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PLANNING, ANALYSING AND DESIGNING OF SMART RAILWAY STATION

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ABSTRACT

This paper deals with the planning, analyzing and designing of existing salem junction railway station to smart railway station. In this project we are planning and analyzing the smart railway station to provide facilities for 80,000 passengers travelling by boarding train on an average day, for the elimination of conflicts between thepassengers for the basic needs. The building has three floors, a subway and parking facilities are provided. The plinth area of each floor is 24800 ft^2.There are five platforms in it. Each platform has a width of 75ft. The platforms are planned to satisfy the needs of all kinds of passengers with all provisions to their satisfactions as per the guidelines of the INDIAN RAILWAYS rules and regulations. In this project the plan is such that natural lightning and ventilation to the people along with their space requirement when they wait to board on trains. Analysis and design of structural components are done using Staad Pro software. In this project the initial dimensions are assumed as per Indian Railway codes and IS code provision. The Loads are assumed as per IS 875 and design is as per as IS 456. From the first trial the section is revised as per the requirements. Design of elements is carried out by hand computation to revise the reinforcement details. The Plan, Section, Elevation are presented using Auto Cad. Reinforcement details of , Column, Beam and Slab are also presented.

Keywords: Plan, section, elevation andStaad. Pro

I. INTRODUCTION

In this project the development of a nation depends upon its infrastructure. It is the fundamental facility and system serving a country, city or other area, including the services and facilities necessary for its economy to its function. According to world bank report Indian transport sector is large and diverse, it caters the need of 1.1 billion people. In 2007, the sector contributed about 5.5 percent to the nation's GDP, with transportation contributing the lion's share. In that Rail transportation contributes about 19.8 million passengers and 2.4 million tons of freight in a day. Indian Railways is the world's fourth largest Railway network. It plays a pivotal role for entire lower and upper sectoral travel segment. It serves as the most economical mode of transport among the prevailing travel modes in India. Rail transportation has number of favorable characteristics as compared to road transportation. In Southern Railway Salem Junction is one of the major transit stations in south India. It is also the Divisional headquarters for Salem Division (SA) which extends from Tiruppatur (TPT) to Mettupalayam (MTP).

1.1 Type's of Railway station Include

- Terminus
- Central
- Junction
- Way side Station.

1.2. Modern facilities proposed by this paper

The modern facilities proposed by this paper on developing the salem railway station as following with additional facilities like,

a. Bottle feeding rooms
b. Women safety rooms
c. Train ticket examiners room
d. Sanitary napkins vending machines
e. Mall
f. Dormitory
g. IRCTC common kitchens
h. Control rooms
i. DRM room
j. Public-official relationship
k. Escalators
l. Water providing r.o. machines
m. Glazed elevated structures
n. Weather rooms
o. Currency exchange
p. Parking facilities for 200 four wheeler 400 two wheelers.

1.3. Specification of Railway Station Building

a. The proposed area to be redeveloped is visited to know on the existing rooms and facilities available in them. They have been completely noted.
b. The column we've proposed is about 500mm which is of R.C.C circular shape.
c. The beam is provided before the superstructure for stability of the building. It is generally about 500mmx300mm deep with R.C.C structure.
d. All the walls used for the outer walls and the partitioning walls are made up of Hollow concrete block masonry 400X200X200mm. They are literally known as 8" blocks.
e. The roofing is generally done by slab about 125 mm thickness as R.C.C with GGBS and M25 concrete and 20mm aggregate.
f. Door = 2.5mX2.1m.
g. Window = 1.5mX 3m.
h. A Floor is a solid base constructed between plinth level and roof level in order to scale divided these portions. The Exposed surface of floor is termed as flooring. Plain CC of 1:5:10 using 40mm broken stone to a thickness of 0.20m will be provided.
i. Glazed elevation which is provided for the stylish look and also for consumption of hollow block masonry is provided with thickness of 3-4 mm.
j. All walls and columns will be plastered with CM 1:3 to a thickness of 10mm then the inner plastered surface will be color washed with distemper and the exterior wall surface will be painted with snowcem paint for two coats over one coat of primer.

II. LITERATURE REVIEW

2.1.Passenger flow in Railway transportation.

Mr. Sanjeev kadam and Dr. Prabir Kumar Bandyopadhyay presentsonPopulation flow is important in calculating the live load and determining the spacious of a structure. The obtained live load helps in the analysis and designing of structure.

2.2.Productivity of Railway stations.

Rohit Anand, Prof Dr. Sanjay Gupta explain us while planning, the need of the dimensions and basic features in the railway station is very important. The basic features like transition area, administrative area and core area are been explained.

2.3.Carbon Footprint and environmental impact of Railway infrastructure.

Matthias Tuchschmid, Wolfram Knorr (IFEU), Alexander Schacht (IFEU), Moritz Mottschall (Oko-Institute), Martin Schmeid (Oko-Institute) portrays that the carbon footprint and ecological disorders while building a railway station is to be considered are explained and used while planning.

III. METHODOLOGY

In the project, Auto CAD is used in planning the railway station. Staad Pro programming has been utilized as a part of request to dissect and analyze along with designing. It gives the Bending moment, Shear Forces, Axial Forces, Torsion, Beam Structures of a concrete so that the outline should be possible utilizing for the security purpose of the passengers and employees.

3.1 Dead Load

Dead load on a structure is the after effect of the heaviness of the perpetual parts, for example, shafts, floor pieces, sections and dividers. These parts will create the same consistent "dead" load amid the lifespan of the building. Dead loads are applied in the vertical plane.

Dead load = volume of part x unit weight of materials.

By computing the volume of every part and increasing by the unit weight of the materials from which it is made, a precise dead load can be resolved for every segment. The distinctive parts can then be included to decide the dead load for the whole structure.

3.2 Live Load

Every single unfixed thing in a building, for example, individuals and furniture result in a "live" load on the structure. Live loads are applied in the vertical plane. Live loads are variable as they rely on upon utilization and limit, consequently the IS875 tables gives us Live load.It gives us a live load of 5 KN/m^2.

IV. PLANNING OF RAILWAY STATION

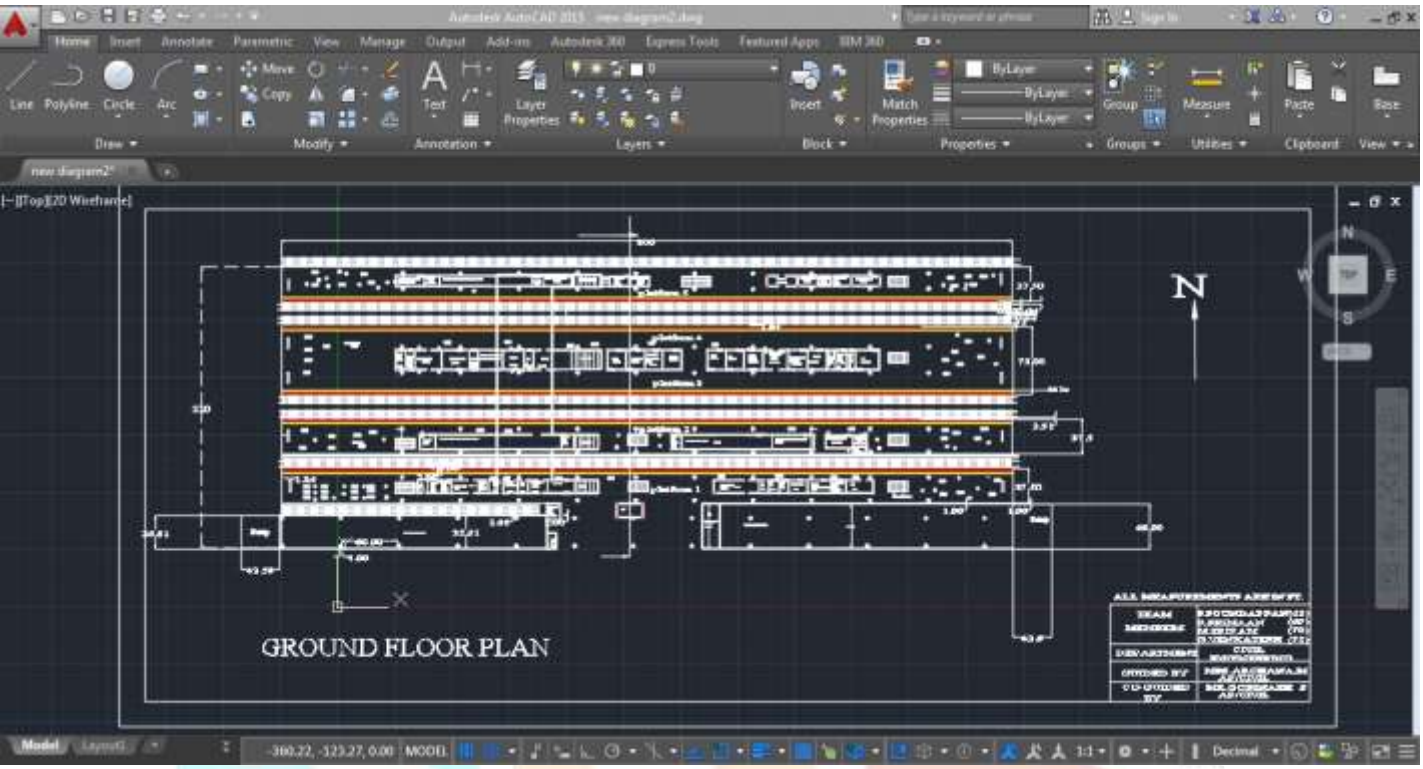

Figure 1 Ground Floor Plan of Railway Station

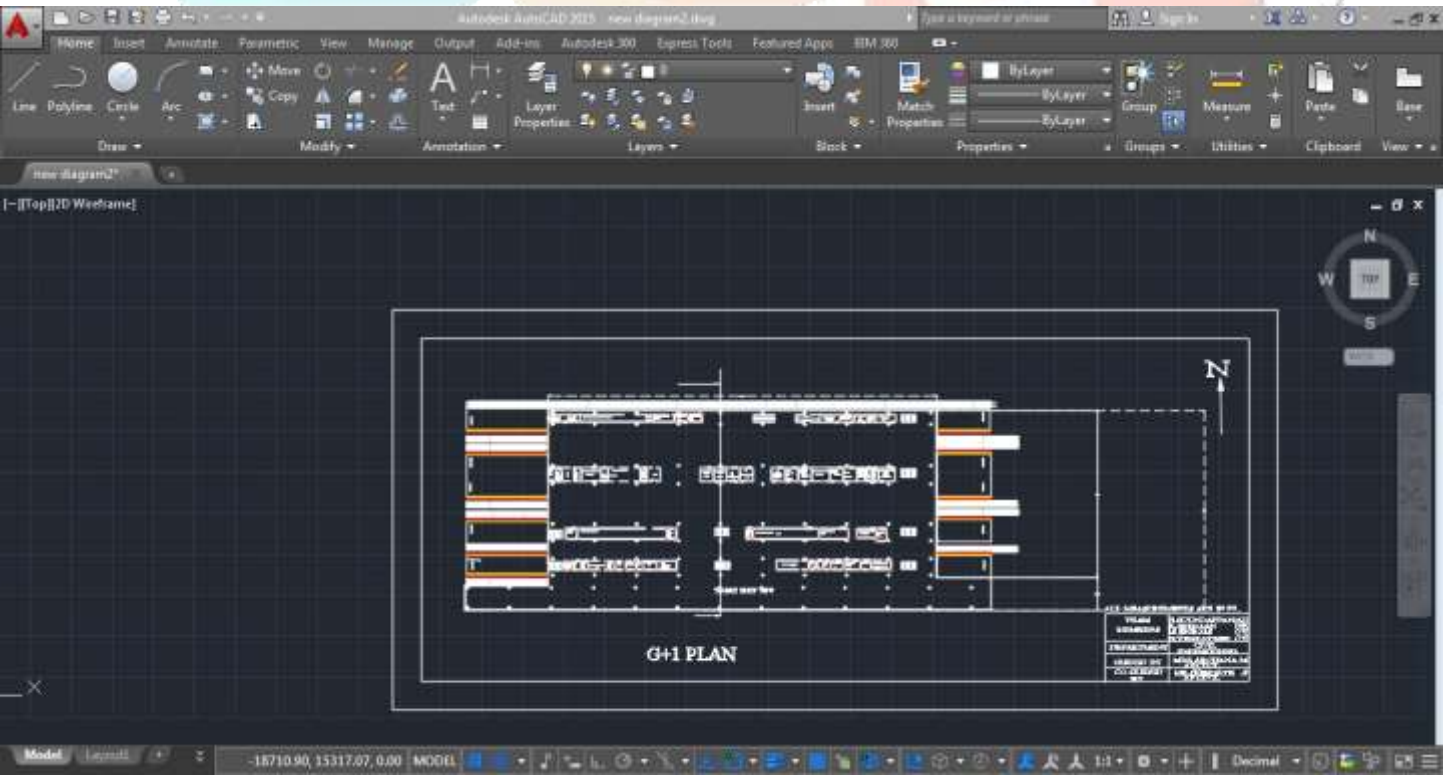

Figure2 First Floor Plan of Railway Station

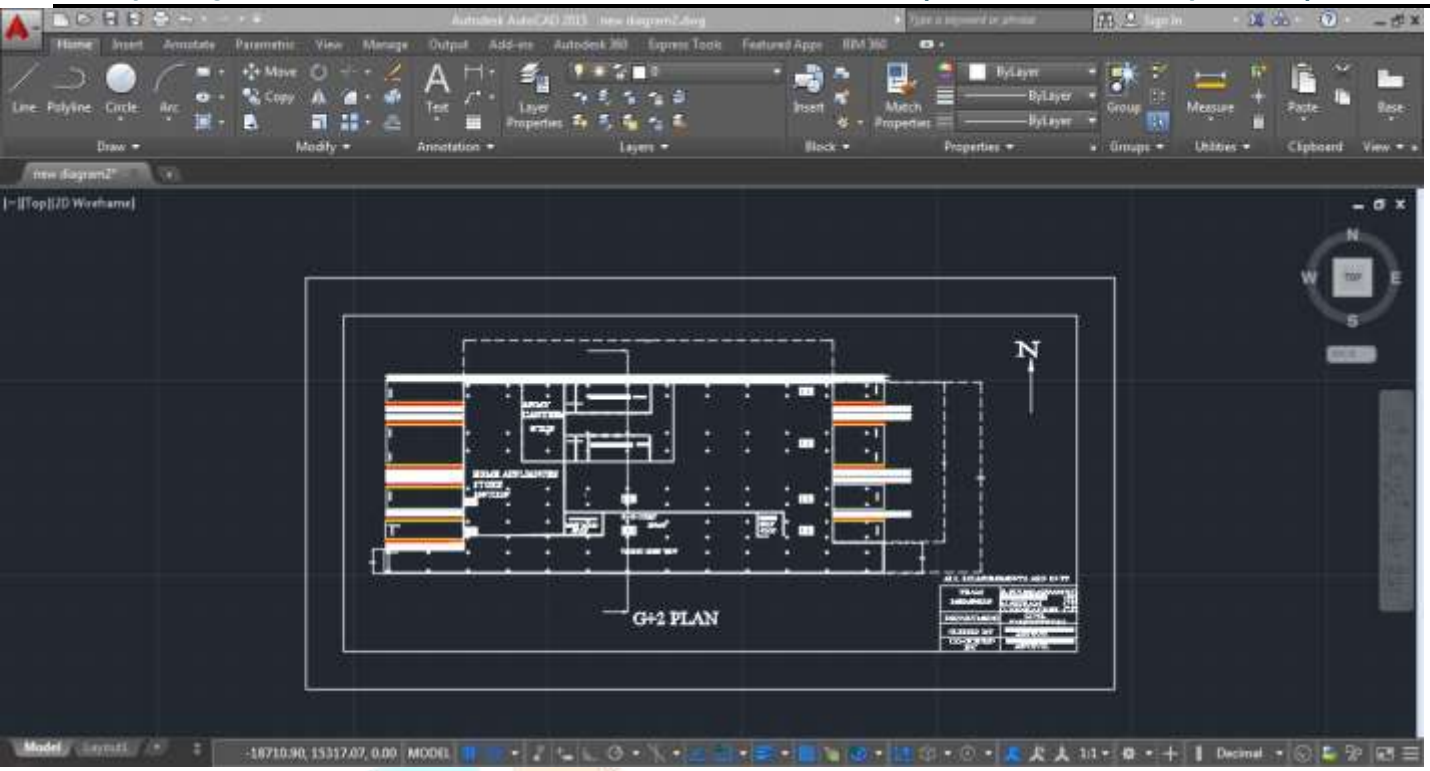

Figure 3 Second Floor Plan of Railway Station

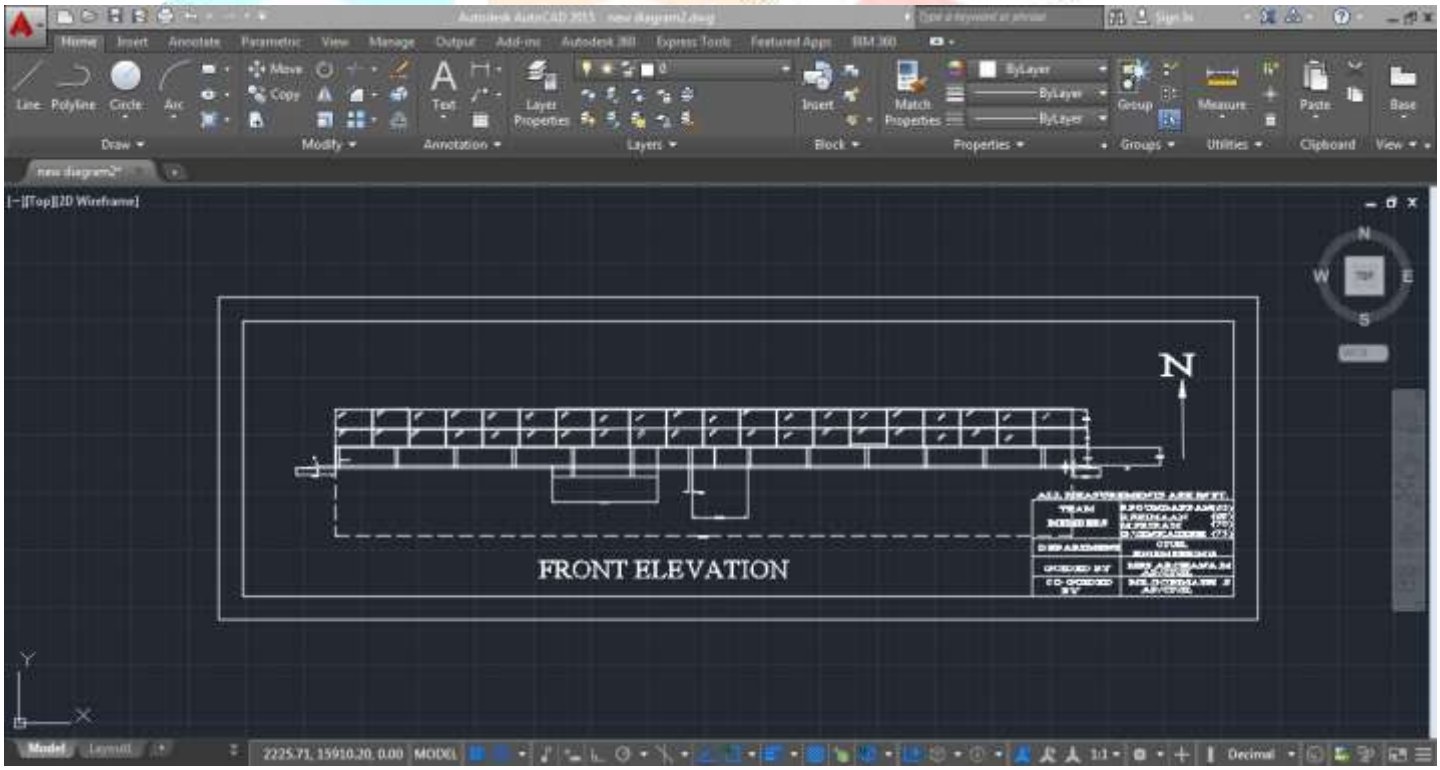

Figure 4 Front Elevation of Railway Station

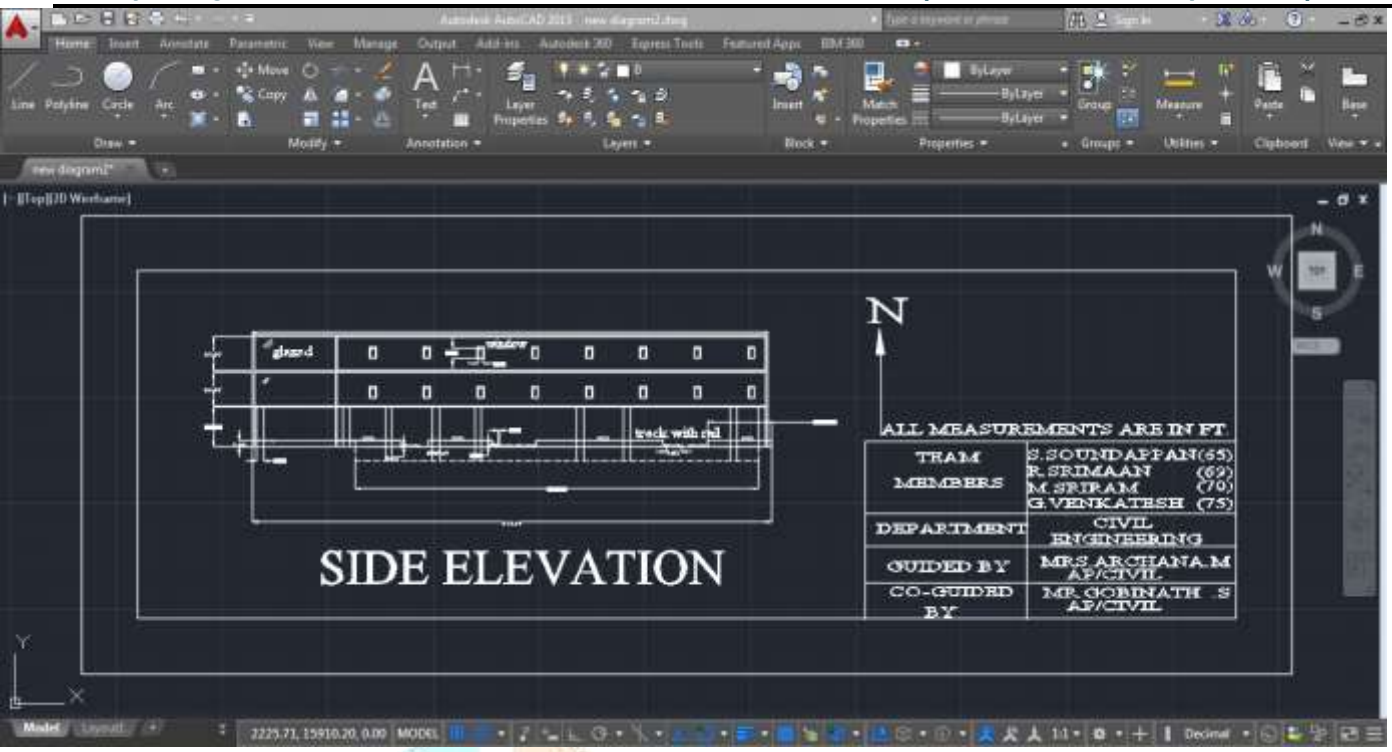

Figure 5 Side Elevation of Railway Station

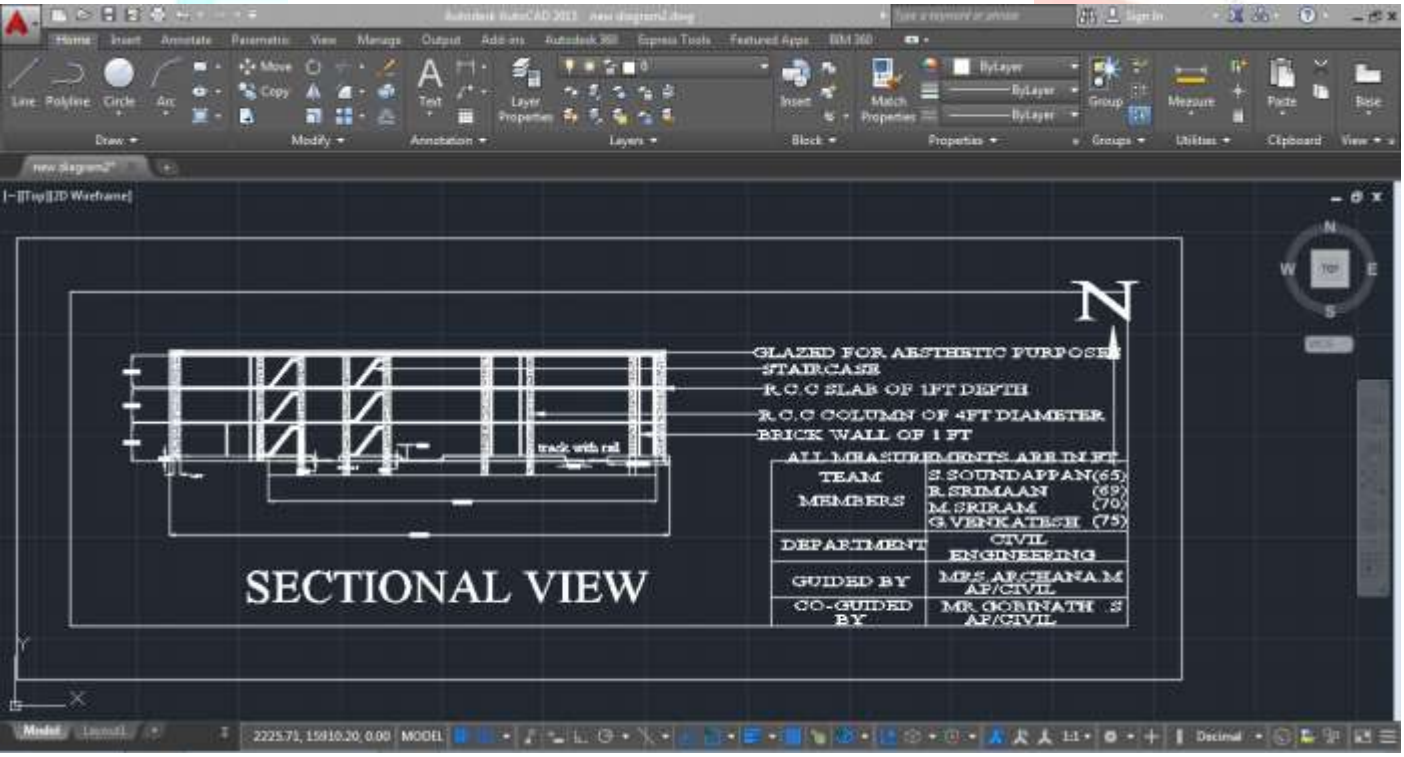

Figure 6 Sectional View of Railway Station

V. ANALYSIS OF RAILWAY STATION

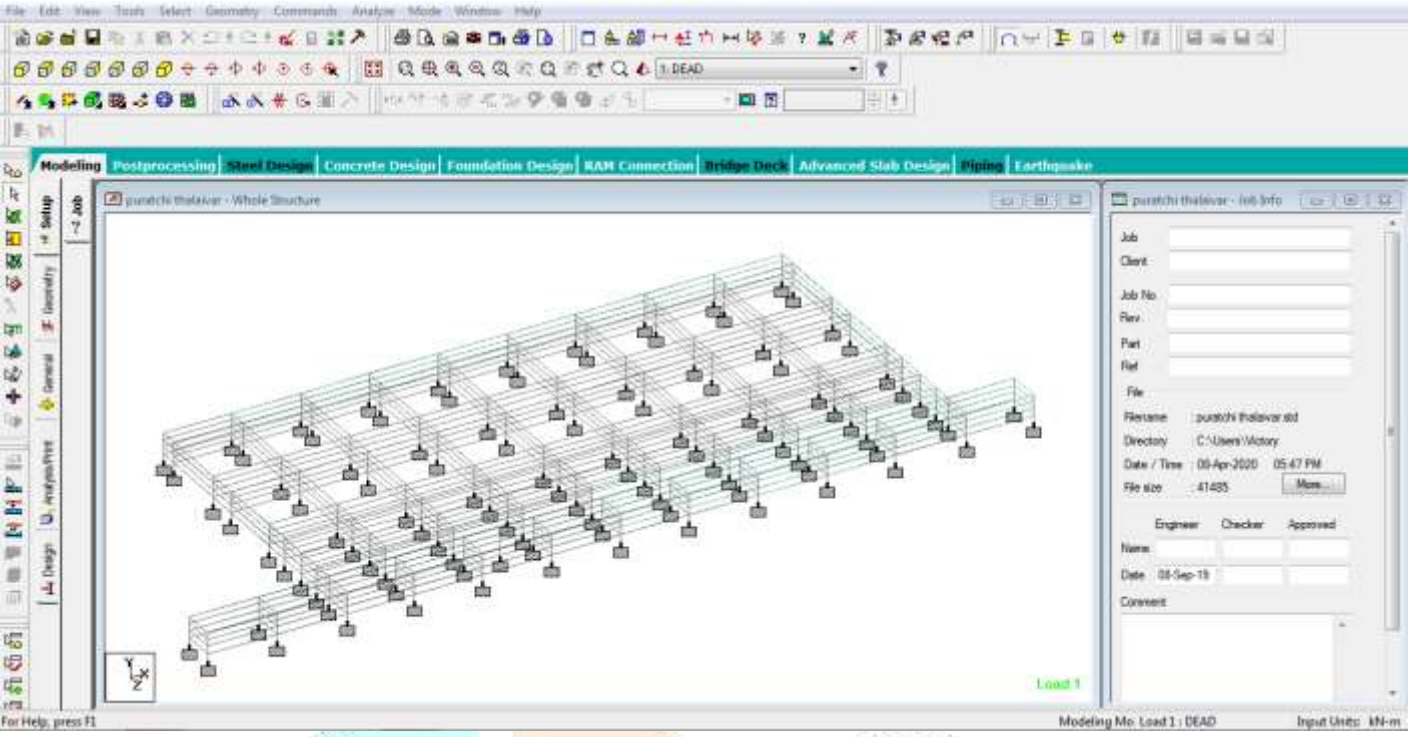

Figure 7 Isometric view of Railway Station

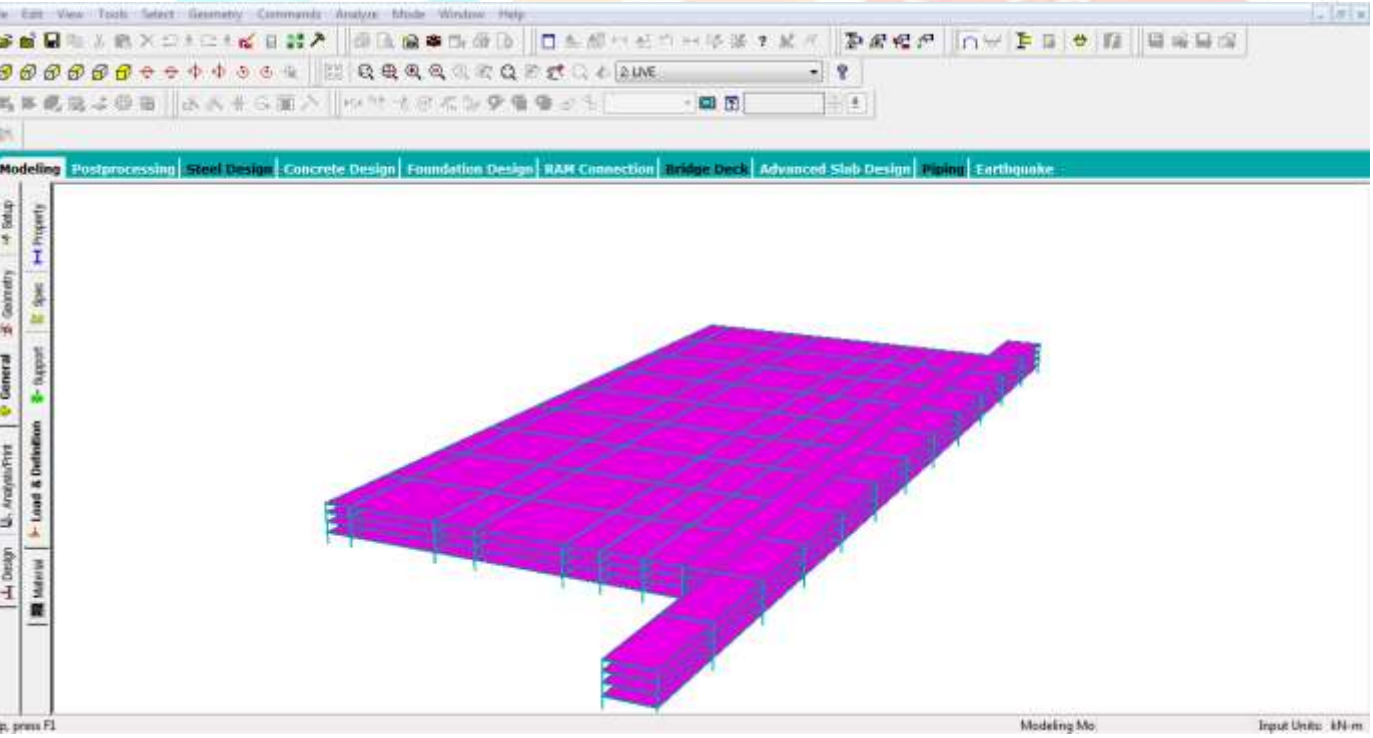

Figure 8 Isometric view of Railway Station with plates

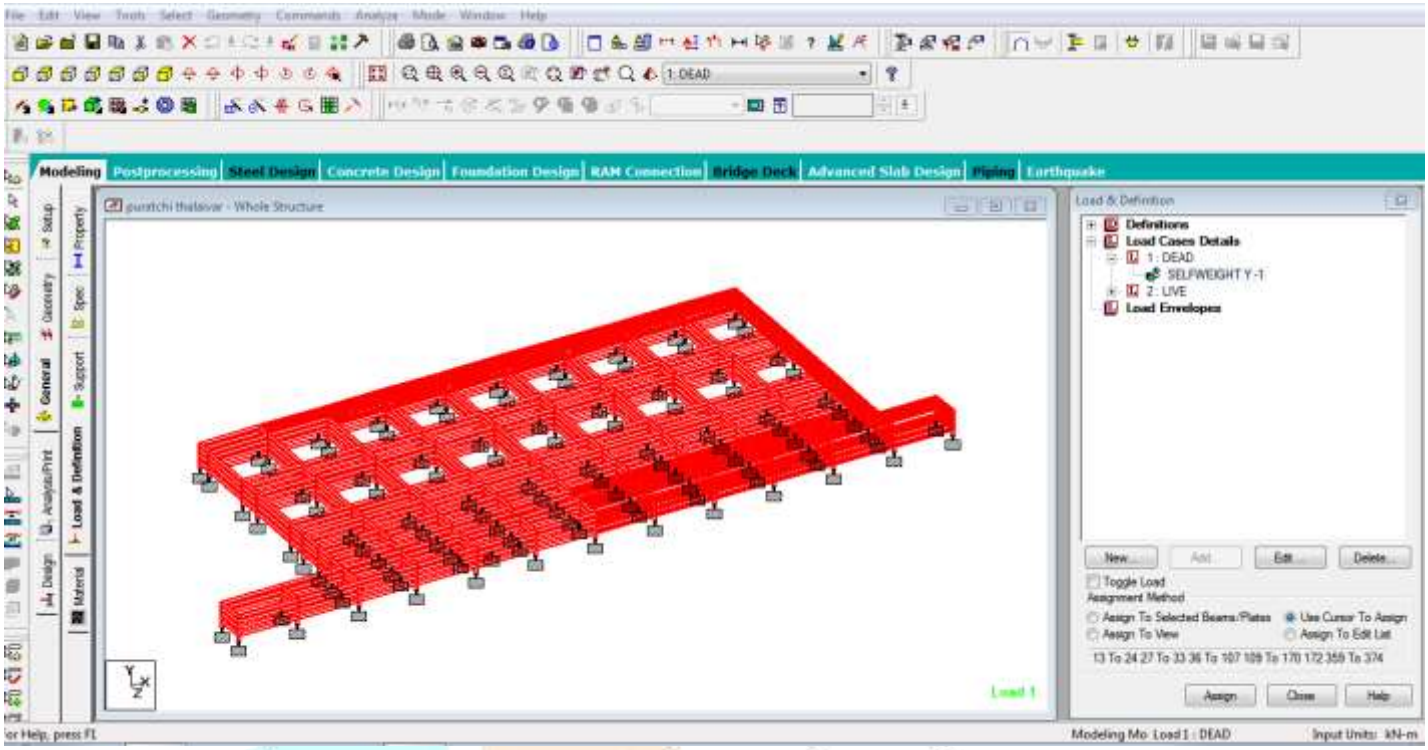

Figure 9 Self Weight Load

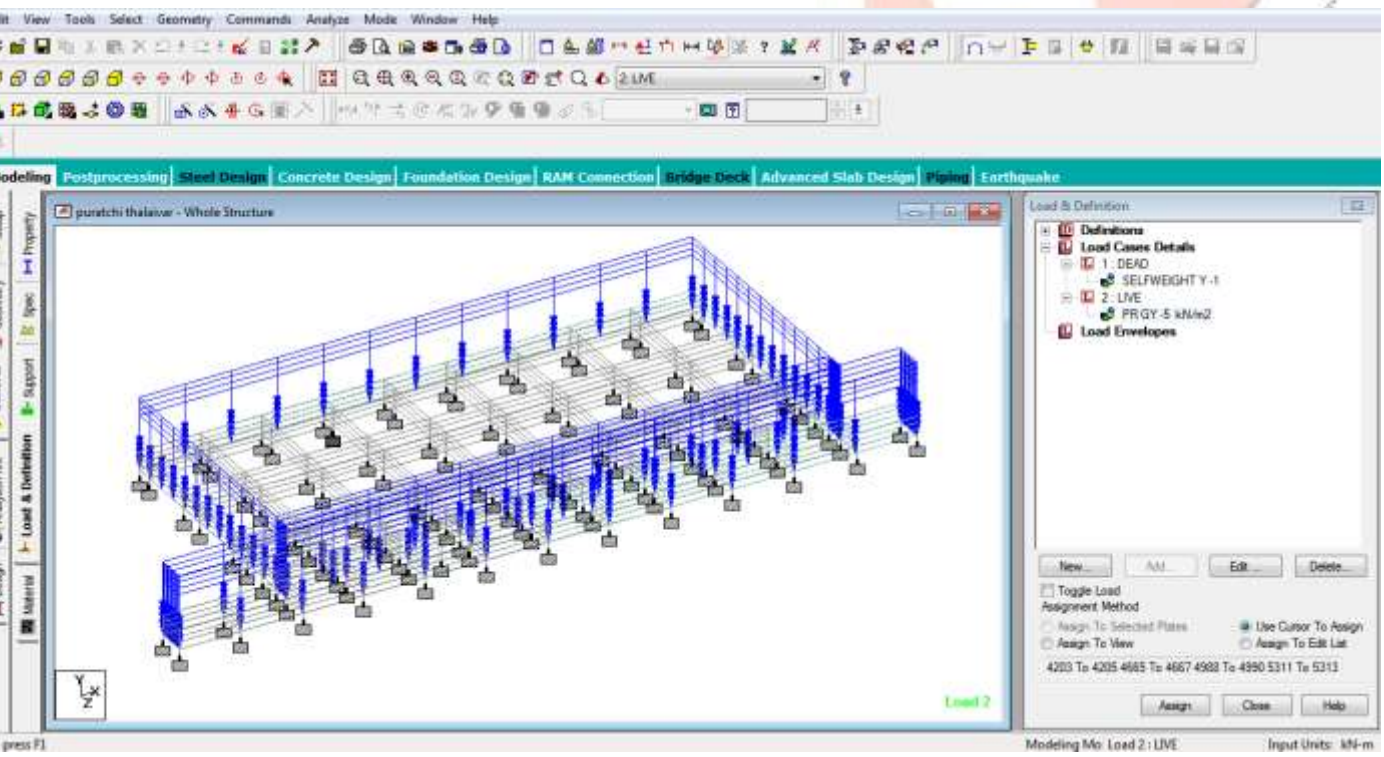

Figure 10Live Load

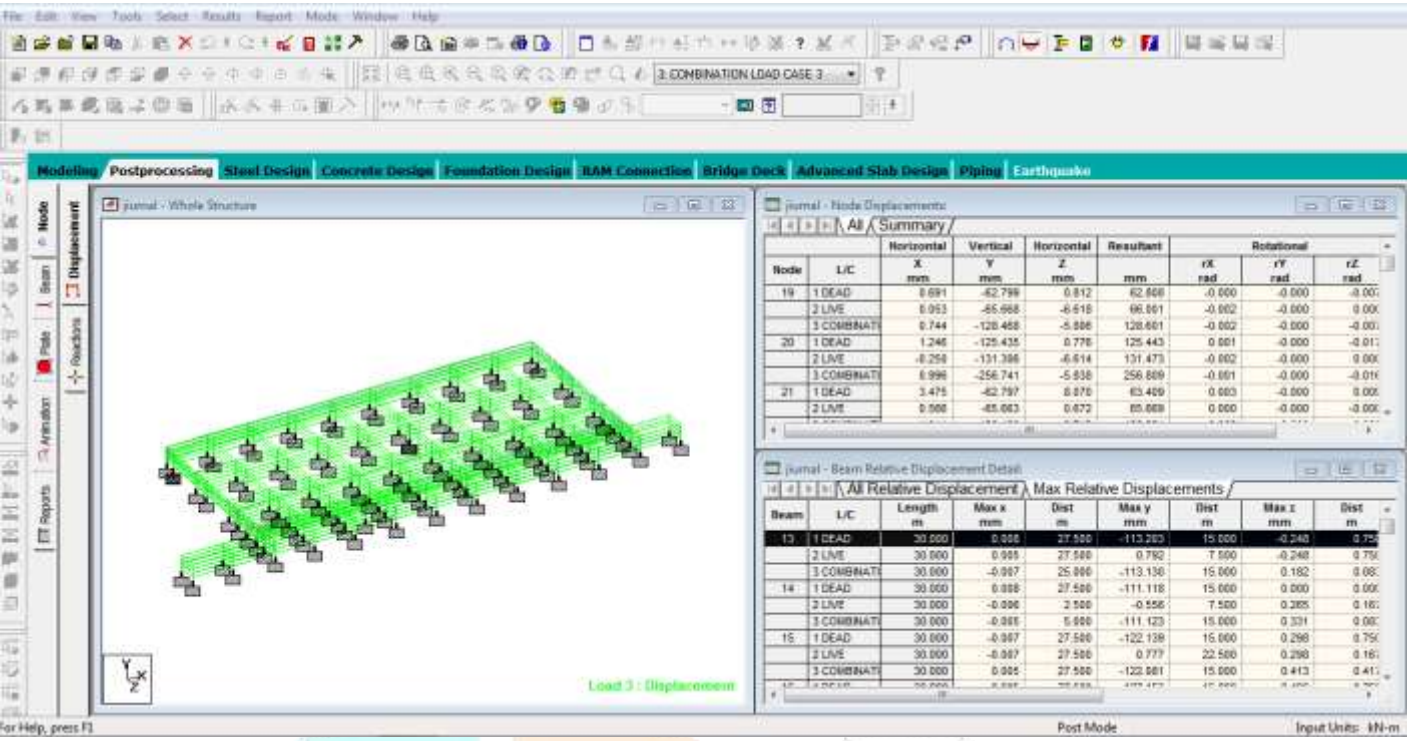

Figure 11 Displacement

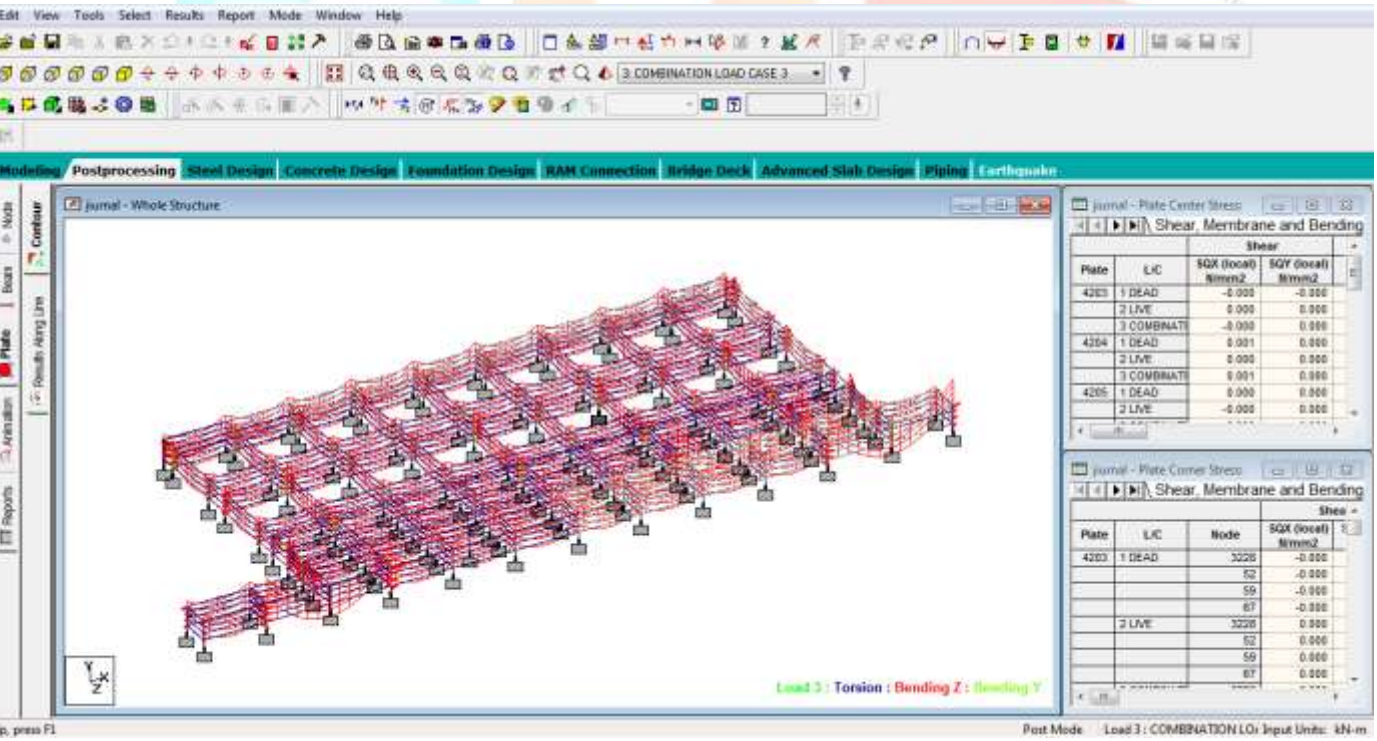

Figure12 Bending Moment

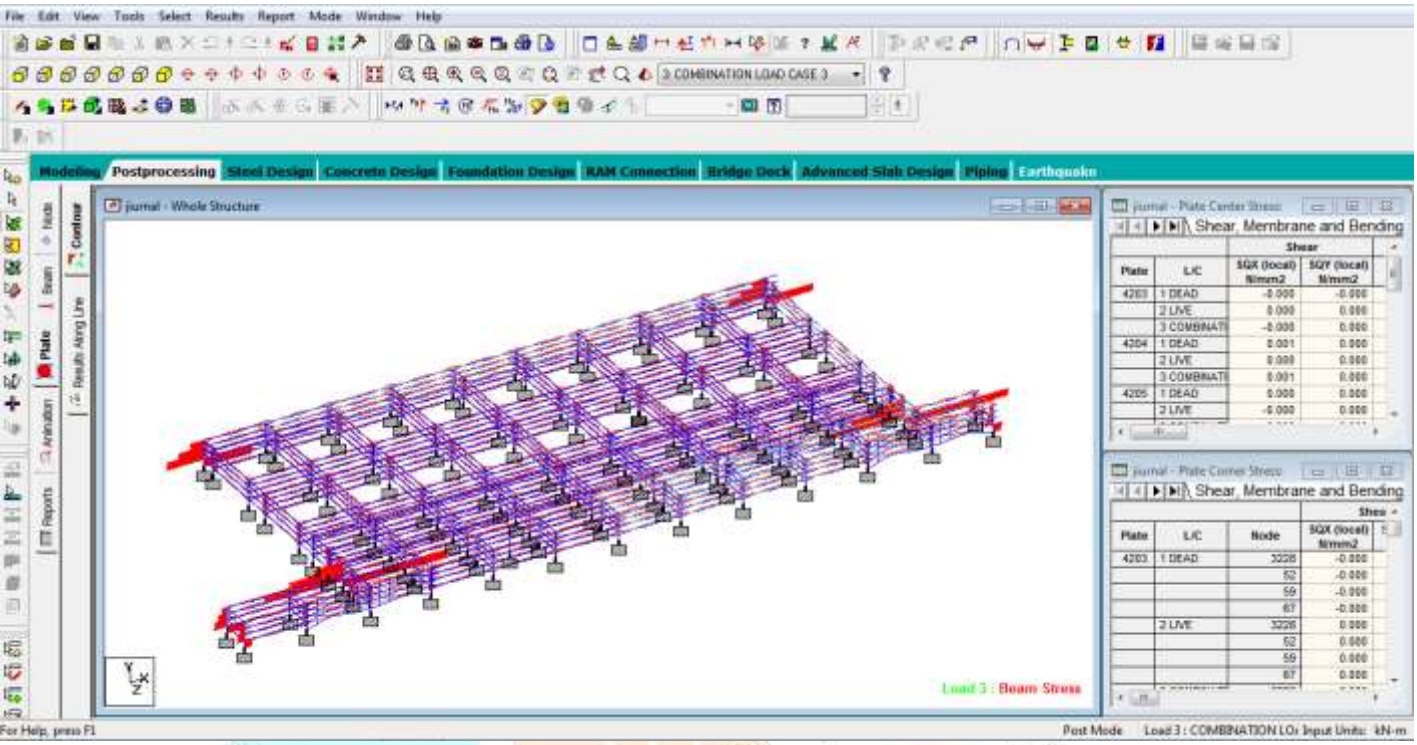

Figure 13 Stress in x, y,z direction

VI. CONCLUSION

Thus, we have completed our paper "Planning, analyzing and designing of Smart railway station" successfully. The station is designed with standard basic requirements according to Indian railways rules and regulations. Due to increase in population, the rail transport tends to increase because of its low economy among the people . so for reducing the cost of purchasing additional land it needs to alter the existing structures into multi storybuilding in which we can provide additional facilities for passengers, handicapped persons, transgender persons, porters and employees. This project proposals are prepared using Auto CAD software and analyzed by STAAD. pro software.

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