

# Questioning the Decisions Made in the Early Stages of the A/E Design Process

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George Carlin (a US comedian, actor, social critic and author) said “Don’t just teach your children to read. Teach them to question what they read. Teach them to question everything”

In engineering and architectural design, we often assume and do not question what was determined in the early phase(s) of the design process. We take it for granted and assume that these early decision are final and unchangeable guidelines. This is an erroneous assumption, as illustrated here.

The five monkeys experiment is an excellent illustration related to this topic. In this experiment, five monkeys accepted the status quo, without knowing the reason of why not eat a banana at the top of the ladder. You can search “monkey and bananas experiment” to find more information.



**Figure 1. Do not accept any decision without knowing the reason behind it.**

The two engineering-related cases shown below illustrate this point, where questioning and not accepting what is presented, has resulted in practical and optimum designs.

## Case #1 – The valve that is interfering with the new design, and absolutely cannot be relocated

When I was an under graduate student, a civil engineering professor narrated the following case. He was working on a project where the design team was told repeatedly that an existing valve had to remain as-constructed, and absolutely cannot be relocated. But this valve was interfering with the location of the new building, and has to be relocated. Numerous correspondences and coordination have not yielded any results.



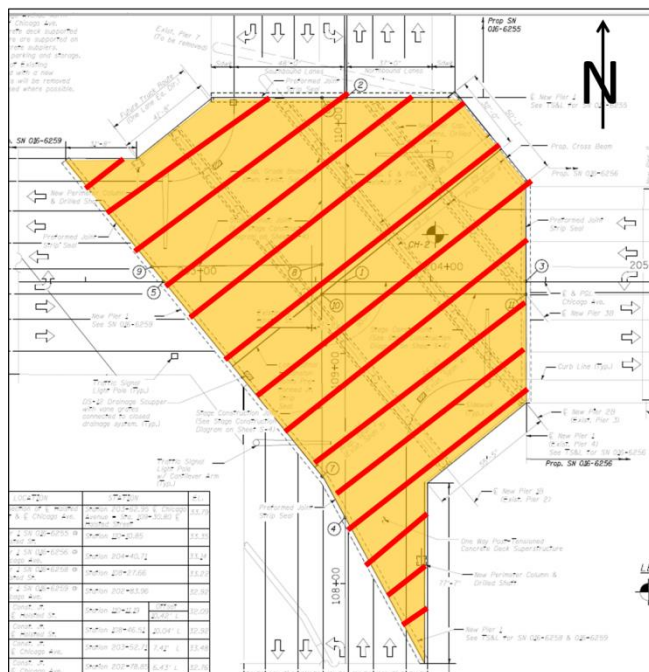
**Figure 2. Even if it seems difficult, it is still worth investigating.**

The design team did not accept this conclusion, and they arranged for a field meeting. They invited all who knows anything about this valve, including maintenance personal and others. As a result of this meeting, the relocation of the valve was found to be acceptable, after finding a suitable new

location for it. To give this professor the credit he deserves, he was Dr. David Ardit, of the Illinois Institute of Technology (IIT).

## Case #2 – Direction of the Post-tensioning tendons

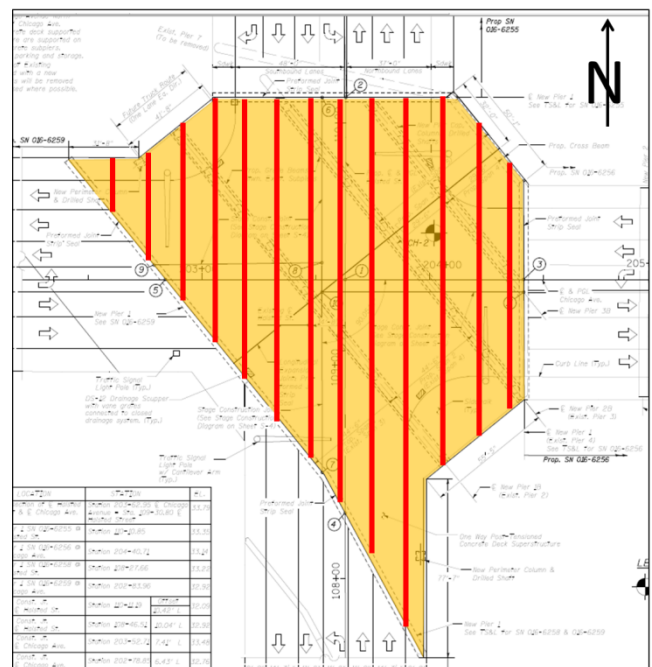
The figure below shows a plan view of an intersection of two roadway bridges in Chicago. The amber color in the figure shows the boundaries of the proposed reinforced post-tensioned (PT) concrete slab. The red lines (in the S-W direction) show the orientation of the PT tendons, as designed and in Phase I (preliminary design phase).



**Figure 3. Post-tensioning tendons in the S-W direction – as designed in Phase I.**

In phase II design (detail design phase), it was found that the installation of these S-W tendons would require long time closure of this major intersection, which is not acceptable. The Phase II design team proceeded to find a solution to this problems however, they assumed that the S-W

orientation has to remain unchanged. This assumption (without questioning the decisions made in the early stage of the design process) is proven to be unwarranted. The phase I design had to be reassessed, and it was found that the direction of the PT cables can be reoriented to the N-S direction to be parallel to the roadways (as shown in figure 4). This reorientation of the PT tendons has proven to be the optimum solution.



**Figure 4. Post-tensioning tendons in the N-S direction – as changed in Phase II.**

## Summary

Question everything. Confucius said “The man who asks a question is a fool for a minute, the man who does not ask is a fool for life. In this engineering context Confucius would have said “The engineer/architect who asks questions might be a fool during the design stage, however, the engineer/architect who does not ask will end up with high-cost and less-than-optimum project”.