



# PROBLEMATIC FEATURE

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## Problematic Features

This section is intended for problem identification and technical analysis regarding the thesis project. It was proposed to identify 5-7 problematic features that could be pursued through detailed analysis of technical building systems and construction methods.

### Construction Method & Schedule Acceleration Scenarios

The main issue found within my thesis project that could be improved, was the time taken to construct the building. I found that with researching specific construction methods, it would be possible to cut down on the schedule time. Consequently it would be beneficial to research areas targeting schedule acceleration scenarios, which in turn could help save money and generate profit to the owner if the project was completed at an earlier date, allowing for tenants to move in earlier. After some preliminary research, it was suggested that the projected completion duration of the project could be cut down to 15 months instead of the 24 months if alternate construction methods were used. The cut down in schedule time would help generate greater revenue for the owner, as tenants would be able to move-in at an earlier date.

### Precast Concrete vs. Cast-in Place Concrete

It is seen that the schedule and construction techniques are the main issues holding back the completion date for the Mansoura Project. Therefore a suggested idea would be to use Precast Concrete, instead of the intended Cast-in Place concrete used. Since Cast-in place concrete can take time for the concrete to set and place, precast could be a faster and cheaper alternative. This in turn could help with schedule saving. However framing of the concrete structure and managing the precast installation must also be taken into consideration when analyzing this alternative method.

Since I would be experimenting with Precast concrete instead of Cast-in place concrete, my breadth analysis can be expanded on this issue. One of my breadths could target the mechanical installation and calculation of the difference in heating value and note the disparity of energy efficiency between both concrete-placing methods. There is also a chance to experiment with the use of prefab for the HVAC system, since there are seven identical floors in the building, this can be used as a schedule saver, faster installation and cheaper option.

Another one of the breadths that could be analyzed is the structural load difference of having Precast Concrete over Cast-in place concrete. Since the thickness of the concrete would decrease, this should impact the loading of the entire structure on the foundations. This in turn could change the specifications of the foundations, which could help experiment with a cheaper form that would help save money, and be quicker to produce. However there is a structural

concern with tying the precast concrete to the structure, which should be analyzed before making a decision.

### **Implementation Of SIPS**

With the typical floor layouts of the Mansoura Development it creates a great opportunity to implement SIPS. An issue that was found with this project was when excavation had begun; a high water table was encountered. This was because no borings were taken and also due to the lack of coordination between team members. No samples were obtained for subsoil investigation. Borings helps determine the load-bearing capacity of the soil and the depth of the water table. In continuation to the high water table, the area of the Mansoura Development is predominantly residential and work, therefore the location can become very congested with traffic, thus the implementation of a Short Interval Production Schedule (SIPS) can help to speed up the process of excavation and construction of foundation. This analysis can help investigate the impact of crews and the tasks to increase the efficiency, productivity and quality of work. SIPS have been proven to cut down on project schedule time, increase worker productivity and reduce cost of construction.

### **LEED Certification**

A potential improvement that could be achievable to the Mansoura Development would be LEED certification. Since the owner did not aim to achieve LEED certification, a lot of points were missed as noted in the tech report 2. However there is a lot of potential for improvement as noted in the LEED Checklist in tech 2, and a minimum level of certification can be achieved. This might increase the cost of the project, however would improve the overall quality of the building and energy efficiency.

### **Different Organizational Structure**

It can be suggested to change the delivery method to CM@Risk from Design-Bid-Build. This is because there had been some project delays due to cost cutting as mentioned above regarding the lack of subsoil investigation. Therefore having a CM@Risk delivery method can help resolve challenging constructability concerns early in the process, and work well with complex scheduling.

### **Field Labor Management & Alteration**

Due to the intense heat of the summer months in Qatar, weather can reach over 122 °F. This can halt construction during the day for safety issues regarding the laborers. This pause in construction comes direct enforcement from the Ministry of Labor and has to be abided by.

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This can create a delay in the schedule, therefore possible research can be done in this area to be able overcome this problem as to not affect the schedule in a negative way.

In conclusion my four leading options will be:

- Precast vs. Cast in place concrete
- Implementation of SIPS
- LEED Certification
- Field Labor Management & Alteration

Within the first (Precast vs. Cast in place concrete) option, I will branch out with two breadth opportunities. One will target the mechanical installation and calculating the cooling and heating load with comparison to both concrete placing methods. While the other breadth will focus on the difference in structural impacts of both concrete placing methods, and how they could affect the specifications of the foundations. In turn these breadths will prove to me if these analysis could help save on schedule timing and reduction of cost to the project.