

# Material Movement: Cement and the Globalization of Material Technologies

by Curt Gambetta

Architecture *moves*. Architectural ideas, technologies and institutions travel along routes of global and regional circulation, while construction materials create conduits and physical pathways for their movement. These routes, however, are not empty or neutral spaces between cultures, as anthropologist Elizabeth Povinelli has recently argued; they are subject to the volatilities of change and disruption.<sup>1</sup> Materials travel through infrastructures ranging from transport vessels to electronic data to cultural forms, encountering social and technical friction as they circulate. In this respect, routes are not benign agents of transport, but rather active agents that shape how materials are represented, manufactured and put to use as objects of knowledge and architectural design.

In the span of a century, a number of basic construction materials attained near-hegemonic status in the otherwise heterogeneous world of construction technologies and expertise. The proliferation of architectural materials such as cement, steel, and masonry followed a map of cultural space and historical development that to this day issues more often than not from an origin point in the West. What of notions of space, culture, and difference are embedded in this map of architectural globalization?

In my own observation of the social and technical life of materials in India, I have long been dissatisfied with the image of historical progress and architectural modernity that this map proposed, both within and outside India. Modern architecture in India and elsewhere in the post-colonial world remains hopelessly tethered to a powerful centre and origin in the Western metropole. The globalization of materials is used by many critics as evidence to confirm cultural processes of Westernization. Indeed, architecture is produced with a standardized and often reproducible repertoire of components and materials of construction that trace their origins to 19th-century Europe and America. Still, differences are tangible to even a casual observer. Mumbai does not look like Houston, nor is it constructed in the same manner, whatever the common material DNA. Rather than accept these differences as culturally determined, we might do well to consider the processes and circuits of material and social exchange through which difference is produced. How might attention to the conditions of material movement reconfigure the spatial and temporal relationships that are drawn between architectural materials and the cultural experience of modernity?

**1** Gayatri Kumaraswamy and I walked through a small lane in Siddapura, a village that was swallowed up by Bangalore after the planning of new, large-scale suburbs such as Jayanagar (said to be the largest in Asia, in its time) after Independence in 1947. The light was typically intense, setting in contrast even the shallowest relief work and surface blemishes such as cracking plaster. We stopped at a series of row houses in order to inquire about the diamond shape that was constructed in plaster above the door of a carpenter who lived on the lane, S.P. Krishnappa.

I anticipated that the quotidian icons above our head were clues to larger circuits of proliferation within Bangalore and abroad, and wanted to know more about their provenance. Plaster shapes, patterns, and surface textures are common to the roadside elevation of small-scale buildings in Bangalore and other cities and towns across India. Pattern, especially plaster relief work, exploded into common use on walls, windows, and doors during the 1950s and 60s. Portland cement was in part responsible, allowing for faster turnaround on building sites and encouraging flattened patterns over slower-drying and more sculpturally adept lime plasters. Cement was also embedded in a wider efflorescence of novel materials, joining a number of other globally circulating construction techniques and materials that were introduced to India during the 20th century.

Changes in material technologies coincided with broader transformations in urban life and architecture. In Bangalore, expertise about material manufacturing and construction was changing during the 20th century, as were forms of architectural patronage. Ideas about “city architecture” and urban spatial organization were re-imagined at the turn of the century and reorganized relationships between street, building, and community. New forms of life and labour emerged in this period with the rise of public sector industries and the reconfiguration of older manufacturing economies; in particular, a revamped and re-imagined industrial suburb was introduced. Cinema halls, hotels, and other new spaces of social friction proliferated around the city, along with new geometries and materialities of space and surface.

Novel materials were suited to the constructional demands of this new landscape, while at the same time transforming it. New architectural materials such as concrete and steel were celebrated by industry, planning, and architectural culture in mid-century India for their capacity to create new forms of domesticity and urban life. It was



Door carpentry, Ulsoor, Bangalore, India. Photo by the author, 2006.



Mobile building model, Mantri Developers, Brigade Road, Bangalore, India. Photo by the author, 2003.



Roadside temple, Lal Bagh Siddapura, Bangalore, India. Photo by the author, 2008.

also thought that concrete would create new experts, such as architects and civil engineers. Whatever its structural innovations, concrete was primarily touted as an image. It was promoted as a building block of society, supporting new ways of living and new forms of knowledge.

Industry publications, such as those published by the Cement Marketing Company and the Concrete Association of India, featured images of new concrete architecture that referenced global trends. During the 1930s and 40s, images of technological marvels and quotidian architecture in Europe and the United States stood side by side with images of concrete furniture, roads, and architecture in India. Progress was achieved by operating at the level of everyday urban aesthetics, retrofitting infrastructure and creating a new urban fabric through the scale of domestic construction, echoing the aesthetic bias of colonial urban improvement schemes. By the 1950s, concrete was expected to bring infrastructural cohesion to the imagination of a national economy. Advertisements and print media invested in concrete the potential to transform large scale infrastructural networks, such as transport and electricity, to “catch up” with the West.

Regionalism, discourses of low-cost construction and vernacular architecture, later turned this narrative on its head, portraying the introduction of concrete as leading to the disintegration of local building traditions. Beginning in the 1970s and 80s, architects in India such as Laurie Baker turned to vernacular architecture as a foil against new technologies of construction. Inspired by the Himalayan vernacular of Pithoragarh and Gandhian “ideals,” Baker describes how the “ideal house” in an “ideal village” is constructed of building materials sourced within a five-mile radius of the building site.<sup>2</sup> In addition to cost effectiveness, Baker also argues that using local materials is a project of cultural mediation, noting that the “delightful dignified housing [of the Himalayan vernacular] demonstrated hundreds of years of building research on coping with local materials, using them to cope with the local climactic patterns and hazards, and accommodating to the *local social pattern of living*.”<sup>3</sup>

Baker was keen to point out the cultural consequences of new technologies such as concrete. If concrete was seen by industry and professional design culture to function as an agent of infrastructural cohesion within the space of national culture, Baker understood novel constructional technologies as viral contaminants of traditional contexts of material use and their cultural milieus. He ruminates about what inhabitants of Pithoragarh think of their own houses, concluding that ‘improvements’ such as:

[P]roper kitchens, bathrooms, latrines, chimneys, smokeless *chulhas*, glass windows, brick walls, concrete floors and roofs...create problems worse than those which they are supposed to remedy, and...are rarely appreciated by the people who have to live with these ‘advancements’ and ‘developments.’<sup>4</sup>

Baker implies that architectural materials not only represent but also affect the social worlds they interact with, attributing materials a similar agency to that of everyday domestic technologies.

Baker’s perspective on building technology and culture exemplifies a longstanding problematic in design culture about globalization, space, and cultural difference. It assumes an isomorphism, writ large across not only architecture but the human sciences as well, between “space, place, and territory.”<sup>5</sup> In a systemic rethinking of anthropology’s colonial inheritance in the 1980s and 90s, James Ferguson and Akhil Gupta critique an assumed spatial ordering of difference in the social sciences that understands the space of one culture as “naturally” discontinuous with another and ties “culture” to the boundaries of a particular territory. “It is so taken for granted,” they write, “that each country embodies its own distinctive culture and society that the terms ‘society’ and ‘culture’ are routinely appended to the names of nation-states, as when a tourist visits India to understand ‘Indian culture’ and ‘Indian society’.”<sup>6</sup>

To this we can add how the imagination of society and culture is appended to particular building materials and techniques. Sigfried Giedion, for instance, imagined concrete architecture as the expression of a French “constructional temperament,” drawing a line of epistemological continuity across history, in his book *Building in France, Building in Iron, Building in Ferroconcrete*, to imbue new materials with the spirit of world historical progress.<sup>7</sup> In Giedion’s image of history, concrete is the culmination of French architectural achievement, from cathedral architecture to the industrial sublime. Conversely, concrete today stands for cultural homogenization, Westernization, Americanization, and the destruction of tradition. Whether seen as an expression or destruction of culture, the idea of culture itself is defined by the fortification or contamination of particular forms of identity and their respective spaces of supposed origin (the West, France, America, etc.).

How does this image of culture hold up against the





Cement mold making, 80ft Road, Koramangala, Bangalore, India. Photo by the author, 2003.

S.P. Krishnappa's home, Lal Bagh Siddapura, Bangalore, India. Photo by the author, 2008.



Painted shutter, Ulsoor, Bangalore, India. Photo by the author, 2004.



proliferation of architectural materials? After all, common materials are subject to wildly different uses that seem to confirm their “acculturation” by particular national or regional contexts. During much of the 20th century, this was understood as a failure to catch up to new paradigms of construction and architectural design. Reflecting on his experience as an architecture student in late 1970s Italy, Mario Carpo recalls the lament of progress deferred. Describing his travels between Italy and Switzerland, he explains:

Why, given the same materials, techniques, and methods of construction, does it seem that on one side of the border it is considered normal that people should live in houses that are more or less identical, while on the other side it is not so, and everyone seeks to avoid as far and as conspicuously as possible the anonymity of a standardized architectural landscape? As anyone can tell you, despite an overwhelming number of building codes and community and condominium rules, in Italy an apartment house with forty balconies usually displays on its façade forty types and colors of curtains or blinds. Since it would be cheaper to purchase forty identical curtains in one lot, *this must come about by choice, not chance.*<sup>8</sup>

Carpo describes the frustration he shared with his peers over Italy’s supposed backwardness (to Wilson and Kelling’s broken window theory, we could add a theory of raucous blinds!). Modernism won out on one side of the border, whereas on the other side of the border, “the battle had yet to begin.”<sup>9</sup>

Carpo’s lament over his youthful sentiments provides him an opportunity to undo the seemingly intractable bond between technological and historical evolution that is implied by the metaphor of a “battle” for progress. Carpo goes on to to illuminate a period of architectural history in which architectural forms changed radically without corresponding innovation in materials or techniques of construction. The proliferation of printed treatises and images in the early Renaissance facilitated the reproduction of architectural forms without reference to their material composition or intended users. Print media became, like oral transmission before it, a circuit through which ideas about architecture traveled, disassociating the historical periodicity of building from the construction technologies and expertise that made building possible.

Notions of material circulation and cultural difference need to be revisited in our consideration of architecture as a fundamentally transient form. Tracing the journeys of architectural materials throws into relief how architectural design and its materialization have always been “hierarchically interconnected” to, rather than “naturally disconnected” from, cultural forms, traversing local and global circuits of industry, media, and people.<sup>10</sup>

In the contemporary world, printed media and orality are joined by a dense and interconnected web of circulatory forms. Circuits of movement require that materials and their representations be configured to fit their constraints. This process of infrastructural mediation has come under an increasing degree of scrutiny in fields such as anthropology.<sup>11</sup> The infrastructure of ships, trucks, publications and other forms of circulation constrain and mediate the materials they transport and represent, both in their physical makeup and in anticipation of how they will be put to work. Prefabrication of building construction, for instance, requires that prefabricated components fit within particular dimensions, weights and logical assembly in order to be transported and utilized on site. Furthermore, institutional forms such as professional bodies, international building standards, educational institutions, systems of patronage and other cultural forms ask that technologies behave according to particular standards and desires in order to be eligible for general use and experimentation.

In India, as with many settings in the postcolonial world, these infrastructures are notable for their instability and vulnerability to improvisation and appropriation by non-professional circuits of use. Infrastructural fragility is not a failure of socio-economic or cultural development, as is often claimed. The volatility of pathways is instead a terrain of cultural possibility, allowing for new avenues of circulation to be created. Through their networks of circulation and dissemination, cement and other materials have transformed urban and rural life, just not in the way imagined by industry and design culture.

**2**  
Gayatri and I struck up a conversation with Krishnappa, who, joking that a young bystander was the owner of a local temple, made light of our bias towards the ordinary architecture of the street over the older architecture of the temple. Krishnappa’s story, and the architectural landscape that surrounded our conversation, reinforced my suspicion

that the urban archive of architectural materials and technologies did not conform to the heroic narratives of progress and decline discussed above.

Krishnappa explained that the diamond protruding from his house was constructed around 1980 by *gare* workers who, by the time of its construction, were repositioned in a new cement-based economy of materials, know-how, and patronage. *Gare* was a basic construction material used for mortar and plastering that predated Portland cement in India, consisting of a mixture of lime, sand, water, and, occasionally, egg. Besides being a method of fabricating surfaces, it was closely associated with technologies of load-bearing walls and terraced or tile roofs.

*Gare* was a mixture of social forces and materials. Its production was familiar to urban residents; the mixture was ground in a large circular stone channel with an ox-driven grinding stone in small units throughout the city. The scale of production units and the materials used to manufacture it remain familiar to a mature generation of Bangaloreans, if only as a memory. Temporally, *gare* was slow both in its manufacture and its application on site, creating a culture of site relations that are said to have privileged skill over speed. Besides requiring a good deal of time to cure and cool before being used for construction, *gare* dried slower on application than cement, allowing relief work to be reshaped by artisans the following day.

Aspects of the *gare* assemblage were transformed by the introduction of new technologies, but were not extinguished wholesale in the manner envisioned by the building industry and the professional design culture. Cement displaced many qualities and consequences of *gare*. Cement manufacture and material composition was unfamiliar to laypeople and users, concealed in a new geography of far away factories. The slowness of hardening and labour was met with a temporal acceleration of site relations entailed by the arrival of the contractor and faster drying Portland cement. Nonetheless, the material and building culture of *gare* survived decades into the introduction of cement. Material admixtures and forms of expertise about *gare* persisted well beyond their anticipated death. *Gare* material and expertise, for instance, survived into the 1970s, and possibly the 1980s, as evidenced by the diamonds above Krishnappa’s door.

Cement established a new assemblage of materials, knowledge and urban life, though its consequences on the ground were at odds with its imagined social and spatial role. Cement was considered a catalyst for new forms of expertise, such as professional architectural practice and civil engineering. Concrete design manuals stressed the centrality of the professional in the hierarchy of architectural knowledge, an authorship that was sanctioned at the municipal level with building bylaws that required the authorial signature of a professional on architectural drawings. A field of non-professional labour, ranging from unskilled to skilled workers and *maistri* (masons) flourished anew, encouraged by cement’s ease of use in the domain of small-scale construction. Educational institutions solely dedicated to architectural training were late to arrive in the Bangalore region, and bylaws that required an architect for construction were undermined by a combination of lax oversight by municipal authorities and a shortage of architects based in the city. Design expertise was distributed unevenly between patron, architect, engineer and labourer, blurring roles and throwing into disarray the hierarchy of work anticipated by the entrance of professionals and new material techniques.

In Siddapura and other older neighborhoods in the city, discrepancies of old and new building practices are inscribed onto building surfaces. Layers of time are exposed along the crowded architectures of narrow lanes, conversing through plastered surfaces and paint. Thick masonry walls, gneiss blocks, and wood trim from the 19th and early 20th centuries occupy the scenography of the street alongside geometric patterns set in steel grill work and cement plastering that bear the mark of the post-Independence Indian city. Contemporary techniques of surface construction allude to the pre-fab materials used in interiors, such as the pink floral ceramic bathroom tile used to clad a roadside temple. This mass-produced unit of surface inverts its interior application, with the effect of converting a heavy masonry structure into something like a wrapped paper box, shrouding the age or time of the original structure in a contemporary, lighter garb.

Old and new forms of expertise are equally heterogeneous, resisting the easy distinctions of traditional/artisanal and modern/mechanized. Krishnappa explained that mechanized carving had been influential to his carpentry practice, dating the transition to mechanized woodworking to around 20 years ago, around the same time he began his own practice as a carpenter. Pointing to the carving on his door, he explained that its design was executed by a machine, seemingly confirming a familiar narrative of technology replacing handiwork and traditional craft. Despite mechanization and the propagation of new designs, Krishnappa noted that people continue to come to carpenters for work.

The work of the hand retains its value, however tenuously, in the presence of mechanical technologies, even if it is transfigured by its encounter with new conditions of patronage and production, as well as aesthetic demands. Knowing the experience of other carpenters in Bangalore, I will take the liberty to supplement his short story with the dilemma carpenters now face. The highly skilled carpentry of the past, particularly in furniture construction, is being increasingly eclipsed by the popularity of pre-fabricated, mass-produced furniture that is commonly known as “Ikea,” even though it is not manufactured by the Swedish furniture company. As well, skills have become more and more specialized, a trend not restricted to the practice of carpentry.

The turn to factory production may or may not prove



to be the death knell for artisanal practices and labour-intensive fabrication. Its consequences remain uncertain in contexts like Bangalore. Still, despite the de-skilling of labour, specialization of design knowledge, and mechanization of fabrication, site-based processes of architectural proliferation continue to thrive. Windows and door frames, household carpentry, window grills, walls, floor slabs and structural framing are all produced on site. Novel pre-fabricated building products are drawn into these larger regimes of circulation and site-based mimesis. In the traffic of borrowing, appropriation, and re-articulation of surface techniques, both handmade and industrial objects act as potential points of departure. For instance, imitation wood replaces real wood in the use of formica furniture and cabinetry. Additionally, imitation wood is itself imitated and transposed from furniture to architectural surfaces. Paint is used to achieve the look of wood, though the look is distinctly graphic in quality, like formica. Additionally, imitation wood is itself imitated and transposed from furniture to architectural surfaces. Paint is used to achieve the look of wood, though the look is distinctly graphic in quality, like formica. Or, common shapes such as diamonds are unhinged from any one material or dimension and rendered in different media, such as wood, paint, cement, or steel. New materials are also suitable to unforeseen or heretical uses, as in the example of the temple wrapped in bathroom tiles.

The city is not a quiet backdrop to these promiscuous transferences among media. Shapes and patterns wander the streets of Bangalore like spirits in search of a medium to temporarily occupy. Though cement industry publications were available from the 1940s onwards, they were printed in English or Hindi, rendering them inaccessible for those illiterate or not literate in either of these two languages. In the absence of widely available publications, the street served as a conduit for ideas about construction and design. Contractors frequently cite “experience” as the locus of their inspiration, an embodied knowledge of surface designs and spatial typologies forged through experience and, critically, a streetwise knowledge of architecture. Though printed media such as Indian design magazines and global remainders such as Ikea catalogues are now readily available through bookstores and roadside booksellers, the street remains an important conduit for the circulation of knowledge and forms.

The circulation of images also connects the local to the global. Cement industry publications were initially the venue for the dissemination of perspectival images, plans and elevations of novel building types in mid-century India. Other books published by engineer authors, such as R.S. Deshpande’s *Modern Ideal Homes for India*, were in wide circulation from 1939 to at least 1982, and were authored explicitly to cultivate and transform modern home types and ways of living that directly or indirectly invoked European and American designs. Home planning books such as *Modern Ideal Homes* featured allusions to European modernist housing or direct appropriations of examples from architects such as Bruno Taut. These publications predated large-scale modernist projects in India such as Chandigarh (Albert Mayer and Matthew Nowicki, and later Le Corbusier) and the Delhi Master Plan (the Ford Foundation), challenging storied notions of modernism’s temporal alliance with postwar economic development and its privileged “introduction” to India through these circuits.

In contemporary Bangalore, personal travel photographs have replaced industry publications as the entry point for images of foreign design. Kedar Diwakar, principal of one of the oldest offices in city, founded in 1966 by his father, L.P. Diwakar, suggested to me recently that the use of personal photographs and other media signaled a decline in the respect that clients accorded to architectural expertise. While his father would carefully illustrate drawings by hand, clients now come with photographs and measure the quality of a designer according to how faithfully she is able to emulate them. Photographs upend the ascendancy of the architect in the daily terrain of practice, deploying materials of construction as a speculative image on par with requirements of style and space. Impersonating a client, he described a typical demand: “I want a building, and I want to use granite everywhere.”

As with home planning books in the 50s, these images are inserted into radically different economies of construction than their original referents of domestic life in the United States or Europe. However, in settings that rely on in-situ construction, similarity begets difference. Images are subject to the material contingencies of the site and varied levels of skill, and are notable for what they do not represent (depending on the angle or image resolution, for example). The reproduction of common trends relating to surface and space is desired by makers and patrons alike, but is altered as it moves through different circuits of material realization and constructional expertise.

Given its complicated status as an image, a technology and raw matter, what is a material, and what is its cultural agency?<sup>12</sup> The question has been asked in many ways of architecture proper during the 20th-century, revealing a productive and unresolved tension between the technical capacities of architectural materials and their status as images and cultural objects. In the Pre- and Postwar era, materials such as cement and steel were tied so closely to their representation that they were sometimes asked to function as a medium of communication. In his history of technology and avant-garde culture in post-revolutionary Mexico, Rubén Gallo positions cement alongside technologies of communication such as the camera, the typewriter, and the radio, suggesting that cement was co-opted alongside media technologies in order to communicate revolutionary political messages.<sup>13</sup> In Mexico and other contexts such as Russia and India, cement was photographed, filmed, and even narrated in fiction in order to communicate its radical social potential

as both a medium of industrial production and architectural innovation. Mid-century American architects such as Eero Saarinen and Paul Rudolph distanced themselves from this social project, rendering the friction between representation and material in the formalization of surface and structure.<sup>14</sup> Concrete was inscribed into the by the very techniques of representation through which it was rendered and speculated upon, as in the transference of Rudolph’s textured pen and ink drawing technique to the corrugation of concrete surfaces in buildings such as the Art & Architecture Building at Yale.<sup>15</sup>

While images (and other forms of representation) carry these histories of material inscription and meaning with them, they can also be dislocated from them when they enter new contexts. Reyner Banham’s account of the one-sided romance between European modernism and American industrial architecture, for instance, frames the friction between image and material in terms of circulation, where myriad misreadings of material innovation occurred along the journey of architectural images from North America to Europe. Banham’s narrative is in part a critique of derivation, describing how Le Corbusier and other European modernists “picked and chose” from the supposedly objective photographic representation of American industrial architecture the elements that were appropriately primitive or mechanistic for their own modernist objectives.<sup>16</sup>

If in Banham’s critique of derivation the reference point was the “ruins” of industry in the United States, in much of the colonial world, the reference point was the West and Europe more specifically. Gregory Clancey, in a brilliant reading of the complicated cultural dynamics of material technologies in late 19th and early 20th-century Japan, argues that the gaps and partial knowledge in the appropriation of “Western” techniques of carpentry and masonry seriously undermine historical narratives of cultural derivation and related models of “technology transfer” that all too often find their way back to a Western point of origin. For example, Clancey traces the emergence of what he calls, schematically, “Japanese Western Carpentry,” a contradiction of terms only if we maintain our faith in the isomorphism of ethnos and territory writ large across global histories of design.<sup>17</sup>

In the 1870s, the Meiji government hired a class of foreign experts such as Joseph Conder for its newly formed technical schools, entangling technologies such as masonry construction and knowledge-making about these materials in a cultural politics of progress. British and German texts circulated into design discourses through this framework but were transformed significantly when re-drawn and interpreted by Japanese authors. Rather than cultivate a historical consciousness about “Western carpentry,” foreign texts were notable for their drawings of fragments and abstract principles without application to a larger building or cultural context. Particular designs for bracing systems were evaluated by Japanese designers not for their cultural significance but earthquake resistance. The partial knowledge of European material techniques allowed for their flexible appropriation in emergent domains of technical expertise driven by geologic context. An idea of cultural derivation here is not very useful, since Western carpentry is not evaluated in this context in terms of its origin in the West, except perhaps within the larger framework of its introduction. Clancey offers the concept of inscription to describe the physical and material agency of these transformations, an effort to give language to cultural transformations that do not adhere to essentialist notions of cultural contact.<sup>18</sup>

It is in the context of this historical problematic that I continue to wrestle with the consequences of the circulation of materials in Bangalore. Though reference points to Western architecture and expertise are everywhere in the media landscape and architecture of the city, they are departed from in critical ways. Material origins are themselves unstable, shifting constantly between representation and raw matter. Wood and other materials are reified as materialities that are dislodged from their origins and intended uses, enabling the creation of knowledge networks, patronage, and urban spaces that necessarily respond to the limited means of an expanding middle class and, more recently, an increasingly mobile underclass. Material and cost constraints demand that qualities associated with a natural material (or its imitation) must alter and conform to the status of an image, such as hand-painted wood or formica, or industrially produced formica “stone.” Architectural typologies are also subject to these conditions of circulation. In mid-century Bangalore, the idea of the concrete home circulated as an image long before many users were acclimated to concrete, meaning that designs of RCC construction that were portrayed in industry-published home planning books were realized in older technologies of *gare* or mud and stone. Similarly, images of wood framed homes from the suburban United States are replicated in contemporary Bangalore in RCC construction.

Complicated materialities such as cement or wood participate in a cultural efflorescence of matter, media and non-professional forms of expertise where mechanization and expenditure is significantly constrained, or is simply reconfigured to the demands of a labour-intensive building economy. Movement relies on common material and spatial types to achieve an endlessly differentiated set of material claims over urban space.<sup>19</sup> Seen through a wider lens, everything from textures and shapes to spatial and tectonic typologies are subject to significant transformations in the course of their movement. Materials are unmoored from their origins; the vacuity of their referents facilitates an ease of translation and adaptation to the sometimes difficult conditions and conflicts of construction on site.

When tracking the circulation of concrete and other materials of construction, notions of an “Indian” way of building or an “Indian” urban vernacular may not do justice to the ways in which technological changes have unfolded

in relation to the cultural or social. An analysis of circulation redraws the map of material technologies and cultural change. Circulation is not necessarily global; it can also be urban in its extent, inviting a critical discussion of collective spatial forms that are not necessarily transnational. Removing the movement of materials from narratives of “cultural difference” also facilitates a re-reading of sites of architectural production that do not fit with already acknowledged centres of innovation.<sup>20</sup> Thinking a materialism of movement allows us to take into account forms and sites of circulation that are unacknowledged or willfully ignored, and understand how routes of circulation are constituted along axes of movement that do not necessarily coincide with powerful images of architectural modernity and its well-established networks of circulation.

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Notes

1. Elizabeth Povinelli, “Routes and Worlds,” *E-Flux Journal* 27 (September 2011): 1-12.

2. Laurie Baker, “Building Technology in Pithoragarh,” in Gautam Bhatia, ed., *Laurie Baker: Life, Works & Writings* (New Delhi, India: Penguin, 1991), 234.

3. Emphasis mine. Ibid., 235.

4. Ibid., 236.

5. James Ferguson and Akhil Gupta, “Space, Identity, and the Politics of Difference,” *Cultural Anthropology* 7 (February 1992): 7.

6. Ibid., 6-7.

7. Sigfried Giedion, *Building in France, Building in Iron, Building in Ferroconcrete* (Malibu: The Getty Center for the History of Art, 1995).

8. Emphasis mine. Mario Carpo, *Architecture in the Age of Printing: Orality, Writing, Typography and Printed Images in the History of Architectural Theory* (Cambridge: MIT Press, 2001), 3.

9. Ibid., 8.

10. Ferguson and Gupta, “Space, Identity, and the Politics of Difference,” 8.

11. The anthropology of circulation encompasses an expanding body of literature in anthropological discourse. For the purposes of this article, three platforms of discussion were primarily referenced, including Elizabeth Povinelli. “Routes and Worlds,” *E-Flux Journal* 27 (September 2011): 1-12; Elizabeth Povinelli, Response to *Infrastructures of Circulation Panel*, American Anthropological Association Annual Meeting (New Orleans, LA), November 17, 2010; and Dilip Gaonkar and Elizabeth Povinelli, “Technologies of Public Form: Circulation, Transfiguration, Recognition,” *Public Culture* 15(3): 385-397.

12. My questions allude to the core argument and title of Reinhold Martin’s essay, “What is a Material?” in Donald Albrecht and Eva-Liisa Pelkonen, eds., *Eero Saarinen: Shaping the Future* (New Haven: Yale University Press, 2006).

13. Rubén Gallo, *Mexican Modernity: The Avant-Garde and the Technological Revolution* (Cambridge: MIT Press, 2005), 168-198.

14. Martin, “What is a Material” and Timothy Rohan, “Rendering the Surface: Paul Rudolph’s Art and Architecture Building at Yale,” *Grey Room* 1 (Fall 2000): 84-107.

15. Rohan, “Rendering the Surface,” 89-91.

16. Reyner Banham, *A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture* (Cambridge: MIT Press, 1986), 16-18.

17. Gregory Clancey, *Earthquake Nation: The Cultural Politics of Japanese Seismicity, 1868-1930* (Berkeley: University of California Press, 2006), 202-211.

18. Ibid., 7.

19. This is a phenomenon not unlike the proliferation of the “original copy” that James Holston witnessed in the periphery of late 1980s São Paulo. See James Holston, “Autoconstruction in Working-Class Brazil,” *Cultural Anthropology* 6 (November 1991): 456-462.

20. Banham observed a particular geographic blindness implicit in the instrumentalization of American industrial architecture by Modernist design culture, noting how his analysis brought into historical critique the experience of American cities which then, as now, occupy critical blind spots for architectural culture at large (except, of course, as a ruin). Reyner Banham, *A Concrete Atlantis*, 107.

Scapegoat

Architecture/Landscape/Political Economy