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Gregory S. Palermo

Iowa State University, gpalermo@iastate.edu

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GREGORY S. PALERMO, FAIA
Iowa State University

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The Home Depot

MATERIALS AND ETHICS

Nails are, as are virtually all other architectural construction materials and assemblies, *geopolitical-economic parts* of buildings. Along the path from architectural dreams and desires to deserts, from architectural conception and development to completion and inhabitation, points are reached at which tectonic design choices are made about the actual materials, the design detailing of their joinery, and methods of assembly that will be incorporated in a home, a church, a university building, a corporate headquarters, an Olympic Stadium. Although the scale and international visibility of these types of structures arguably moves along a rising vector, the physical realization of each is largely an international construction not unlike the VW Beetle and the Stanley Hammer, both of which are multi-national and multi-continental in their origin. A trip down the aisle at The Home Depot yields ubiquitous nails, screws, bolts and other fasteners originating in Mexico, Brazil, Korea, Taiwan, Japan and China.

Wherever you are reading this — in hard copy or digital format — you are some *place*: in a room or building, an airplane, or garden. Whatever the ideological origination of the design of that place, whatever its construction roots, its aesthetic qualities or its meaning to you and others, it is a material realization of human design intent for habitat — architecture. This paper explores ethical aspects of that *material realization*.

When we consider the work of paradigmatic masters, for example, Louis Kahn, Le Corbusier, Mies van der Rohe, or Frank Lloyd Wright, we experience their architecture fully realized through their extant works. We carry with us, to varying degrees, perceptions of their place in history and their theoretical approach to architecture, their aesthetic and tectonic sensibilities. It is manifest as well in their writings, their offices/ateliers/schools and critical commentaries regarding their oeuvre. What I wish to explore is not the ideological, aesthetic or perceptual roles of materials and assemblies in architectural work, nor the ethics of structural and safety integrity in construction, but, rather, the conditions of ethics that pertain to materials and assemblies themselves — their origination, production, and use.

As they had well before the advent of Modernism, construction materials and assemblies in the contemporary world arise in international systems of production. For example, in his overview of post-industrial revolution construction assemblies Cecil Elliott points out:

The materials that have been used to construct buildings during the last three centuries were already present in ancient and medieval times. The change, in essence, has been largely in the development of mechanized methods for manufacturing them and in the networks of commerce that have made raw and finished products available.... [Giving rise to] Industrial 'empires' and competition (so fierce the terms of warfare were often used to describe it).... [Aspects included]...enlargement of scale, which extended markets.... [and]...reward in the medals presented to competing manufacturers at the international expositions....¹

And he presents them as neutral fabrication media:

This study gathers together stories of the production of building materials and the development of building equipment and other systems. These are the media in which architects work. They constitute the array of possibilities from which architects, builders and investors make the choices that largely define the nature of a building....²

But, are materials and assemblies the neutral matter of architecture? Raw materials are mined in one nation; transported to another where they are refined and or milled; then shipped again to a third

where they are machined into finished products for installation in buildings. After a final shipment, workers at the construction site incorporate the materials and assemblies into a building. All along the production path exists a collection of governing laws, legal contracts, exchanges of wealth and property rights transfers. What originates as bauxite in Guinea is installed in Ann Arbor as an aluminum frame curtain wall.

This is not a pure “resources/materials/economics” formula. The political-social-labor-economic-ecological terrain’s within which any modern construction takes place bear within them constraints and opportunities not only for ethical choices but justice as well. To select and specify aluminum curtain wall is to select and specify a material product for architectural realization that in itself has profound ethical implications. These occur at the intersection of environmental degradation, labor production, property holdings, and wealth.

Is it possible to specify materials and assemblies systems throughout a building that are ecologically benign; that use no materials from corrupt political or corporate regimes, or from locales lacking environmental protection laws, or from those with intransigent impoverishment of working people; and that utilize local labor during construction thus contributing to communal well-being? In an ethics interview J. Max Bond reflects:

...we try to understand the economic implications of material selection: Whose economy is being served? ... [As well as] Impact on local economy and labor in particular; cultural references of importance to building sponsors and users ... who might be affected by our choices.³

Implicit in the preceding are questions and judgments about what is “good” or “just” with regard to the origination and use of a product. Ought this to be a concern of the architect? Should it influence aspects of architectural education? Do ethical claims regarding material production necessarily conflict with or impede design?

Without discounting the value of “a-tectonic” avant-gardism and speculation about virtual architecture,⁴ the position taken here is that architecture is intrinsically kinesthetic/physical/experiential! And from this, that in the origination of construction materials and assemblies and in their application, there is a substantial field of ethical concerns that should parallel other architectural concerns that are much more typically on the surface such as program, function, ideological or rhetorical positions, and aesthetics. Among the many examples of these latter two approaches are classic works by Kenneth Frampton, and Colin Rowe and Robert Slutsky. Frampton explores material constructions in terms of their poetics:

... this study seeks to mediate and enrich the priority given to space by a reconsideration of the constructional and structural modes by which, of necessity, it has to be achieved.... I am not alluding to the mere revelation of constructional technique but rather its expressive potential. Inasmuch as the tectonic amounts to a poetics of construction it is art, but in this respect the artistic

dimension is neither figurative or abstract....building is as tectonic and tactile in character as it is scenographic and visual...⁵

Rowe and Slutsky explore an aesthetics of transparency in architecture through apprehension:

Therefore, at the beginning of any inquiry into transparency, a basic distinction must perhaps be established. Transparency may be an inherent quality of substance — as in wire mesh or glass curtain wall, or it may be an inherent quality of organization...: and one might for this reason distinguish between a real or literal and a phenomenal or seeming transparency.⁶

And:

... in this present article it is proposed ... to concentrate attention, not upon the three-dimensional or spatial aspects of phenomenal transparency, but as far as possible upon its two-dimensional manifestations — upon phenomenal transparency as pattern.⁷

The issues in construction materials and assemblies for Elliott are invention and systems of production linked to emergent new architectural form: for Frampton they are rhetorical; for Rowe and Slutsky, perceptual and aesthetic. The referent works are classics in the discourse of architectural ‘matter.’ Bond’s brief comments are closer to the themes of this paper: making ethical material choices based upon assessment of a more fully complex situation of human affairs within which aesthetic experience is but one (though vitally important) aspect.

MATERIALS AND ARCHITECTURAL REALIZATION

Architecture is a material production. Stating that architecture is material production does not deny the critical power of architectural thought and speculation. It is only that such speculation in drawing, text, modeling, film and other media, and virtual reality simulation is *architectural* — of architecture — and a stimulation to imagination and action, but it is not architecture in the sense commonly understood and as defined here: the designed and built inhabitable landscape. That landscape tends to be large, certainly larger than human beings, and demands many resources for its accomplishment.

That accomplishment uses global resources upon which all are dependent. This aspect of material production leads to a consideration of the matter of construction materials themselves. Construction materials have certain characteristics and qualities. Knowing about materials and how to utilize them for various construction purposes in order to realize a design vision is an aspect of the special knowledge architects are expected to master. It constitutes a *virtue ethics*.

As with so much else in the modern architectural curriculum, precursors to materials, assemblies and construction methods courses are found in Vitruvius, Alberti and Palladio.⁸ Vitruvius addresses basic building materials and methods in Book II (stone, brick, tim-

ber, mortar and wall construction), and finish materials in Book VII (stucco, frescoes, and pigments). Vitruvius in the introduction to Book II:

I thought it best to postpone this [discussion of proportion and symmetry] until after I had treated the practical merits of the materials out of which, when they are brought together, buildings are constructed with due regard to the proper kind of material for each part, and until I had shown of what natural elements those materials are composed.⁹ (italics added)

He continues reflection on the purposes of Book II in Chapter I:

... but in this [book] I shall discuss the use of the building materials which nature provides. For this book does not show of what architecture is composed, but treats of the origin of the building art, how it was fostered, and how it made progress, step by step, until it reached its present perfection.¹⁰ (italics added)

Alberti covers similar ground in his Book II which addresses materials, and Book III which provides a guide to construction methods and assemblies. Alberti also indicates the reason he dedicates Book III to construction:

The construction of a building does not entail just setting stone on stone, and aggregate on aggregate. ... for, because the parts are different, so too the materials and methods of construction vary quite radically. ... We must now inquire what is appropriate in each case.¹¹ (italics added)

In his Book I, Palladio not only discusses building materials and methods, expanding them to cover metals, but also includes his own illustrations. He, too, explains his intent:

... in the first [book] shall be treated of the preparation of the materials, and when prepared, how, and in what manner, they ought to be put to use, from the foundation up to the roof: where those precepts shall be, that are universal, and ought to be observed in all edifices, as well private and publick.¹² (emphasis added)

The terms of material construction: ‘proper’, ‘progress’, ‘perfection’, ‘appropriate’, and ‘ought to be’ are value terms that define the quality of excellence (the Classical Greek *areté*), or *ethical virtue*.

These examples indicate the historical depth and richness of thought regarding material production that underlies contemporary construction. An ethical duty is incurred either individually or collectively when designing and constructing buildings and infrastructure with respect to resource utilization and sustainable patterns of settlement and construction, and with respect to personal health and physical safety. In the centuries since these treatises were published, design and construction have been separated, with the architect almost exclusively focusing on design. But, the architect remains responsible for the structural integrity of building designs and for designing and selecting the construction assemblies through which buildings are realized. Thus, the contemporary architect, no less than earlier architects, is bound to mastering this material

production aspect of his or her craft, not only as a skill, but as an ethical mandate.

A MATERIAL CASE: PRODUCTION, REUSE, AND LEGACY

Vitruvius’ demand for “durability” is an *a priori* deontic claim about the positive virtues (the ethical *good*) of architecture – an essential condition for building to be architecture. But even absent that claim or other claims from architecture’s ideologies such as “truth in materials,” or “technology ought to be an expression of our time,” the context of a material selection contains a situational ethics. Client sponsorship, building project purposes, the economic wealth and labor condition of the societies affected by the construction, other social needs, etc., frame that situation.

Upon first consideration, it may seem that the material assembly “aluminum frame curtain wall” is ethically neutral. After all, it is one among uncountable construction products available in contemporary society. It is legal to produce and legal to purchase. Yet, it, along with all of those other products arises in particular circumstances. For aluminum those circumstances include a complete system of mining and transportation, the mining of bauxite and the management of tailings “waste” product, its smelting into aluminum (an energy intensive process), another complete system of fabrication and machining, and of course, selection and construction – activities virtually always international in scope. Curtain walls also incorporate a range of other materials such as glass, insulation, sealant, and joint fittings. Most often we are inclined to think in terms of the aesthetics, constructibility, cost, or the suitability to expressing or extending an ideological or rhetorical concept when thinking of a curtain wall system.

Aluminum and other contemporary construction materials do not exist except within technological societies of a certain complexity. They utilize global material resources and energy – they are not ecologically neutral and can be weighed against the embedded material/energy in other basic materials. Some types of construction grade aluminum are recyclable and aluminum does not deteriorate nor pollute as much as other products after installed. Financial resource flows that pay for processing bauxite into aluminum and machined materials, and the labor system that delivers it (adding value and stabilizing livelihoods), are also inherent in the product.

Everyday, all over the world, architects sit down to select and specify building materials and building systems for projects as diverse as back-porch additions and Olympic stadiums. Is it too onerous a thought to burden these parochial and local choices conceived and perceived as pertaining to appearance, durability, cost and constructibility with the weight of justice? Each building material or assembly that is installed in a new building arises in a particular process that transforms natural or recycled resources into usable material. The production labor, corporate and national exchange, trade, and installation labor systems by which materials are produced have embedded within them not only business and legal

implications, but also ethical ones. In what way do these architectural choices pertain to justice?¹³

SPECIFYING RECYCLABLE CONSTRUCTION MATERIALS

Aluminum is a mainstay of contemporary construction systems. It is used for surface panels, glazing systems, curtain wall and storefront systems, etc. It is light, workable, does not rust, holds sharp definition formally.

It is also extremely resource intensive to extract and refine in production. Mining often takes place in “invisible” parts of the world: 59% of the mined bauxite ore originates in western Australia, central Brazil, and Guinea, and none of the world’s top ten ore producers are in North America. Then of course, it is refined and milled into final usable forms. As consumers, the US and Canada are first and fourth respectively in aluminum production. In the manner that aluminum cans can be recycled, certain aluminum building products, which are a bit more first-cost intensive, are also recyclable.

In our contemporary global economy, how is the use of single-use disposable, as opposed to recyclable, construction materials justified? Are there other ethical/justice implications inherent in basic construction materials?

There are those who pursue the issue of the ethical standing of the environment, per se. Here we may assert that even considering ecosystem earth as a productive source to support human endeavors with no ethical standing, there is at least one matter of ethical consequentialist concern: if we deplete earth, what is next for humankind? A *Star Trek*-like existence in starships in search of a new world? A hope (wish?) that technological advances will keep us ahead of depletion? Consider that it is the general public, not architects, who pushed for, and passed, environmental legislation in the US and Europe.

One of the technological systems that we have mastered is the extraction, production, use, and recycling of various earth resources, including those that go into buildings. As a matter of logic, it would seem that given the numbers of people on earth, the inequities of access to goods and life quality that need to be addressed, and the rates of use of resources, that we ought to at least recycle materials when possible. Can doing otherwise be justified?

Matters of international economic justice, environmental justice, and global inequalities with respect to access to life’s goods are major areas of discourse. Many products being used in the richest third of the world (the largest refiner of bauxite into aluminum is the US), originate in less developed nations. They are part of those nations’ national product. Without turning this into a geo-political debate regarding the WTO, clearly, building products and enterprises are part of such globally connected markets. Banking systems and financing in the developed world favor “least first cost” and secure investment systems: a rate of return on investment is needed. The difficulty is that the investment cost and rate of return

on architectural projects, both private and public, are often drawn too narrowly: at the limit of the immediate open-market first-cost transaction at hand without regard to environmental degradation or long term operations consequences.

If contracting entities have reached what each considers to be legal, fair exchanges — has justice been served? Even if one or both parties operates in a political landscape without environmental protection laws, or labor rights laws? Depletion of global resources, inequities in global labor rates, befouling the environment (in places conveniently out of sight from North America), rather than being ameliorated are often being exacerbated. Witness the Texaco TV advertisement (aired regularly during the winter of 2000) that shows geologists hugging and tasting rocks at the most pristine of wilderness sites searching for oil and then pans away from the wilderness to speak optimistically about finding the energy to meet society’s needs. One can alternatively tune in to *CBS 60 Minutes* to see an exposé on the degradation caused by Texaco’s pipelines and production facilities in the Andes and Amazon. Tellingly, Texaco’s advertising campaign in the summer of 2000 showed ecologists on the same sites speaking about protecting the environment while it is mined to fuel progress.

This may seem to play fast and loose with generally acknowledged “hidden” environmental costs. Nonetheless, landscape construction (civil and architectural) is among the US’s largest industries. From within architecture, sustainable environmental design practices such as: reusing and recycling buildings and building materials, designing buildings for more efficient use of energy, making them more energy neutral, proposing urban development patterns that are less infrastructure intensive, etc., are strategies that we currently have available that do not decrease living standards and choice. They affect non-renewable resources, renewable resources, environmental impacts, labor expenditure and international exchanges. With the possibility of specifying recyclable materials as a matter of architectural choice, is it just not too? Who would you define as the affected parties with respect to the ethics and justice of the social-political-legal-economic process of architectural realization?

INCLUDING ETHICS IN THE MATERIALS MIX

The focus of the preceding case was perhaps an easy mark: sustainable design practices as exhibited through material design choices. And this is no small matter of concern: for example, the 2000 Sydney Olympic venues, while not receiving nearly the architectural design coverage of Barcelona, in fact were significantly advanced in utilizing reusable resources, designed for solar enhanced operational efficiency and environmental neutrality with respect to waste management, while arriving at bold memorable forms that will remain as a positive imprint on the city.¹⁴ In the context of the presented case and in other areas of the paper, multiple areas of the ethics embedded in construction material and systems choices emerged:

- **Environmental Sustainability:** This includes a range of public and private potentialities with respect to plant, animal and/or physical resources including strict preservation, 'enlightened' management for beneficial use with minimal degradation, ecological degradation or depletion.
- **Labor Equity:** Many materials are extracted and/or refined in economies dependent upon sweat shops or payment of less than living wages. Moreover, the triage of world economics tends to keep economic powers (governmental and corporate) powerful while creating a less than even playing field for 3rd world economies.¹⁵
- **Governmental Context:** Questionable human rights conditions and/or corruption affect many production economies.
- **Property and Wealth Controls:** Are circumstances of extreme deficiency the only situations in which an ethical concern arises? If corruption, labor inequity, and human degradation exist – given that some economic activity benefit trickles down — is it not better to *not* make these an issue of architecture, but rather to pursue rectifying these politically? When ought we (as a nation or as a corporation or profession) cross the line to explicit action such as international embargoing of Cuba and Iraq, or creating 'social choice' investment portfolios such as those that led to withdrawal of investments from South Africa?

These concerns are intractable only if we allow them to remain so. But clearly they are larger than any one architectural project. Yet, the proposition raised here is that the embedded ethics and social justice of the material realization of architecture ought to augment the more typically considered design influences and expectations. In the academic setting, the issue may simply be to incorporate a continuous awareness of the justice impacts of architectural fabrication into the curriculum, and in practice to work toward making aesthetic and poetic choices that are also ethical and just.

NOTES

¹Cecil D. Elliott, *Technics and Architecture: The Development of Materials and Systems for Buildings* (Cambridge: MIT Press, 1992), 2.

²Ibid., vi.

³John Perkins and Peter Coombe, "On Ethics: J. Max Bond and John Whiteman," *Practices*, v2, Spring 1993, Bond interview, 35-39.

⁴*Architecture*, June 1997, issue dedicated to "Digital Worlds." Page 85: "Virtual Environments, unbound by gravity and unhindered by economics, have turned today's architects into spatial Magellan's." Three years later, *Architecture*, September 2000, p. 93, the editors address translation into constructible habitats: "Digital architecture is straddling the line between vision and reality. ... The technical intricacies of how to build a computer age architecture, and what the results should look like, are quandaries occupying some of the keenest minds in contemporary architecture."

⁵Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge: MIT Press, 1995), 2.

⁶Colin Rowe and Robert Slutsky, "Transparency: Literal and Phenomenal," in *The Mathematics of the Ideal Villa and Other Essays*, Colin Rowe (Cambridge: MIT Press, 1976), 159-183, quote on 161.

⁷Colin Rowe and Robert Slutsky, "Transparency: Literal and Phenomenal (Part 2)," in *Architecture Culture 1943-1968: A Documentary Anthology*, ed. Joan Ockman, collab. Edward Eigen (New York: Columbia Books of Architecture/Rizzoli, 1996), 205-225, quote on 206.

⁸Gregory Palermo. The series of treatise citations is excerpted and revised from material originally developed by Palermo for *Ethics and the Practice of Architecture*, Barry Wasserman, Patrick Sullivan and Gregory Palermo (New York: John Wiley & Sons, 2000), pp. 82-85.

⁹Vitruvius, *The Ten Books of Architecture*, (1st-C, BCE), trans. Morris Hicky Morgan, (Harvard University Press, 1914), reprint (New York: Dover, 1960), 36.

¹⁰Ibid., 41.

¹¹Leon Battista Alberti, *On the Art of Building in Ten Books*, (1452), trans. Joseph Rykwert, Neil Leach, and Robert Tavernor (Cambridge: MIT Press, 1988), 61.

¹²Andrea Palladio, *The Four Books of Architecture* (1570), trans. Isaac Ware (London: 1738), new intro. by Adolf K. Placzek, facsimile reprint of Ware ed. (New York: Dover, 1965).

¹³Gregory Palermo. The case example and subsequent analysis in this section is adapted and revised from material first developed by Palermo in "Architecture as Environmentally Embedded Social and Material Justice," Frances Bronet, guest ed., Daniel Sullivan, ed., *Contemporary Justice Review*, in production.

¹⁴Bill Bryson, "Sydney: On Top of the World Down Under," *National Geographic*, v198, n2, August 2000, 2-25. Green architecture is discussed on p. 18. The map supplement "Sydney Olympic Park: The Green Games," highlights the sustainability features built into the Olympic venues: new construction materials made of recycled waste, solar energy systems for the Olympic village and main boulevards, the capture and reuse of storm water for irrigation, protection of habitat, etc. For a mixed design review, see Anne Susskind, "Sydney," *Architectural Record*, June 2000, 55-ff.

¹⁵For a concise discussion, see Karen Lebacqz, *Six Theories of Justice: Perspectives from Philosophical and Theological Ethics* (Minneapolis: Augsburg Publishing House, 1986). Chapters 2, 4, and 6 identify social inequities and compare the justice perspectives of John Rawls, the National Conference of Catholic Bishops and the Marxist liberation theologian Jose Porfirio Miranda that attempt to redress them.