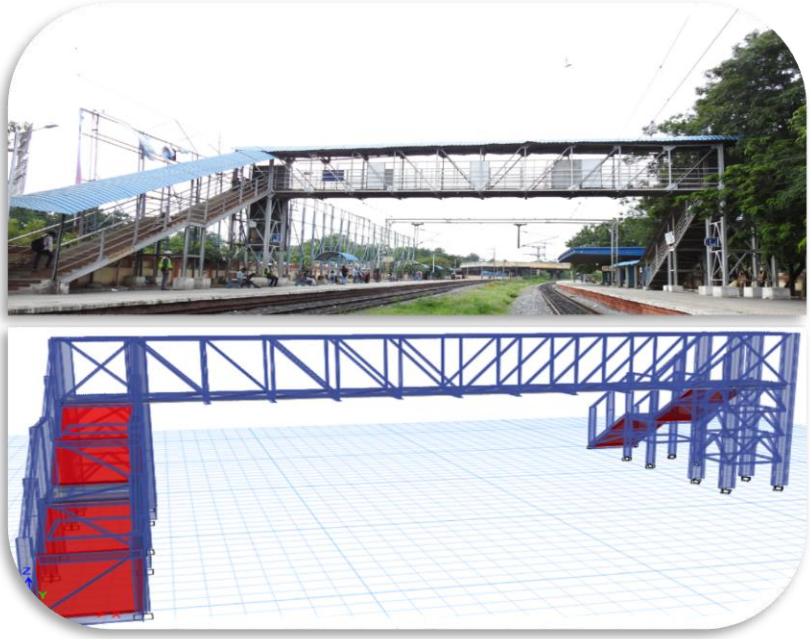
Name of the Project	:	VISUAL INSPECTION OF FOB/ PF-1 - PF-2 AT KHAIRTABAD RAILWAY STATION
Location	:	KHAIRTABAD RAILWAY STATION
Location Co-ordinates	:	**17°24'46.5"N 78°27'39.5"E**
Date of Inspection	:	2nd, 14th and 25th AUGUST, 2019



Summary:

a) Slight corrosion is observed at all the joints between truss and slab (above slab).
b) Major corrosion is observed at few concrete steel joints (below slab).
c) Minor cracks are observed at bottom of pre-cast slab panels.

Tests to be conducted:

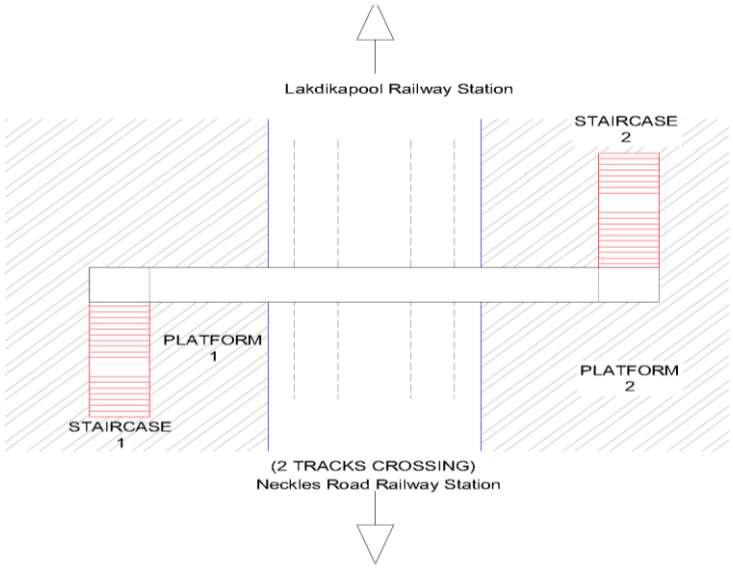
a) Ultrasonic Thickness gauge to measures local thickness of a solid element.
b) Elcometer (Coating thickness Gauge) to measures dry film thickness on steel surfaces.
c) Ultrasonic Flaw detector to detect hidden cracks, voids, porosity, and other internal discontinuities in metals.
d) Fillet weld gauge to measures the size of the weld.
e) Profometer Test for concrete cover and diameter of rebar.
f) Rebound Hammer test surface strength of concrete (For Pre-cast slab panels and staircase)

FORMAT FOR VISUAL INSPECTION (VI) OF STEEL FOOT OVER BRIDGE

Name of the Project	Visual inspection of FOB/ PF-1 - PF-2 at Khairtabad railway station
Location	Khairtabad Railway Station
Date of Inspection	14-08-2019

PART 1 GENERAL INFORMATION AND OBSERVATION		
1.1	Name of the Bridge	FOB/ PF-1 - PF-2
1.2	Location Location co-ordinates	Khairtabad Railway Station 17°24'46.5"N 78°27'39.5"E
1.3	Type of truss Structure	N-type Truss
1.4	Year of Construction	Approx. 20+ years
1.5	Description of the main use of the bridge	Pedestrians Crossing
1.6	Major Materials used in different parts of bridge	Structural Steel (Truss, frame), RCC (Slab, Staircase)
1.7	Width of the Pathway (m)	2.0 m
1.8	Length of the Pathway (m)	21.50 m (Clear span)
1.9	No of Railway Lines Crossings	2 tracks
1.10	Span arrangement (no x Span in meters)	1x 21.5 m
1.11	Vertical Clearance (from rail top to girder bottom)	7.039 m
1.12	Head Room	2.70 m
1.13	Damages due to accidental hitting, Grazing Marks	No Visible signs appear
1.14	History of Repair/ Maintenance	Yes (2017)
1.15	Existing Structural Drawings	Not available

1.16 Key Plan



PART 2 IDENTIFICATION OF LOADS ON BRIDGE			
		Yes/No	**Notes**
	Dead Loads at Roof level		
2.1	a) Pipeline - Utilities	No	Not observed in site
	b) Cables	Yes	Cables are protected with 1-inch dia HDPE pipe (Refer ***fig :1***)
	c) Roof Truss	Yes	30 x 30 x 4 mm Angles are used (Refer ***fig :1***)
	d) Roof Sheet	Yes	Steel Metal Sheet is used for Roof (Refer ***fig :1***)
	e) load of advertising hoarding	Yes	Advertising boards are provided (Refer ***fig :2***)
	f) load of train/coach display boards	No	No train coach display boards are provided
	g) Electrical equipment (OHE), signal	No	No electrical equipment and signal are provided
2.2	**Dead Loads at Floor level**		
	a) Additional wearing coat on Floor	No	Only Chequered tiles used for Flooring (Refer ***fig :3***)
	b) Provision of protective screen for passengers	Yes	Chain link fence made of Galvanized wire of 2 mm gauge and 2 mm Galvanized sheet is used above OHE Line on both side of Gangway is used for Protection. (Refer ***fig :3***)
	c) Type of Material used for mesh	GI wire mesh	

	PART 3 STRUCTURAL SYSTEM OF THE BRIDGE		
			Notes
3.1	**Foundation details**		Not visible at site
3.2	**Tresels details**		
	Type of Material	Concrete	*To protect the column from corrosion, it is protected with concrete encasement on PF level (Refer ***fig :4***)
	Dimensions (L x W)	a:720 x 600 mm b:600 x 600 mm	
	Reinforcement Details of tresels		** a and b dimensions of Concrete encasement are observed in site
	Column – Tresels Connection Details		
	a) No of Bolts and size	Not visible, filled with concrete	Base plate is observed at staircase, partially covered by concrete (Refer ***fig :3.1***)
	b) Thickness of Base Plate	Not visible, filled with concrete	
3.3	**Roof Truss**		
	Element of roof truss section	Semi-circular angular truss	30 x 30 x 4 mm Semi-circular Angular section are used for roof truss, supported on 65 x 65 x 8mm Tie Members using welded joints. (Refer ***fig :1***)
	Size of roof truss	2.5m wide	
	Connection of Roof elements	Welded connection	

3.4	**Steel Girder/Truss**		
	Type /Shape of Truss Section	N- type, Double Angle	a) Main members 75 x 75 x 10 mm Double Angular section b) 65 x 65 x 8 mm Double angular are used as bracing Members c) 10 mm thick gusset plate for welded joint. (Refer ***fig :6***)
	Height of Truss (H)	2.70 m	
	Boundary Condition	Ridged connection	
	Shape of Secondary Girder /Bracings	Double Channels angular section	150 x 75 x 6 mm Double Channel Sections are used as Secondary Girders, supported with 65 x 65 x 8 mm angular sections to Transfer Load from Slab to Roof Truss. Secondary girders are connected Tie Member using Bolts and Bracing are connected to Tie members using welding. (Refer ***fig :5***)
	No of Secondary Girders/bracings for span	9 no's	
	Arrangement of Bracings	Diagonal	
	Type of Beam-Column Joint (shape of gusset plate if any)	Cleat angles	
3.5	**COLUMN**		
	Shape of Column section	I – Section	FOB is Supported on Vertical Column of 4 - ISMB 300 with 65 x 65 x 6 mm Angular Lacing members connected using Gusset plates and bolts. (Refer ***fig :8***)
	Height of column from (PF level to bottom of slab panel)	6.123 m	
	No of Columns/ support	4 no's	
	Dimensions of Column	300 x 150 mm	
	BEAM-Column joint (bolted, welded, riveted)	Welded connection	
3.6	**Floor of the Pathway**		
	Material of Slab	Pre-cast slabs	Pre-cast Reinforced Concrete Slab panels are used for floor slab of 100 mm thick, Pre-cast RCC slab panels are resting on Angular tie members supported on Secondary Girders and Bracings from bottom. Chequered tile (25 mm thick) flooring is laid on the top of the Pre-cast slab panels. (Refer ***fig :3 and 5***)
	Thickness of Slab	100 mm	
	Condition of Slab from Bottom	Leaching effect and minor cracks observed	
	Condition of Slab from Top	Covered with Chequered tiles	
3.7	**Staircase Details**		
	Number of Staircase	2 No's	Staircase steps are observed as Pre-cast RCC slab panels of size 300 x 100 are used. Steps are supported on ISMC 300 Channel using cleat Angles. Staircase Landing of 2 m wide is supported on Vertical and Horizontal Angular Members. (Refer ***fig :4***)
	Number of Steps from PF – 1	44 no's	
	Number of Steps from PF – 2	44 no's	
	Material used for steps	Pre-cast Slab Panel	
3.8	**Staircase Railing**		
	Type of Parapet Railing	Steel Railing	Stair case is provided with Railing on both sides of one-meter height using Angular and Hollow Circular sections. Billboard is partially supported to staircase railing and landing vertical supports (Refer ***fig :2***)
	Height of Railing	1 m	

PART 4 SURVEY OF SIGNS OF DISTRESS, DEFORMATION IN BRIDGES

4.1

- ✓ Leaching effect and cracks are observed in Pre-cast RCC Slab panel at joints.
- ✓ Corrosion is observed in Tie Angular sections, Gusset plates and bracings along steel - concrete joint on both sides of FOB.
- ✓ Rusting is observed in Truss bracing members along the length of FOB near steel concrete joint.



Leaching effect and minor cracks observed in Pre-cast slab panels

4.2

- ✓ Distressing of Cleat angle is observed at Beam – Column joint
- ✓ Rusting is observed at all beam Column joints.



Distressing of Cleat angle is observed at Beam – Column Joint

PART 4 SURVEY OF SIGNS OF DISTRESS, DEFORMATION IN BRIDGES			
	Defects	**Location**	**Notes**
	Cracking in Steel Members		No cracks are observed in Steel during visual inspection
	Cracking in RCC components	Slab panels	Minor cracks are observed in Pre-casted RCC slab panels
	Water seepage		No water seepage is observed
	Spalling		No Spalling is observed in RCC members.
	Rust straining	Beam – Column Joints	Slight rusting is observed at all the joints of FOB at floor level
	Extent of Corrosion	PF – 2 Beam column joints	Distressing is observed at Beam – Column joint
	Corrosion in Gusset plate	near base slab	Rusting is observed in Gusset plates
	Corrosion at steel-Concrete joint		Major corrosion is observed at steel concrete joint along (Refer ***Fig 9)***
	Condition of Painting of steel structure		Painting is affected only at distressed places.



Fig 1: Electrical Cables, Roof truss and Roof sheet



Fig 2: Load of Advertising Hoarding and staircase details



Fig 3: Galvanized wire mesh and Flooring



Fig 3.1: Base plate at staircase



Fig 4*:* Concrete encasements



Fig 5: Shape of main and secondary girders



Fig 6: Main truss details



Fig 7: Beam- column joint



Fig 8: Shape of column



Fig 9: Corrosion at concrete-steel joint along the span

5.0 Numerical Model

- Three-dimensional numerical model has been developed from the dimensions obtained by visual inspection and loads considered for foot over bridge is 5kN/m^2. obtained model and results are shown below.

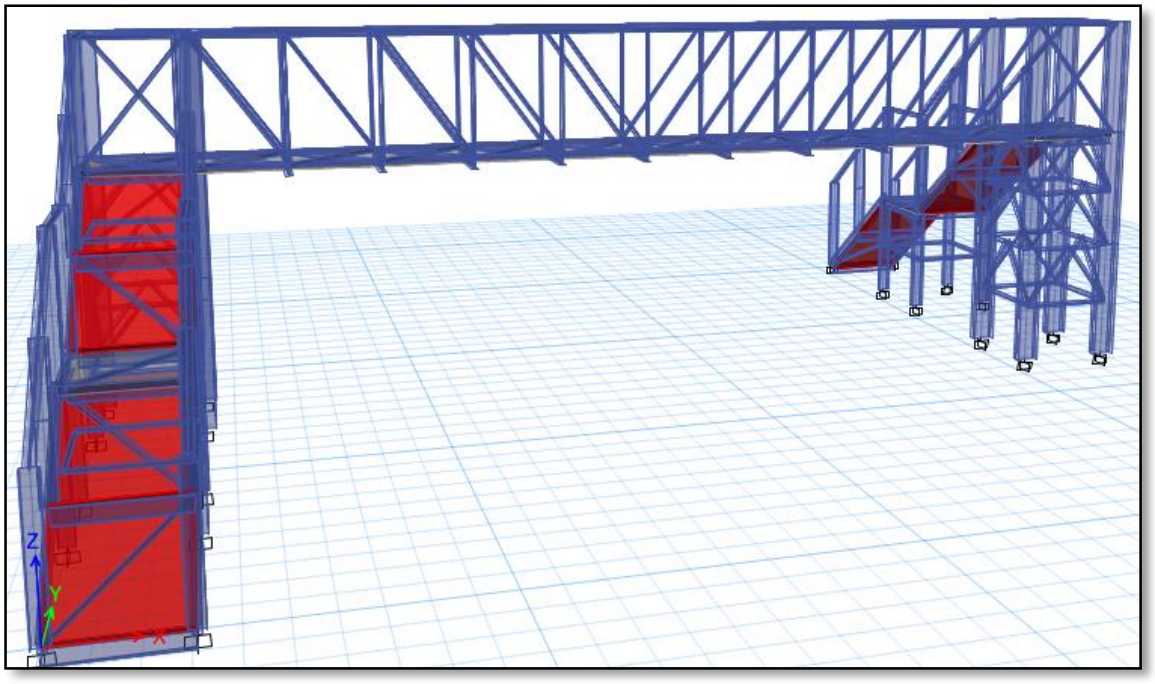


Fig: 5.1 Numerical Modeling of Khairtabad Railway station FOB (Developed from the Visual inspection)

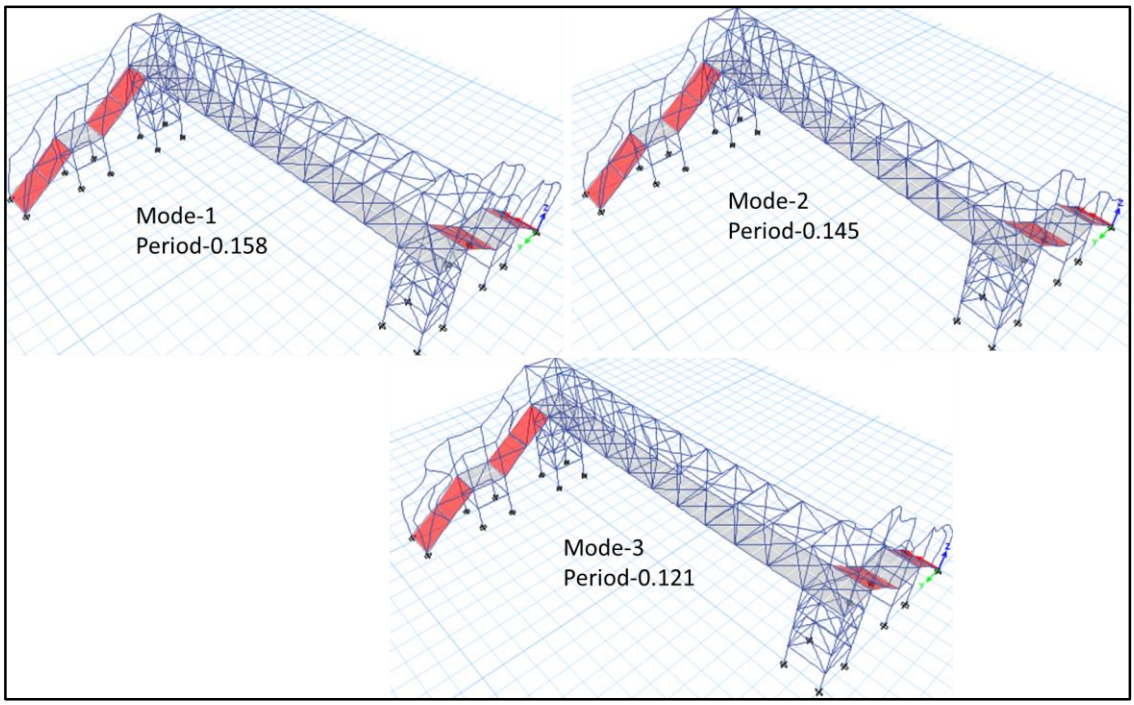


Fig: 5.2 Modal analysis of FOB

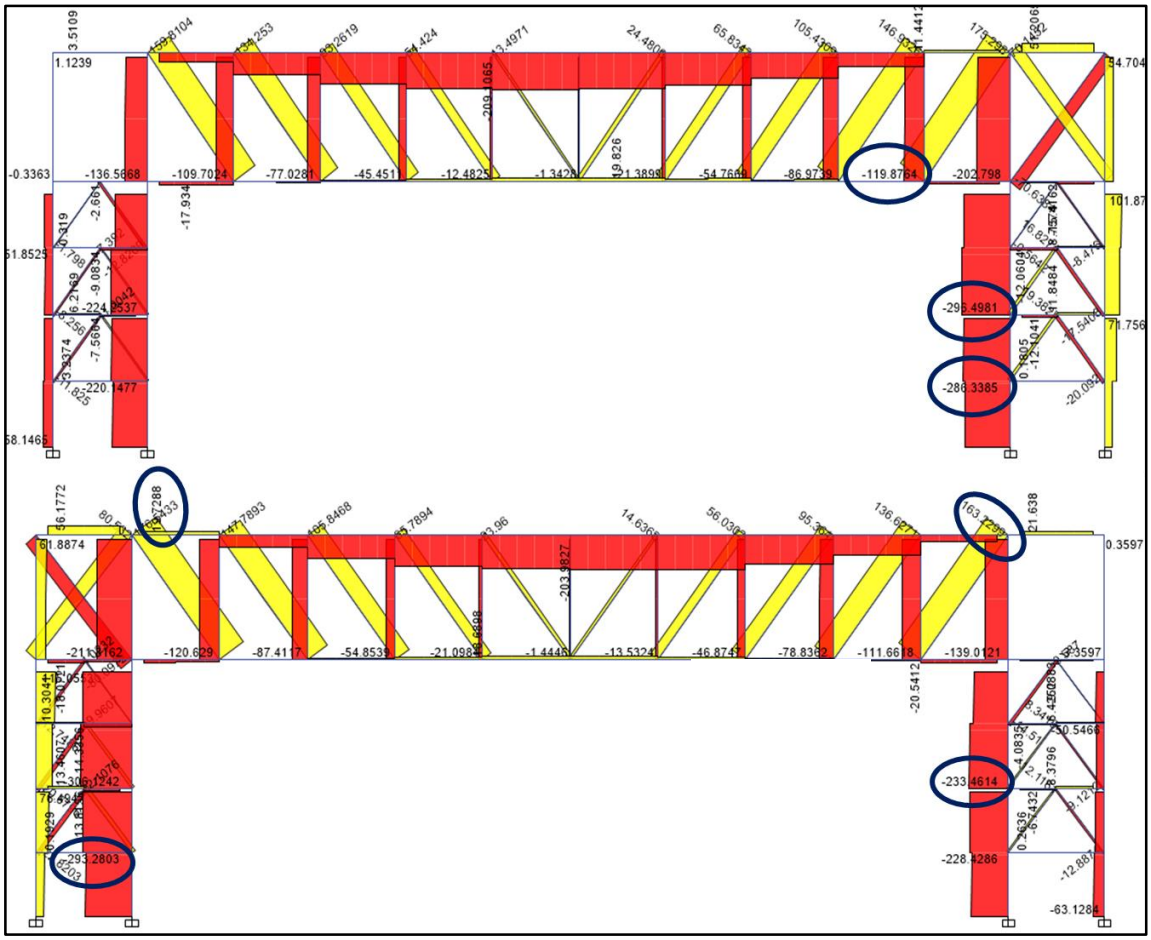


Fig: 5.3 Axial Forces of all Members

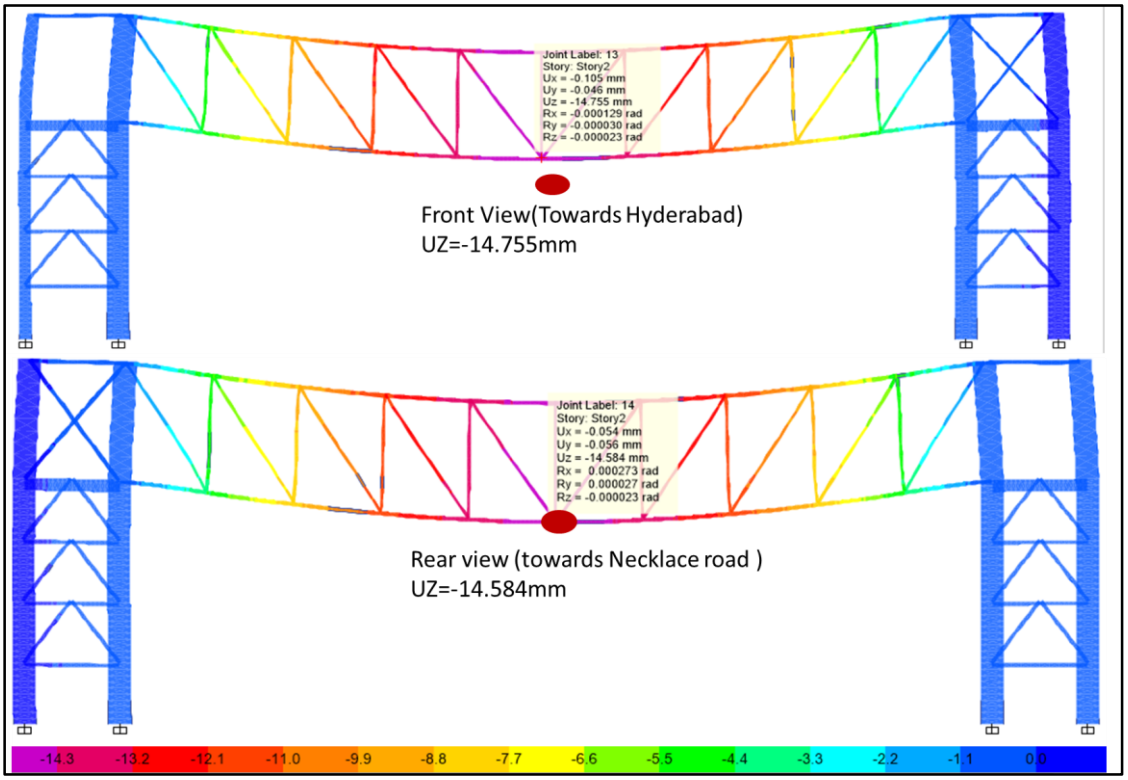


Fig: 5.4 Displacements in truss

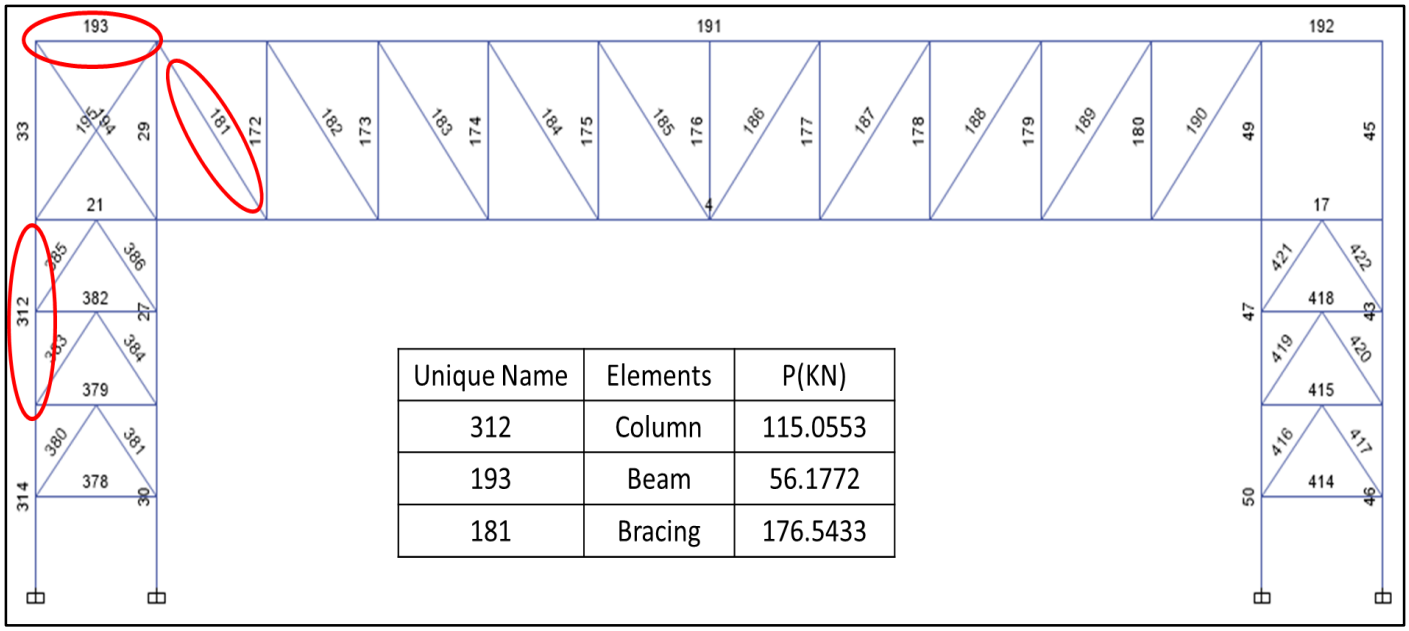


Fig: 5.5: Highlighted members having maximum axial forces (Members shown are with their respective element numbers)