**Abstract**

In these papers, most intricate and most difficult problems are to be solved in both design and construction of structure assembled of precise members is the joining of the latter. It’s highly important that the construction of the joints should be easy, that unavoidable smaller inaccuracies and deviations within dimensional tolerances should neither influence the designed stresses to a detrimental manner nor cause inadmissible changes in the stress distribution of the structure. It is desirable that the structure should be load bearing as soon as possible, preferably immediately after assembly. An additional justified demand is that the joints require, owing to their intricacy, greatly increased control/ joints which cannot be inspected should be omitted. When solving the problems for joints, the properties of reinforced concrete must be taken into consideration. This means in other words, that the design and the construction of the joints should harmonized with the material to come into use. The properties of steel and timber are quite different from those of concrete and reinforced concrete. Therefore, joints similar to those used in timber and steel construction generally not appropriate for the purpose.

**Keywords:** Reinforcement anchorages, Threaded inserts, Chamfers, Columns to columns connections, Beam to column connections, Main beam to secondary beams

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**Introductions**

This principles of design express the difference in the behaviour of precast and monolithic structures. The principle is the consequence of different systems for producing these structures. In statically determinate monolithic structures smaller inaccuracies occurring in shuttering, generally, do not cause additional stresses [1]. In case of a recast of a preset continuous beam, On the other hand, if after positioning, the relative position of the support is not the same is not the same as the place of casting, important additional stresses could result. For a 2- hinged arch the situation is essentially the same. In this case, the placing of the arch should not be the cause of surplus stresses if after placing, the distance between the 2- hinges is exactly the same as it was during prefabrication [2]. As designed. it is more empirical to precast two hinged arches in the form of three-hinged ones because the latter are statically determined structures and so not sensitive to inaccuracy which may occur when placing [3]. After roofing members are placed are roof laying is finished, the centre joints are eliminated [4]. The structured acts, from the viewpoint of further loads, as a two hinged arch. Another fundamental principle to be respected is that the degree of the statically redundancy of assembled structures, arising from the assembly itself should be as low as possible [5]. Rigid joints increase the degree of statically redundancy [6]. For any type of moving loads act at the stretched joints sections is deformed and rigid. Rigid joints increased the degree of statically redundancy, from the viewpoints of deformations sometime they do not satisfy the conditions of perfect rigidity assumed in calculations [7]. Owing to this, in the case of stational redundancy of a higher degree the correctness of the computed force distribution may become doubled in compliance the above rigid joints should not be formed between joining beams and columns but the beams should not be placed simply and the columns [8]. These methods will lead to more simply manufactured
and placing and in addition to the omissions of rigid joints at corners, the forming and execution of which is usually complicated and difficult [9]. In this context, this paper special designing joint sections for prestressed members. That connection based on the columns to columns, beams to beams and main beams to secondary beams connections.

Methodology

Connection details in precast concrete constructions the connections between the elements are of utmost importance. There are 2 types of connections. Wet connections with mortar or in-situ concrete. Dry connections with welding or bolting [10]. While choosing connections, so many factors we have to consider. The connection should satisfy in technical economical, and if required aesthetical respects [11]. Structural requirements the connections must comply with all requirements regarding the transmissions of force and moments, and permissible deformations or rotations. All joints and connections are rigid and flexible conditions [12]. It’s better critical load transmissions capacity of the structural performance.

Designing Connections

While designing the connections following points must be considered. Design of connections must be considered. Design joint connections must be based on the relevant standard specifications codes of practice, rules or by-laws and any other special requirements or recommendations which might be relevant [13]. Loading under working conditions, stability of structures, load conditions during constructions, effect of shrinkage, creep and temperature, unequal settlements [14]. Loading under working conditions the entire structure, as well as each unit own must be designed to resists all loads. Forces and moments, acting when the structure is in like an external load on the internal columns, torsions of main beams and columns [15]. Each load act at the same units compound components of 2 stretched sections and to convert the uniform sections.

Stability of structure

The overall stability of the structured must be warranted during each phase of construction [6]. This may equired special provisions.

Load conditions during joint constructions

Load conditions during construction joint may cause higher stresses than those through normal usage. Temporary eccentric loading of internal columns temporary additional loads due to erection materials and temporary supports [17].

Shrinkage of creep and temperature

With fixed beam connections the stresses and moments due to shrinkages, creep and a temperature drop of the beams must be considered for the connections properly and for the structured as a for the connections properly and for the structured as a whole [18]. To minimize these effects, its desire for the greater part of the shrinkage and creep shortening to have taken place prior to the installations of the beams [19]. Shrinkage and creep and steel can be partly if not entirely eliminated [20]. A post-tensioned structured can also be large and heavy girders, which cannot be produced from manufacture precast members which, are to assembled on the site into a larger girder by post-tensioning methods. In this way, otherwise untransportable produced in factories can be divided into smaller members, already suitable for plants preferable and for shipping. Concrete to use for post-tensioning structure should usually have the quality C 400 but least C 280 [21].

The manufacturing and hoisting of respective members are essentially the same theas in the case of other precast structures. Unequal settlements in this case of fixed end connections the possibility of settlements at the supports should be investigated.

Reinforcements anchorages

The connections will require additional reinforcing bars and anchorages, which must be so designed, that a sound fill and proper compactions of the concrete can be realized [22].

Bond

Bond surface with vertical joints face in contact with a vertical mortar (1:1- ratio) or cast in place joints [23]. A bond surface which should transmit vertical shear must either the roughened or ribbed.

Holes for dowels bars

Figure 1. Shown as dowels holes should have liberal dimensions especially with regards to length or depth. Moreover, the material with which the role should be
filled must be specified. If the dowel bars are to transferred longitudinal forces, the dowel holes should be provided with ribbed walls and columns [24].

**Connection**

Precast connection based designs are consideration of industrial productions standards. Some other types of precast connection are production by the precast unit. Its key variable of important in durability, ductility, temporary and high load resisting capable are the requirements involved in the key standard of production standard [25]. The design connection must be followed based on the relevant standards specification code practices, rules or by-laws and other special requirements, resisting fire protection and corosions, firing installation and economical appearance.

**Columns to Columns Connections**

![Figure 2.Column to column connection](image)

Fig 2 shown, a CC 1, CC 2, Columns to column three different types of connection.

CC 1 is a column to column lateral dowelled connections.
CC 2 is a column to column connection by coupling of reinforcing bars.

CC 1 and CC 2 is same mode and different types of pre-cast columns butt connection. These types of connection are continuity of rigid like the reinforcement of bottom to top latitudes. Add they used in connecting rods, bolts steel plates connections. Pre-cast cavity column connection is more suitable and rigidity or ductility frame structure. This connection is able to transmit large moment and the resemblance is performance and shapes a monolithic construction [26]. Add a good accessibility to fix bolting action. That is satisfactory in technical economic and also in aesthetical respects. Its lead to fastest possible rigger erections in short time [27]. Connect of steel plast is provided good corrosion production and same to high induced the friction joint stability of precast member [28]. These connections are based on heavy anchor bolting sections. In small lower plinth level to higher plinth level of structure.

**Columns to Beam Connection**

![Figure 3.Special design of beam to columns precast connection](image)
Figure 3 shown a special CB 1, BC 1 Connection is based on precast and post-tensioning process. That connection is 2-precast member connected to rigid form with permanent as well as temporary structural joint. It is primarily used in dowel bars and anchorage bolt plates.

**Designing Procedure**

That design connection is chosen highly mechanical operations and the same time to high acceptable working site values. Remove and or seismic performances. That hollow post-tensioning connection is induced the high flexibility, rigidity and corrosion free improvements structures [29]. Rich jobs in large and short panel constructions. Joint connections are installation re-bars anchor bolts its attached to the fastener assembly to locked in a preform structure. design reliable and surrounded to screw lock threads and into the outside tight load can be secured with a nut and washer. Post-tensioning process anchor howls bars is used to epoxy coating in all over the reinforced section [30]. Importantly that means embedded bolts and strong install heavy tighten bolt value assembled sections and better corrosion resistance.

![Figure 4. Dry mort joint](image)

Figure 4. Dry mort joint

Figure 4. shown as a special mort joint for pre-cast structure. In the surface joint connections for 2- different member. Its most economic better result for the nodal joint of the rigid connection. Dry mort connection is another name of grout connection. It’s specified mixed to pave between the two precast blocks. Dry mort joints connections are make used many types of cavity blocks connections. For examples V- Cut Blocks, Grip weather and Concave joints.

![Figure 5. V- Cut Precast Block Dry mort joints](image)

Figure 5. V- Cut Pre-cast Block Dry mort joints

Figure 5 shown as a V-cut block precast section-xx is represented in different ways grout connections section systems. It’s advanced connection systems its followed by the grout connections techniques. Grout is a special liquid appearance used to fill the concrete gaps. It’s another name of pressure grouting. The pre-casting hollowed duct members used in cement mortar grout technique connections refer shown a figure 6.

![Figure 6. Steel RC Bars and Dry mort grout Joints](image)

Figure 6

Cavity grout and tiling grout are same is improved the friction bonds into the steel fix blocks to pin blocks connections. It’s high grouting process for interconnecting techniques for the pre-casting systems [31]. It’s most advanced generations jointing technique rigid methods. Fast and construction process for precast creating structural members [32]. And figure 5 grout dry mort joint is precious mix and convention proportions of cement mortar. It will be used to 2: 1/5 ratios for PPC mix and added to resin glues are added to specified mixes. 5 to 10 minutes it should be provided to mixed and applied to the grout cavity blocks sections. And after setting paste clear finishes the connections between the two members.
Main beam to secondary beam connection

Figure 7 shown a while casting the main beam pre-caste channel section are provided in beam web and projecting 100mm to 250mm each side of the beam as corbel. The corbel is means of joist spacing in main beam web and pre-cast hollowed and solid slabs. And after erecting the main beam initially same time precast joints are fixed over the channels provided in the main beam then joist and the continued joist channel are weather sealing mort connections. Weathering mortar recessed increased pinnacle and bed connection [33]. Weathering joints is another name for surface grip interlock connections. It will increase the networks rough wavy horizontal connection joints structure connections. This connection of bed mortar is 20mm thickness. This connection is able to transmit fairly large vertical loaded as well as horizontal forces. The joints are light in weight consequently this can be erected by easily manually, small mobile cranes are used in small constructions and mount crane as well as skyscraper. And important advantages this connection in maintenance cost is not required.

Design parameters of precast connections

The parameters are based on 2- types

Ductile Connection

Figure 5 is one of the best examples of the ductile connection. It’s permanent RC steel bars interlocked plastic hinged connection in a cast in place in a frame that connection is tight cover in D/2 from 26.4mm and 0.4mm joint face in a ductile connection [34]. That connection is permanently fixed and to needed to removed its and to break that connection and after assembled section. That rigid connection frame is high yielding in load stress. It’s high valuable proficient in developing the structural reinforcement and assembled out of the pre-cast column coupling connection and assembled the minimum space of joist is a D/2 phase. After evaluating gaping is beam and column is filled with connection grout rebar joint in caste in place of the site.

Strong connection

Its referring to the bolted joint of post-tensioning assembled precast member joints for example figure 2. These types of connections its special moment forced. The basic concept of connections is strong tension bolt thread joints connections [35]. A load is applicable for plastic hinges section inflection of short columns connection in the behaviour of fluctuation in seismic loads.

- Vertical Load = Height of columns/ Length of the beam
  \[ (1) \]
- Moment of Joints = Vertical load of the beam (Length of beam-height of the column)/2
  \[ (2) \]
- Moment of beam = Moment of a joints-Vertical load of the beam (Vertical column coupler)
  \[ (3) \]

Conclusion

The precast concrete connections is use the cost favourable connection panel in CC1, CC2, CB1, BC1 are the assembled in section. In any of time and created huge structure in short period. Connections of joints are the important part of the stability of the structures. Its design implemented that paper new parts of the connections techniques design is applicable for the pre-fabricated structures. That design is most economics less working or labour cost for disuniting and created structures and assembled parts of Pre-stress member of the building. That joints are more favourable for longs and short span concept is more detailing of serviceability period design of precast construction.

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Design methodology is ACI 318 followed, A to my college faculty Assistant professors, for comments that greatly improved the manuscript.

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