Re-representation of Urban Imagery

STRATEGIES FOR CONSTRUCTING KNOWLEDGE

Mike Christenson North Dakota State University

Productive analysis of photographically composed urban imagery is a 'wicked' problem due to the presence of multiple, entangled systems. This paper proposes constructive analytic techniques for composite imagery, consisting of digitally generating and superimposing graphic overlaps within and adjacent to original images, producing new images not rationally related to nameable systems. These new images promote pattern identification, which in turn has the potential to inform conclusions about memory and navigation in urban sites. Thus, the difficulty inherent in systemic urban analysis is shifted to one of abstract image interpretation, and a new set of reflective strategies becomes relevant. These strategies are illustrated through analysis of two existing systems in a midsize, Midwestern city: a system of pedestrian walkways connecting several downtown buildings, and a system of overhead power distribution structures. The systems have observable characteristics in common. But, while the walkways represent a deliberate attempt to structure memory and thus to aid navigation, the system of power distribution structures makes no such claim.

The paper discusses specific implications of the method informing the author's ongoing research and architectural design teaching. In conclusion, wider implications are suggested, informing the general question of constructing urban knowledge.

INTRODUCTION

Two-dimensional photographic images of urban sites are ubiquitous components of documentary architectural and urban research. The value of such images to research purposes is traditionally limited by one of the following assumptions: first, that an image of a site neutrally substitutes for the site's content, or second, that an image reveals through its framing the political biases of the photographer, and is thus not neutral. I argue that productive reliance on images in support of research must not be limited by either assumption, but instead that research must be provocatively informed through digitally executing actions on image content and by observing results. This position derives directly from my recognition that certain technical effects in Adobe Photoshop and Adobe Illustrator software, if carefully directed and modulated, have the capacity to simultaneously displace the image from either of its obvious positions as a neutral register of content or an idiosyncratic and value-laden artifact.

In this paper, I discuss in general the ability of photographic images to function as neutral registers or as value-laden artifacts. This discussion in turn informs the general difficulties inherent in image-based urban analysis. I then describe a constructive method of digitally generating abstract graphic stratifications from original photographic images, consisting of three primary techniques in combination: *overlaid striation, blurred stratification,* and *contour extraction*. Through this method, I propose to substitute for traditional assumptions inherent in image-based research the need to draw productive inferences from abstract imagery.

ANALYTICAL PROBLEMS AND PHOTOGRAPHY

Horst Rittel and Melvin Webber establish "wicked" problems in design as those which, possessing "messy" character, are not susceptible to linear analysis or scientific solution (Rittel and Webber 1984). Cities are particularly characterized by idiosyncratic and apparently accidental relationships in urban form and patterns of use—for example, as interruptions to a street grid, or as apparent disregard to local topography within a planned grid, or a collision of uses in partially reclaimed abandoned industrial districts. These relationships may be observed at multiple and simultaneously overlapping scales, as when difficult-to-predict relationships are observed between and among buildings whose use and purpose has changed over time. Analysis of urban form can thus be understood as a "wicked" problem in Rittel and Webber's terms because it does not lend itself to a predictable method of analysis or a universally applicable approach. A persistent difficulty of analyzing idiosyncratic urban form is that of identifying a set of forces or ideas which have the power to guide or shape the creation of cities over time. (Bacon 1976; Kostof 1991; Christenson 2005) While I believe that this need is legitimate, and indeed, that the act of deriving from observation nameable city-shaping forces is finally critical to a well-grounded understanding of the city, I am not convinced that these forces are fundamentally deterministic, but rather that their intersection and overlap at specific localities results in urban form that is accidental or chaotic in appearance, and that chaotic appearance is precisely that aspect of experience and memory which is best registered in photographs. Thus, a method to deal with the "wickedness" of urban analysis through a critically informed analysis of urban images appears necessary.

TENUOUS ASSUMPTIONS OF NEUTRALITY

It has long been recognized that photographic images do not function as neutral registers of sites. However, certain contemporary uses of digital technology fail to take this recognition into account in two specific ways: first, when digital databases of remote or imagined urban sites are produced and disseminated with the intention of making the sites accessible to researchers, and second, when visual simulation becomes the primary means of entering digital three-dimensional models of urban sites into critical discourse. Both uses of digital technology propose to achieve success when the *photograph* (or simulated photograph) is freed from bias: that is, when the photographic medium achieves neutrality relative to the site.

Practices of structuring access to collections of graphic information referring to existing urban sites and works of architecture generally derive from Enlightenment-era approaches, as seen for example in the works of J. N. L. Durand. The modern work of Clark & Pause is a direct epistemological descendant of these earlier approaches (Clark 1985). A persistent issue in arranging collections of this kind is the degree to which a standard set of artifacts can be established *a priori* with regard to a selection of urban sites or architectural works. Durand's works establish frames of orthographic projection which purport to apply neutrally to a selection of sites. Following Durand, but with a greater degree of stratification, Clark & Pause organize information by means of mutually exclusive categories of mediating artifacts such as plan and section diagrams. The implication inherent in this work is that the epistemological relevance of an existing site to a new situation (i. e., a design problem) can consist of a collection of discrete artifacts classified according to type. However, perceptual or cognitive effects of media are generally silenced.

Flemming & Aygen, in suggesting possible uses for a digital database of architectural precedents, suggest that the principal values of a digital database, as distinct from paper-based collections such as Clark & Pause, exist precisely in the *arbitrary extensibility* both of content and of classification type permitted by the computer (Flemming 2001). This arbitrary extensibility has two effects: first, it continues the assumption of neutrality present in database fields, as also present in the earlier, pre-digital work, and second, it implies that there is no definable limit to the applicability of the scheme. In other words, the construction of a database generally assumes that the establishment of organizational categories (database fields) will apply equally well to any site or work of architecture that can be documented. Digital databases thus clearly differ from paper-based collections, which, though they may promise arbitrary extensibility, are nevertheless actually limited by physical conditions (page size, book size, etc.). It follows that a digital database heightens the possibility that its constituent artifacts will be understood or interpreted as free of bias. More specifically, because their success in making works of architecture or urban sites accessible to researchers depends on their promise of simulated unfettered access to the original works, digital databases perpetuate the possibility that artifacts in general, and photography in particular, will be understood as neutral registers of site content.

The assumption that digitally constructed three-dimensional models of cities or works of architecture are valuable to the construction of knowledge implies that there are important attributes of the built environment (whether that environment is existing or projected) which are susceptible to modeling within a digital model. A prevailing approach in the construction of digital models identifies visually perceptible attributes as primary, meaning that the models are constructed to support the derivation of artifacts which simulate visibility, either statically or in motion. This approach suggests that the value of a given digital model can be measured by the degree to which it embodies sufficiently high verisimilitude to be mistaken for a photograph of the completed site, such verisimilitude being usually manifest in a high level of constructed detail, simulated realism of surface textures and accurate light effects, and so on. This assignment of value, however, assumes that the end result—the image—is valuable to the construction of knowledge not primarily because of its inherent biases, such as the simulated position of the photographer, or the conditions of the image frame, *but because of its content*. This argument is strengthened by the ease with which software permits the simulation of off-ground-level views of a site, as if the act of removing the point of view from the locus of human habitation were inconsequential to structuring architectural understanding. In this way, the construction of digital models can also be seen to perpetuate the possibility of interpreting photography as a neutral, bias-free medium.

IMAGES QUESTIONED

However, to insist that images such as that reproduced in Figure 1 can enter into productive discourse in either of two ways (i. e., either as neutral registers of site content, or as embodiments of the photographer's biases) is inadequate. Both positions fail to productively account for a fundamental characteristic common to all mediating artifacts which are constructed to sustain architectural discourse: that is, that such artifacts always, in Michael Graves' phrase, "tangibly speculate" about positions that are initiated, but never fully resolved (Graves 1977); or, stated differently by Andrzej Piotrowski, that the artifacts relied upon by architects to sustain processes of "conceptual negotiation" are successful insofar as they "initiate thought" rather than close or conclude it (Piotrowski 2001). If seen as neutral registers, pho-

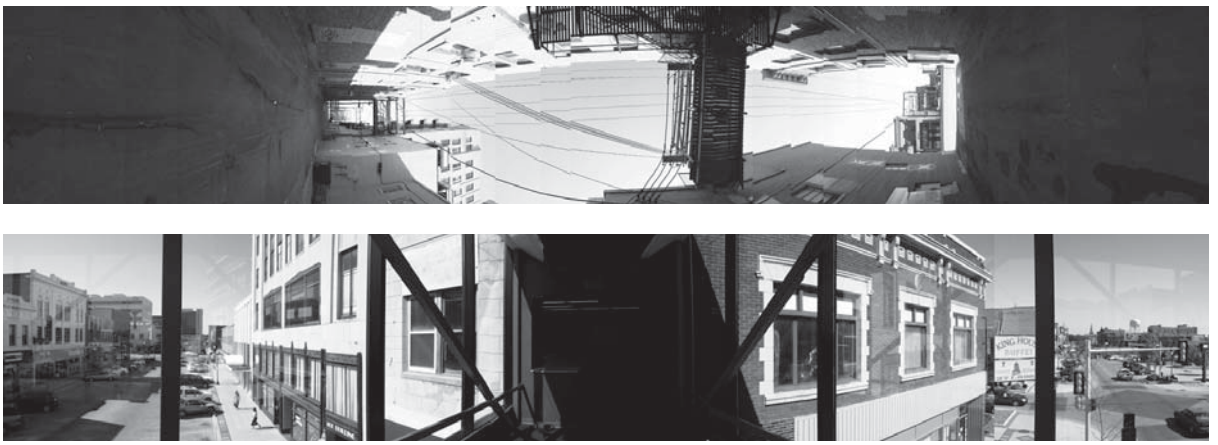


FIGURE 1 (top) Overhead power distribution structure in downtown Fargo, North Dakota.

FIGURE 2 (bottom) Downtown Fargo, ND, viewed from within skyway.

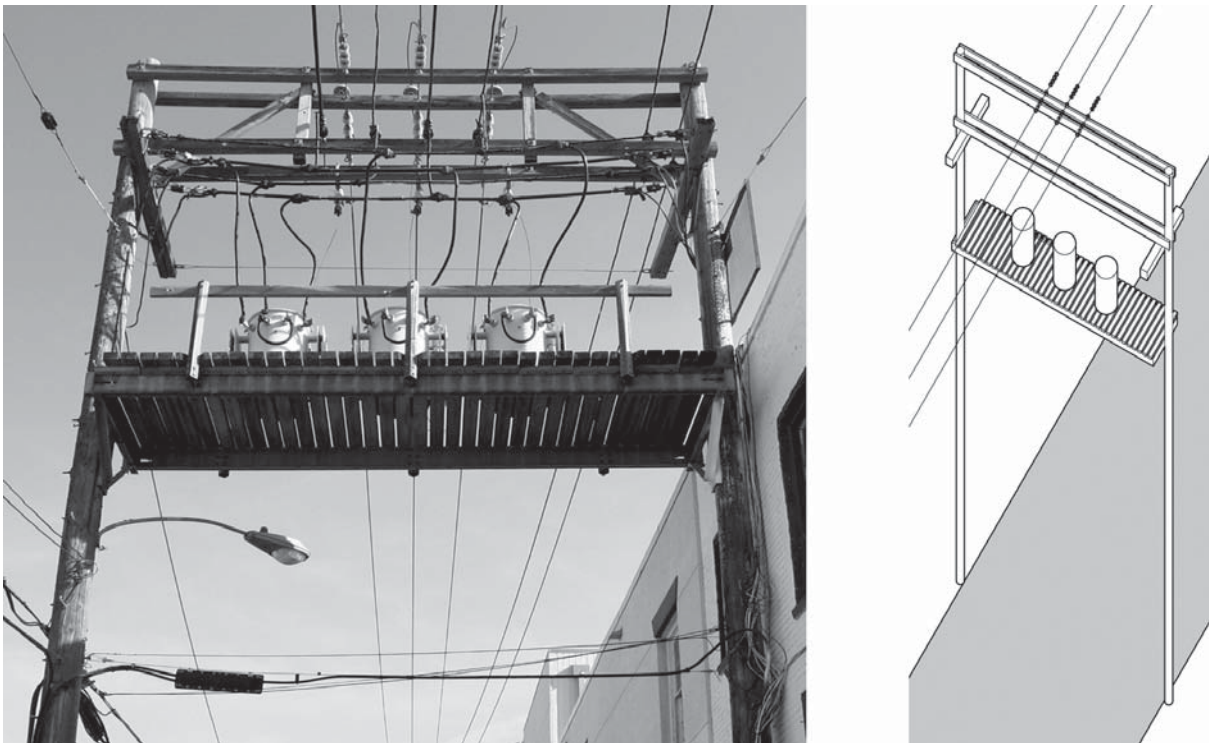


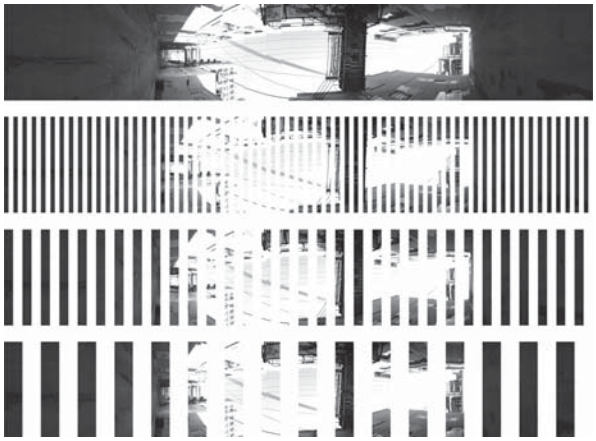
FIGURE 3 Details of power distribution structure

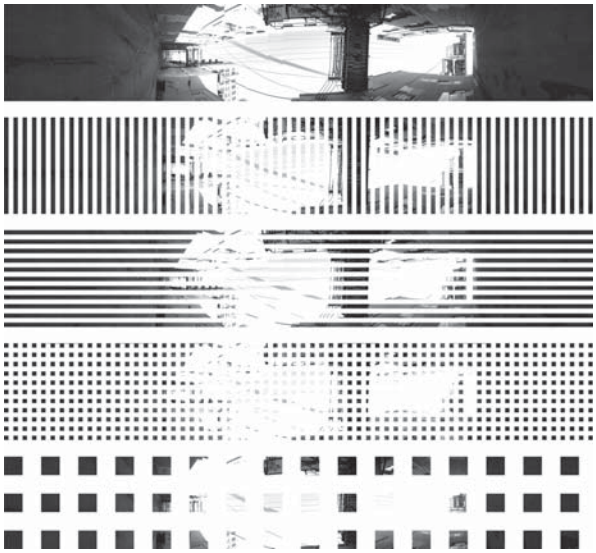
tographs are clearly incapable of speculating tangibly about anything other than their content: one photograph of a site will be as good as another; there can be no real difference between them apart from the amount of content which they reveal. Conversely, if photographs are understood to embody bias (i. e., in such forms as the prioritizing of a point of view, a direction of view, and/or a highlighted frame), they are certainly capable of sustaining discourse by provoking speculation, but such speculation will necessarily depend on understanding the original intent or position of the photographer. What is sought is a way of expanding the informative analytical power of the image.

Graphically acting on the image, for example by inverting its tones or stretching it, increases the difficulty of placing the image into direct correspondence with its subject site. As the image is graphically modified, it enters into a realm of incompleteness, fragmentation, or abstraction; specifically, it becomes easier to identify the image as something speculative, as though it has not yet become fully resolved, rather than as something conclusive. Critically, whether the original image is seen as a neutral register of site content, or as a value-laden artifact embodying the biases of the photographer, increasing the abstraction of the image will displace it from its original position. Supposedly neutral registers lose their direct correspondence with the site, while those aspects of the image responsible for promoting a sense of bias are minimized, distorted, or omitted. What remains following a graphic modification is an image capable of a wider range of possible interpretation, but which is yet conditioned in some way by the original subject site. As Graves would have it, the abstracted image "speculates tangibly" about the site. Speculation is enabled through its abstract quality, while "tangibility" remains present because its precise visual condition derives from a specific source and no other.

IMAGES AND THE CITY

Downtown Fargo, North Dakota contains two urban systems which represent opposing tendencies of designed systems to rely on carefully structured visibility in order to function. The first is a system of elevated walkways or *skyways* which connect a disparate collection of Fargo's downtown buildings to each other (Figure 2). The skyway system consists of steel-and-glass bridges which span downtown streets, and interior hallways at the second-floor levels of buildings which connect one bridge to the next. The second system is a set of overhead power distribution structures routed within downtown alleyways (Figures 1 and 3). These are not simple utility poles, but are instead fully three-dimensional structures supported on wooden poles at the edges of alleyways. The skyways and the power distribution structures have





FIGURES 4 (above) **AND 5** (right) Overlaid striation

visible characteristics in common: each system relies on modular structural frames, each possesses strong visual transparency, and each exhibits consistent articulations of assemblies and components over multiple scales. These commonalities reflect the similar sets of problems which their respective designers apparently faced, such as the need to connect to varying types of existing structures and the desirability of standardizing system construction to minimize construction costs. The most significant contrast between the two systems is that the skyway system represents a deliberate attempt to structure memory through image and thus to aid navigation within the city, and the system of power distribution structures makes no such claim. Thus, precisely because the design of the two systems exhibit differing degrees of dependency on image to structure memory, they provide testing ground for the ideas discussed above.

As examples of approaches which constitute productive action on images, in order to enter those images into a realm of "tangible speculation," I propose here three specific techniques: *overlaid striation, blurred stratification,* and *contour extraction.* These techniques, whether used singly or in combination, may be used to produce an arbitrarily large number of distinct abstract images, which when considered individually or in groups can be understood to "speculate tangibly" about the original image and hence the site to which the image refers. Although the resulting modified images bear visual similarity to digitally-aided form-generation work, the techniques are deliberately not framed as form-generative exercises. Instead, the modified images are argued here to inform understanding only insofar as they are used to re-read original images - not as ends in themselves. Nevertheless, the value of the techniques to subsequent design work exists precisely in their ability to open new lines of speculation: lines that would be less likely to come about were the images limited in their applicability to analysis in a traditional manner.

OVERLAID STRIATION

The process of *overlaid striation* requires that information be erased from the original image in a regular striated pattern. Variables include the width and directionality of the erasures (Figures 4 and 5). Overlaid striation promises to be particularly valuable to analysis in two ways. First, the technique heightens the possibility of perceiving spatial or textural relationships which, though in close mutual proximity within the original image, are occluded because of intervening imagery. Second, through decomposition into discrete fragments which could subsequently be rearranged, in a manner recalling a Dada process described by Tristan Tzara (Tzara 2006), the image will exhibit over multiple iterations a specific *threshold of atomization* beyond which it becomes irresolvable into nameable components or discrete surfaces. Depending on the characteristics of the source image (and by implication, of the site itself), this threshold may occur at course or fine levels of erasure. An important value of the technique to urban analysis, leading into design, thus exists in the question: Are certain urban sites, or certain types of images, subject to *different* thresholds of atomization? And if so, what could be done to an image of a site–and, thus, to the site itself–to alter its threshold?

BLURRED STRATIFICATION

The process of *blurred stratification* begins by using

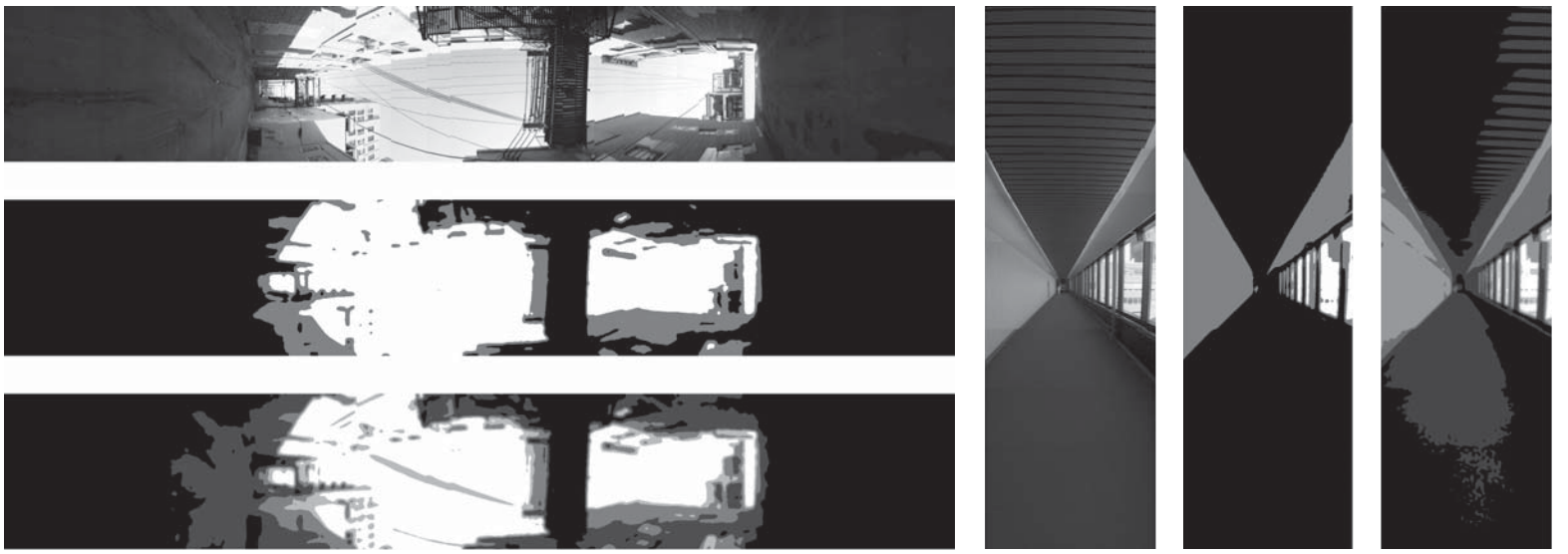


FIGURE 6 Blurred stratification of power distribution structure image (left) and skyway image (right)

Photoshop's Gaussian Blur filter at a moderate pixel radius (e. g., where P is defined as the resolution of the image expressed in pixels per inch, and W is defined as the width of the image measured in inches, let the pixel radius R be defined as (P * W)/600). Following filter application, the Image > Adjustments > Posterize command is used to stratify the image into two or more distinct tones (Figure 6).

In general, intentionally blurring an image decreases the possibility that it can be used to establish direct, nameable correspondence with its subject site. However, even a strongly blurred image is conditioned by the composition and content of the original image. Thus, a blurred image constitutes a specific and powerful kind of "tangible speculation" about an urban site: *speculation* is enabled through its abstract quality, while *tangibility* remains present because its specific visual characteristics derive from a specific photographic source. Supposing that blurring an image only once is insufficient to enter it into sustained constructive discourse, a successful application of the technique will require repetition (iteration) and even occasional interruption by other techniques. As an analytical technique, blurred stratification appears most promising when its results are considered in aggregate, as a series of abstract images produced by incrementally increasing the number of levels in the posterization process. Particularly as a fixed area within an image is observed to change, step by step through the series of posterized abstractions, between relatively dark and light tones, the technique promises the possibility of revealing subtle and unanticipated effects of light and texture within original images. Figure 6, showing images of spaces under the power distribution structures, and within the skyway, illustrates how the technique highlights the shapes and edges of light cast on apparently smooth and otherwise undifferentiated surfaces such as the floor or ground. Such discoveries of conditions which (though registering visually) are not immediately perceptible suggest that the technique could be used to identify possibilities for change within the subject site. How, for example, might existing conditions be modified to affect perceptibility of specific conditions of light registered through the technique?

CONTOUR EXTRACTION

Adobe Illustrator's Live Trace command is used to extract edges, or contours, of areas of contiguous color or tone. This contour extraction can be conducted on any image whether or not that image has been adjusted with either of the previous adjustments. Figures 7 and 8 show the application of contour extraction to two sets of images, the first set of the skyway (Figure 7) and the second set of the power distribution structures (Figure 8). In both examples, the original images are shown at the top, followed by a series of extracted contours of increasingly light-toned areas. (Thus, the top row of extracted contours shows outlines of the 100% black tones within each image, and the bottom row shows the lightest gray).

Contour extraction tends to focus attention on those aspects of the image which register specific conditions of texture made visible through light. Where the extracted contours are close and parallel (as contours would appear on a map of a steep slope), the corresponding areas of the original image contain sharp edges or quick transitions between conditions of light or texture. More critically, where extracted contours form discrete islands, the corresponding area within the original image possesses a

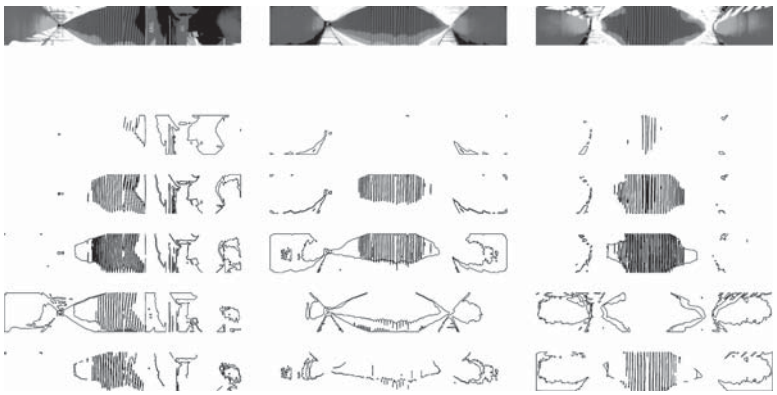


FIGURE 7 Contour extraction of three skyway images.

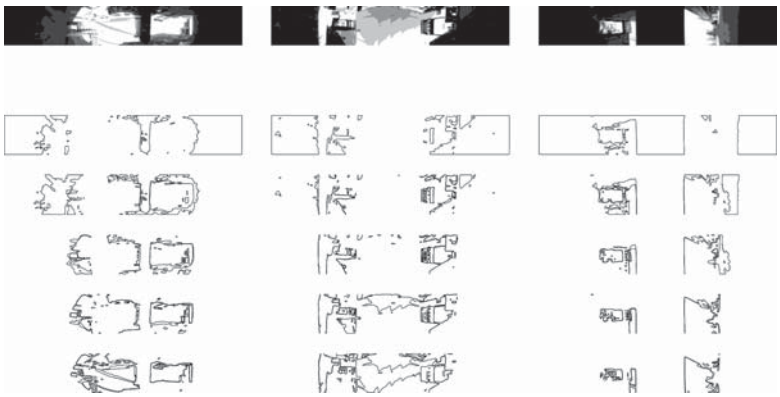


FIGURE 8 Contour extraction of three power distribution structure images.

specific kind of rough regularity, neither fully uniform nor highly textured. These kinds of areas are common as fields within urban sites although they tend to escape notice relative to those features which capture attention in an immediate way.

Of the two urban systems considered, the one which was designed to be easy to navigate (the skyway) is the more visually complex of the two. This complexity, already present in the original unaltered photographs, is highlighted through the intricate contour traces of the original images, and significantly, it occurs in spite of the designers' attempt to introduce visual uniformity to the system through the superficial application of a striated ceiling panel (which appears in the skyway images as a zone of tightly-spaced vertical contours). In contrast, the power distribution structures, with no expressed need to provide an easy-to-understand visual experience, are suggested through these images to bound a simpler, less visually active space (Figures 7, 8, and 9).

CONCLUSIONS

In this work, the traditional difficulties inherent in systemic analysis of urban form as registered in photographs shift into new difficulties of structuring architectural understanding around iteratively produced abstract images. These images have no obvious correspondence to nameable architectural or urban elements or subsystems, nor to the static positioning and framing defined by original photographers, and consequently when considered in aggregate they open original images to the possibility of fresh interpretation: in particular, to the revelation of site-specific phenomena obscured by traditional assumptions about neutral visibility or political bias. The techniques promise to productively inform design because they enable, even for an instant, the separation of *seeing* from *naming*, thus forwarding attributes of images which exist beyond immediate perceptibility.

Specifically, the images of downtown Fargo make it possible to ask a new set of questions relative to memory and navigation: for example, to what degree is successful navigation within these systems related to superficiality (e. g., as present in the applied striated ceiling texture)? What elements of an urban site, registered in photographs, are ultimately responsible for providing orientation within that site? Critically, how does the appearance of a photographed site bear out a designer's intentions? And if those intentions are revealed to be inadequately executed, *what could be designed within the original site to affect its legibility?* This last point suggests that the techniques described here have value not only as analytical tools but also as generative and testing grounds for new design direction.

The techniques are simply illustrations of the general principle that photographs of urban sites can be productively *acted upon* (e. g., graphically fragmented, blurred, selectively erased, or rearranged) to positively inform and construct knowledge of the urban site, regardless of the resulting abstract images' lack of "explicit representational information" to support such construction (Oxman 1997); or, that graphic iterations of original images have the capability to establish ground for new lines of questioning, and thus to initiate transitions from analysis to design. I believe that this is precisely because the images which result from these techniques "are very much like the kinds of drawings that one makes in the design process itself" (Crowe 1986). Thus, as photographic images shift from a traditional realm of relatively static *interpretability* into one more directly and immediately supporting the *productivity* associated with design work, the wicked problem of analysis shifts into a question of design.

REFERENCES

Bacon, E. N. 1967. *Design of Cities.* New York: The Viking Press.

Christenson, M. 2005. Accident and predictability: an analytical methodology for persistent forces in the American city. In *The Reach of Research: Proceedings of the Architectural Research Centers Consortium National Conference on Architectural Research, Jackson, Mississippi, April 6 - 9, 2005*, ed. James L. West, David J. Perkes, and Anne H. Howell. Mississippi State, MS: Mississippi State University College of Architecture, Art & Design.

Clark, R. H., and M. Pause. 1985.*Precedents in Architecture.* New York: Van Nostrand Reinhold.

Crowe, N. A., and S. W. Hurtt. 1986. Visual notes and the acquisition of architectural knowledge. *Journal of Architectural Education* 39(3):6-16.

Flemming, U., and Z. Aygen. 2001. A hybrid representation of architectural precedents. *Automation in Construction* 10:687-699.

Graves, M. 1977. The necessity for drawing: tangible speculation. *Architectural Design* 6:384-394.

Kostof, S. 1991. *The City Shaped: Urban Patterns and Meanings Through History.* London: Bulfinch Press.

Oxman, R. 1997. Design by re-representation. *Design Studies* 1:329-347.

Piotrowski, A. 2001. On the practices of representing and knowing architecture. In *The Discipline of Architecture,* ed. A. Piotrowski and J. Robinson. Minneapolis, MN: University of Minnesota Press.

Rittel, H., and M. Webber. 1984. Dilemmas in a general theory of planning. In *Developments in Design Methodology,* ed. N. Cross. Chichester: J. Wiley & Sons.

Tzara, T. 1920/2006. To make a Dadaist poem. In *The Dada Reader: A Critical Anthology*, ed. Dawn Ades. Chicago: University of Chicago Press, 2006. Originally published in *Littérature* 15.

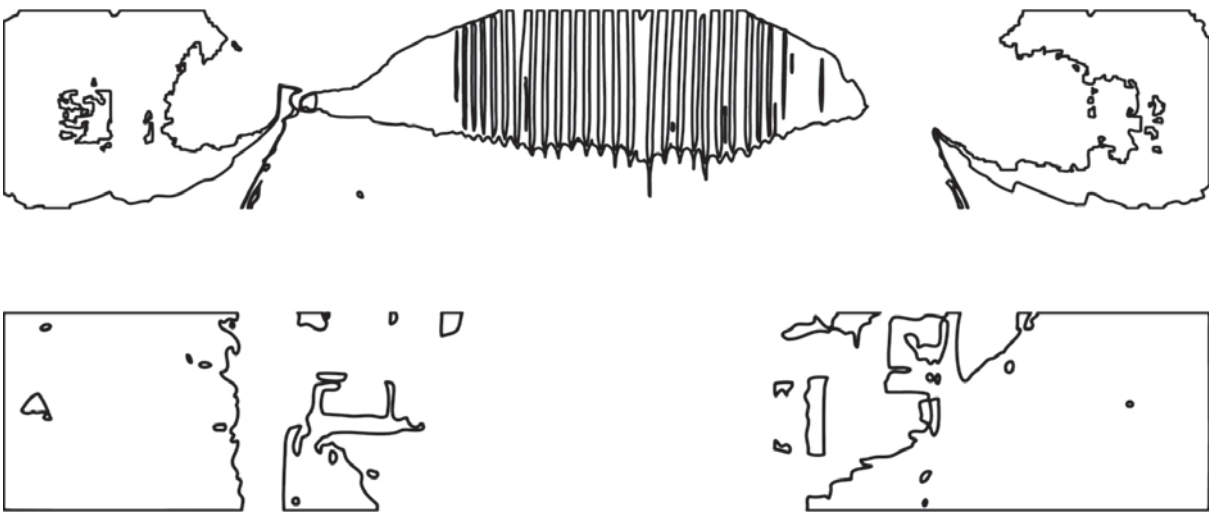


FIGURE 9 Detail of extracted contours from the skyway series (top) and the power distribution structure series (bottom)