Material, Procurement, and the Academy: Ethics and Value in a Culture of Displacement

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The great French author Zola once said that the fictional construct called the novel would not hold up for a moment without "truth in the details." Ruskin pointed out that the white cloud in the sky that reminds us of a lamb is in fact nothing more than a cluster of water drops floating in the air. Truth in architecture seems to me to be something like the drops of water that can create the illusion of a white lamb. Architecture too is a grand work of fiction based on "truth in the details."

Kunio Maekawa, Aesthetic and Building Performance, 1952

A UNIVERSAL CONTEXT

Architecture maintains a close alliance with the visual arts. However, even with the ever increasing accessibility of parametric and transfer technologies, the architect labors at distinct disadvantage to the painter and sculptor in manifesting a physical artifact of thought. While the painter and sculptor work directly in the manipulation of the object, the architect predominantly works through, or with, some intervening medium. This displacement of effort [1] and the indirectness of access to the artifact being produced prevail as the primary distinguishing characteristics of the architect's creative process. Further distinction between architecture and the other visual arts exists due to economic, interactive, and political demands; components that define a clear social dimensions. Buildings, the artifacts of practice, are socially constructed by the hands of individual architects, their colleagues, organizations that they work within, an array of contributors from clients to consultants, and by larger socio-economic forces that affect the profession. Conceptual aspirations and their relationship to technological exploration, whether engaged as a productive consequence or as generative tool, are tangibly challenged by those forces with great immediacy in critical practice.

The procedures associated with the creation of architecture are complex and often ambiguous. Likewise, means of working with clients and consultants are based on vague foundations of cooperation, understanding, trust, and confidence. The methodologies, sequence of events adopted, means of developing ideas, and critical paths to agreement are only a few of the actions exhibited during the course of a project that will affect outcome. Consequence of choice is often significant and uncertain. Being at the center of the design and construction process, the architect's skill, training, and conceptual ability must equip the architect to coordinate these components throughout the course of a project, mediating some of the risk. Knowledge must be manifest in engineering, business administration, and construction law to assuage potential distortions to conceptual and material authenticity.

Unless a choice is made to ally architecture with the other visual arts more securely, insisting that only that which the architect manipulates with his own hands is the architectural artifact, there must be recognition of the architects displacement from the most intense activity in the creation of architecture; realization of the spatial and figural artifact. Such a consolidated methodology would employ processes characterized by involvement, substantiality, tangibility, presence, immediacy, and direct action. The scale of most architectural projects precludes this relationship meaning that divergent, disembodied or displaced methodologies must be employed. Those methodologies are a process characterized by obliqueness, abstraction, mediation and action at a distance. While the ne-

cessity and refinement of communicative tools varies greatly between these two methodologies, both point to the fundamental Socratic question: *How do we proceed along a chosen path, and how is that question considered?* The answer must be guided by ethical reasoning skills requisite for fulfillment of the architect's social contract. The metric for success is the built artifact itself – which must exist independent of architectural rhetoric, and which is the product of the procurement process.

Figure 1. (L) Commissioned Fabrication of Mild Steel Post Tensioning Plate/glazing Termination executed by two students in ARC 459/559 Ethics and Practice. (R) *Excerpt from critical Analysis/ evaluation of Production Strategies – Photos of Fabricator executing work with log of invested labor techniques/durations.*

THE CONTEMPORARY CONTEXT

While it is important that architectural curricula recognize, address, and engage both consolidated and displaced methodologies, the predominance of transformative forces influencing the architectural profession indicate that there is great urgency in addressing displaced methodological circumstance. The cultural, societal, economic and technological context for professional practice is, and has been, rapidly reconfiguring. Our global economy has fueled the advancement of information technologies, induced dramatic demographic change, and influenced the realignment of governmental and business interests on a scale not witnessed before. Innovation, speed and performance have become the metrics for maintaining professional relevance in this world culture.

These societal transformations are reflected by the expectation that critical practitioners achieve risk free innovation within reduced timeframes as reflected in the latest generation of commercial contract forms. Post Occupancy and After Project Reports have become tools to determine final payment of fees. schedule compliance, budget management, program reconciliation, sustainability and intelligent technologies implementation are the determinant criteria of success in those documents. The evolution of significantly increased user representation, expanded contractual obligation, and unprecedented legal liability intensifies the increased demands placed on the professional architect today. It is a period of elevated expectation – both for practice and the academy.

In the context of these transformations, it is critical that we not lose sight of architecture's primary aspiration – the creation of place. Building must be an act of understanding and reverence; that is our responsibility as architects. The outlined global conditions of change represent the contingent realm of architecture – a realm that can potentially distance the architect from considerations of primal importance in joining structure and land; considerations that reside in the physical, spiritual, and cultural realms. Careful construction is a product of those three realms, it is not a specialized pursuit residing in the contingent realm; it is an inherently centered, collaborative accomplishment predicated on broad consideration, sensibility and ethic.

The dilemma that the profession and the academy face is society and popular culture's gravitation toward specialization. The academy can choose to develop highly particularized forms of knowledge which will support specialized territories of the profession or, we can return to the fundamental core attributes of practice and education that rely on reasoning, logic and ethic. It is the latter of those two choices that will sustain the future of the profession in a context of increased and changing demand; and ultimately maintain the profession's fundamental responsibilities to society. We have a responsibility as educators to establish intellect and maintain broad reaching consideration in the creative process by engendering clear reasoning skills; reasoning skills that will defy the restrictions of specialization and benefit environment.

The diversity of conditions encountered in professional practice varies greatly from project to project. Site, material, constructive technologies, and delivery methods are among the variables that affect the resolution of a project. The development of critical thinking skills and an analytical ethic that can obviate the challenges associated with the contingent realm in architecture can only be manifest in the academic setting if students are required to engage in the full spectrum of the project delivery sequence, including procurement. Without engaging in procurement, evidence of developed ability in navigating the contingent realm in ensuring the vitality of physical, spiritual and cultural remains speculative.

PROCUREMENT BASED PEDAGOGY

One avenue for testing the abilities of students in application through procurement is the Design Build Studio. The increase in the number of institutionally affiliated Design-Build programs indicates the perceived potency of that curricular platform in maintaining the academy's professional relevancy. The strength and value of the Design-Build experience is largely irrefutable, but also represents a consolidated methodology; one that is predominantly absent in the delivery of most building typologies. The investment of time and resources necessary to facilitate a Design-Build program that honors pedagogical responsibilities of the parent institution often means that only a fraction of the students matriculating at the institution will have an opportunity to engage in the experience. Professional liability, bonding capacity, and availability of financing present other challenges to Design-Build Curricula that often translate to syncopated scheduling, further exacerbating the issue of predictable student access.

In the interest of maintaining predictable access to the procurement phase of project delivery, and ensuring that students simultaneously engage consolidated and displaced methodologies, Technology and Critical Practice Curricular Streams can be utilized to reinforce work being done in the traditional Design Studio. This has been accomplished at the School of Architecture at the University of Arizona by structuring student work in hybrid technology and critical practice courses sequentially.

In these courses a methodological pedagogy has been implemented that reflects the trajectory and structure of contemporary practice and exposes the students to a full spectrum of issues in a tangible way, by requiring an engagement in procurement. The two courses were the pedagogy is focused are *Construction Documents* and *Ethics and Practice*. These required courses are offered in consecutive semesters during the fourth year of the professional phase undergraduate curriculum and as a component of the post-professional graduate program. The courses have been structured as an integrated unit. The Construction Documents course, the first in the sequence, utilizes a traditional Linear Path Method (*LPM* adhering to conventions of *AIA B144* and *AIA A201General Conditions* contract forms) of project delivery as a scaffolding to disseminate

course content, initiate research and govern work. Over the course of the semester students working in groups of five are required to survey the site, complete a detailed site analysis/building verification package, complete a zoning and code analysis, resolve an adaptive re-use/addition program, and complete a set of construction documents for procurement and permitting processes utilizing contractual benchmarks embedded in the LPM Contract Method. The empirical and analytical components of the work are engendered in the drawings. The adaptive re-use programs developed for the course are structured in a way that forces students to utilize drawing as a means of visualizing, understanding and communicating intention for the resolution of complex systemic relationships.

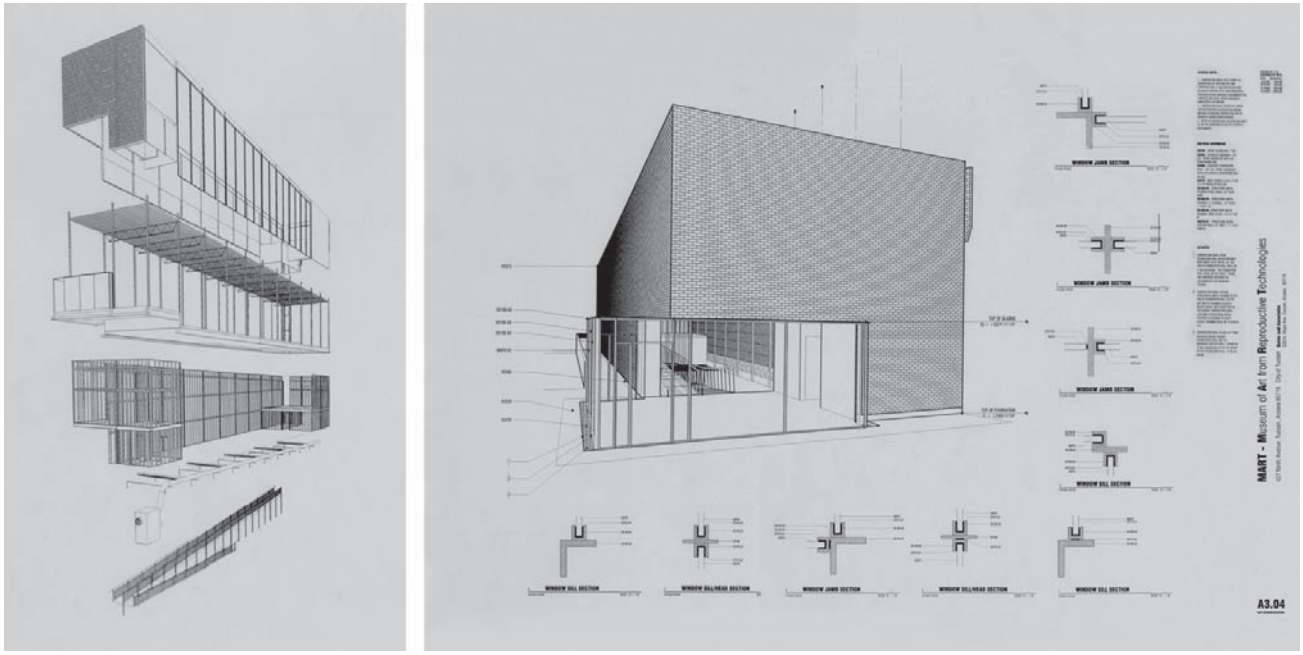

Figure 2. (L) Analytical Systemic Dissection of MART Program/utilizing BIM (R) *Composite Elevation/Detail Sheet from Construction Documents at 65% Submission Executed by a single team of five students in the Construction Documents Course.*

As indicated by the word *construction* in the title of the course, lectures, labs, and review sessions focus on the poetic aspects of translating drawing to building. Students are required to first dissect the existing structures and then reconstruct the projects digitally (figure 2). During this process they are monitored to see that they are maintaining consistency with material processes and sequencing logic. Once the initial constructive logic is established students continue to utilize the constructed model to rigorously evaluate and refine the intentions of spatial and material resolution (figure 3). The communicative representation of this work focuses on reaching the diverse audience that utilizes the documents in all phases of project delivery; the clients, consultants, contractors, financiers, and jurisdictions. The degree to which the work succeeds is determined in the following semester.

Ethics and Practice picks up where Construction Documents leaves off, at procurement. In this course the students are required to develop an independent body of research through the commissioned fabrication of a finite architectural element delineated in the resolution of the program from Construction Documents. The degree to which their intentions are accurately represented is tested when they engage with fabricators. Likewise, assumptions regarding fabrication technique, invested time in production and relative cost are verified. In the context of these interactions, the initial design and representation of the design invariably transforms through an iterative three

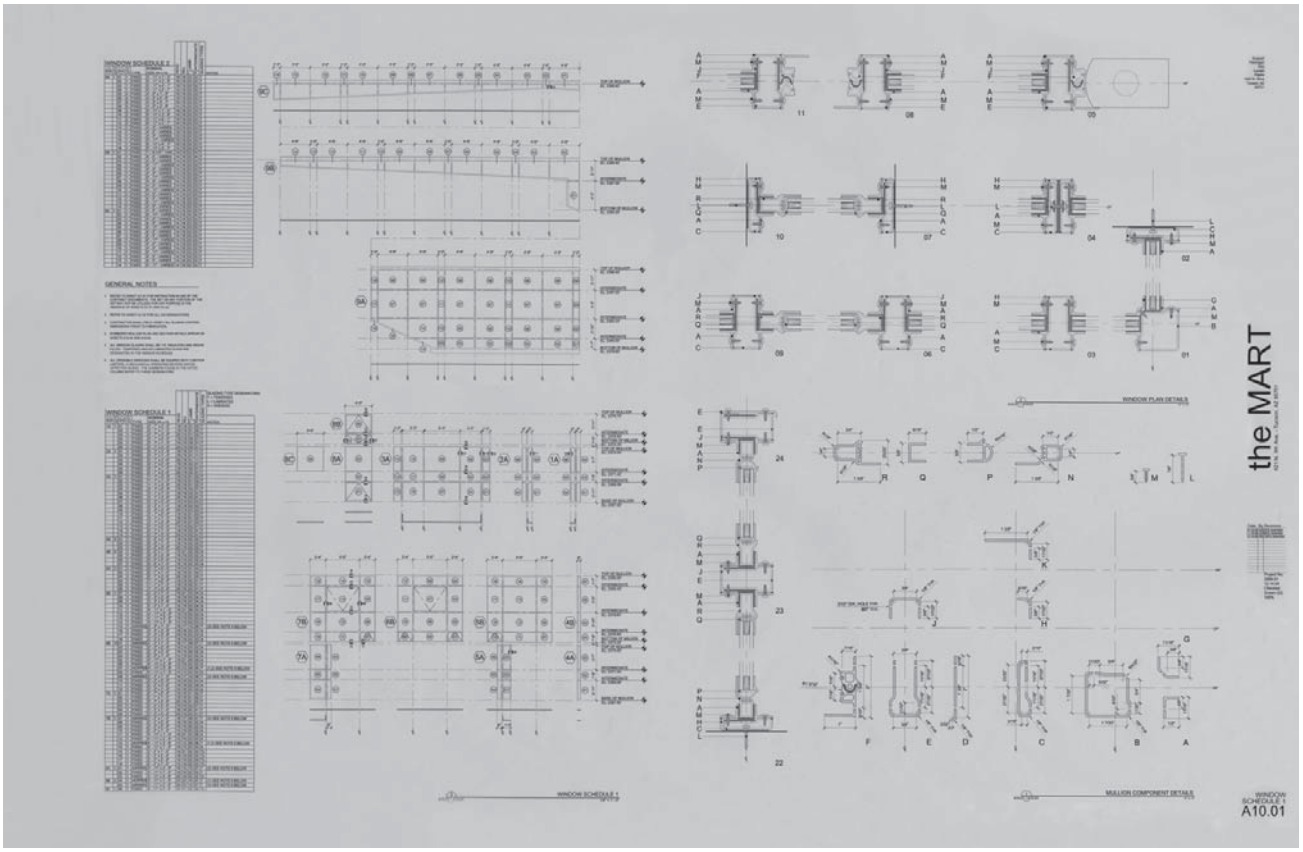

Figure 3. (L) Developed Fenestration Schedule and component Typology developed as part of the 100% Construction Document Submission. Completed by a team of 5 students in the Construction Documents Course.

stage process of prototyping and refinement where the students struggle to make budget and conceptual intention merge. At the conclusion of each iteration, students are required to evaluate that work critically in the context of specific ethical tenets that govern traditional thought and social interaction [2]:

1. **Teleological Theory**, Consequences from actions and the evaluation of resultant benefits through utility theory. Teleological Theory provides a fundamental index in evaluating the value of architectural resolution. Function and human purpose, at the core of architectural ideology, are the foundational attributes of this theory. Potency is maintained in addressing the communal actions precisely with regard to risks and benefits embedded in architectural proposition.

2. **Deontological Theory**, Actions based upon moral rules or principles of duty. Deontological Theory is founded in the notion of right and wrong. The absolute concept of right and wrong is replaced with an underlying moral order established through reasoned principles. The reasoned principles are informed by two principle Kantian moral imperatives: one, categorical imperatives that are obligatory

duties binding upon all people; two, hypothetical imperatives that are voluntary choices regarding ethical conduct of prudence, skill, and necessary or contingent meritorious duties to self and others.

3. **Contract Theory**, *Agreements about how to co-exist, to pursue common and personal goods with the least amount of restriction.* Contract Theory is grounded in the social contract that exists among equals. It recognizes that the realization of an architectural project involves implied relationships in addition the apparent structured relationships that facilitate design and construction. The underlying principle is the autonomy of the individual, entitlement to certain

rights, and entitlement to pursue desires as long as they do not impinge on rights, pursuits, and desires of others. The design and construction of an architectural project is never a neutral event, it requires choices; the source of moral import lies in fairness and justice.

4. **Virtue Theory**, *The manner in which we do things and the quality of the things that are made.* Virtue Theory is an ethic founded in the valuation of excellence. The degree of excellence is perceived and judged within social and professional contexts where qualitative expectations are defined. Meritorious architecture is seen as an extension of excellence in productive practices; the architecture having achieved qualities or conditions that pertain directly to the meritorious application of reason, volition, and mastery of pertinent knowledge.

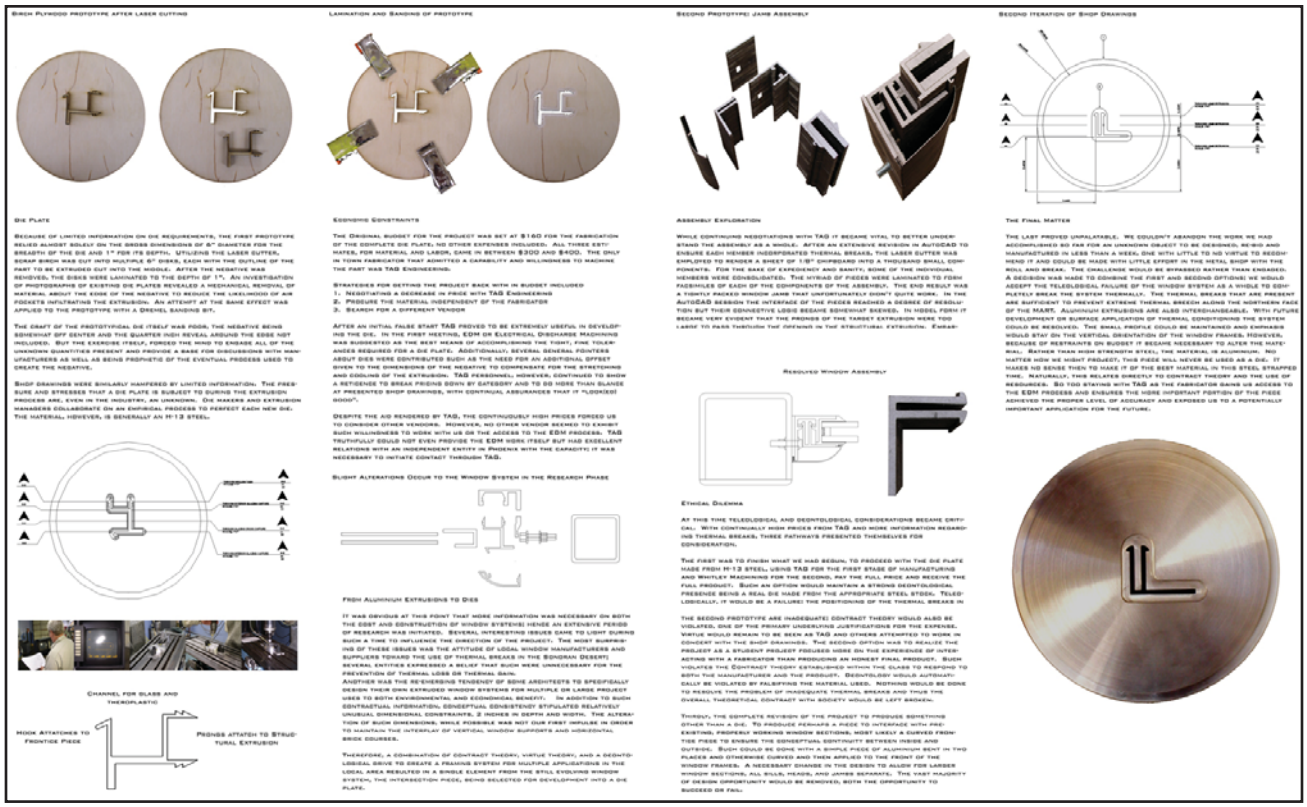

Figure 4. Excerpt of Documentation relating to Fabrication. In this project the students went from thinking about production of the finite typological elements defined in the Construction Document phase to the production of the mechanism for fabrication, the tooling die (in this case, aluminum was used as a surrogate material for the investigation). Narrative assesses decision making process and influence mechanisms.

Through this process they develop the ability to prioritize hierarchically the significance of ethical tenets in reconciling technology, budget and conceptual intention. As the terminus of the Critical Practice Stream Curriculum, this course requires students to demonstrate proficiency in developing modes of inquiry influenced by critical evaluation, challenges pre-conceptions and establishes an intellect.

Parameters for the investigation are established based on a proposal that clearly articulates the significance of the detail with regard to Virtue Theory in the context of the architecture's overarching conceptual intent. A budget is defined for the realization of the detail as technical drawing and prototyping advance development of the detail toward commissioned fabrication. Technical drawing and prototyping are utilized in two distinct ways: (1) to refine the resolution of the detail within the context of conceptual intent; (2) as communicative tools in directing commissioned fabrication of the physical artifact. In the production of this detail, the act of making is predominantly displaced and

economic considerations inform decision making in the iterative refinement of material and constructive technique.

The initial proposal for work during the Methodological Ethics in Fabrication exercise, completed in the Ethics and Practice Course, includes a detailed unit per square foot cost analysis for the completed design and Construction Documents completed the previous semester. The cost data is established using R.S. Means Cost Data manuals supplemented by communication with local sub-contractors that is fostered during the Construction Documentation phase. The students also produce a projection for the cost of fabricating the specified elements broken down in terms of labor cost, overhead and profit (the fabricator's, architect's, and any relevant consultant's), equipment set-up fees, and material costs. The students initiate dialogue with a minimum of four fabricators/subcontractors to obtain estimates for production of the finite element that they have proposed. Invariably, the students underestimate the costs associated with production. It is at that point that they use the ethical tenets to prioritize conditions in evaluating and maintaining the value associated with the material production (figure 4).

In many cases there is a material transformation that occurs as the dialogue with fabricators advance over the course of the semester. More often, there is a significant modification to the formal/physical qualities and productive mode. With each iteration the students are required to refine their cost analysis not only for the specified component(s), but also for the entire building on a square foot basis. In some cases students decide to reduce investment costs elsewhere in the overall structure to facilitate refinement in a localized area affected by the finite element. Regardless of the strategy, the total cost for all prototyping and fabrication may not exceed $200.00/per partnership. The extended budgeting often requires that the elements be fabricated for half that amount.

Additional financial parameters exist in the process. During the Construction Document phase in the first semester, the students are required to execute a Ratio Utilization Chart. At the beginning of each phase of work they are required to project their

Figure 5. Example of components from evaluative process documentation for a cast bronze panic hardware panel including iterative economic scaling

anticipated production schedule. They record their time investment throughout the semester in terms of indirect expense, direct expense, management, and production. For each task there is a dollar value associated that enable them to understand what the efforts translate to in projected fees. The Ratio Utilization Chart is utilized as a mechanism for students to understand the significance of efficiency in maintaining conceptual constancy. In discussing their allotted fee structure for delivery of the proposed project, money is held back for Construction Administration, Overhead and Profit, and Unforeseen Time Investment. Their actions in bringing the cost of the finite element in line with the projected Hard Cost Budget of the building are also checked against their ability to maintain projected limits of the Soft Cost, or Fee Based Budget.

The trajectory of the process is documented comprehensively through narrative, drawings, and financial analysis. Each decision is contextualized through the use of the ethical tenet evaluation. Statements made regarding the relevance of a specific action to a specific tenet, or set of tenets must be substantiated through documentation. Most substantiation is established in the monitoring of production/fabrication, an activity for which the students are required to be present. Students must demonstrate in the narrative that they maintain full understanding of the operative equipment utilized and the time associated with the operative interface (figure 5).

OUTCOME: ESTABLISHING *SIGNIFICANCE*

By virtue of these actions, economics and displacement, the predominant factors in the dilution of conceptual intent, become predominant factors in the students assignment of value in design – particularly in the context of comprehensive design and material manipulation. The pedagogy enables students to reason through economic parameters that often figure heavily in the dilution of conceptual intent. It is a clearly defined practice methodology informed by constructive means are often absent in the academic setting. Through this process, students begin to understand that while they are affecting the purity of an architectural proposal, those decisions have implications to the private and social contracts inherent in architectural practice. Procurement of this detail, which appears to be a limited and inconsequential act, enables students to tangibly model the aspects of practice that create distortion and define ethical position. Throughout the production process, the analogue between ethical theory and praxis is investigated via reflective critical evaluation of work; critical evaluation in the context of teleological, deontological, virtue, and contract theory. It is with those tools that the students return to the Vitruvian notion of significance in material[3] .

ENDNOTES

1. The Ethical Architect: The Dilemma of Contemporary Practice; Spector, Tom; Princeton Architectural Press, 2001, In Chapter one, Spector describes *Displaced* and *Consolidated* methods in relationship to the Architect's elective *Diminished* or *Expanded* Role

2. Ethics and the Practice of Architecture; by Barry Wasserman, Patrick J. Sullivan, Gregory Palermo, Wiley 2003. The book examines case studies in the context of four ethical tenets that have been identified as fundamental to all architectural interventions regardless of scale. Teleology, Deontology, Contract and Virtue theories, as defined in the book, and case studies are utilized in the definition and evaluation of the student work.

3. Ten books on Architecture; Vitruvius, 1200BC, reference to the relationship of the thing "Signified" and that which gives it "Significance", referring specifically to relative laws of physics and economics.