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## The effect of internal force in column due to skip floor installation.

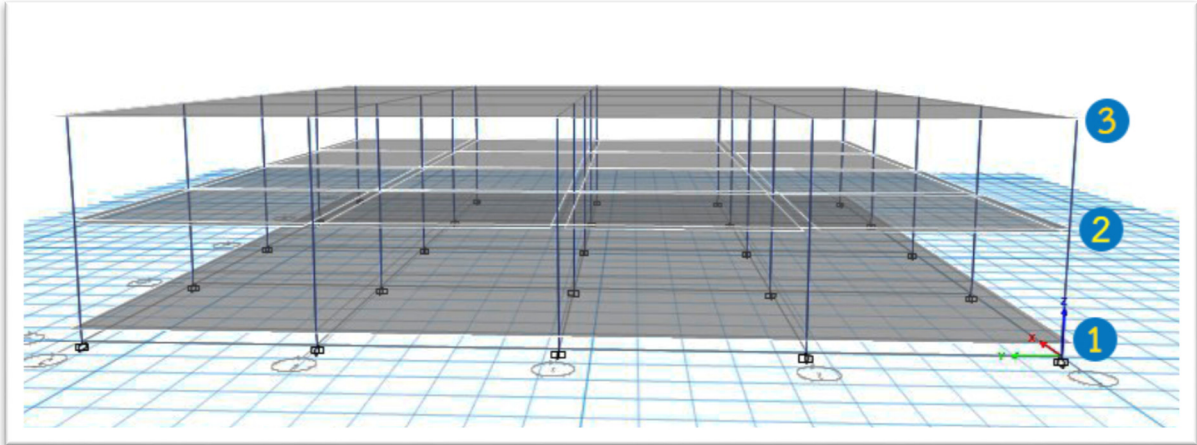
In building construction, constructive techniques that we choose to build or to solve problems will affect construction time. Skipping floor installation for post tension slab is one of the techniques helps to reduce construction time.

Usually, this method is used when the constructions need to build upper floor or roof level before finish the lower floor level. The causes could be either the lower floor has problems and not allow to continue construction or the need to have a roof first then build the lower floor.

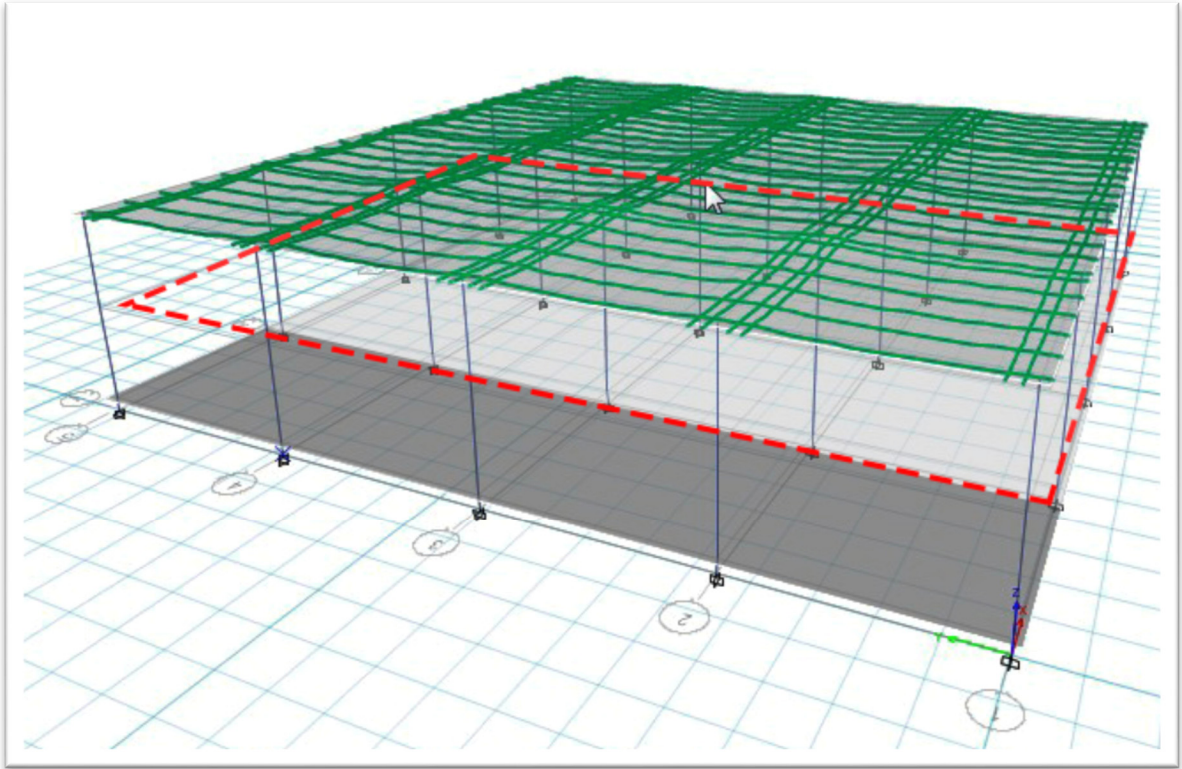
Skipping floor installation, the first step is placing steels reinforce of column rise to the level of upper floor passing the lower level.

All rebars in post-tensioned floor need to embeded in column. For example minimum bonded reinforcement, punching shear reinforcement(if any), preventing progressive collapse reinforcement, corbel reinforcement etc should be embedded in column. Then pouring concrete for column and start upper floor construction. When upper floor concrete strength reach the specified value, start the stressing process. After finish stressing process, set the slab formwork for lower floor and repeat same post tension construction sequence.

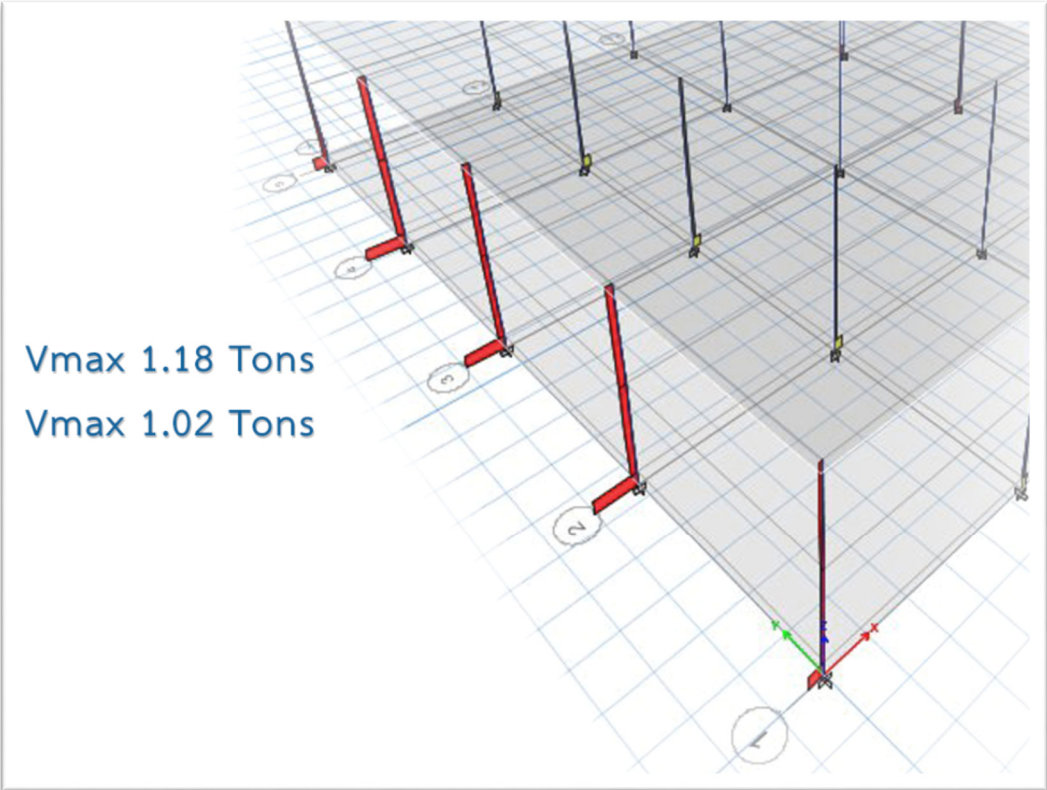
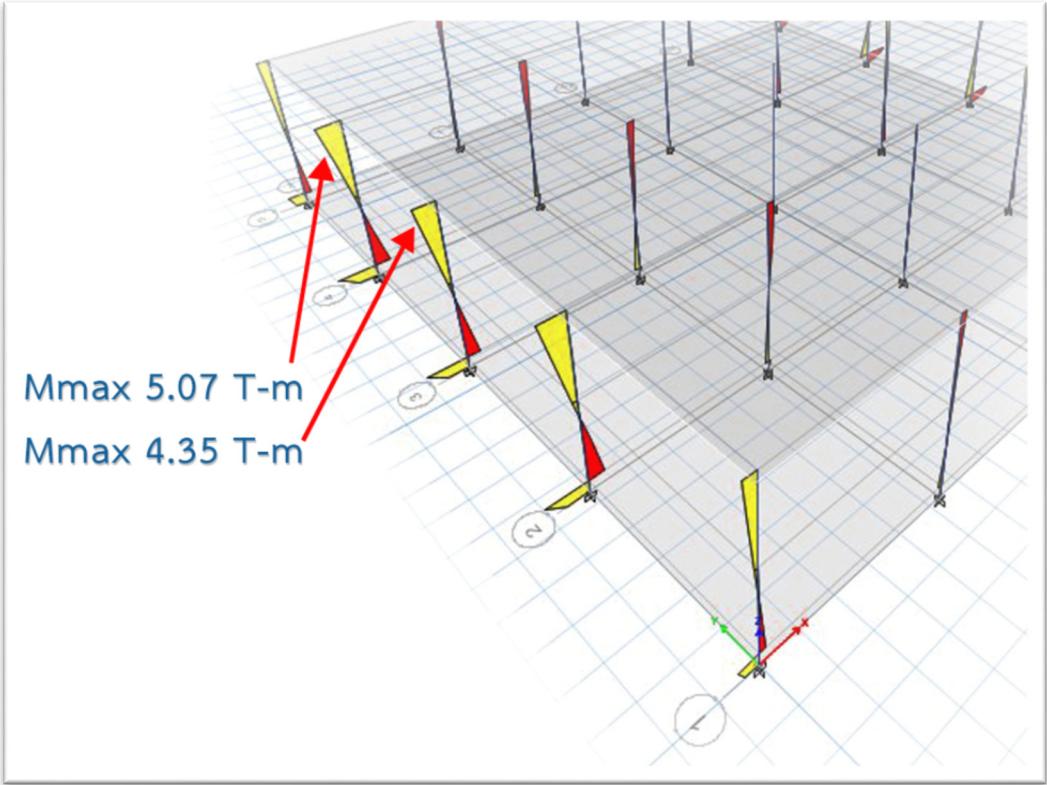
Normally, joint between lower post tensioned slab and column should be designed as pinned connection. The assumption is moment from slab can not transfer to column. Lower slab is set on corbel and slab is not connect to column. This skipped floor construction will change column moment. When we stressing upper floor, column moment is not much because columns are slender. Then we stressing lower floor, columns are shorter and column moment are increase. This case study is show in this following,



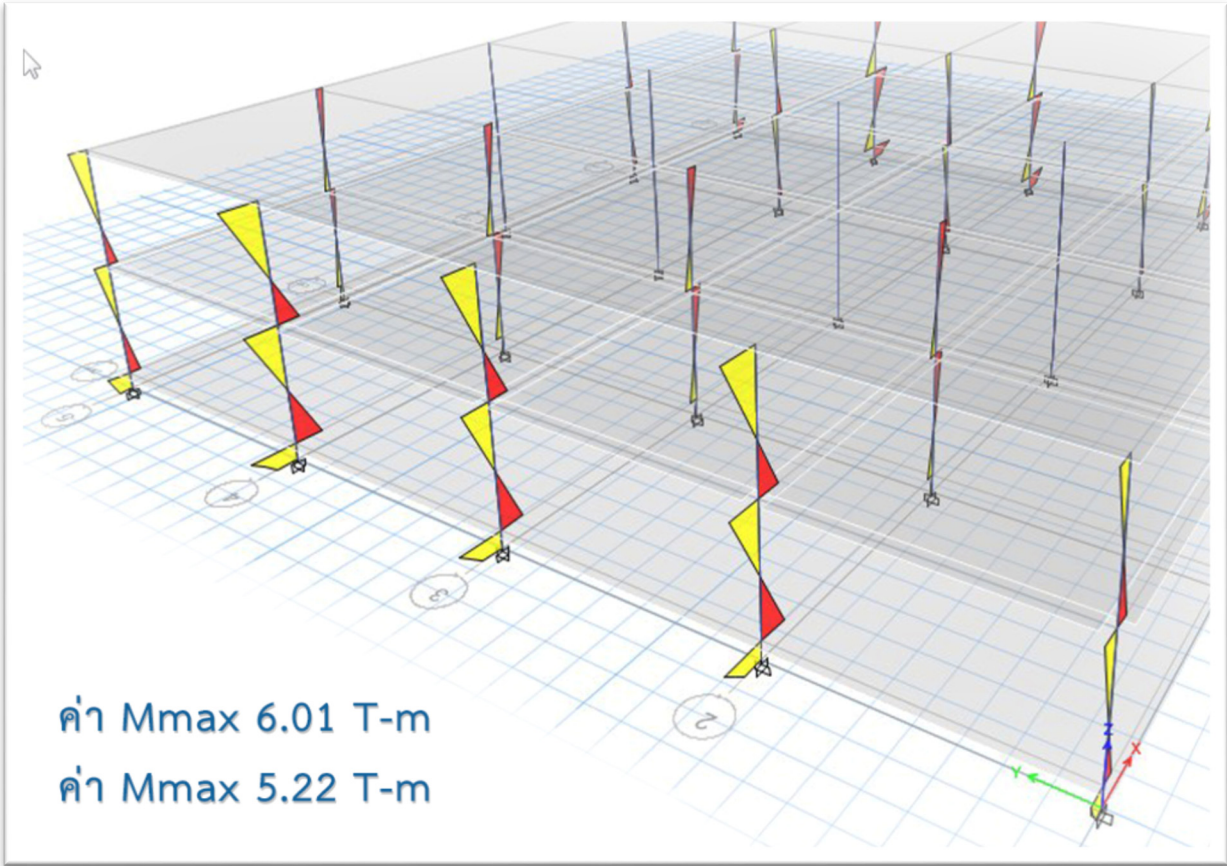
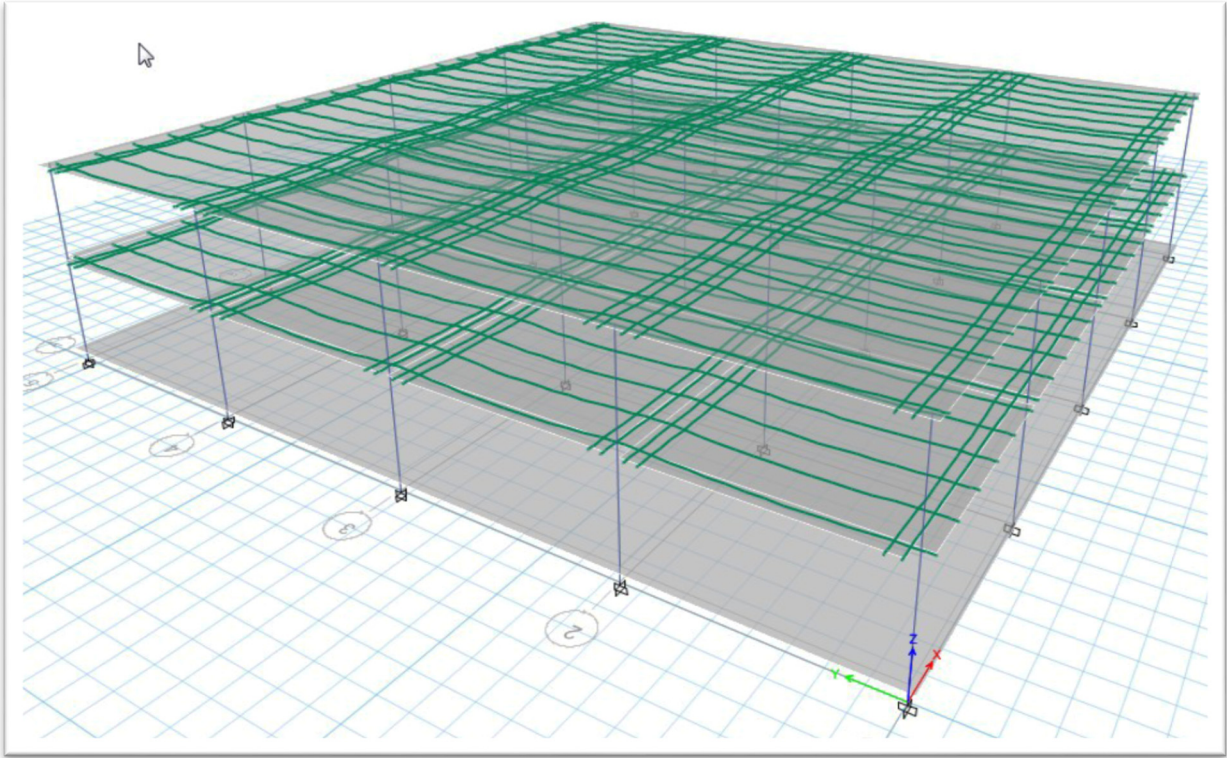
3 floors building of flat plate post tension slab with 0.25 m thick, on top of 0.50x0.50 m column size. Each floor has high of 3.5 m. After first floor construction has finished then we are going to construct the third floor instead of second floor, as shown in figure below.

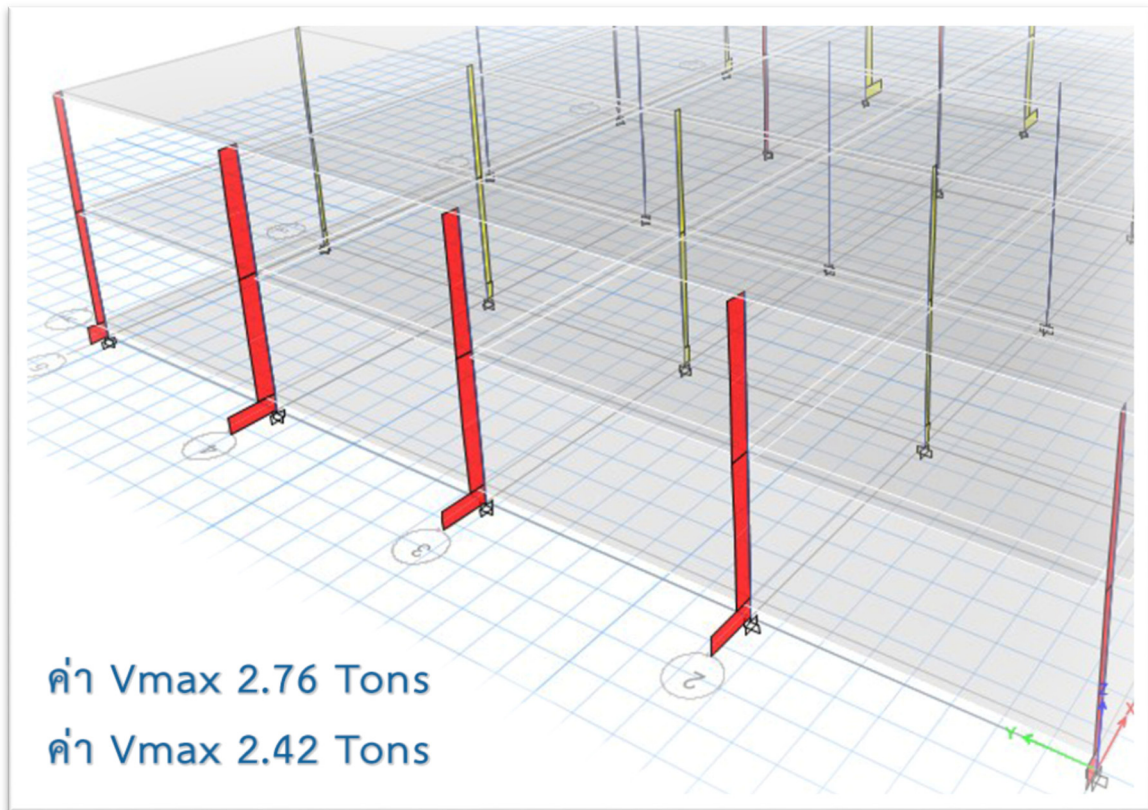


After finish pulling PC strands on the third floor, the self-weight of the slab and the wire pulling forces will affect moment and shear forces, as shown in figures below.

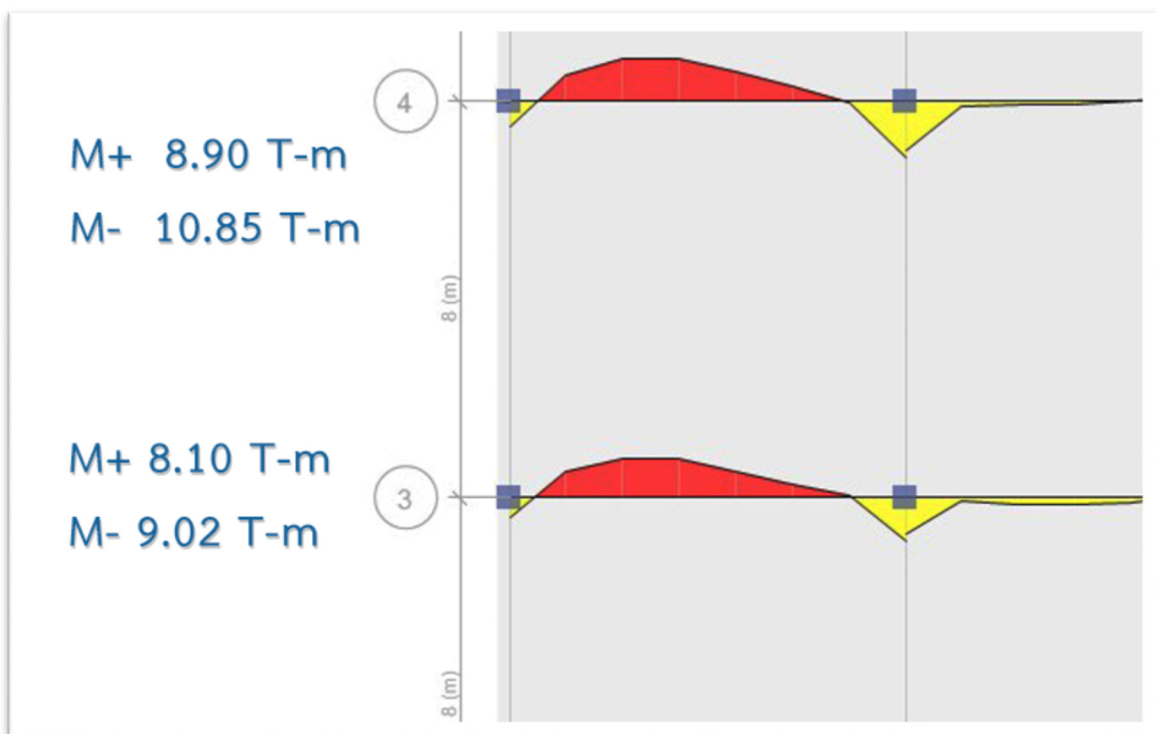


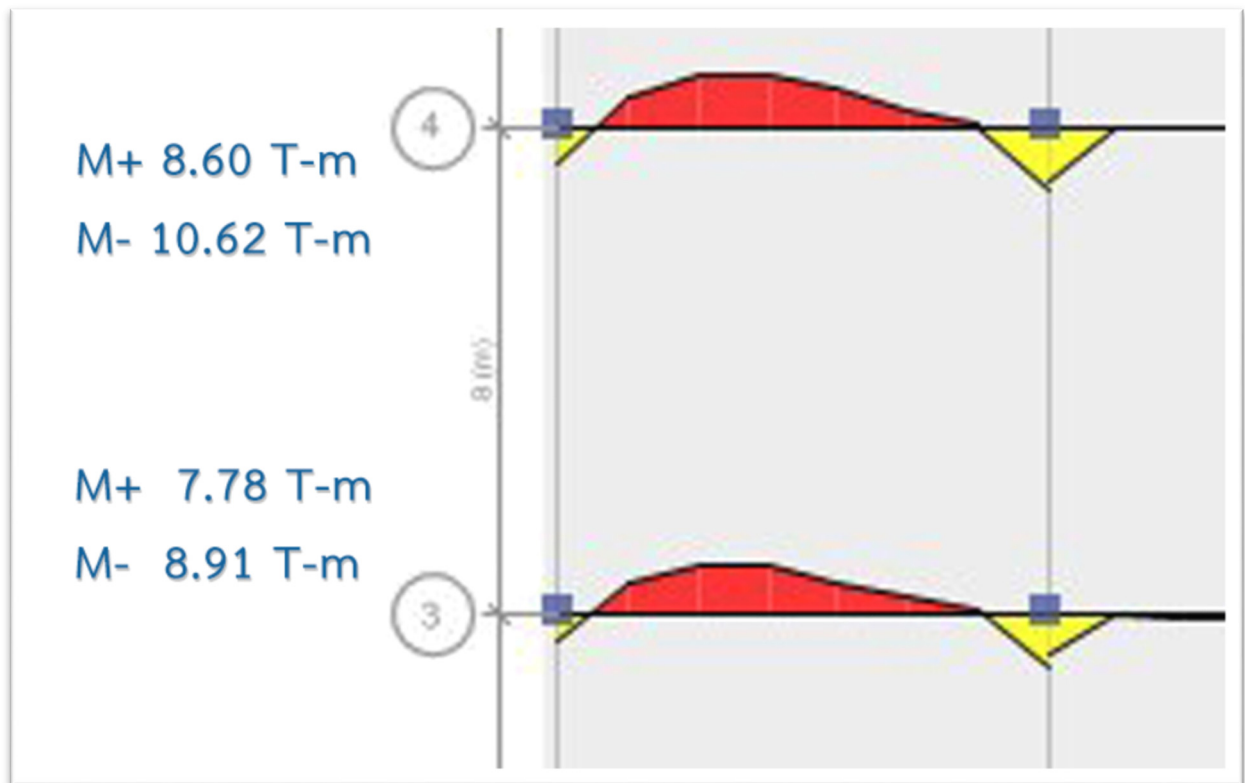
After that the second floor slab can be build. The new moment and shear forces after finished build second floor are as shown in figures below.





Not only column but it also affect to moment values in slabs. It will slightly decrease the moment values.





From figures above, it can be concluded as shown in tables below.

	เสาขอบ Grid line 4		เสาขอบ Grid line 3	
	Mmax	Vmax	Mmax	Vmax
	Tons-m	Tons	Tons-m	Tons
เมื่อติดตั้งอัดแรงชั้นที่ 3	<u>5.07</u>	<u>1.18</u>	<u>4.35</u>	<u>1.02</u>
เมื่อติดตั้งอัดแรงชั้นที่ 2	<u>6.01</u>	<u>2.76</u>	<u>5.22</u>	<u>2.42</u>
%increase	<u>18.54%</u>	<u>133.90%</u>	<u>20.00%</u>	<u>137.25%</u>

	โมเมนต์ในพื้นที่ End span Grid line 4		โมเมนต์ในพื้นที่ End span Grid line 3	
	M+max/ Tons-m	M-max Tons-m	M+max Tons-m	M-max Tons-m
	เมื่อติดตั้งอัดแรงชั้นที่ 3	<u>8.90</u>	<u>10.85</u>	<u>8.10</u>
เมื่อติดตั้งอัดแรงชั้นที่ 2	<u>8.60</u>	<u>10.62</u>	<u>7.78</u>	<u>8.91</u>
%decrease	<u>3.37%</u>	<u>2.12%</u>	<u>3.95%</u>	<u>1.22%</u>

Therefore, skipping floor installation of post tension slab is affecting moment and shear force values. After stressing PC strands of the third floor and after pulling PC strands of the second floor, the moment in columns is increased up to 20% and shear force is increased up to 100%.

But for the third floor, after stressing PC strands of the second floor, the moment values are slightly decrease. However, it should be re-checked in cause of long span or large value of live load.

### **Compiled by**

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