A Bridge to Tectonic Expression:
The Use of Precedent and Type in Designing Structures

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> . . architects do not create *ex nihilo*; in the course of creation an architect may receive inspiration from a large number of sources, from works of the past and present and from right outside architecture . . he is certainly no less creative if he spreads his net wide and has an eye that remembers...
>
> – Denys Lasdun

The detail development of studio work confronts a student with challenges not previously encountered in early schematic design. As is commonly known, good detailing requires a knowledge of materials and methods of assembly that is usually acquired over time and through practice in the working environment. One becomes familiar first with the standard practices of construction and the potentials and limitations of materials before attempting to invent the detail that is needed for realization of some aspect of the project. In fact, most detailing is often the *reapplication* and *adaptation* of general solutions to the particular case at hand.

Structural design follows a similar process in requiring knowledge of conventional practice, structural behavior, and material properties. In addition, structural decision making can be enhanced by an understanding of structural *morphology* or type. Categorizing structures according to type is a way of identifying the general characteristics of various structural elements and systems. This kind of systematic knowledge contributes to the process of selecting an appropriate system at the outset of a design problem.

Knowledge of structural precedent can also be a powerful resource guiding both the selection and configuration of the structural design. Careful analysis of an exemplary work of structural significance will reveal much to the critical observer. A few areas of interest might include the choice of system or element, estimated loads and load path, size and configuration of structure, repetitive versus unique structural patterns, relationship of structure to other building systems, and details of assemblage. While much of this information can be gained qualitatively through case study research, the use of quantitative methods can serve to dramatically confirm otherwise intuitive assumptions regarding the actual logic of the structure. To this end both graphical statics and computer structural modeling are useful.

The studio work (Figures 2-6) benefited from a coordinated Technology Workshop course taught by the author (Lonnman) for the third year graduate studio. While the goal of the workshop was primarily to enhance detailing, consideration of structural form and expression formed the basis for much of the case study research. A pedestrian bridge was selected for the studio design problem. Light bridges make an ideal choice in that functional issues of strength and stability are paramount and thereby allow expression of structural form to dominate. The bridge had an additional requirement of accommodating a special activity: bunjee jumping. While this form of eccentric behavior posed no real structural challenge to the bridge, it was felt that it might create design opportunities arising from the uniqueness of the event.

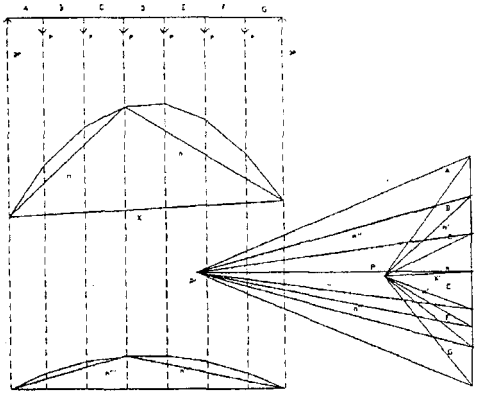

Fig. 1. Graphical Analysis of a Whipple Bowstring Truss. David Tyler.

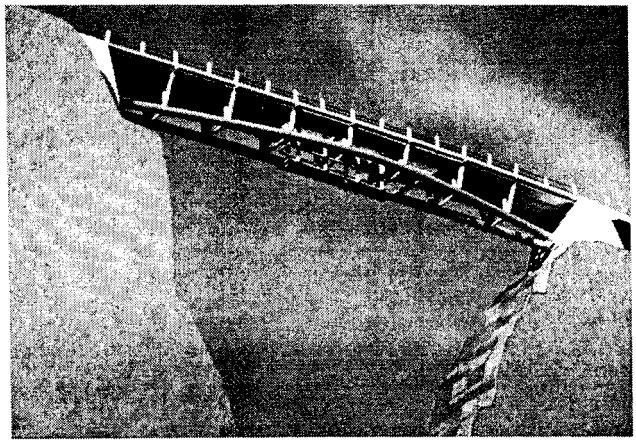

Fig. 2. Bridge Design Model. Fabrice Dourlens.

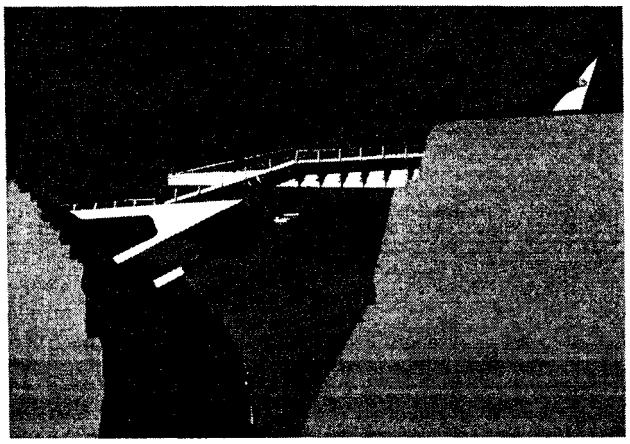

Fig. 3. Bridge Design Model. Suzanne Farwer.

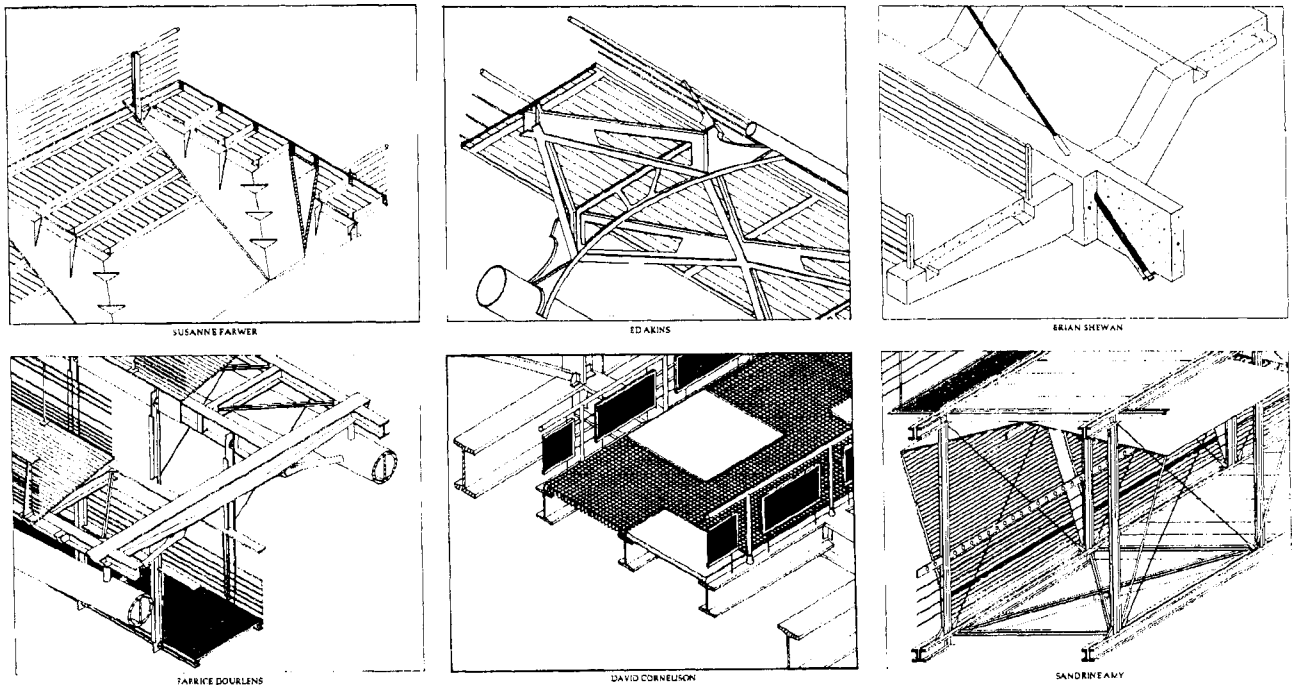

Fig. 4. Bridge Design Detail Drawings.

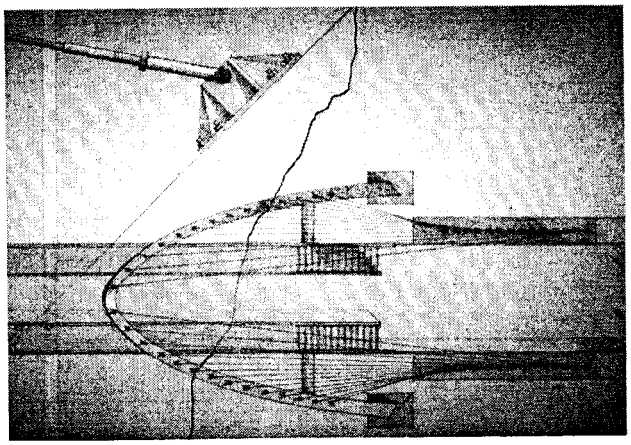

Fig. 5. Bridge Design Drawing. Andy Schneggenburger.

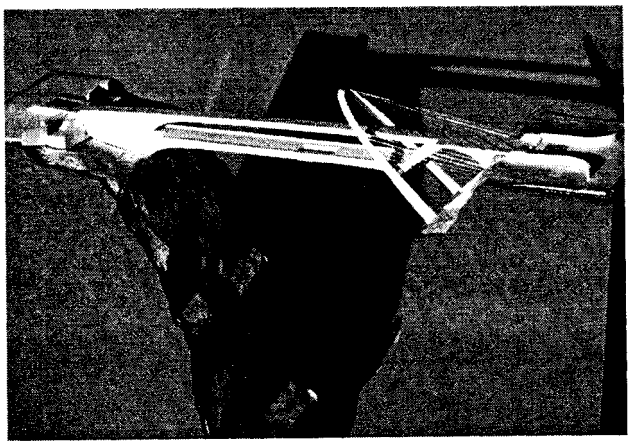

Fig. 6. Bridge Design Model. Andy Schneggenburger