCEPT :

The vegetation cover is pretty minimum and has small seasonal water bodies , the wind flows from various sides and predominantly from the north east all through out the year.

Multiple ways of entry to site is possible, industrial rail line behind the site for materials, national highway as primary access and side road as the service way.

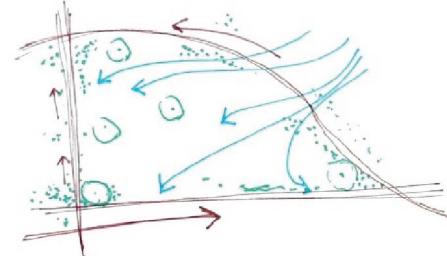
The extent of site can be zoned out into 3 parts :

1. Frontal part for all primary uses like parking, security check ups, formal landscape and solar plant.

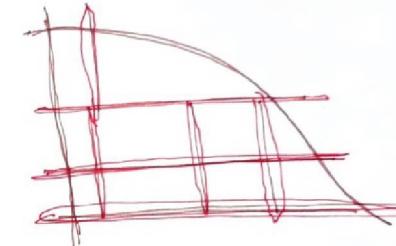
2. Mid part for secondary services like production halls, warehouses and etc.

3. Rear end for support services like rail line, logistics and future expansion.

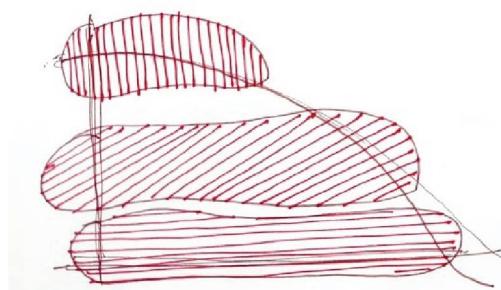
SITE LEVEL:



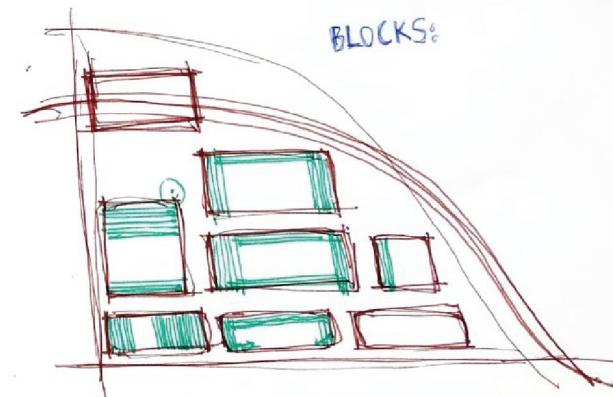
CIRCULATION:



ZONING:



BLOCKS:



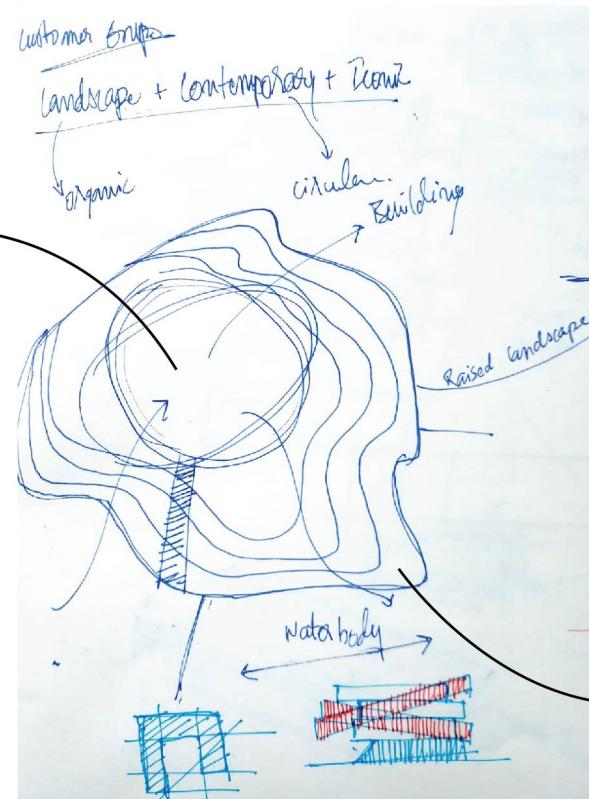
The site is covered with grid pattern circulation to improve the well connectivity to every zone of the site.

Efficiency is achieved through parallel linkage of the road networks.

All the blocks of the site are arranged as per the proximity and chain of activities in the production process.

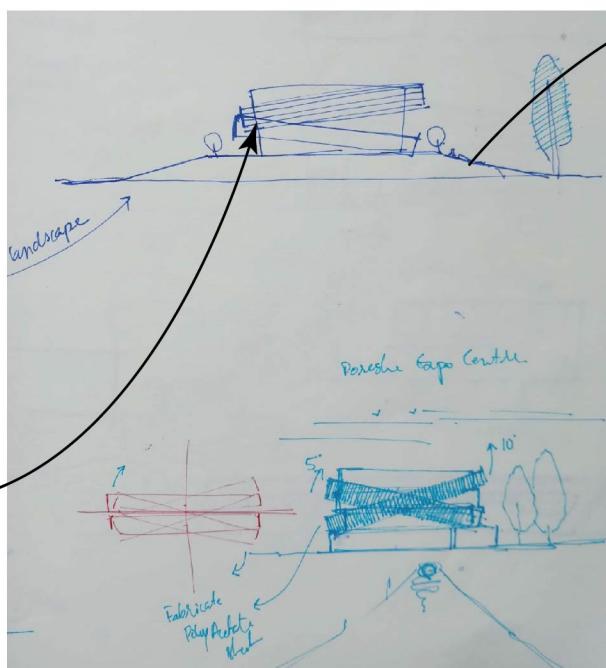
Various other services and blocks are well attached with one another, an suitable landscape will compliment the entire site.

CONCEPT :



Circular shape of the builing adds on interest and contrast to the entire site by making a large difference to the visual appeal.

Free organic patterns are given on the landscape surface of the expo block to compliment the curcular building.

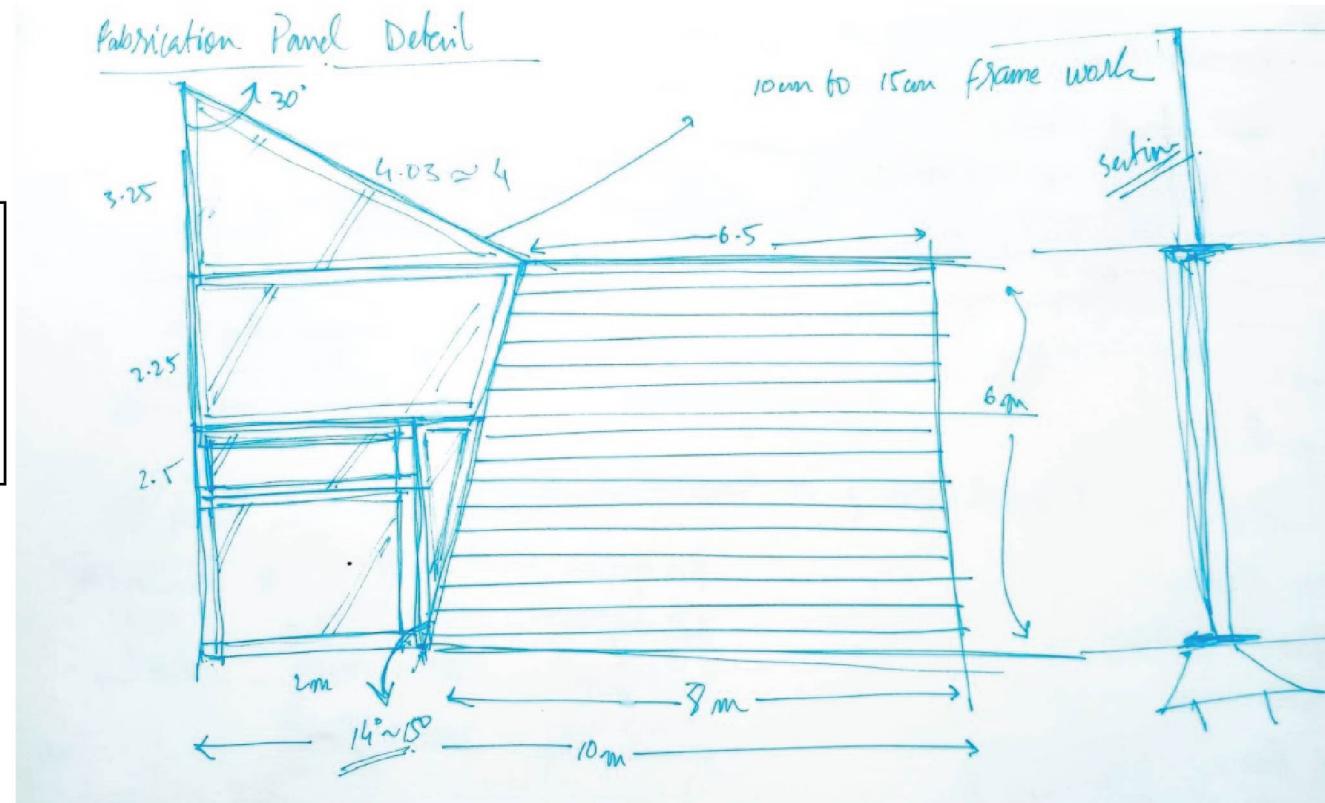


External rings are used as wind walls and also as decorative elements along with the factor of providing shade for the internal spaces.

Minimal rise is given to the contoured landscape zone with variations in colors and materialistic details.

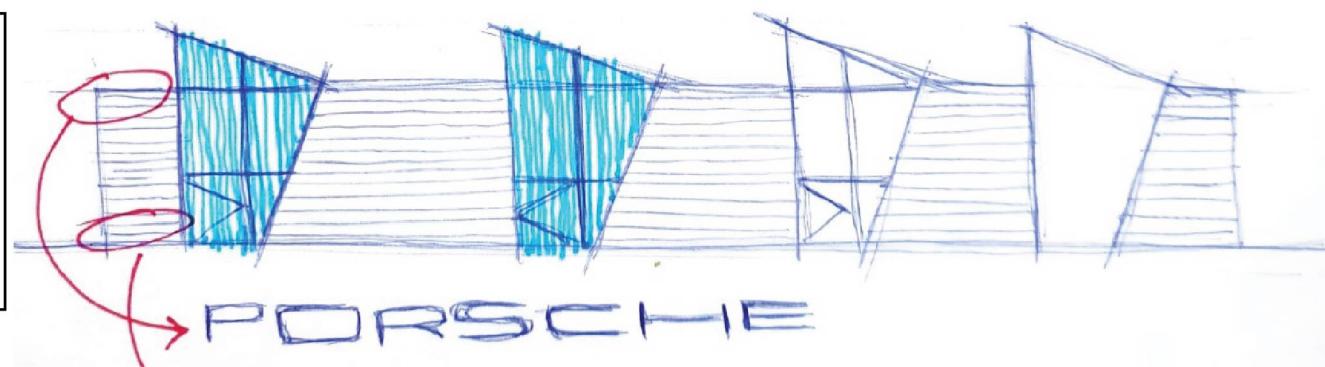
CONCEPT :

Sandwich layered shed structure envelop will aid the maximum insulation method to the production halls for making a better isolated space.



Fabrication design brings in the ease of making the shed structure for the entire production halls with the added feature of simple installation

Inclination on top of the shed structures will provide allowances for unstration of overhead solar panels to support the power production



Large and wide span openings improve light in to the space. The angling on the top helps wind to ease off the structures the spreading the wind load forces.

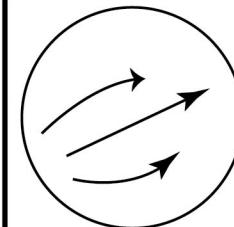
CONCEPT :



FREIGHT STATION

A freight station is, in the widest sense, a railway station where, either exclusively or predominantly, goods, such as merchandise, parcels, and manufactured items, are loaded onto or unloaded off of ships or road vehicles and/or where goods wagons are transferred to local sidings.

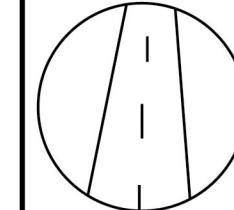
Having a zone such as this is very beneficial for various purposes for the plant.



WIND FACTOR

Being in the near proximity of the coastal line the site has the chances to experience the mild range of winds that prevail during the late afternoons that adds a relief to the users in the site.

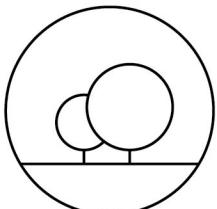
As a part of design, the structures can be made that can resist the force of wind in case of heavy cyclonic winds that can occur anytime.



ROADWAYS

The site has a major access from the National Highway that is adjacent to the longer side of the plot.

This acts as a very crucial way of access for materials, machinery, vehicles, people and various other services. Few small other roads are established around the site for traveling further inside the region.

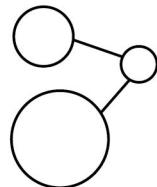


VEGETATION

The typology of vegetation present in the site is very less which comprises of shrubs and small scale trees.

The plot is a seasonal agriculture fields that are used when optimum water facilities are available

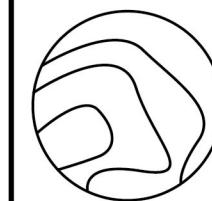
On the other hand most part of the year, the land is vacant and barren with dry vegetation.



SURROUNDINGS

The site is enriched with facilities and services that are needed for establishment of manufacturing units and further large scale projects

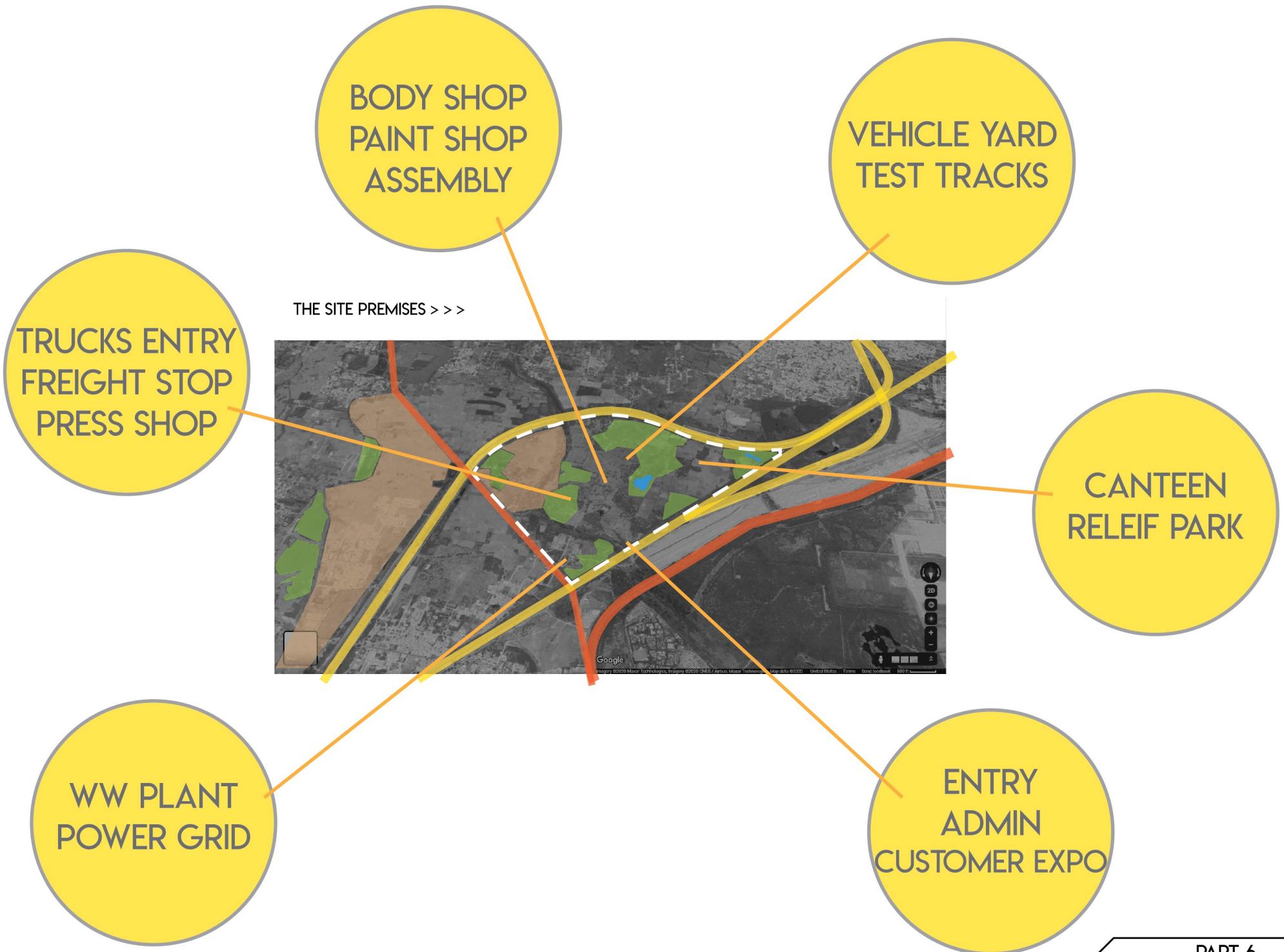
The efficient roads and rail lines for transport, The presence of logistics hub for in and out flow of various materials and availability of basic amenities is an edge to the site.



TOPOGRAPHY

The site is basically a barren land which is seasonally sometimes used for small scale cultivation. So, the land surface here is mostly plain and has small contour variation from 1m to 3m at some points of the site.

Since the proposed project is industrial theme, flat lands are much well preferred for the construction.



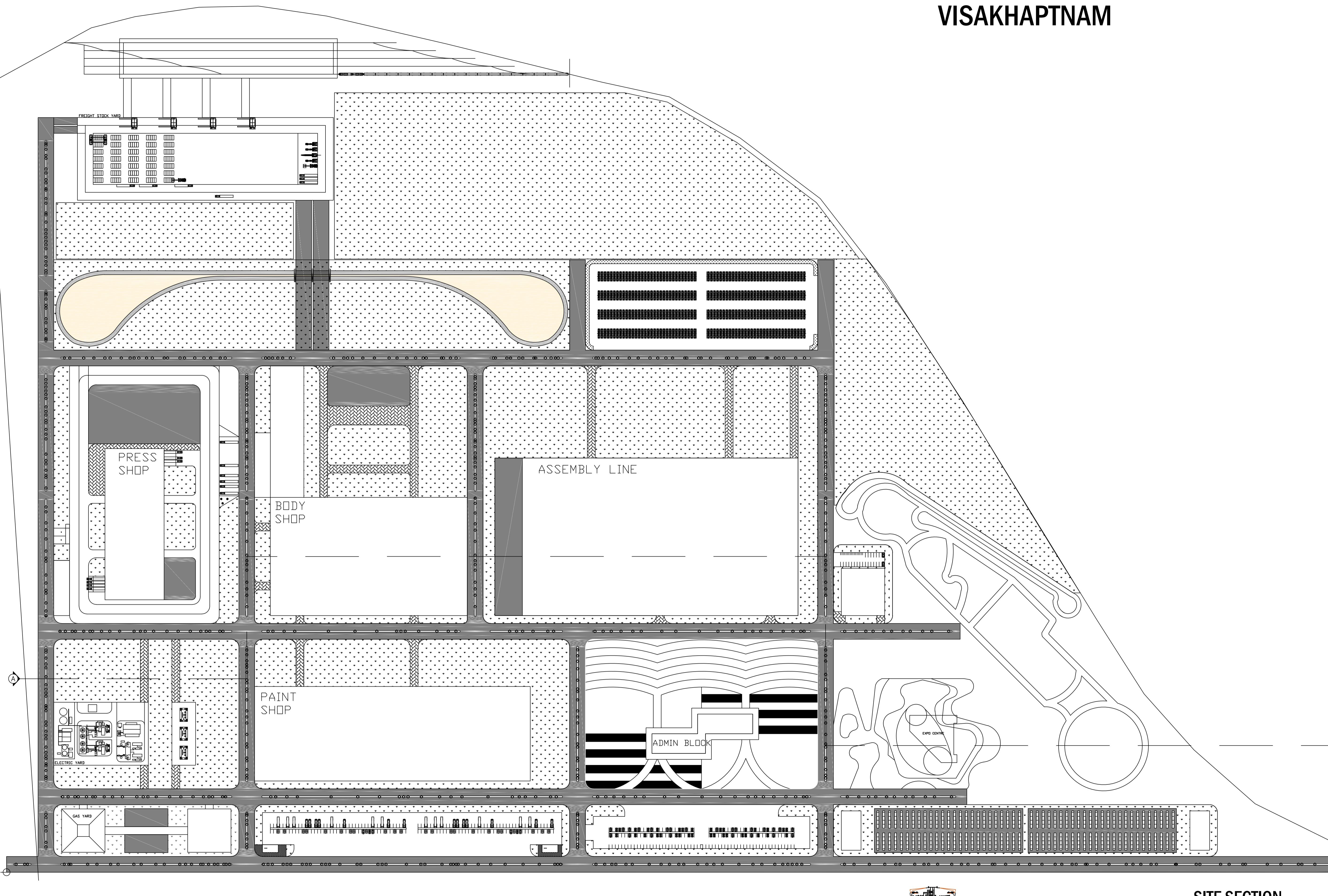
TOOLSTUDIO

PART 7
DRAWINGS

PORSCHE ELECTRIC CAR MANUFACTURING PLANT

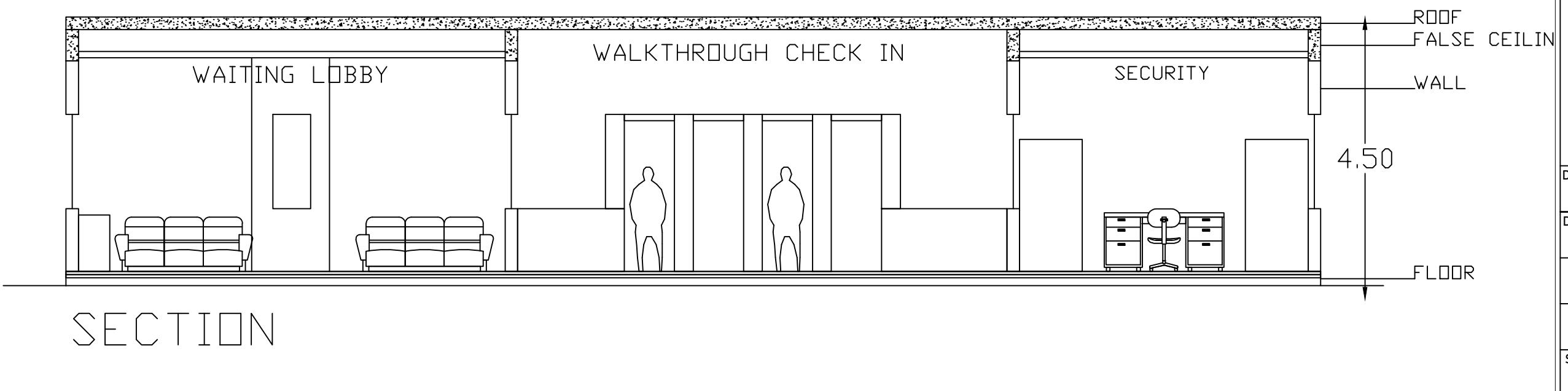
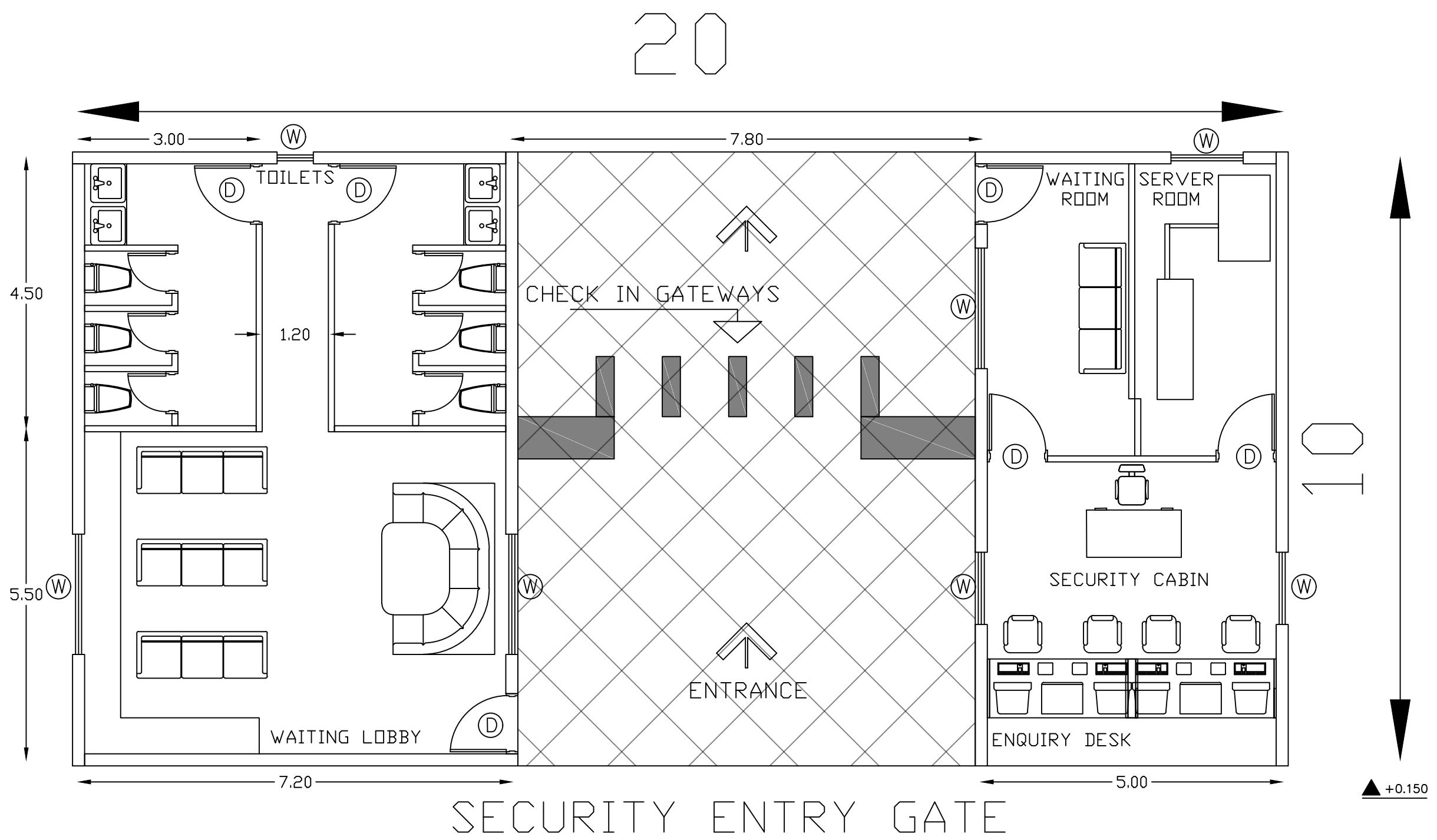
VISAKHAPATNAM

PORSCHE ELECTRIC CAR PL
VISAKHAPATNAM

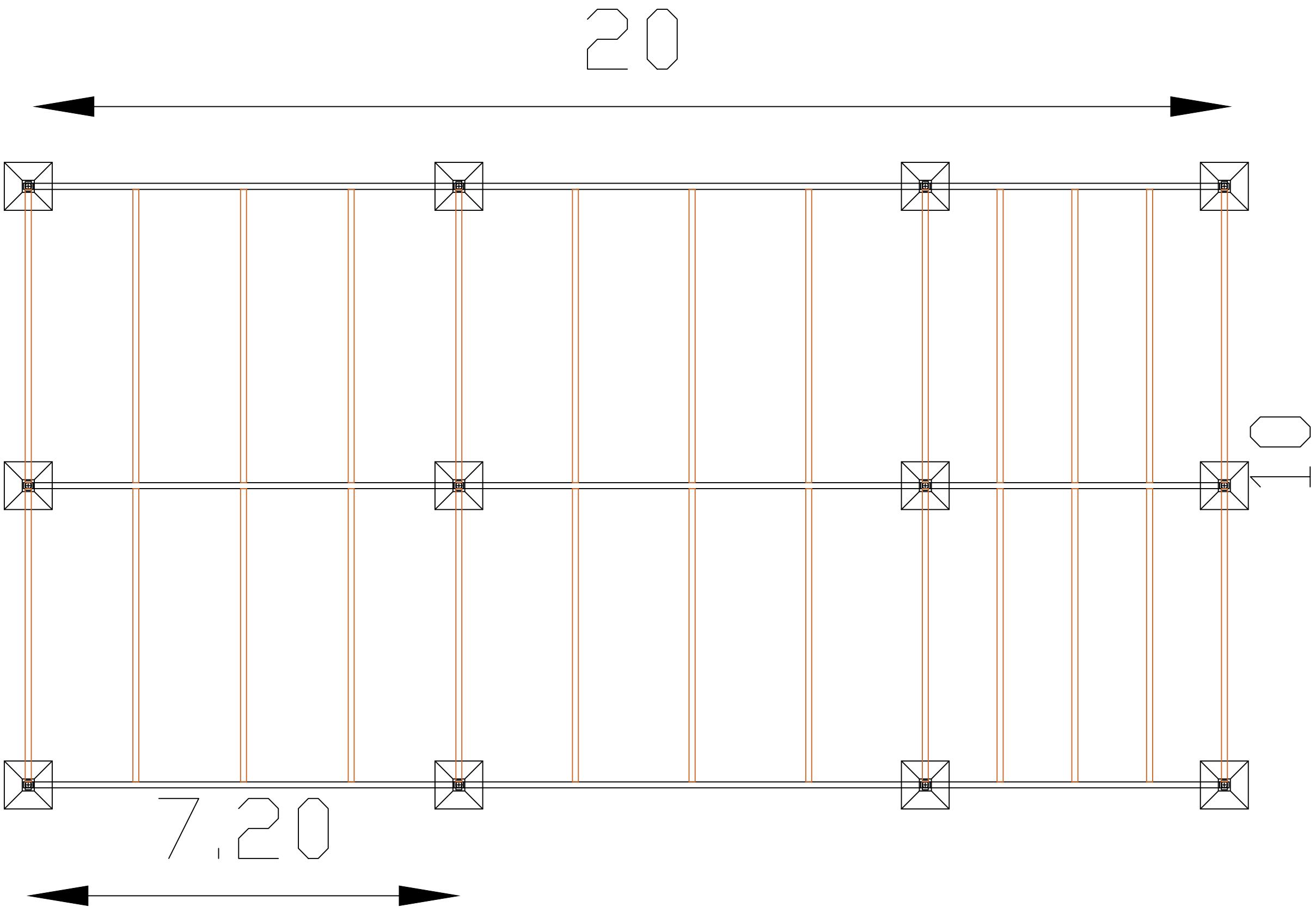


SITE SECTION

DRAWING TITLE: MASTER SITE PLAN & SECTION
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DEPT OF ARCHITECTURE
NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALI
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DRAWING TITLE : **SECURITY BLOCK**
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DRAWING TITLE :
STRUCTURAL DETAILS

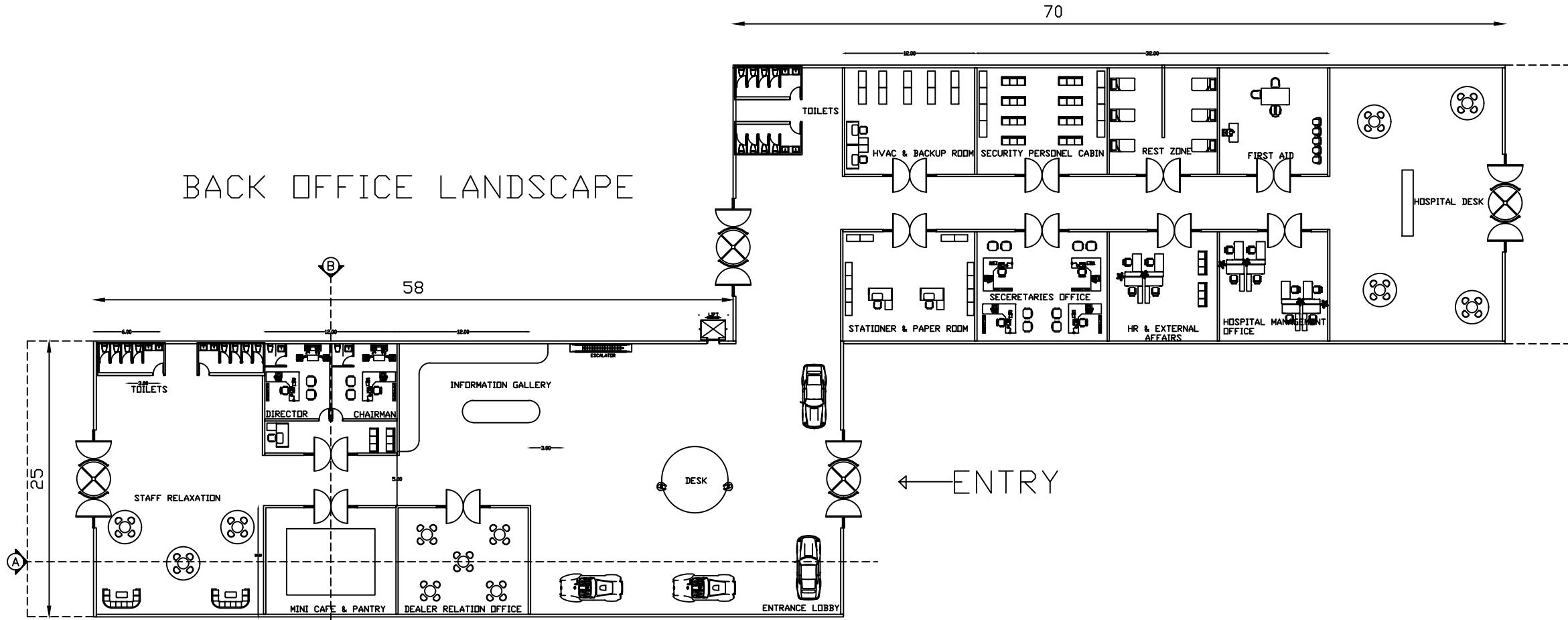
DONE BY :
V JAYA SURYA 10 11 15 043

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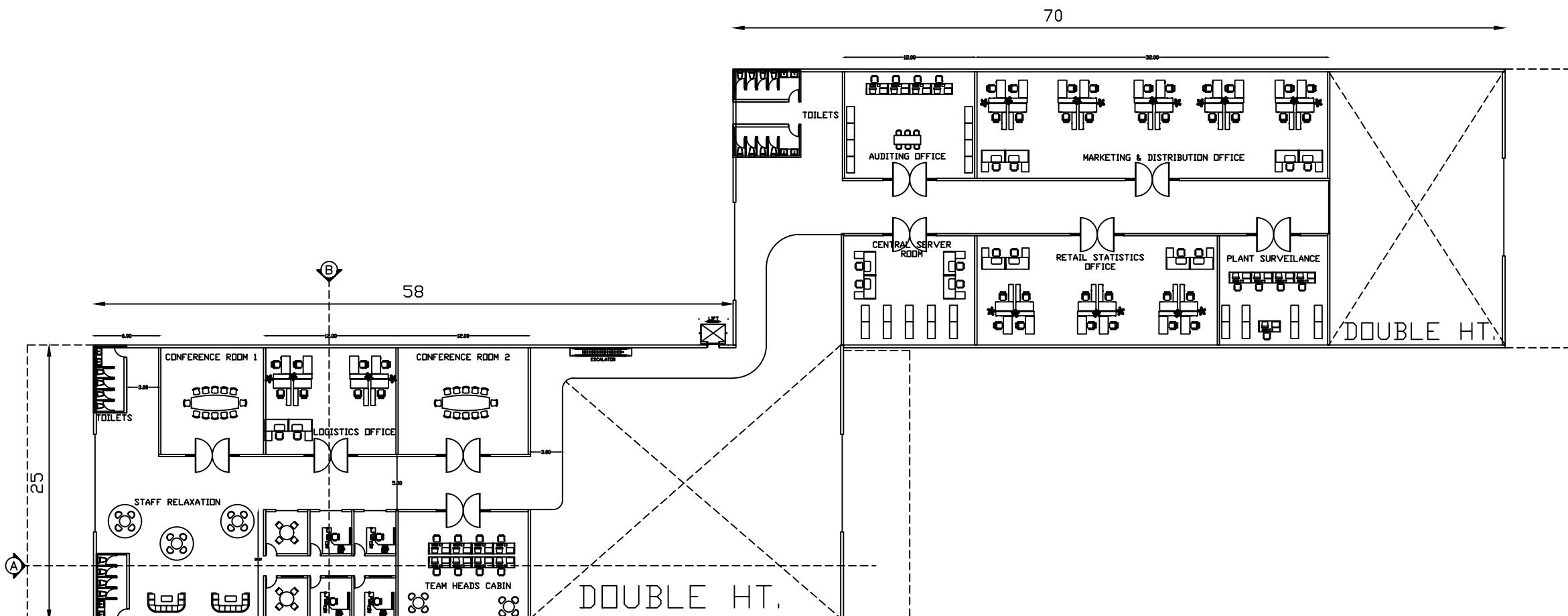
NATIONAL INSTITUTE OF TECHNOLOGY

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BACK OFFICE LANDSCAPE



ADMIN BLOCK GROUND FLOOR

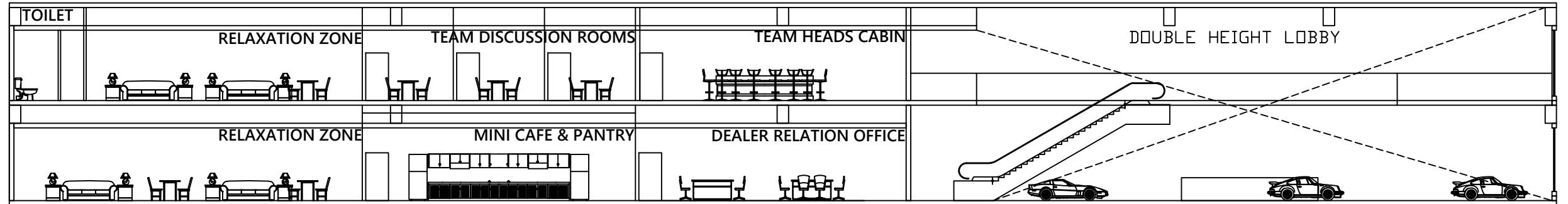


ADMIN BLOCK FIRST FLOOR

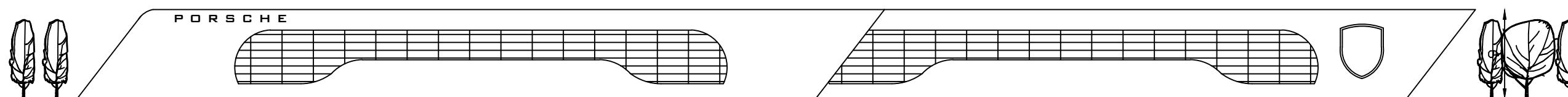
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ADMIN BLOCK PLAN
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PORSCHE ELECTRIC CAR PLA
VISAKHAPATNAM

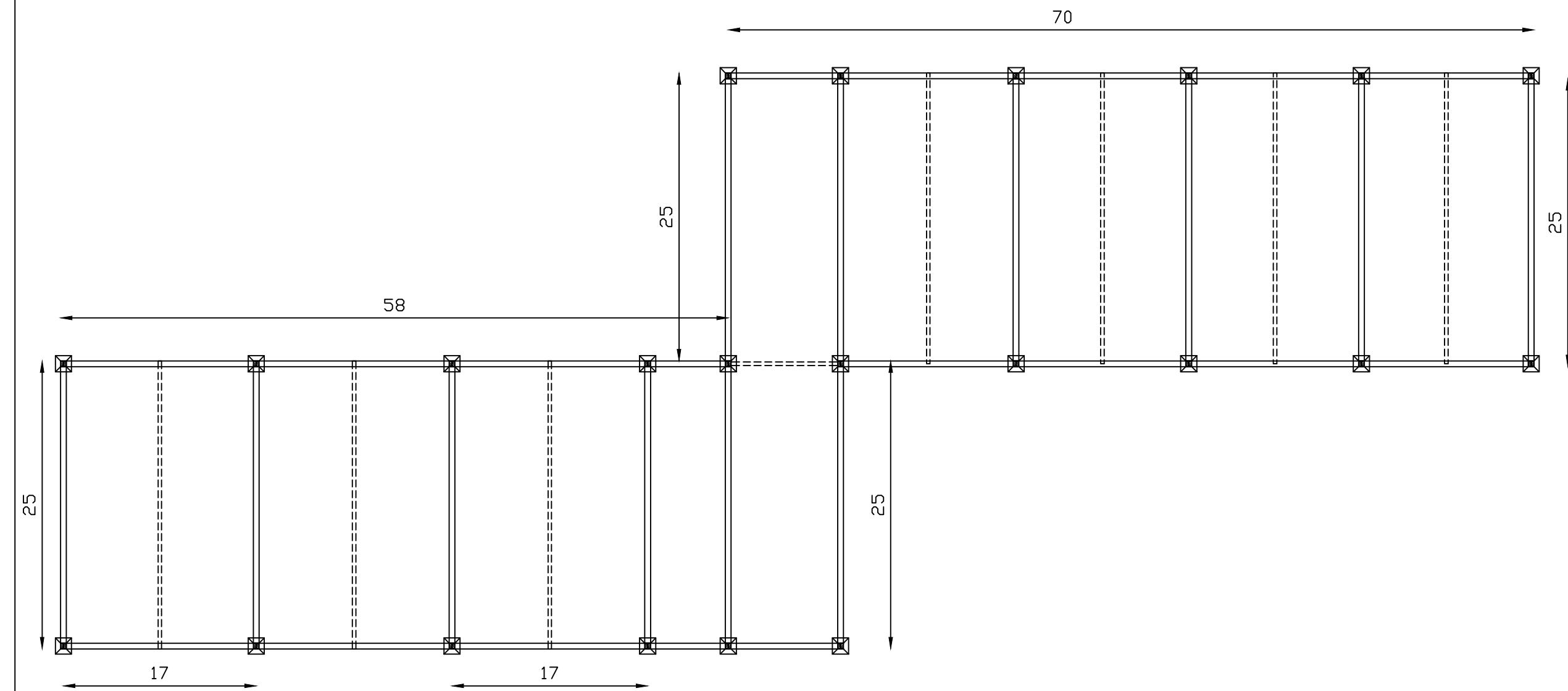


SECTION



ELEVATION

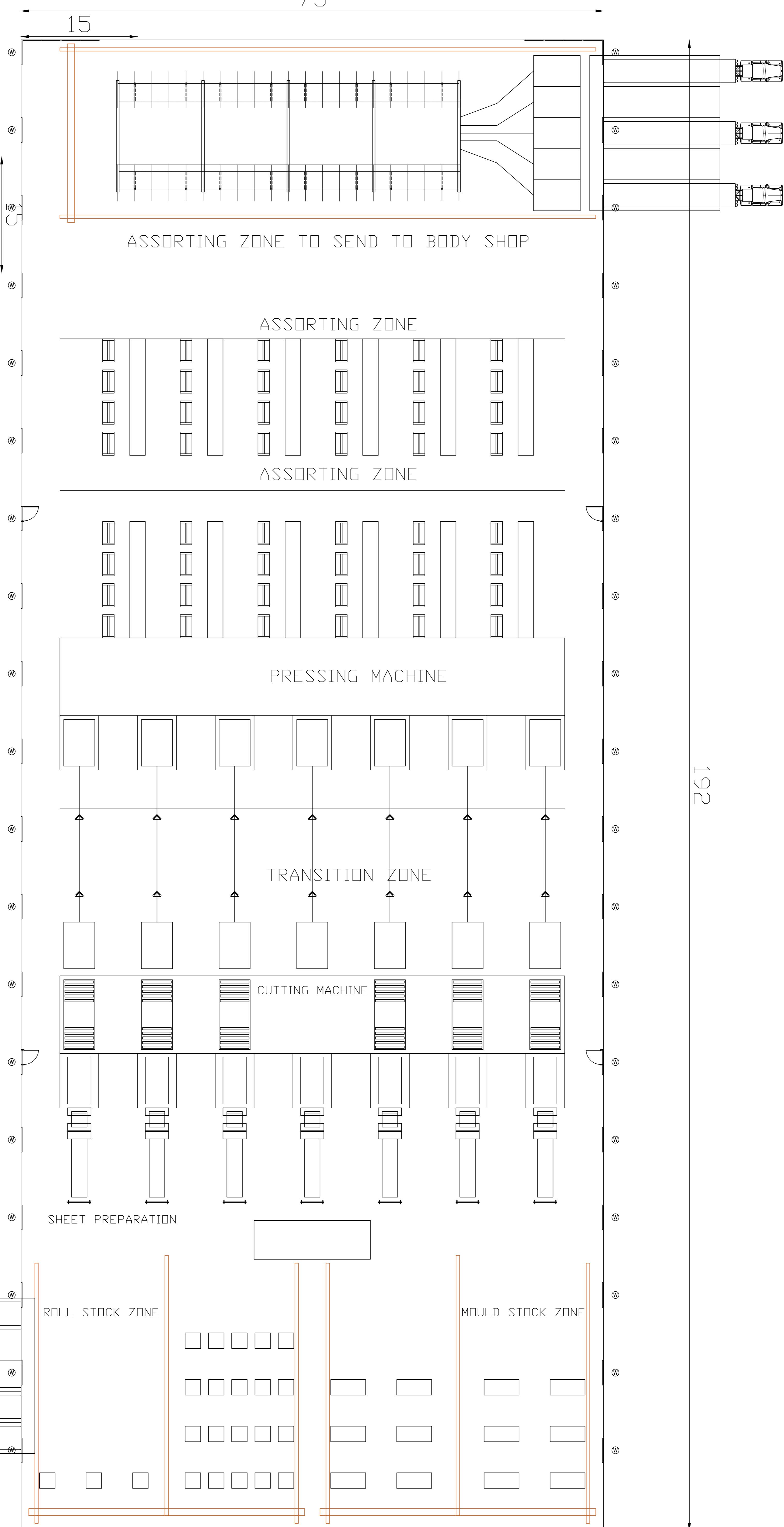
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ADMIN BLOCK : SECTION & ELEVATION
DONE BY :
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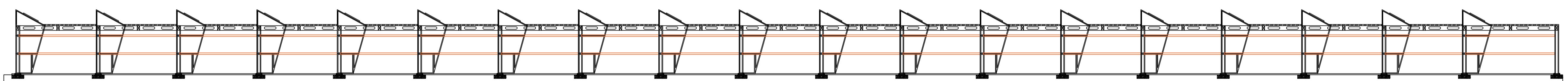
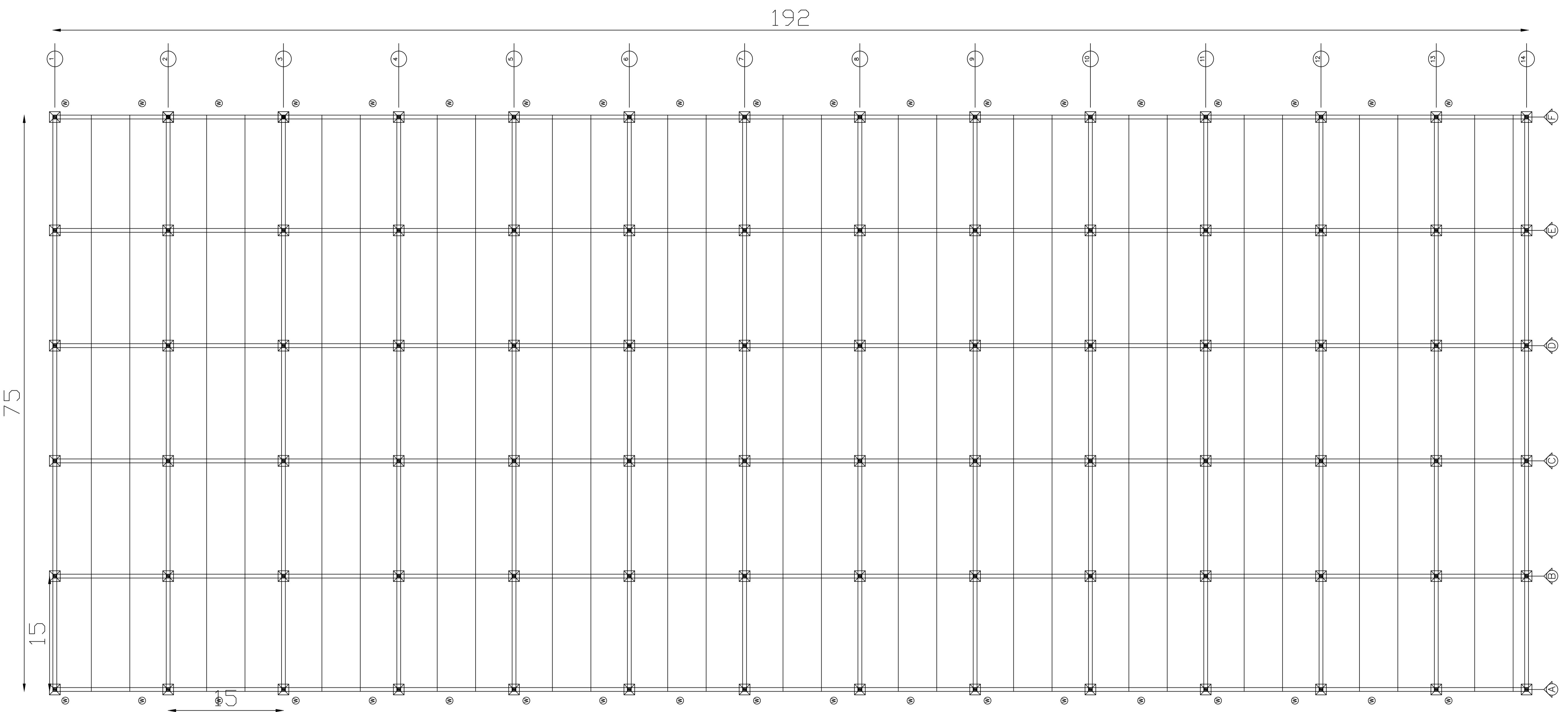


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ADMIN BLOCK : STRUCTURAL
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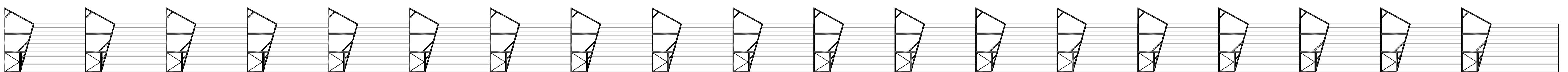
PRESS SHOP

75





SECTION



ELEVATION

DRAWING TITLE:

PRESS SHOP STRUCTURAL

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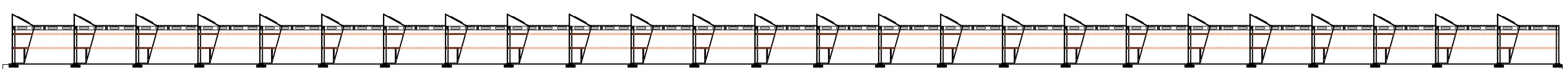
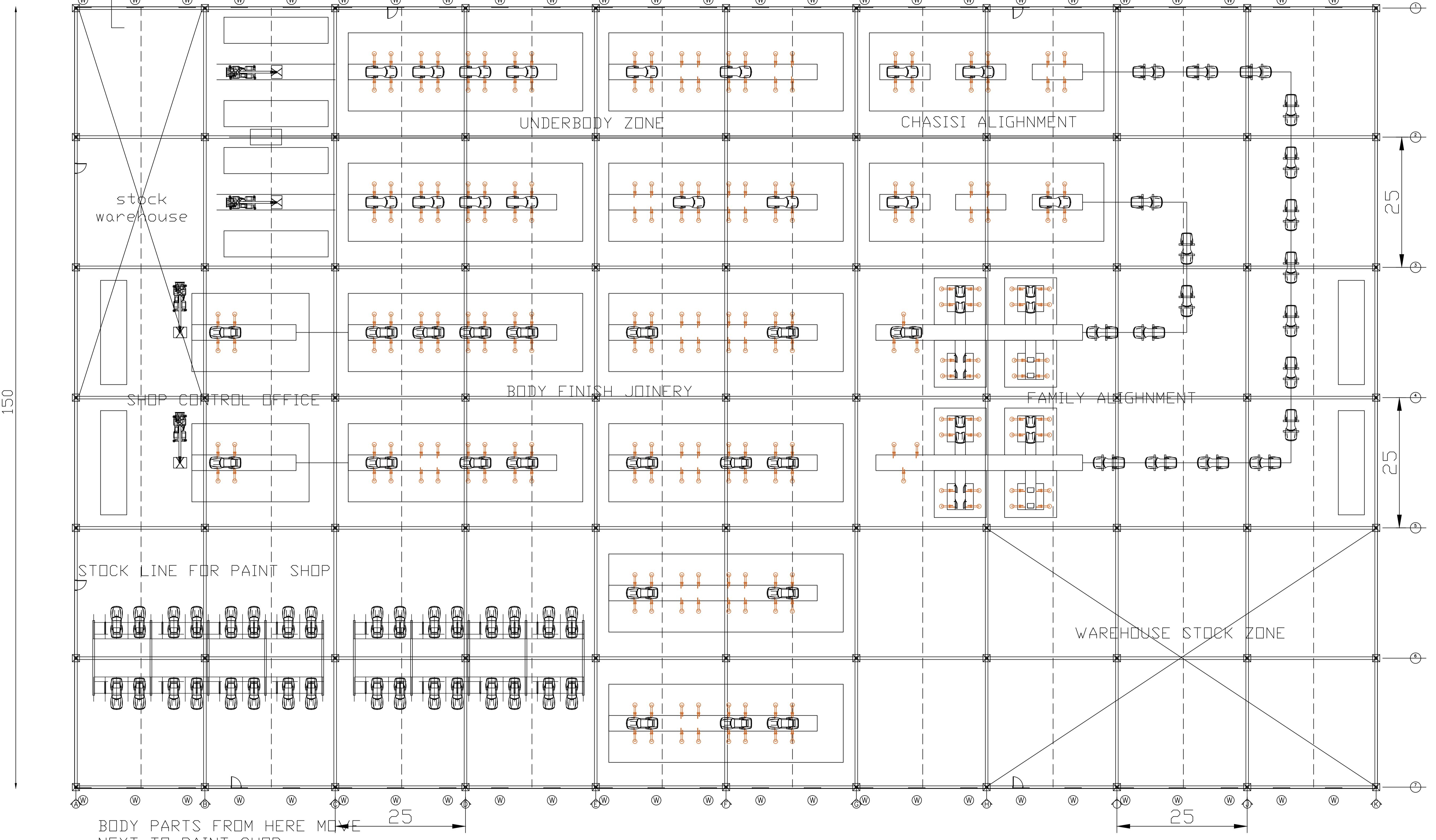
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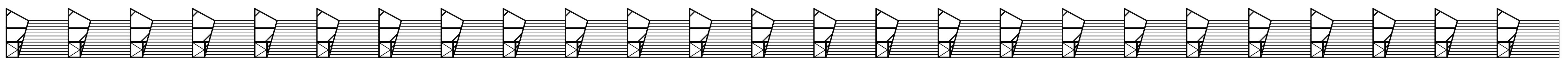
THE BODY SHOP

250

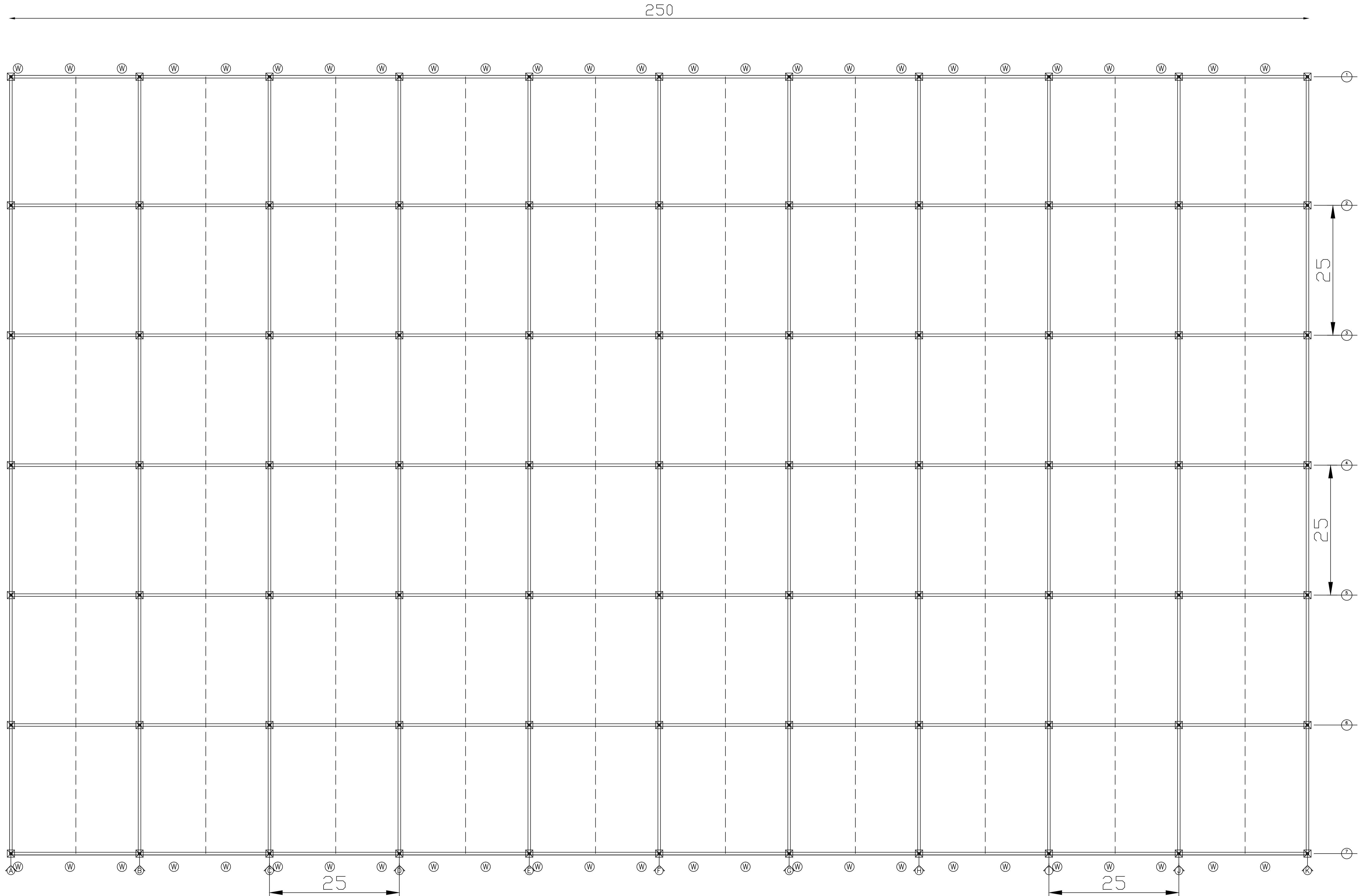
PARTS FROM PRESS SHOP
STOCK UP HERE.

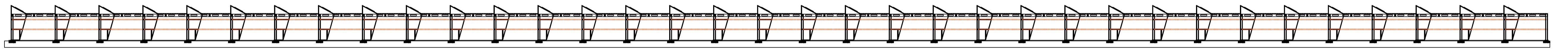
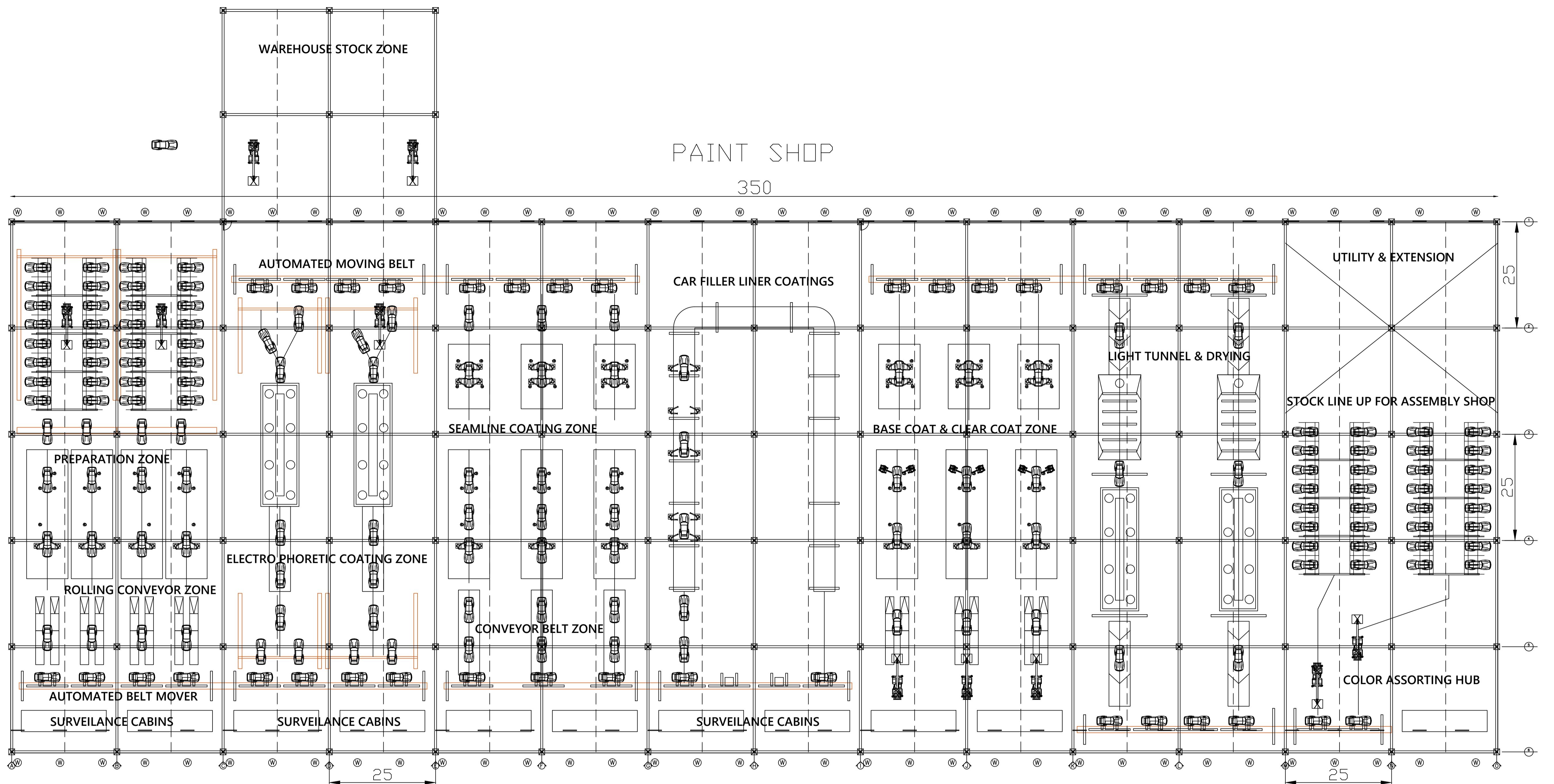


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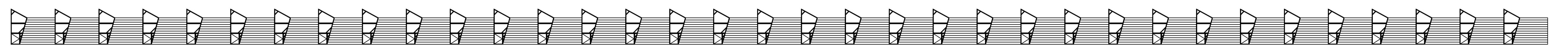


ELEVATION

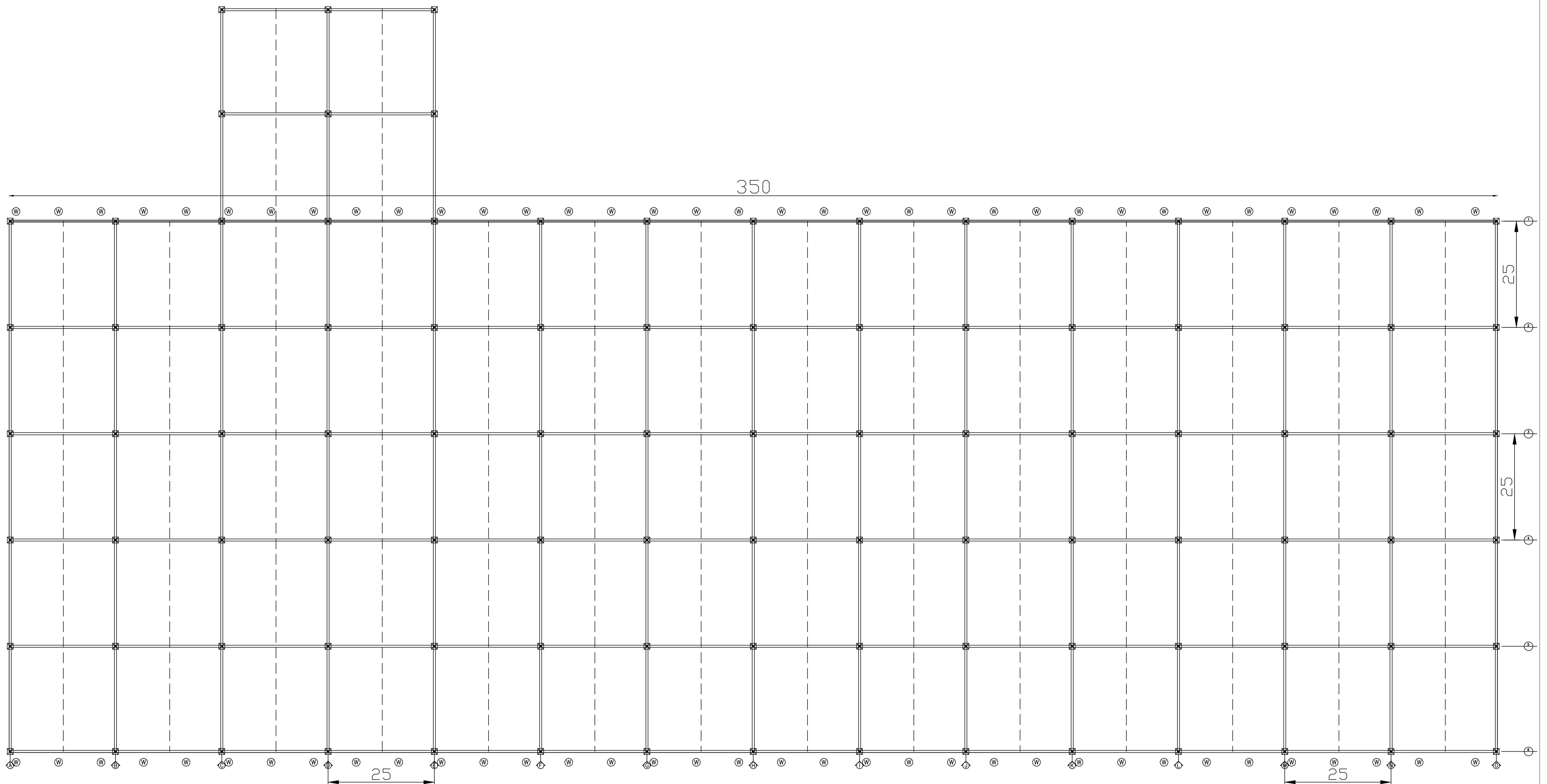




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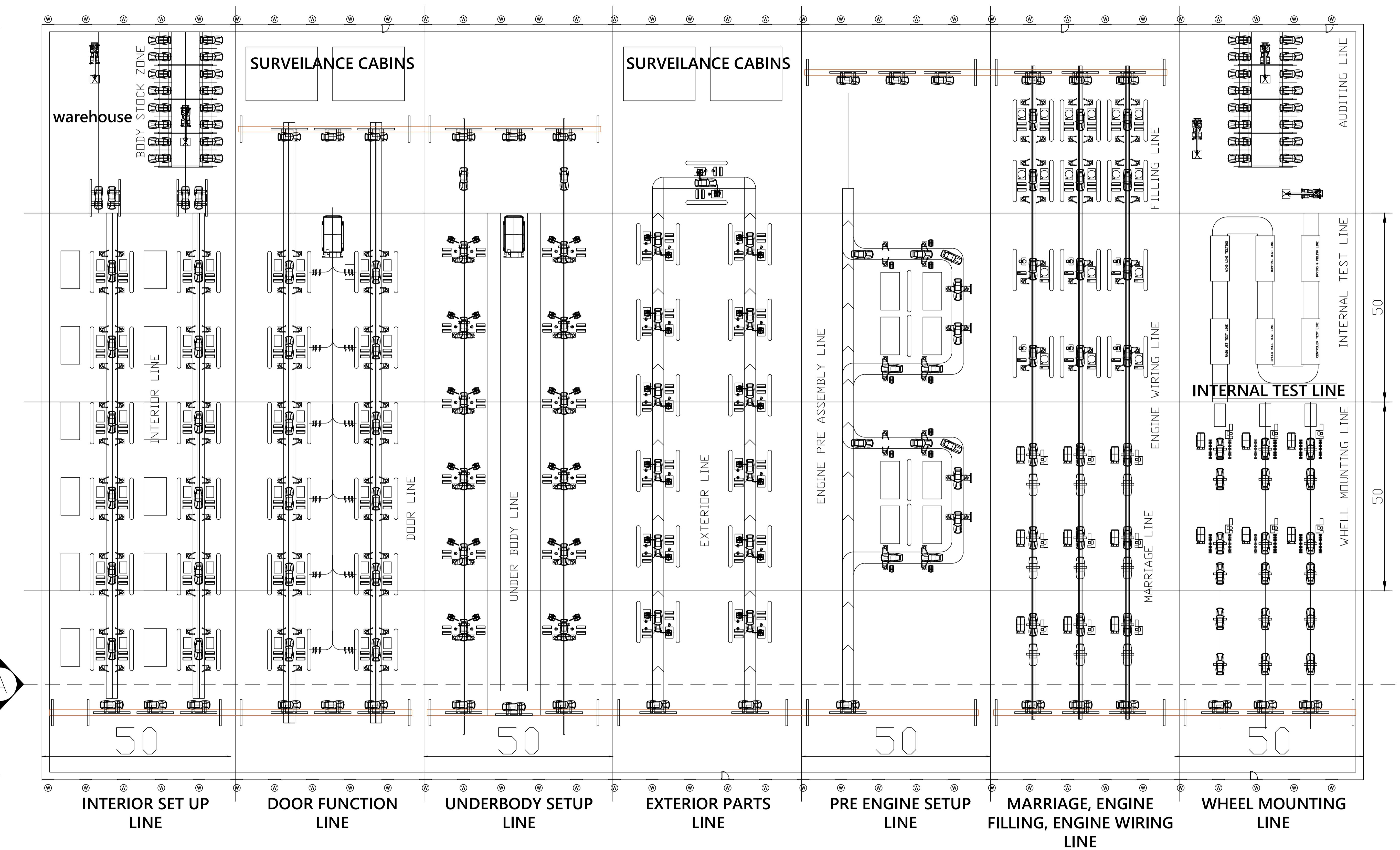


ELEVATION



ASSEMBLY LINE

350

CAR AUDITING
LINEDRAWING TITLE :
ASSEMBLY SHOP PLAN

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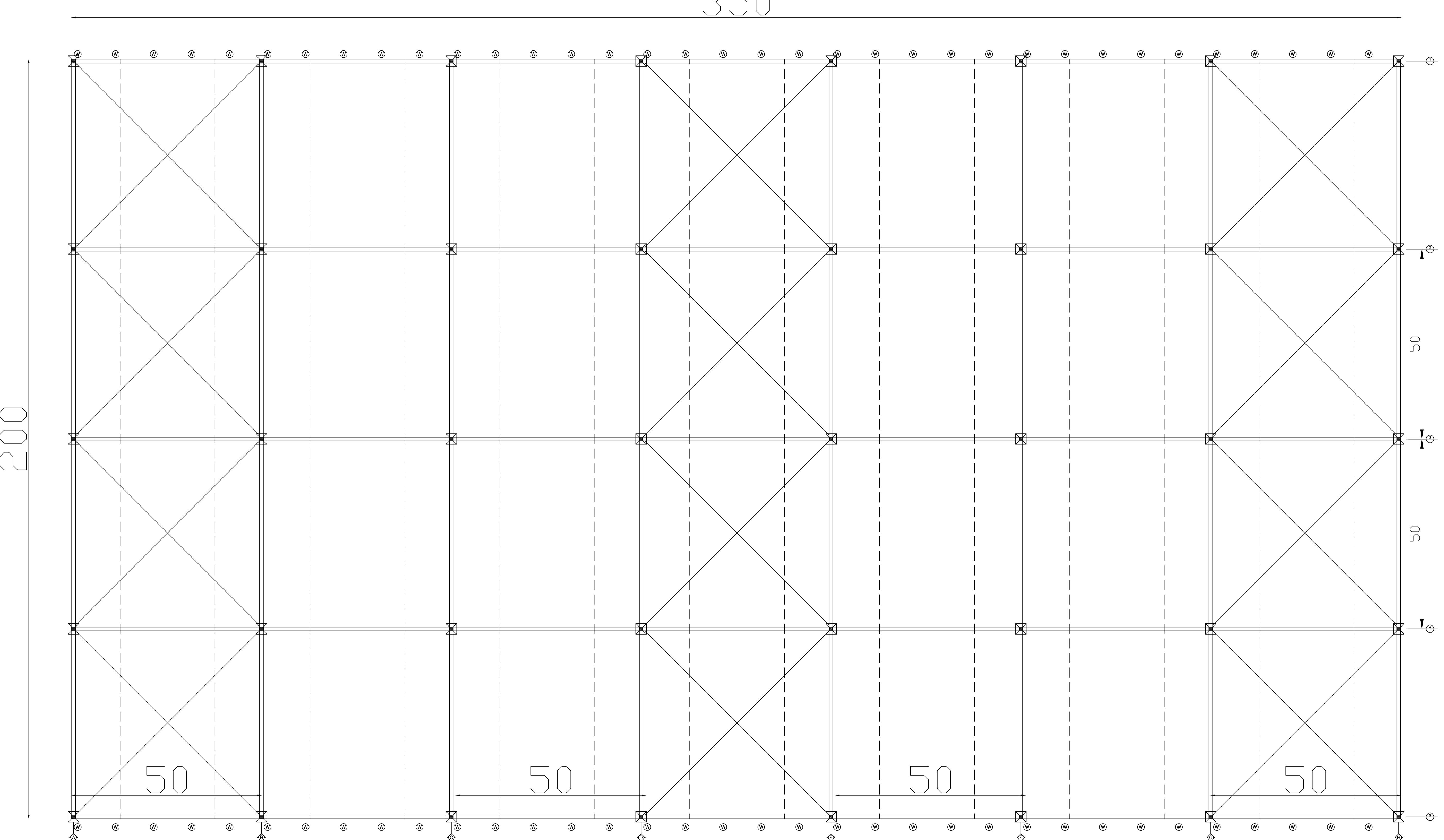
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SHEET NO : DATE :

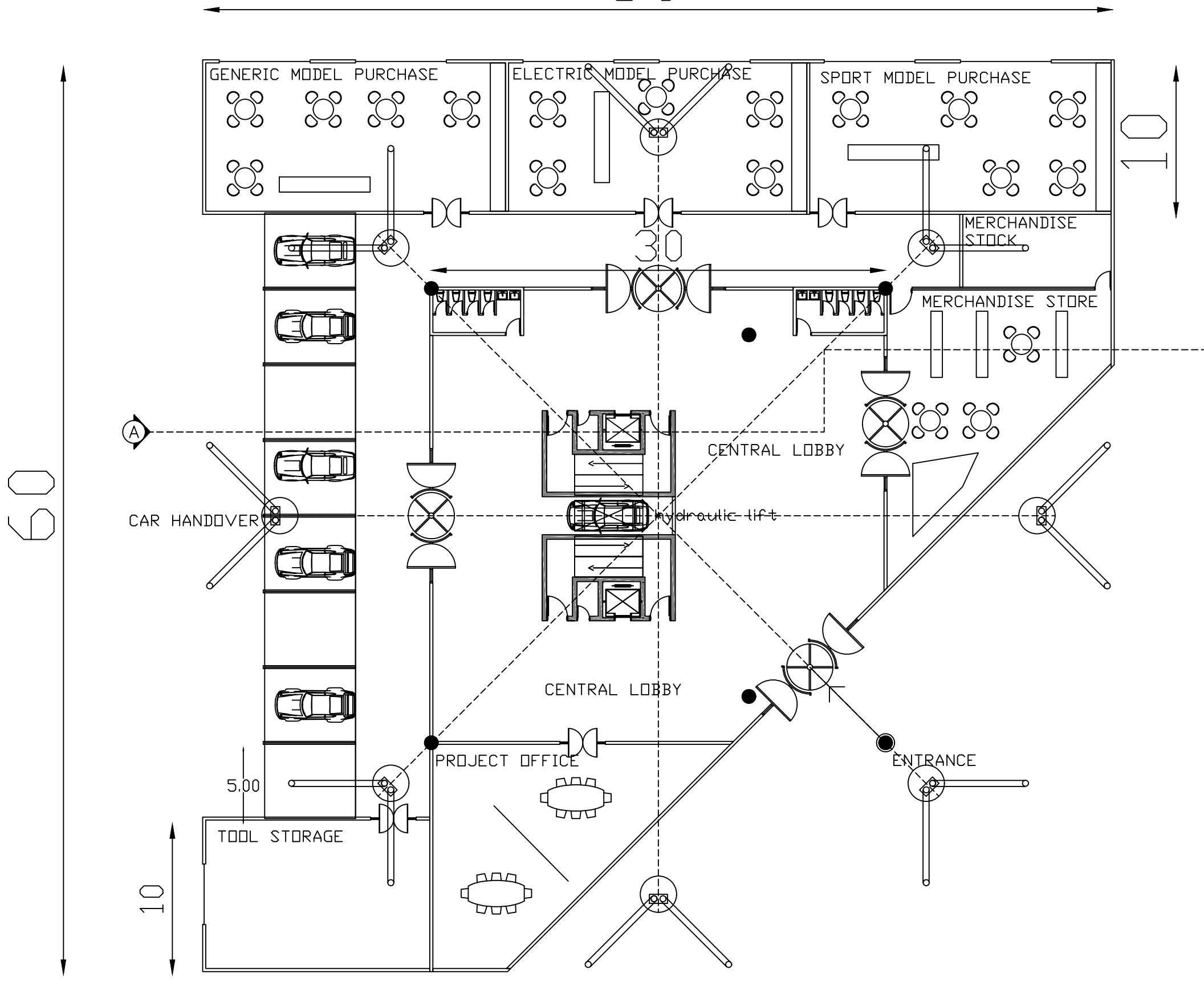
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350



CUSTOMER EXPO

60



GROUND FLOOR : CUSTOMER AMENITIES

THESIS 2020

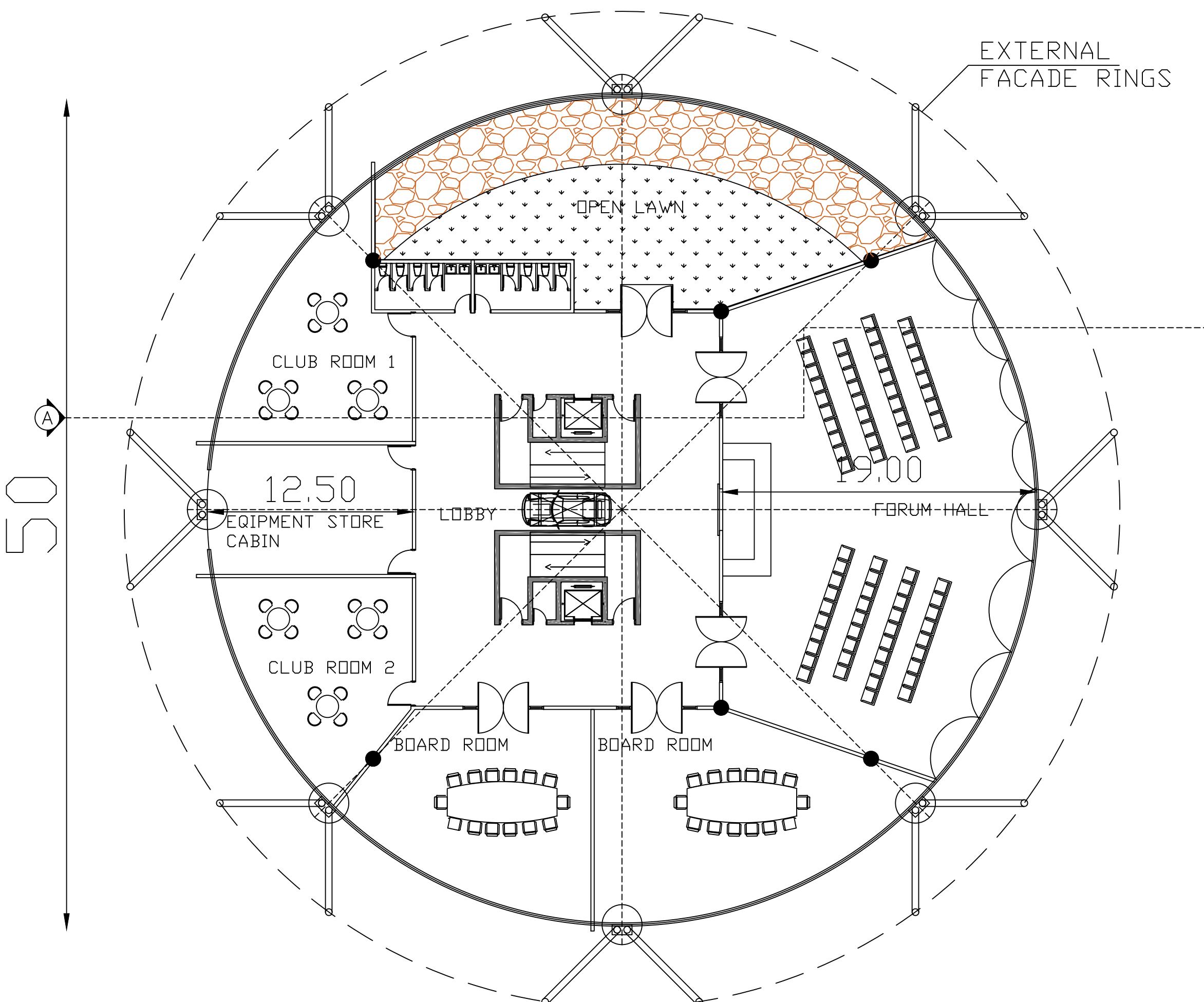
PORSCHE ELECTRIC CAR PLA
VISAKHAPATNAM

DRAWING TITLE:
EXPO BLOCK

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FIRST FLOOR : EXECUTIVE USAGE

DRAWING TITLE: EXPO BLOCK

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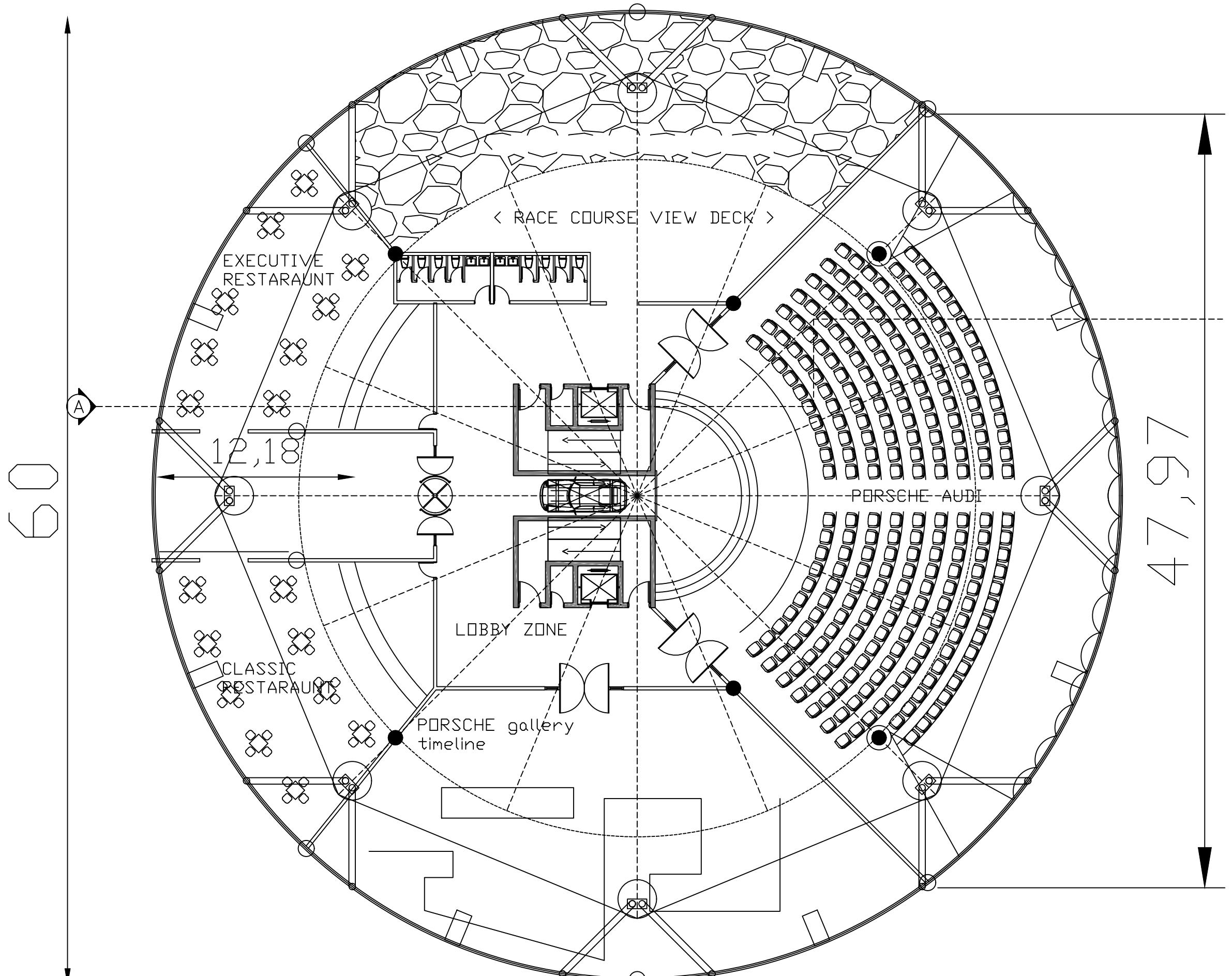
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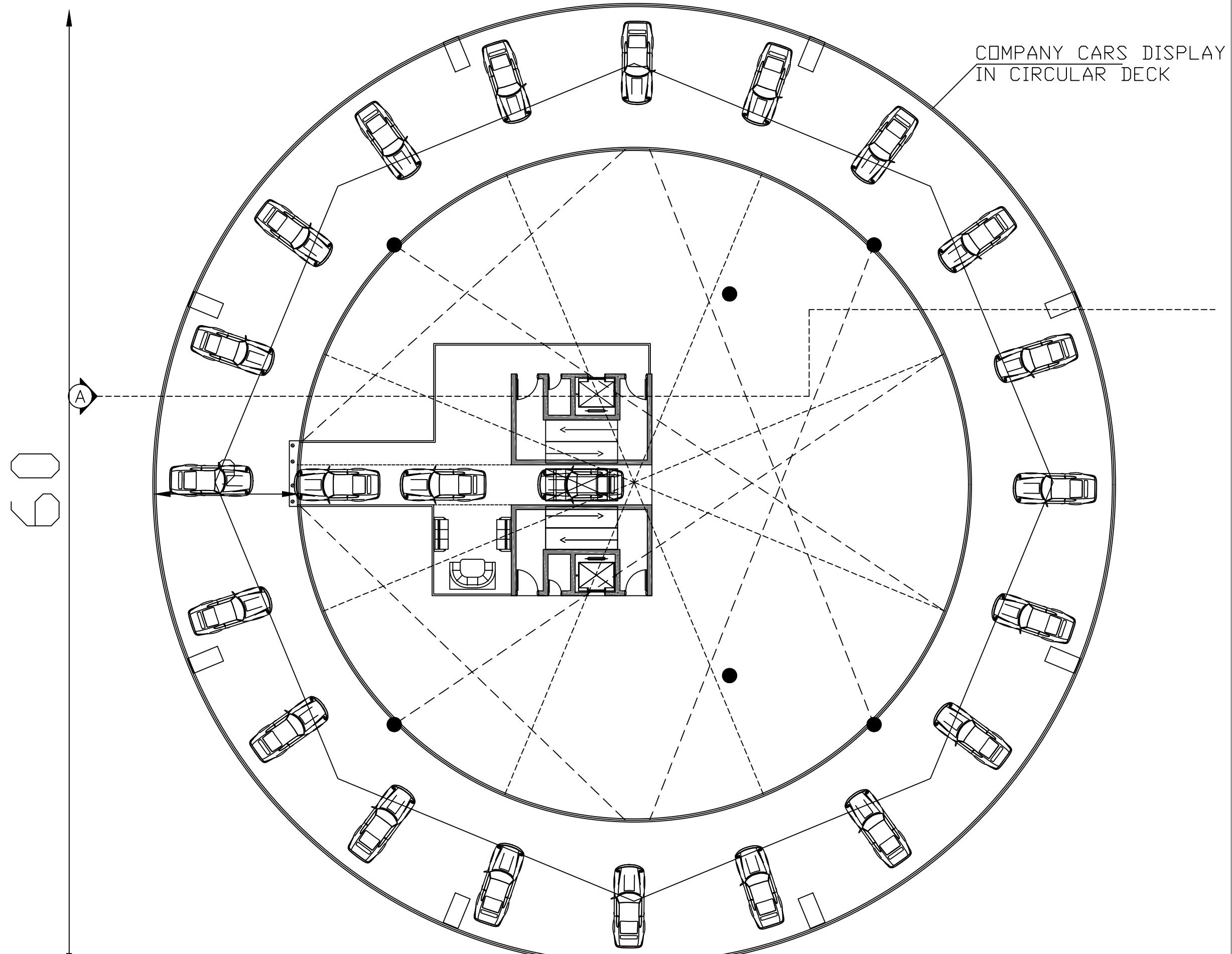
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SECOND FLOOR : DINING & MEETING

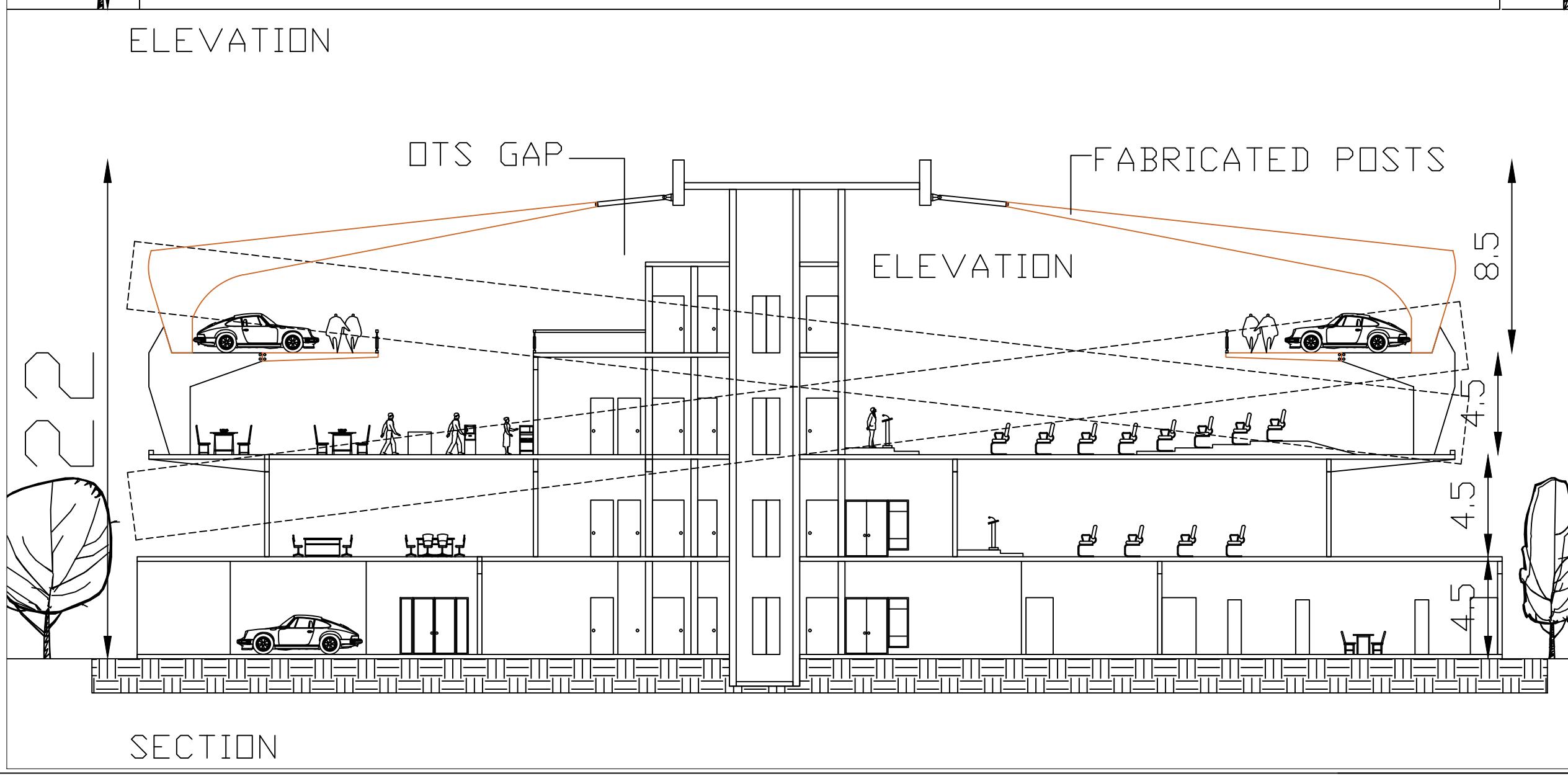
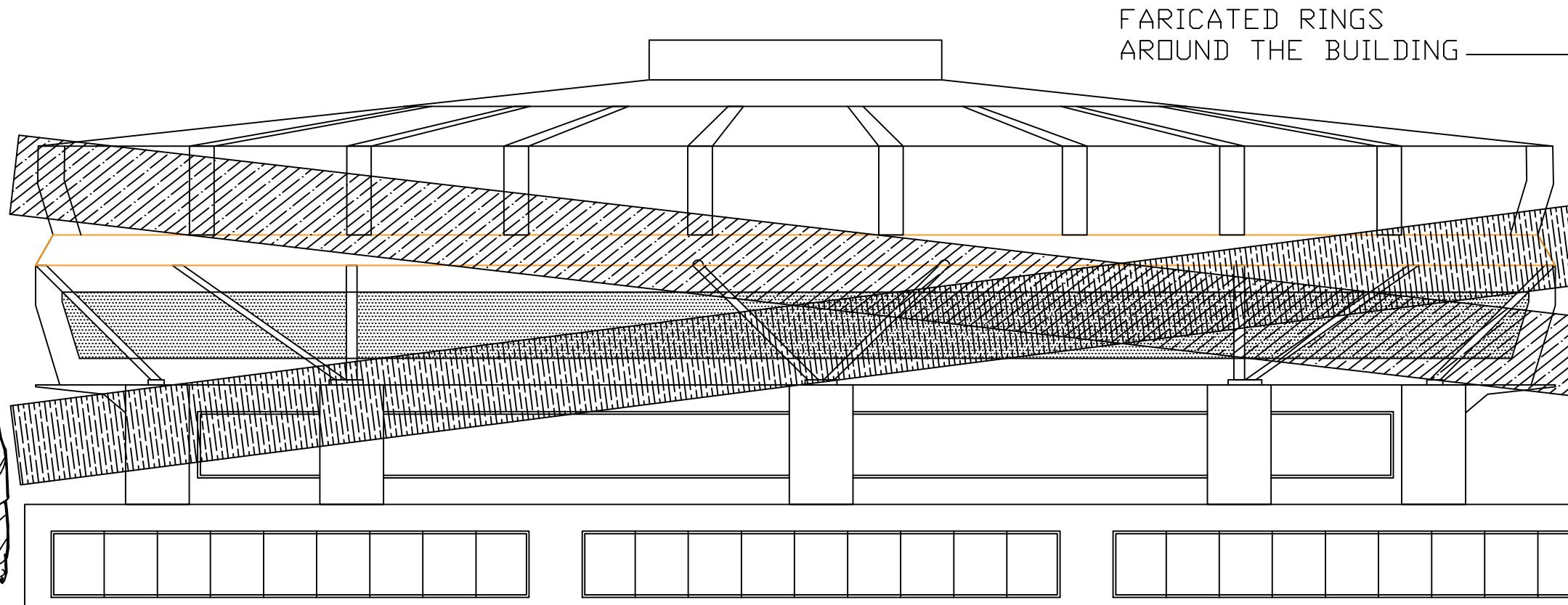


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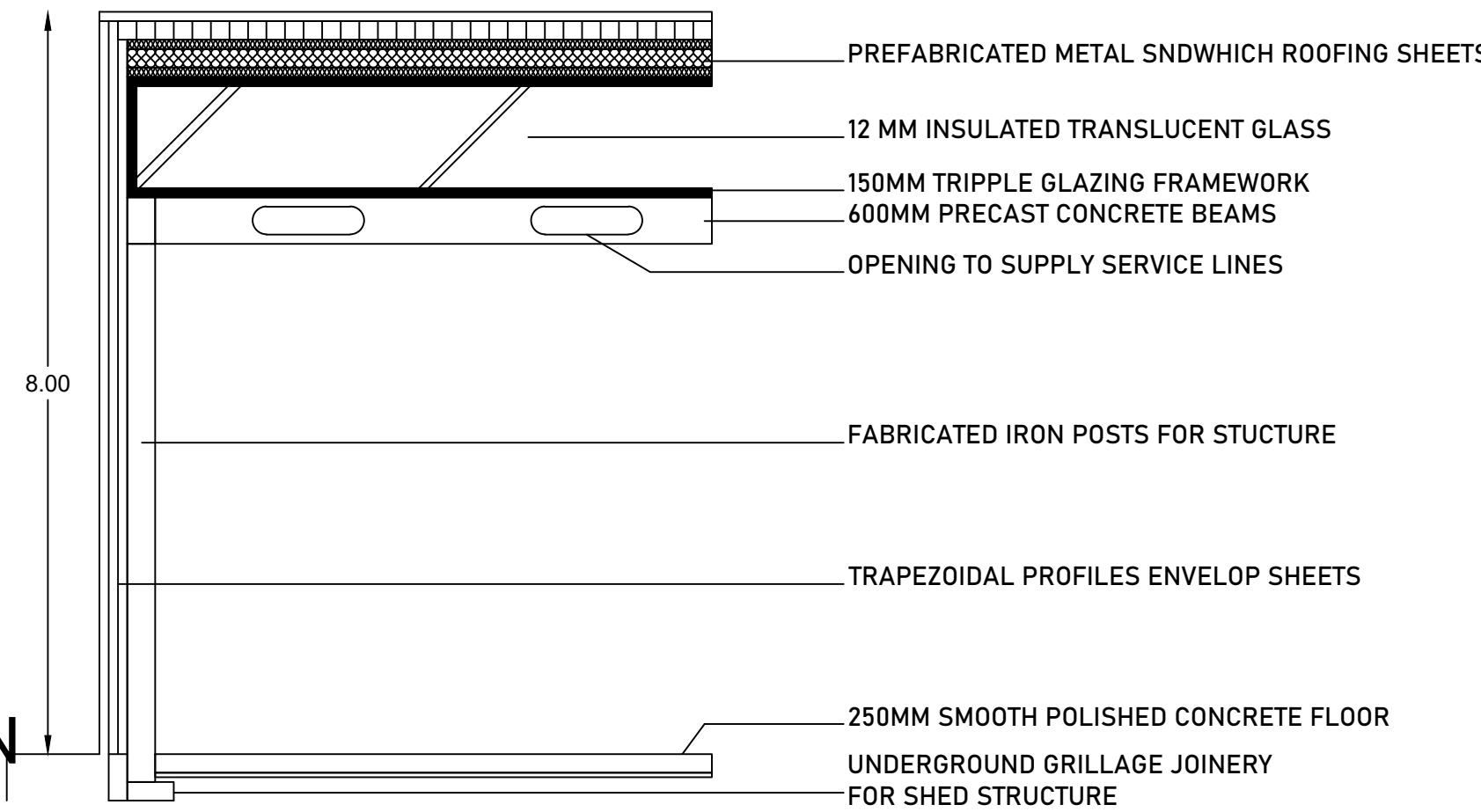
SHEET NO :	DATE :
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SHED STRUCTURE & ENVELOP DETAILS

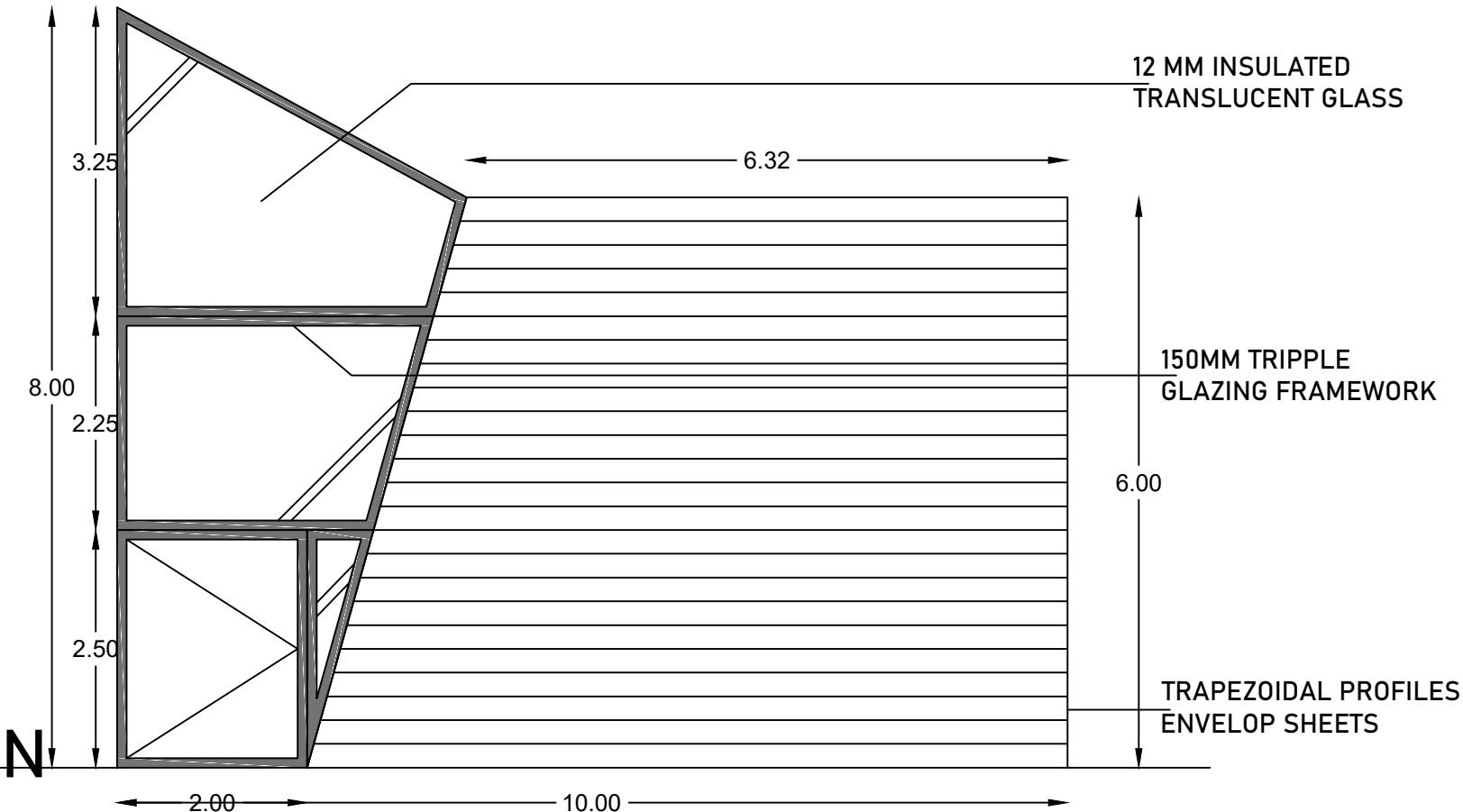
THESIS 2020

PORSCHE ELECTRIC CAR PL
VISAKHAPATNAM

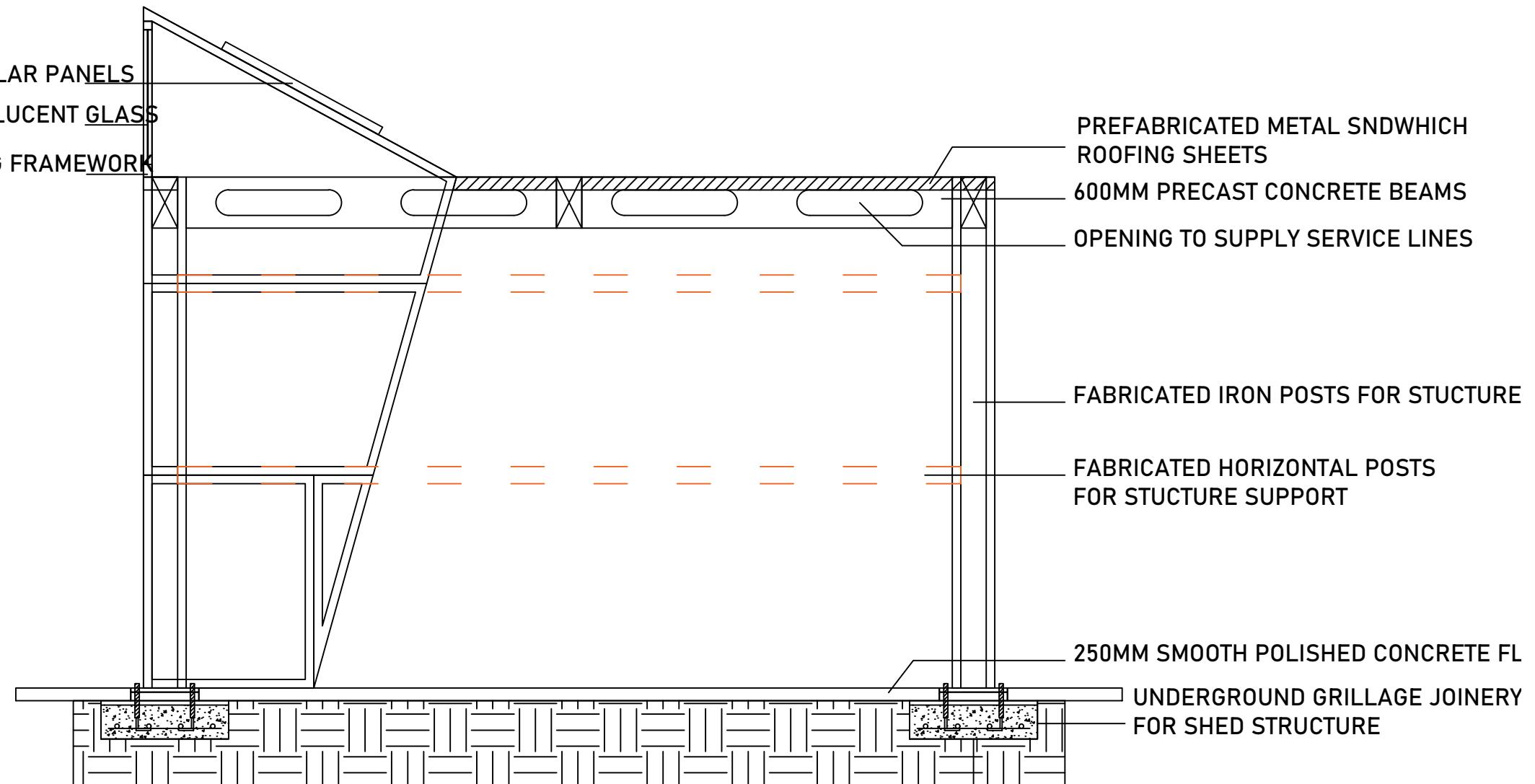
SECTION



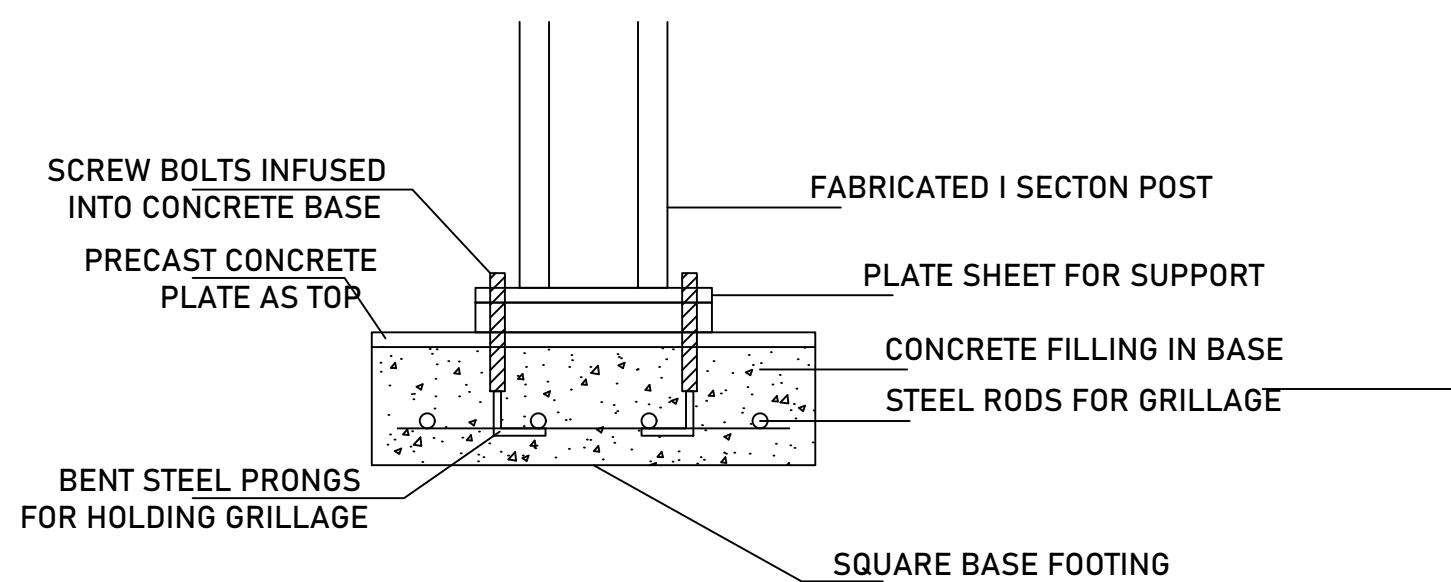
ELEVATION



DRAWING TITLE : SHED STRUCTURE DETAILS	
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SHEET NO : FINAL REVIEW	DATE : 15.06.2020



SECTIONAL DETAILS



UNDERGROUND GRILLAGE JOINERY
FOR SHED STRUCTURE

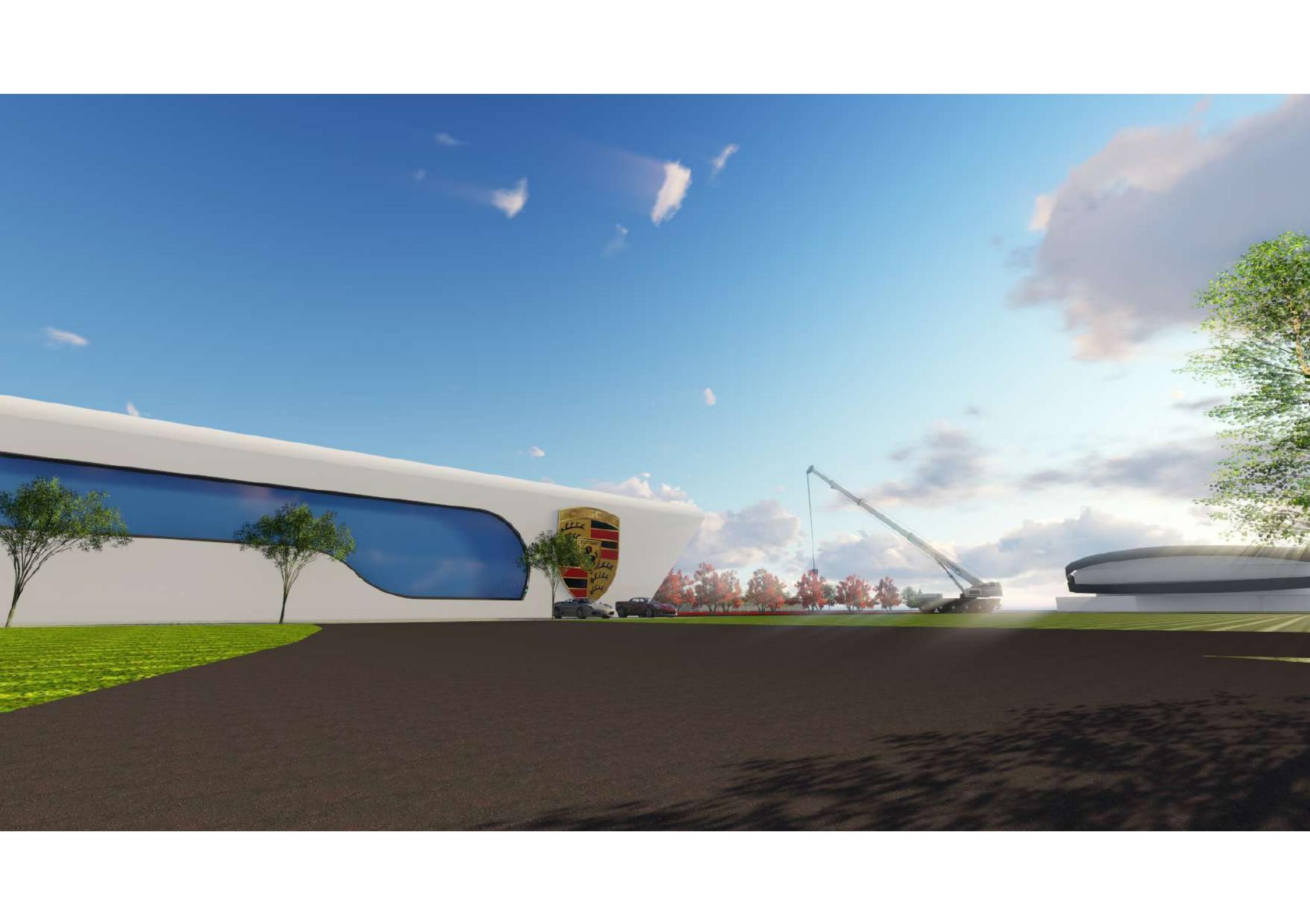
DRAWING TITLE : SHED STRUCTURE DETAILS
DONE BY : V JAYA SURYA 10 11 15 043
DEPT OF ARCHITECTURE
NATIONAL INSTITUTE OF TECHNOLOGY
SHEET NO : DATE :
FINAL REVIEW 15.06.2020

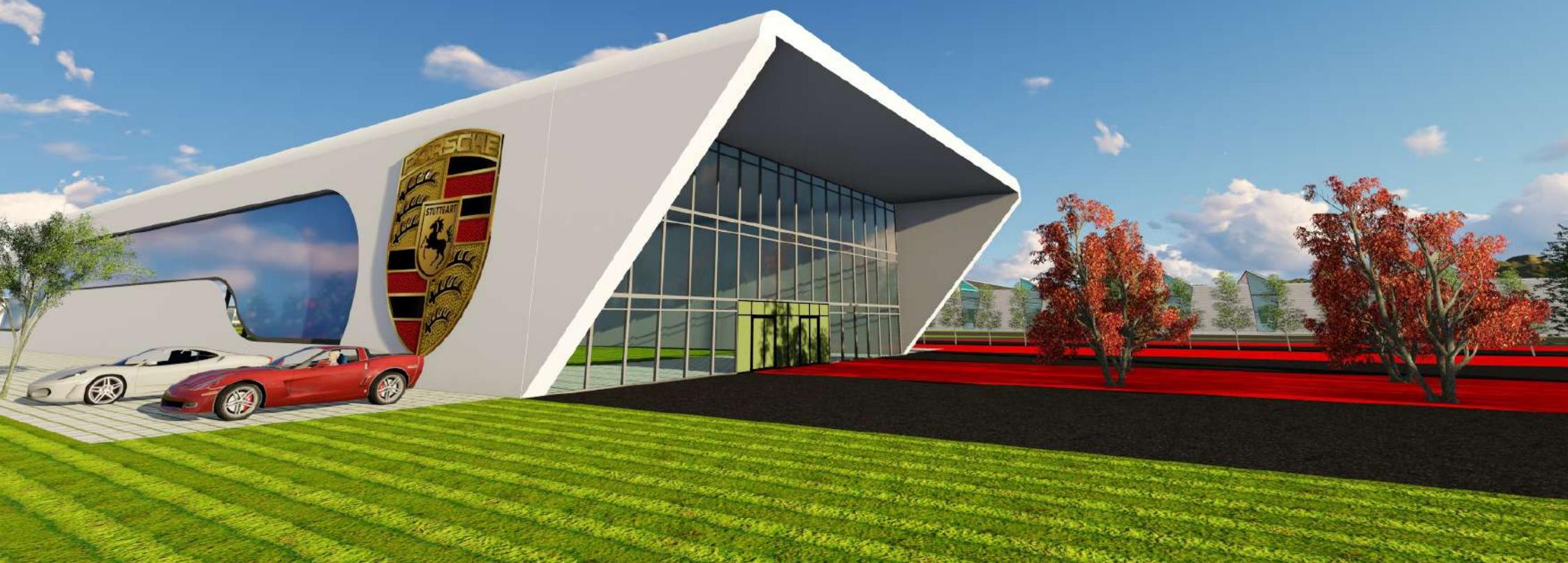
TOPOGRAPHIC

PART 8
VIEWS





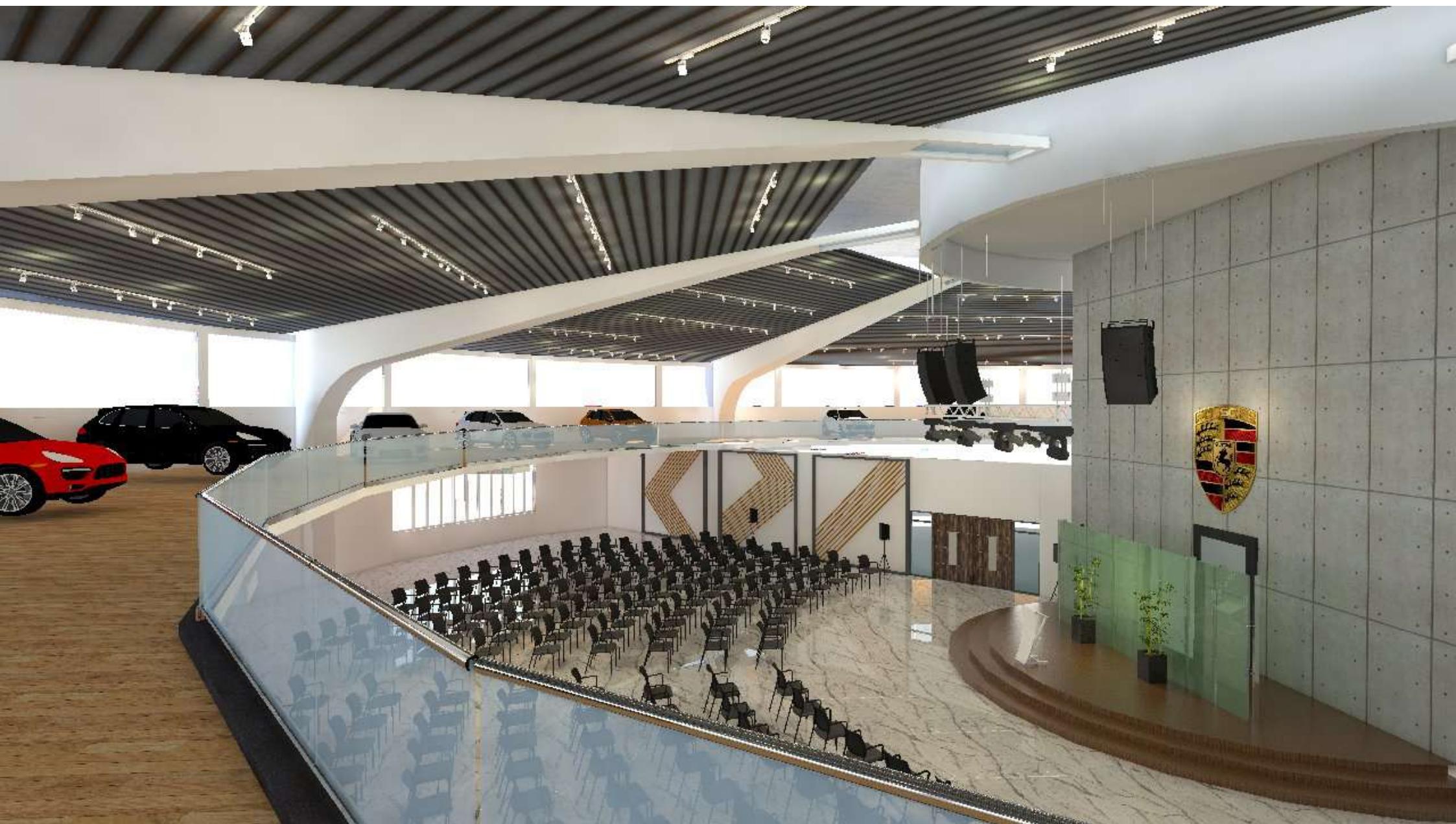


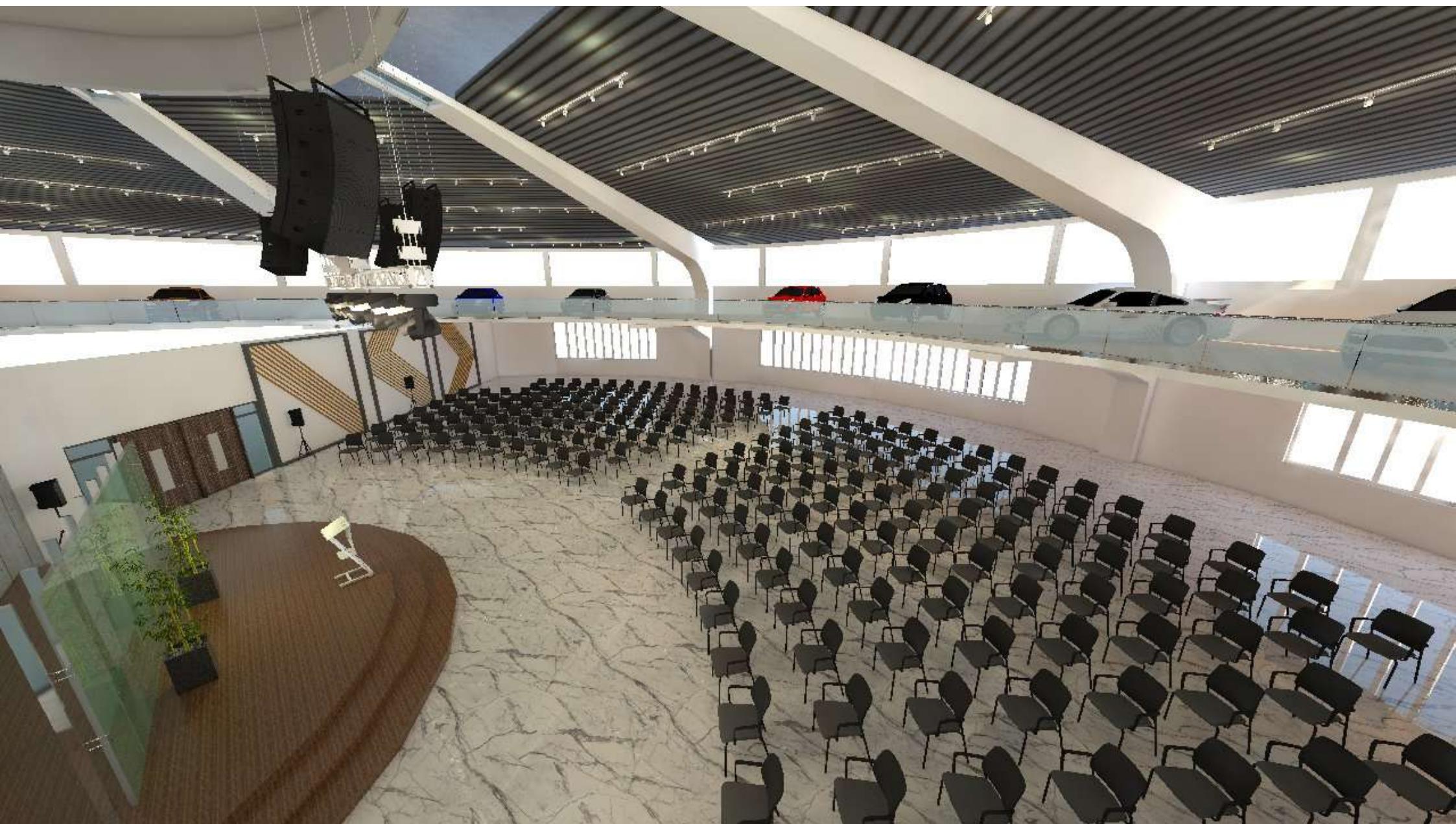












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.THANK YOU.

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