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COMPARATIVE ANALYTIC STUDY ON CONVENTIONAL FRAME AND SPANDREL FRAME

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ABSTRACT

The main aim of the Project is to Comparative analytic study on conventional frame and spandrel frame. Bending of beams is a frequently encountered loading situation in practice. This project helps as to understand the conventional and modern method of construction. We are observing the important of design. The first option is to design a ductile frame, which involves special design and detailing provisions to ensure ductile behavior. The second option is to design a nominally ductile frame. This option involves designing for twice the seismic lateral load as that for ductile frames, but without taking all the special provisions for good detailing in the design of the frame members.

KEYWORDS: Conventional Frame, Wedge Spandrel, Arched Spandrel, Polyurea Coating.

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The term is typically employed when there is a sculpted panel or other decorative element in this space, or when the space between the windows is filled with opaque or translucent glass, in this case called spandrel glass. In concrete or steel construction, an exterior beam extending from column to column usually carrying an exterior wall load is known as a spandrel beam.

It shows the character of the beam. The design engineer and supervision do the designing of this beam. The process has the detail report of deflection and stress distribution of a beam.

CONVENTIONAL FRAME

Reinforced concrete (RC) frames consist of horizontal elements (beams) and vertical elements (columns) connected by rigid joints. These structures are cast monolithically— that is, beams and columns are cast in a single operation in order to act in unison. RC frames provide resistance to both gravity and lateral loads through bending in beams and columns.

The results of dynamic modal analyses and non-linear static analyses showed that the proposed method can safely be applied to ordinary multi-storey concrete precast frames characterized by structural regularity and limited flexibility. Their results demonstrated that the design method can be safely applied to regular structures with first vibration period less than two second, under condition that a suitable partial safety factor is adopted. They observed 27 that better proportioning of the columns and their connections to beams can be achieved with reference to the distribution of stresses provided by dynamic modal analyses (Figure 1).

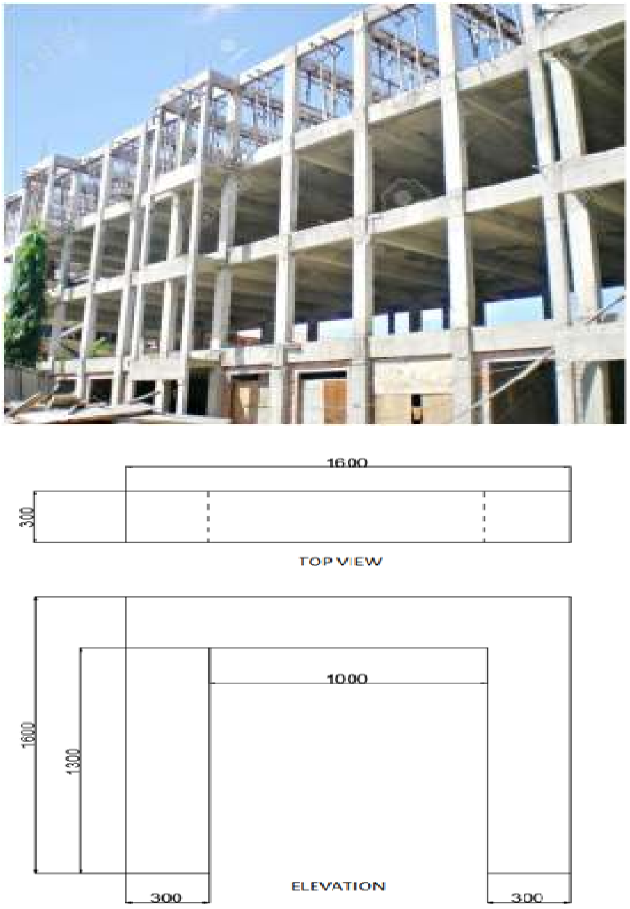

Figure 1: Conventional Frame

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WEDGE SPANDREL

A Spandrel, less often spandril or splaundrel, is the space between two arches or between an arch and a rectangular enclosure. There are four or five accepted and cognate meaning of spandrel in architectural and art history, mostly relating to the space between a curved figure and a rectangular boundary - such as the space between the curve of an arch and a rectilinear bounding moulding, or the wall space bounded by adjacent arches in an arcade and the stringcourse or moulding above them, or the space between the central medallion of a carpet and its rectangular corners, or the space between the circular face of a clock and the corners of the square revealed by its hood. Also included is the space under a flight of stairs, if it is not occupied by another flight of stairs.

In a building with more than one floor, the term spandrel is also used to indicate the space between the top of the window in one story and the sill of the window in the story above. The term is typically employed when there is a sculpted panel or other decorative element in this space, or when the space between the windows is filled with opaque or translucent glass, in this case called spandrel glass. In concrete or steel construction, an exterior beam extending from column to column usually carrying an exterior wall load is known as a spandrel beam (Figure 2).

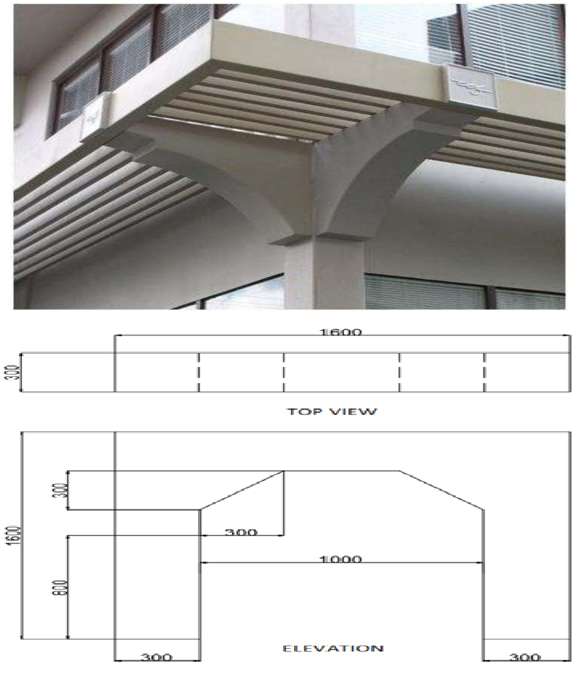


Figure 2: Wedge Spandrel

ARCHED SPANDREL

An Arch is a curved structure that spans an elevated space and may or may not support the weight above it. Arches may be synonymous with vaults, but a vault may be distinguished as a continuous arch forming a roof. Arches appeared as early as the 2nd millennium BC in Mesopotamian brick architecture, and their systematic use started with the ancient Romans who were the first to apply the technique to a wide range of structures. Arches have many forms, but all fall into three basic categories: circular, pointed, and parabolic. Arches can also be configured to produce vaults and arcades (Figure 3).

- To avoid buckling occurs in the elements of building.
- To get the life of building more when compare to conventional method.
- To avoid cracks which was occurs in the frame
- To build ecofriendly manner
- To get more flexural strength in the beam
- To increasing flexural strength of beam by providing of spandrel

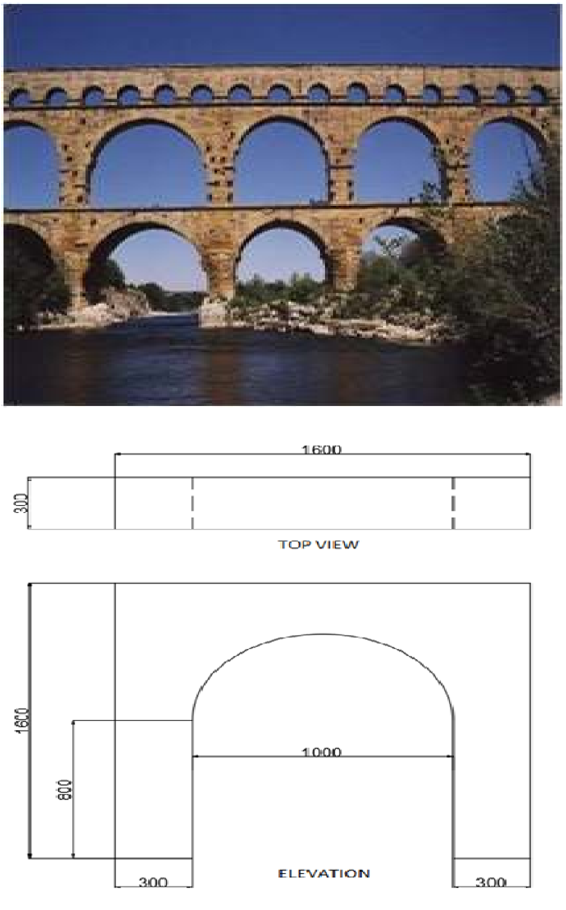
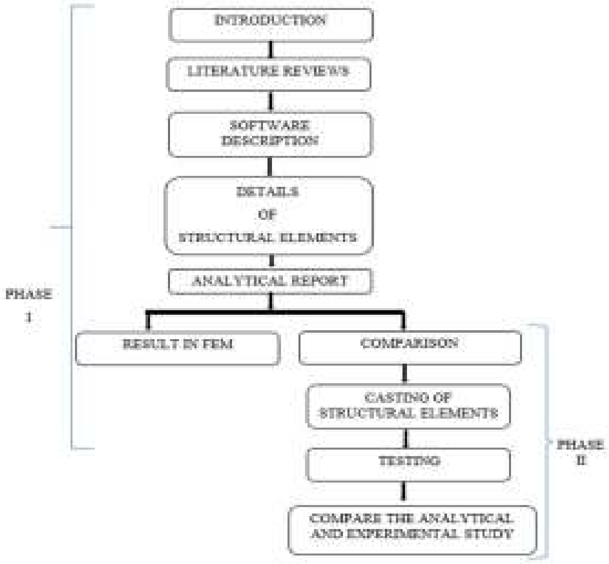


Figure 3: Arched Spandrel

POLYUREA COATING

Polyurea is a type of elastomer that is derived from the reaction product of an isocyanate component and a synthetic resin blend component through step-growth polymerization. This type of paint are acting as DPC, bonding agent. It will be coated only on R.C.C member such as beams, slabs, column. Polyurea is a type of elastomeric that is derived from the reaction product of an isocyanate component and a synthetic resinBblend component through step-growth polymerization. The isocyanate can be aromatic or aliphatic in nature. It can bemonomer, polymer, or any variant reaction of isocyanides, quasi-prepolymer or a prepolymer. The prepolymer, or quasi-prepolymer, can be made of an amine-terminated polymer resin, or a hydroxyl-terminated polymer resin.

METHODOLOGY



ANALYSIS REPORT

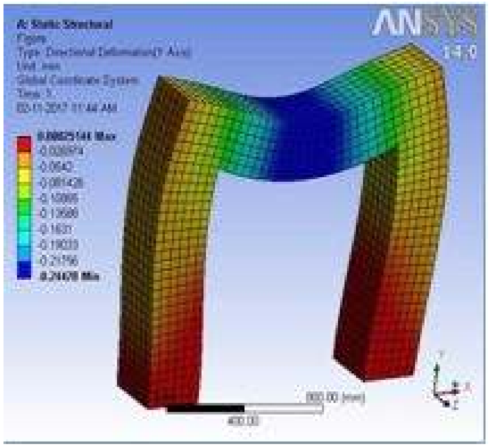


Figure 4: Deflection In Conventional Frame

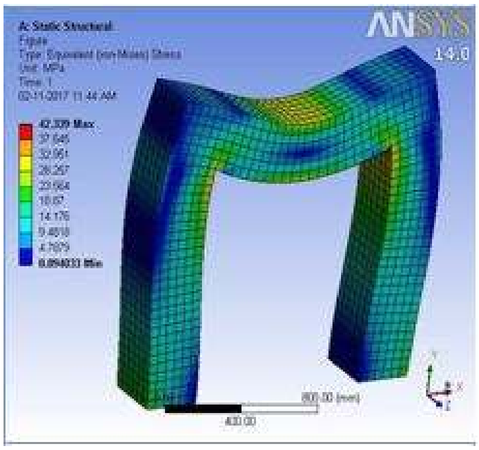


Figure 5: Stress In Conventional Frame

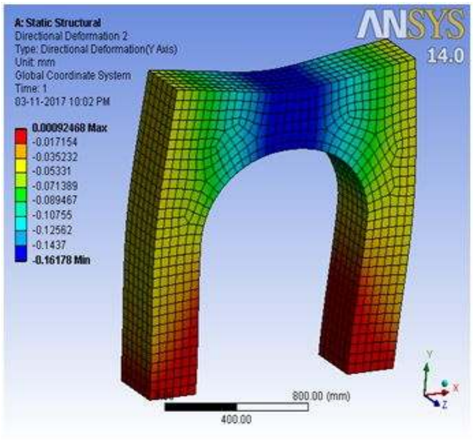


Figure 6: Deflection Inarched Spandrel

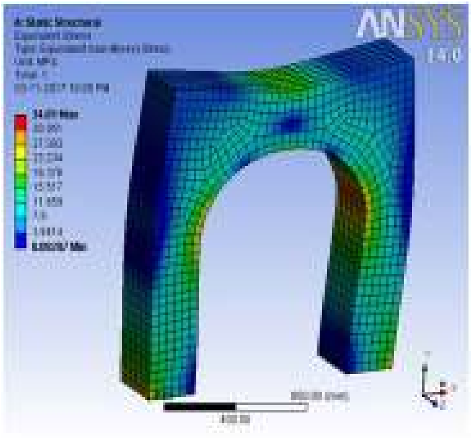


Figure 7: Stress Inarched Spandrel

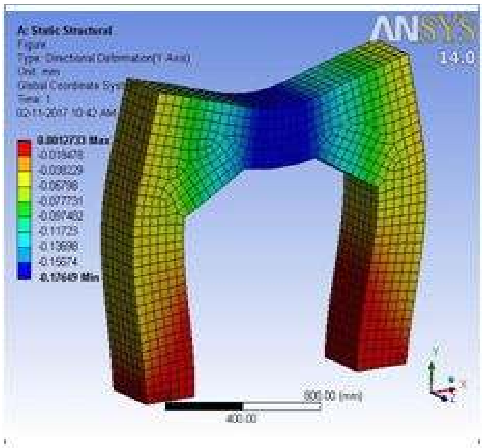


Figure 8: Deflection In Wedge Spandrel

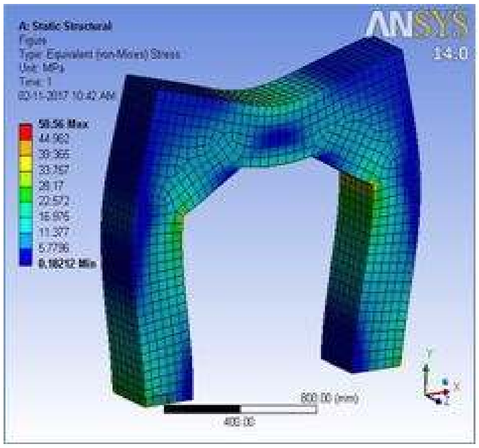


Figure 9: Stress Inwedge Spandrel

RESULTS AND DISCUSSION

Table 1: Comparison of Frames

Sl. No.	Parameters		Conventional Frame	Wedge Spandrel	Arched Spandrel
1	Equivalent Stress in MPa	Max	42.339	50.56	34.81
		Min	0.094033	0.18212	0.08287
2	Equivalent Strain	Max	0.0002	0.0025	0.000174
		Min	0.0000016	0.0000009	0.0000004
3	Shear Stress in MPa	Max	18.049	17.475	9.5869
		Min	-18.049	-17.449	-9.5816
4	Strain Energy in mI	Max	392.18	327.13	190.87
		Min	0.95628	0.75651	0.389
5	Deformation of x-axis in mm	Max	0.075667	0.079534	0.0705
		Min	-0.075667	-0.079534	-0.0705
6	Deformation of y-axis in mm	Max	0.00025	0.0012733	0.00092468
		Min	-0.24478	-0.17649	-0.01617
7	Deformation of z-axis in mm	Max	0.008	0.00788	0.0063
		Min	-0.008	-0.00788	-0.0063
8	Total Deformation in mm	Max	0.2448	0.17652	0.16181
		Min	0	0	0

CONCLUSION

The analytical investigation presented in this paper is intended to provide a better understanding of the concentric load behaviour of ductile and nominally ductile structures. The ductile frame performed very well under pushover loading. This was due to weak beam-strong column considerations. The response showed that the capacity design philosophy and ductility level as applied in current Canadian standards are effective. The nominally ductile frame was stronger than the ductile frame due to larger member sizes, but the results showed lower ductility capacity.

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