

Traces of Oil in the Architectural Archive: Some Aspects of a Larger Project

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This paper revisits the publication of *A Bucket of Oil: The Humanistic Approach to Building Design for Energy Conservation*,¹ produced in 1973-74 by researchers at the multinational architecture firm Caudill Rowlett Scott (CRS).² The publication was a response to the US experience of the oil embargo, but it was also an index of a transformation in the firm's research practices—a transition from experimental research in the laboratory to historical research in the archive. While arguing for domestic energy conservation, *A Bucket of Oil* strategically exercised the agency of the archive to conceal the firm's rapidly growing commitment to the international oil industry and the oil producing and exporting countries of the Middle East, especially Saudi Arabia and its project for the University of Petroleum and Minerals (UPM). The relationship between archival research practices and fossil fuels, both then and now, raises serious questions about the nature of the architectural archive in the age of anthropogenic climate change.

EPIGRAPH

"There is no document of civilization which is not at the same time also a document of barbarism. And just as such a document is not free of barbarism, barbarism taints also the manner in which it was transmitted from one owner to another." - Walter Benjamin. *On the Concept of History*. Thesis VII.

INTRODUCTION

The last three decades of research on archives has made one thing abundantly clear—archives are no mere repositories. Archives are institutions with their own agency or power. They are political actors in their own right. We gain this insight from the writings of Foucault, Derrida, Mbembe, and Azoulay.³ But how are we to understand the political agency of the archive in the context of anthropogenic climate change? What consequences do Chakrabarty's theses on the "Climate of History" have for our understanding of the archive?⁴ When an archive houses examples from the history of a culture that has developed into a force of nature, how are we to discern the relationship between its politics (culture) and its physics (nature)? What may seem like a theoretical issue is brought remarkably close to home when we consider the role of the architectural archive in the architectural history of fossil fuel production and consumption.

What role has the architectural archive played in the development of our fossil fuel dependency and our transformation of the planet? This paper is only the barest outline of a response to this question through the case study of one architectural firm, Caudill Rowlett Scott (CRS), and one fossil fuel, oil or petroleum. For some, the role of the CRS archive in the production and consumption of oil is negligible; but for others who—for one reason or another—are closer to the archive,⁵ it is the starting point of serious reflection. As Antonio Gramsci wrote, "The starting point of critical elaboration is the consciousness of what one really is, and is 'knowing thyself' as a product of the historical process to date, which has deposited in you an infinity of traces, without leaving an inventory."⁶ This paper begins an inventory of the visible and invisible traces oil has left within and upon the CRS archive.⁷

TERMINOLOGY

Some clarification of terms is necessary. "CRS archive" means two things in this paper. First, the "CRS Archive" refers to the current repository of documents donated by the multinational architecture firm to Texas A&M University in the early 1990s. These physical documents, which include architectural project files, photographs, programs, and business documents,⁸ are wholly owned by the university and are maintained through an endowment created by the firm before its divestiture in 1993. The second referent, the "CRS corporate archive" is historical. The firm was able to donate its materials to a university because these materials were already organized and housed as an archive within the firm's corporate headquarters in Houston, Texas. The historical sense of the CRS corporate archive is at least as old as 1959. While the current CRS Archive has made minor revisions and acquisitions, the bulk of its materials are housed as received; in many ways, the current CRS Archive is an extension or continuation of the historical CRS corporate archive.

The second term that requires clarification is "research." From its inception as a two-person partnership in 1946, CRS was committed to a vague idea of research as a means of promoting and developing its business interests. Building on the existing claims about this topic, I argue the practice of research in the firm transitioned from experimental research in a laboratory during the 1940s and 50s to historical research in an archive during the 1960s and 70s. Contrary to existing claims, the result of this development was not the dissolution of research in general, but

rather the transition to archival research, which was exemplified by the publication of *A Bucket of Oil*. As an index of an archive, *A Bucket of Oil* was also an instrument of its politics, which raises larger questions in the context of oil and climate change.

EXISTING CLAIMS ABOUT RESEARCH IN CRS

The idea of research in CRS has already been well-examined in two articles by Avigail Sachs, “Marketing Through Research: William Caudill and Caudill, Rowlett, Scott (CRS)” (2008), and “The Postwar Legacy of Architectural Research” (2009).⁹ Sachs has made several claims worth summarizing.

- CRS, like other large architecture firms in the Postwar US, undertook experimental research to acquire agency and secure funding in an institutional matrix that linked industry, military, and university. Throughout the 1940s and 50s, CRS associated with Texas A&M University (TAMU) and the Texas Engineering Experiment Station (TEES) to produce experimental research on building systems, including the development of techniques for measuring, evaluating, and improving the ventilation and illumination of houses and school buildings. The results of this research were used as the contents of the firm’s promotional materials. Promoting the firm by marketing its research simultaneously met the professional demand to satisfy its clients and the disciplinary demand to legitimize its reputation.¹⁰
- In this period, the idea of experimental research was subject to an ongoing argument over the control of its results. This argument was polarized between calls for the centralization or decentralization of the authority to define the scope of research and the ownership of resulting patents. CRS contributed to this argument by rebuking the AIA’s call for a nationally centralized and shared agency of architectural research, writing instead that “if architects can in some way carry out a continuous research program within their own offices, if only on a very small scale, good advancement can be made.”¹¹
- Toward the end of the 1960s, in the context of severe economic stagflation, the model of decentralization prevailed, prompting competition and subjecting research departments to the interests of market capitalism. CRS, which in 1970 was the first architectural firm to sell its shares on a public stock market, was particularly susceptible to this trend.

A thorough reading in the CRS Archive generally confirms the three above claims, but Sachs has also made several specific claims pertaining to CRS’s termination of research that need qualification:

- The firm’s public stock offering and its subsequent focus on profit led to the decline of research until research was ultimately “dropped” in 1975. In other words, once the research department at CRS was deemed a failed profit-center it died a slow death between 1970 and 1975;¹² research

“dissolved” in the early 1970s when the firm transformed into “a profit-oriented enterprise.”¹³

- Research emerged in name only again in 1980, but it was no longer the result of a commitment to experimentation and the scientific method; it was no longer “a thinking process toward the perfection of man’s physical environment.”¹⁴

To be fair, CRS was laser focused on earnings long before “going public.” The earliest form of its partnership, an agreement between Bill Caudill and John Rowlett in 1946, was established with the guidance of Caudill’s long-time friend John Stambaugh, a CPA and partner at Touche Ross and Company.¹⁵ Stambaugh was CRS’s accountant and was instrumental in its incorporation agreements; its relocation from Bryan College Station to Houston; and its overall financial, organizational and managerial strategies. In the mid-50s, he taught the partners how to calculate profit projections as a means of riding out the cyclical nature of the construction industry. When the firm went public in 1970, under Stambaugh’s guidance, its identification of new markets and orientation toward profit was nothing new.

What was new after its public offering was that the firm’s means of production were suddenly subjected to a new audience—shareholders—and a new format—the publicly accessible annual report. Whereas CRS had previously produced research reports that were held in high esteem by the military-industrial-academic complex and the firm’s professional peers, it was now also required to report to disinterested capitalists. From the shareholder’s point of view, research was valued only insofar as it contributed to earnings, but this does not mean that the idea of research was dissolved altogether.

FROM EXPERIMENTAL TO ARCHIVAL RESEARCH

In 1957, CRS relocated its offices from Bryan College Station to Houston, Texas, to expand its market share, venture into new industries, and compete more directly with other architects. This move also meant the association with TAMU and TEES was no longer convenient. In Houston, CRS could no longer depend on its proximity to the laboratory to produce experimental research; indeed, what little research CRS managed to publish and promote in the 1960s was mostly reworked material from the late 1950s.¹⁶

Recognizing the difficulty of researching at its new location in Houston, the firm established a Research and Information Department (R&I) to consolidate three previously separate operations: architectural programming, marketing and promotion, and maintaining the firm’s list of contacts. Caudill imagined R&I as a department of fact-finders in service of direct and indirect promotion:¹⁷ “A [partner] could pull [a publication] out of his briefcase and say something like this to a prospective client: ‘See, Here’s the way we do these things. A problem arises that requires fact-finding. We give it to R&I and they dig up the information needed.’”¹⁸



Figure 1. The Research and Information Department (R&I) at CRS, ca 1960s. CRS Center.

R&I was tasked with maintaining the firm's high level of research productivity, making its results accessible through various kinds of promotional materials, and distributing these materials to the right people. To help organize the distribution process, and as part of the firm's relocation budget, CRS purchased a McBee system for indexing, sorting, and retrieving contact information on 5 x 8" punch-cards.¹⁹ Initially, the McBee system was used to organize a conventional master file of all the people known to the firm, but shortly after its installation, it occurred to CRS that the same punch-cards could also be used for architectural project information.²⁰ By the end of 1959, the firm was experimenting with the arrangement of project information on the punch-cards and the creation of a systematic project-oriented master-file indexed to photographic slides--an archive.²¹ The next year CRS debated a substantial reinvestment in the R&I Department, including salaries for a full-time researcher, graphic designer, draftsmen, and an additional secretary to assist with the enlarged role of the McBee system.²² While systematic, the McBee machine was hardly automatic; the maintenance of its files required full-time labor, which--as elsewhere in the US--was unequivocally gendered female.

R&I was hardly a smooth operation. In 1965, with very few results in hand, Caudill asked "How can R&I be reorganized to be

more effective?" and he pressured the department to develop into a "library."²³ An audit in 1969 showed that the amount of work passing through R&I was a fraction of what had been expected and that the department faced a bureaucratic minefield as it sought advanced approval for internal billings.²⁴ In 1971, the department was still active, and still actively maintaining its archival files, but its reports were increasingly concerned with justifying its existence.²⁵ At the same time, CRS was actively developing a separate computer software subsidiary--CRS2 (Computer Research Systems)--which was tasked with marketing the information management processes imagined first in R&I. In 1973, R&I was floundering when another partner criticized it for its failure to materially contribute to business development: "R&I is now structured to take care of information to the public, like publicity, articles; and information for clients, such as project reports, etc... [but] for whatever reason, it all comes out marshmallow fudge."²⁶

The history of CRS's R&I Department records a transition--roughly between 1959 and 1969--in which the laboratory was replaced by the archive as the firm's principle locus of architectural research. Just as experimental research depended on specialized labor and created particular forms of work with precisely calibrated outcomes, so too did archival research prompt

its own kinds of labor, work, and outcomes. In the CRS corporate archive, like many others, this labor was gendered, the work was typically rendered invisible, and the outcomes were often uncredited. Hence, when a male partner claimed it “all comes out marshmallow fudge,” he was playing into a trope in which the agency of the archive was obscured. Contrary to the conclusion that research was dissolved in the early 1970s, archival research had in fact reached its maturity. The first example of this new research practice was the publication of *A Bucket of Oil* in 1974.

THE DOCUMENTARY HISTORY OF A BUCKET OF OIL

The documentary history of *A Bucket of Oil* begins in July 1973 when CRS partners Charles Lawrence and Joe Thomas presented their recent research at a panel discussion on the “energy crisis” at a meeting sponsored by the Houston Chapter of the Associated General Contractors (AGC). Following the firm’s policy, Lawrence reported the outcomes of this promotional activity to R&I. Several things were gleaned from the meeting. CRS was persuaded the energy crisis was real, oil production would likely peak in the next decade, and coal and nuclear fuel were expected to make up the difference. Pertaining more directly to architecture, the firm learned the energy crisis would have more impact on architectural form than any school or individual in recent memory; architects would need to observe regional conditions and undertake life cycle cost analyses as part of their regular services; and there were reasons to approach design in a balanced and creative manner to avoid building “iceboxes--windowless, totally insulated cubes for living and working.” Tying all of these together, Lawrence also reported that the Middle East was expected to be the center of oil production for the next two decades, which, he wrote, “should tell us something about a shift in political power and development. Our College of Petroleum and Minerals [in Dharan, Saudi Arabia] could become a strong [business development] lever.”²⁷

A week later, Caudill forwarded the contents of Lawrence’s report to the entire firm, minus the details about international practice and the promotional opportunity of the College of Petroleum and Minerals (CPM or UPM). Instead, Caudill amended the things learned to include the sentiment that the firm’s climate control research of the 1950s “may [soon] have another day.”²⁸ Around the same time, Caudill began to craft the content of his invited lectures and speeches around the idea of energy and the energy crisis, which had already caused a serious slowdown in CRS’s backlog. In a speech to the AIA’s Northwest Regional Conference in September 1973, Caudill spoke to the future of architecture five-years out. Among several prognostications, he laid out his thoughts on the energy crisis, including a repetition of things learned from Lawrence, minus the reference to international practice and the UPM, but plus a further elaboration of his notion that his earlier climate control research would experience a renaissance. As part of this speculation, he welcomed the role of government regulation and the possibility of energy rationalization in the construction of buildings.²⁹

These sentiments changed in November of 1973 when another partner, Tom Bullock, attended an oil industry meeting sponsored by the brokerage firm Loeb Rhoades & Company and including speakers from Columbia Gas Development Corporation, Continental Oil, El Paso Natural Gas, and Tenneco. This meeting also qualified as promotion and Bullock reported back to R&I. Of the outcomes reported, none were more important than the industry representative’s confidence that the energy crisis was real but temporary; the US would be “energy self-sufficient” by 1980 or 85; and Houston should expect to be the beneficiary of a massive expansion in both the oil industry and other fuels like nuclear or “more bizarre sources.” The construction industry in Houston, Bullock reported, should expect sudden growth from population migration and increased industrialization related to the energy sector.³⁰

In the same week, members of CRS attended a meeting in Washington, DC sponsored by the National Conference of States on Building Codes and Standards working with the Center for Building Technology of the National Bureau of Standards (NBS). The purpose of this meeting was to evaluate a proposal for federal and state building codes that recognized energy conservation. But after the oil industry meeting, CRS was no longer a proponent of government regulation, and in response to the discussion of prescriptive energy-oriented building codes Caudill later exclaimed “What we heard scared the hell out of us.”³¹

In October 1973 the energy crisis was driven home in a very real way in the US by the oil embargo. On 30 November, at Clemson University, Caudill delivered the first lecture titled “A Bucket of Oil, or Conservation Options for New Building Design and Construction: An Architect’s Viewpoint.” The lecture was a summation of the previous four months, including several points lifted verbatim from Lawrence’s report; the omission of any reference to international practice, politics, or the project for the UPM; the elaborate recitation of research outcomes from experiments conducted in the 1950s; the prognostication of expanded energy futures; and the denigration of state intervention in architectural invention and production.³² For all intents and purposes, the lecture script was a draft of the future publication.

By the end of December 1973, Caudill circulated the lecture script internally for comments from the partners.³³ This was followed by a discussion that prompted calls to renew R&I and business development efforts in the Houston area. Based on a reading of Caudill’s lecture, the partners agreed: “One by-product of the energy crisis is the well-known assumption that Houston will profit through even greater growth being the scientific and technological center of the petroleum industry.”³⁴ When management met for the first time in 1974, the primary purpose of the meeting was “to explore ways in which the energy crisis, the economy, etc. will affect our companies, both negatively and positively.”³⁵ At this meeting, and in this context, CRS decided to renew R&I around an initiative to publish *A Bucket of Oil*.

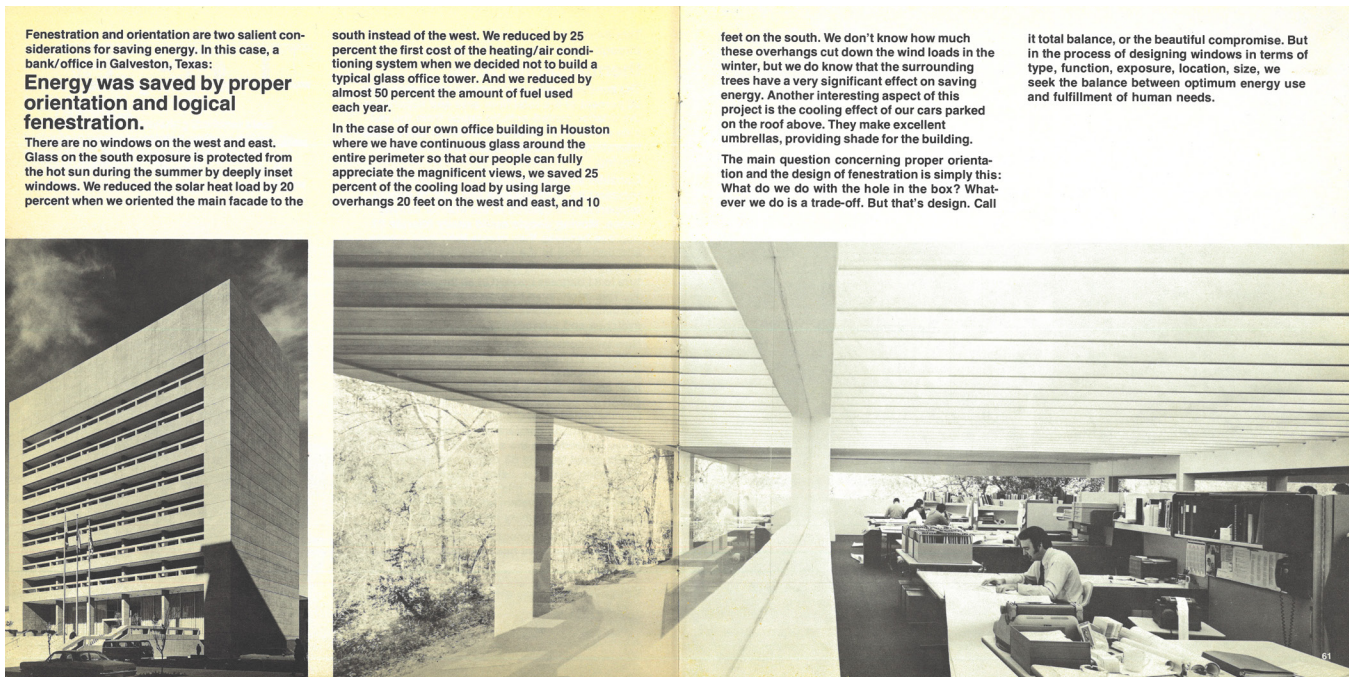


Figure 2. Spread from *A Bucket of Oil*, showing the interior of the CRS Offices (right), ca. 1970. CRS Center.

A BUCKET OF OIL, REVISITED

When it was published in March 1974--nearly simultaneous with the lifting of the oil embargo--*A Bucket of Oil* was very different from the kinds of research publications and promotions that preceded it. The book compiled a 10-page version of Caudill's 1973 lecture with 35 spreads of photographs from the corporate archive new drawings by Frank Laywer (Figures 2 and 3 show examples of typical spreads). Caudill's lecture developed a three-pointed argument: first, the conservation of energy should be balanced against the preservation of humanism; second, a renaissance of postwar design research could satisfy this balance; and third, the government should not regulate or otherwise interfere with progress toward energy conservation in the building industry. The photographs complimented this argument with examples from CRS's body of built work. Caudill concluded his lecture with prognostications about the possibilities of untrammled architectural creativity in a post-energy crisis era. Lawyer's sketches, untethered to any particular project, bridge the gap between CRS's historical production and Caudill's speculation.

The basic premise of the book was that energy--in this case, oil-shaped buildings. Caudill argued contemporary buildings wasted energy and proper design could waste less energy--conserving as much as 65 billion gallons of oil--but because buildings shaped daily life, energy conservation must be balanced against the preservation of "human values."³⁶

The criticism of contemporary buildings was levied largely against work accomplished in the 1960s. "The design profession picked

up sloppy methods during the affluent 60s. Our firm, too. If our clients said they wanted all glass walls on the west, our engineers proudly replied: 'We can do anything you want done, even make you feel comfy in a glass box.' They were right. All they needed was some cheap fuel."³⁷ In contrast, Caudill asserted that design in the 1970s would be like "creating a Cadillac building with a Volkswagen engine."³⁸ But rather than argue for innovation, the book proposed a return to the firm's design techniques of the immediate postwar period, including the understanding of solar illumination, ventilation, and heating and cooling in design. These were the techniques CRS had developed for its houses school buildings in the 1940s and 50s; more importantly, these were also the outcomes of experimental research in the laboratory, dusted off and paraded for the sake of recapturing the firm's authority.

Caudill's third point was to inspire resistance to federal and state regulation of the building industry's progress toward energy conservation. "We are capable of responding to the energy crisis if given a chance to innovate. One problem is codes. Building codes. If the government starts imposing legalized restrictions on creativity, we're sunk."³⁹ In particular, prescriptive codes were the target of serious animosity. Prescriptive codes regulated how something must be accomplished; the means and methods of designing and building. According to Caudill, these were arbitrary and hampered innovation.⁴⁰ "Once the reason behind the prescription code becomes invalid, say through an advance in building technology or a new idea, it makes no sense."⁴¹ The book railed against several examples of such codes, which, once passed, were the law and required to be obeyed. "Prescription

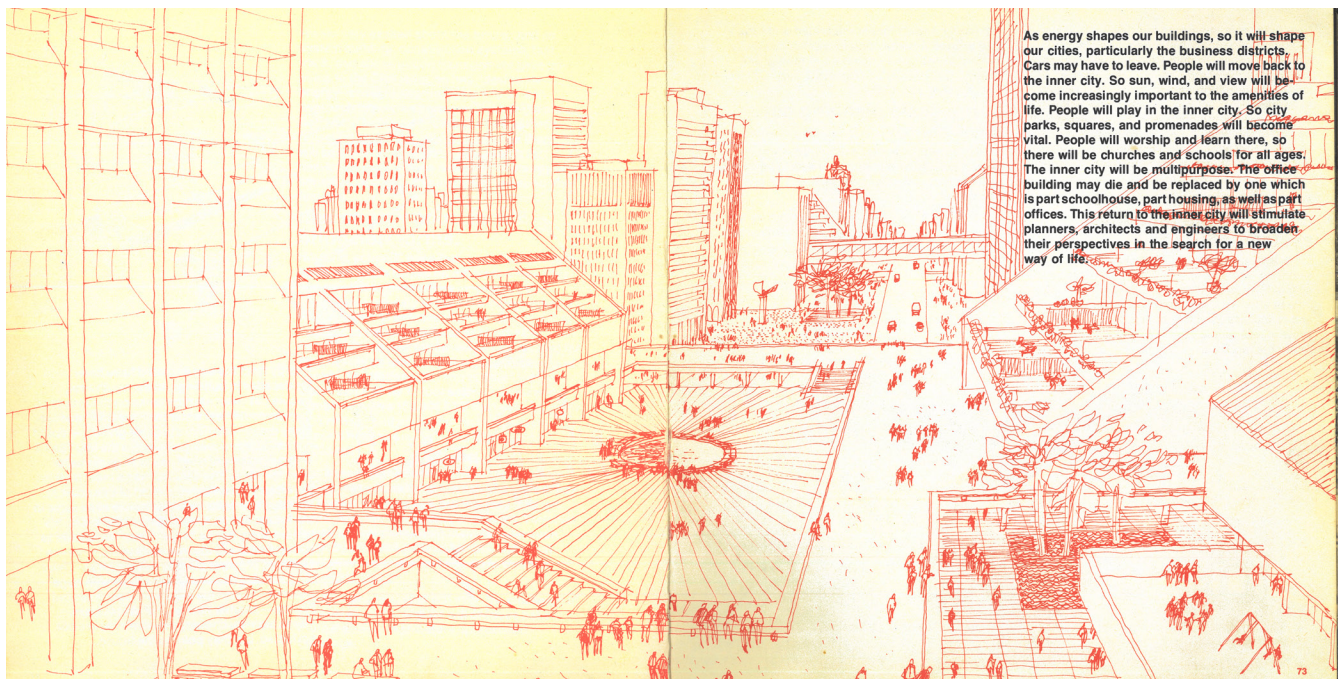


Figure 3. Spread from *A Bucket of Oil*, including drawing of the post-energy crisis city by Frank D. Lawyer Image caption. CRS Center.

codes are the enemy. We're certainly not opposed to building codes designed to protect health and safety. This isn't the issue."⁴² (We will have to return at a later time to the question of whether energy-oriented regulations concern health and safety.) Caudill permitted some appreciation of performative codes, but decried "even a 'good' code is not what we need for the design profession to have a productive, efficient, creative response to the energy crisis. We need freedom to design so we can build highly functional, people-oriented buildings requiring less energy."⁴³

As a counterpoint to calls for regulation, Caudill offered 14 "principles" for designing with energy conservation in mind. To make these more palatable to a general audience, he also reframed them as 6 "guidelines." Conceived in terms of "laws," "codes," "regulations," as well as "principles" and "guidelines," *A Bucket of Oil* communicated within the framework of a rudimentary legal vocabulary. This was no longer research conducted in the language of inductive reasoning, this was the language--the logic--of the archive, which as Derrida famously noted, refers the house of authority and its commandments.⁴⁴ We should not be surprised, then, to read Caudill asserting that "working with principles is a process of re-discovery, not invention."⁴⁵

Designing with an attitude toward energy conservation meant adhering to the following forms of design conduct:⁴⁶

- Identifying orientation in relation to sun and wind
- Identifying radiation, convection, and conduction of heat from the sun

- Identifying light for illumination;
- Identifying the heating, cooling, and lighting requirements of specific tasks; reframed as guideline "Design lighting systems for specific tasks"
- Increasing efficiency by minimizing floor area
- Recognizing regional conditions like climate, terrain, and cultural values; reframed as guideline "Use the climate, put the elements to work"
- Manipulating wind for tasks and human comfort
- Manipulating heat flow through the addition and subtraction of reflective materials, air vacuums, and insulation
- Manipulating outdoor spaces to reduce interior loads
- Building the capacity to control energy; the capacity to turn it on and off; reframed as guideline "Provide controls, automatic or on-off switches, so energy can be saved when spaces are not in use or when systems need modification"
- Recognizing temperature tolerances and other standards of comfort are not universal; reframed as guideline "Design on the edge of comfort zones"
- Selecting building systems depending on the project; reframed as guideline "Use energy efficient systems"
- Manipulating building geometry; reframed as guideline "Make the envelope... lean and clean"
- And theorizing aesthetics more generally: "Physical comfort cannot be separated from esthetic comfort." Caudill asked "What is beauty these days? Let's zero in on this

last principle. The energy crisis has already changed the notion of beauty. It's difficult to see beauty in buildings that have an inherent craving for energy. The highly admired complex forms of the 60s are losing their eye appeal, too, because people are beginning to realize that the juts, zigzags and extravagant use of outside walls are inefficient forms for saving energy. A new morality of form is emerging."⁴⁷

Speaking the language and logic of the archive into promotion and marketing meant connecting the principles to photographic evidence from CRS's body of work. This was only loosely accomplished in *A Bucket of Oil*. Caudill's principles find no direct indication or sequential connection to the profusion of photographs and sketches, although it is easy enough to see their associations. Through repetition, framing, and size, the photographs place special emphasis on projects like Olin Hall of Science at Colorado College, Colorado Springs (1960-62); Roy E. Larsen Hall for the Graduate School of Education at Harvard University (1964-65); PS 219 Paul Klapper Elementary School in New York City (1965-66); Jesse H. Jones Hall for the Performing Arts in Houston (1963-67); CRS's own office building (the so-called "White House") in Houston (1967-69); the Anniston Education Park in Anniston, Alabama (1966-70); the Hyatt Regency Hotel in Houston (completed in 1972);⁴⁸ Mission Viejo Elementary School in Aurora, Colorado (1973); and the Houston City Annex Building (1966-73).

What is noteworthy about this selection of work from the CRS corporate archive is what is missing. Entirely absent is any mention of international practice or the work CRS had accomplished for oil interests in the Middle East as far back as 1964, when they began work on the University of Petroleum and Minerals (UPM) in Saudi Arabia.

THE UNIVERSITY OF PETROLEUM AND MINERALS

The largest omission from *A Bucket of Oil* was the project for the UPM (now the King Fahd University of Petroleum and Minerals) in Dharan, Saudi Arabia.⁴⁹ In 1964, CRS's international reputation for school building design led to an invitation to compete in a site selection study for a new university. What began as a \$25K site design contract grew into nearly \$20 billion worth of construction in no less than five phases over the next twenty-five years. The first three phases were completed before the publication of *A Bucket of Oil* in 1974.

By 1965, CRS had completed the master plan and architectural programming for Phase I of the UPM. In the meantime, the firm was commissioned to design 26 units of faculty housing. In 1967, the construction contract for Phase I was awarded to Taisei Construction Company, and within two years three classroom and laboratory buildings, a student union, library, administration building, and a 3000-seat amphitheater were standing. CRS was retained for Phases II and III, which began in 1970 with the construction of the tennis courts, recreation center, and university power plant, as well as various interior



Figure 4. University of Petroleum and Minerals, Phases 1-3, Master Plan Drawing, ca. 1974. CRS Center

design services. By 1972 the master plan had already become outdated and CRS was hired to expand it with facilities for staff.

By the time *A Bucket of Oil* was published in 1974, construction of Phases I, II, and III of the UPM were completed. But this does not reflect the whole of the firm's work in the region or for the oil industry. In 1973, CRS and joint venture partner McGaughey, Marshall & McMillan were awarded what was at the time the largest single contract in the Middle East for architectural services on the King Abdulaziz Military Academy near Riyadh, including complete infrastructure and support facilities for over 12,000 people. Prior to 1974, CRS had pursued other similar international projects, including proposals for the Dhahran International Airport, the University of Kuwait, and the International Petroleum Company of Peru. But aside from these international projects, CRS was also engaged in domestic projects for the Continental Oil Company in Moundsville, West Virginia; a contract with Monsanto to provide project management services for all of its petrochemical production facilities;

as well as promotional endeavors focused on Tenneco, Shell Oil Company, and Houston Lighting & Power.

Looking beyond the publication of *A Bucket of Oil*, CRS's investment in the architecture of international oil markets led to the rapid growth of its industrial and construction management divisions. The story of the UPM continues for the next decade and a half. By 1976, construction of Phase IV was completed, including 273 family residences and 450 units of support-staff housing, plus the facilities for the School of Industrial Engineering Management and the Graduate Studies and Research Institute, the stadium, and storage facilities for dangerous chemicals. 1976 also saw the design of Phase V, which included the transportation and services facilities, an emergency services complex, dorms for 1000 more students, dining facilities for 5000, 56 more units of married graduate housing and 20 units for singles. By 1977, the initial 1969 library was already being renovated, the cafeteria remodeled, and the parking garage converted to accommodate expansion of the university and the industries it served. The list of contracts for the UPM goes on and on. CRS provided architectural services for office buildings, academic buildings, conference centers, and parking garages between 1978-1979. In 1980, construction of the 10,000-seat soccer stadium was completed, along with more classroom and laboratory buildings, an administration building, a recreation center, a dental clinic, a neutron generator facility, and the Islamic Studies Center. The Student Mosque was completed by 1985. Contracts continued to flow to CRS throughout the 80s. The final services provided by CRS to the UPM in 1989 were the master planning of a new university town for 4000 students and 10,000 staff.

But again, this only represents a small portion of the firm's work in the region or for the oil industry after the publication of *A Bucket of Oil*. In 1975, CRS master planned and designed housing and community facilities for five new towns for Aramco's TAPLine. The firm provided similar services for a new town for the refinery workers at Ruwais in Abu Dhabi. Between 1982-87, CRS managed a consortium of firms that planned, designed, and managed a \$2 billion project for Saudi Arabia's Ministry of the Interior, including 12,000 housing units and community facilities in 21 locations across the country. These projects are directly linked to the expansion of the international oil industry, but this list only hints at the wider range of oil related projects undertaken by CRS in Texas and the Middle East for Arco, Aramco, Chevron, Conoco, Esso, Exxon, Halliburton, Igloo, Mobil, Monsanto, Pennzoil, Petromin, Schlumberger, Shell, Sohio, Tenneco, Texaco, and Texas Eastern. And none of this touches upon the scope of architectural and construction management services developed under the framework of petrodollar recycling and foreign purchases of US military technology.

SUMMARY AND CONCLUSION

In the 1960s, the Houston-based architectural firm CRS transitioned from a model of research and development practiced in the university laboratory to one practiced in the corporate archive. In the 1970s, the energy crisis presented an opportunity to quicken this new model of research; the publication of *A Bucket of Oil* was its first concrete outcome. *A Bucket of Oil* speculated on the regulatory conditions of an architecture without oil, but it also went far out of its way to avoid any mention of the firm's ever deepening dependence on the international oil industry. Acknowledging the architectural projects that were excluded from the firm's publication shows the degree to which research in the corporate archive was used to conceal large segments of the firm's geopolitical interests. As architectural and environmental historians continue to wrestle with the impact of energy transition and climate change, we would be wise to heighten our sensitivity to the topic of the archive and its agency.

ENDNOTES

1. William Wayne Caudill, Frank D. Lawyer, and Thomas Bullock. *A Bucket of Oil: The Humanistic Approach to Building Design for Energy Conservation* (Boston, MA: Cahners, 1974).
2. CRS was established in 1946 and divested in 1993. In 1989, it was the largest multinational AEC firm in the world. The company was known by several names including Caudill & Rowlett (1946-47), Caudill Rowlett Scott (CRS, 1948-57), CRS Design (CRSD, 1958-70), CRS Design Associates (CRSDA, 1971-78), CRS Group (CRSG, 1979-83), and CRS Serrine (CRSS, 1984-93). Its subsidiary companies are too numerous to mention in this space.
3. Michel Foucault, *The Archaeology of Knowledge and the Discourse on Language* (Vintage, 2010); Jacques Derrida, "Archive Fever: A Freudian Impression," *Diacritics* 25/2 (Summer 1995), 9-63; Achille Mbembe, "The Power of the Archive and its Limits," in Carolyn Hamilton, et al, editors, *Refiguring the Archive* (Springer, 2002), 19-27; and Ariella Aisha Azoulay, *Potential History: Unlearning Imperialism* (Verso 2019). See also Gilles Deleuze, *Foucault* (University of Minnesota, 1988).
4. Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35/2 (Winter 2009), 197-222.
5. In an effort to elaborate this sentence, I searched for synonyms of the adjective *closer*. The website www.merriam-webster.com provided some uninspired suggestions following this definition of *closer*: "being the less far of two // the *closer* gas station was also more expensive." What does it mean that the definitions of our most basic terms are exemplified by the downstream economics of the oil and gas industry? I choose to keep the word *closer*, simply to be able to ask this question.
6. Antonio Gramsci, *Selections from the Prison Notebooks of Antonio Gramsci*. (International Publishers, 1971), 324.
7. On writing the inventory of oil's traces, see: Jennifer Wenzel, "How to Read for Oil," *Resilience: A Journal of Environmental Humanities* 1/2 (Fall 2014).
8. The firm's architectural drawings are noticeably missing from the collection.
9. Avigail Sachs, "Marketing Through Research: William Caudill and Caudill, Rowlett, Scott (CRS)," *Journal of Architecture* 13/6 (2008), 732-752; and "The Postwar Legacy of Architectural Research," *Journal of Architectural Education* 62/3 (2009), 53-64.
10. Caudill's definition of research was fugitive. See Caudill quoted in Sachs 2008, 742: "What is research? To us the word means the pursuit of perfection. It means working towards the improvement of planning techniques--the development of new ways to make buildings more functional, more attractive for living and working, and more economical. It means, too, the development of new ideas for lighting, ventilating and sound conditioning buildings. Research means finding new ways to give assurance of safety and low maintenance in the use of new materials... Architecture research is a thinking process toward the perfection of man's physical environment."
11. Caudill quoted in Sachs 2009, 59.
12. Avigail Sachs, "Marketing Through Research" *Journal of Architecture* 13/6 (2008), 748: "The CRS strategy to incorporate research into the firm's professional practice," writes Sachs, "was extremely successful in the firm's first two-and-a-half decades of work. After 1971, however, the Board of Directors took a more profit driven

- approach and actually dropped research in 1975. When the research component was revived six years later it no longer was 'a thinking process toward the perfection of man's physical environment' as Caudill had described it in the 1950s, but focused rather on the design and equipment of technology-laden and flexible office space. This research supported the design work in CRS's new (and narrower) fields of interest and investments, but it was no longer part of a maverick marketing strategy."
13. Ibid, 737.
 14. Ibid, 748.
 15. Touche Ross and Company later became Deloitte & Touche (now just Deloitte). Stambaugh was offered a partnership in the firm on several occasions but declined to pursue his career in accounting.
 16. For example, Willie Peña and John Focke's *Problem Seeking*, was published in 1969 but was originally developed as a lecture a decade earlier.
 17. Indirect promotion was defined as "that which did not relate to any specific job. Included in this definition was writing magazine articles and reports, making speeches, making TV appearances, making initial personal contacts, conducting clinics serving as visiting professor, serving on juries, serving on committees, preparing news releases, preparing exhibits, answering inquiries, distributing reports, entertaining foreign guests as well as visiting professional from this country, fulfilling requests for photographs and data relative to our buildings and other activities which make friends for CRS." Policy Manual, October 1960, Box 2001.0409, CRS Center, Texas A&M University.
 18. Caudill quoted in Sachs 2008, 744.
 19. Memo from Scott, Bullock, and Rowlett to Ward and Estes, 8 July 1959, Box 2001.0408, CRS Center, Texas A&M University. The McBee system was hardly revolutionary; it was built on technology which was already more than a half-century old in 1959.
 20. CRS Annual Corporation Meeting Minutes, 15 August 1959, Box 2001.0403, CRS Center, Texas A&M University.
 21. Memo from Peña to Bullock, 5 January 1960, Box 1079.1205, CRS Center, Texas A&M University.
 22. Memo from Bullock and Perry to Peña and Caudill, 13 January 1960, Box 1079.1205, CRS Center, Texas A&M University.
 23. Memo from Caudill to CRS Partners, 4 August 1965, Box 2001.0504.3-8, CRS Center, Texas A&M University.
 24. Memo from Kliment to Bullock, 21 November 1969, Box 2001.0602.3-4, CRS Center, Texas A&M University.
 25. October Financial Statement from Mike Trower, 22 November 1971, Box 2001.0804, CRS Center, Texas A&M University.
 26. Report on the CRS/DV Preliminary Draft from Bullock to Scott, 26 December 1973, Box 2001.0814, CRS Center, Texas A&M University.
 27. Memo from Lawrence to Caudill, 1 August 1973, Box 2001.0901, CRS Center, Texas A&M University. The details of their presentation are unknown.
 28. Bill Caudill, "TIB: General - Future Energy Crisis, 7 August 1973, Box 2001.0901, CRS Center, Texas A&M University.
 29. Caudill wrote "During the next five years you will probably be dealing with the government on any major project, including those for the private developers. It's quite possible that government involvement will determine priority judgment as to which kind of new facility gets an energy allotment. Regulations might tell us how to heat, to cool, to skin, and to light our buildings. It's a good bet we shall be talking about the allotment of quantities of energy per square foot. The last decade we fought the square foot cost war. Now it's the energy per square foot battle." Bill Caudill, "Speech: The Five-year Future," 25 September 1973, Box 1079.0202, CRS Center, Texas A&M University.
 30. Memo from Bullock to CRSDA Company Presidents, 20 November 1973, Box 2001.0816, CRS Center, Texas A&M University.
 31. Caudill, Lawyer, and Bullock, *A Bucket of Oil* (1974), 10.
 32. Bill Caudill, "Speech: A Bucket of Oil," 30 November 1973, Box 1079.0202, CRS Center, Texas A&M University.
 33. Memo from Bullock to Caudill, 20 December 1973, Box 2001.1003, CRS Center, Texas A&M University.
 34. Response to the CRS/DV Preliminary Draft from Bullock to Scott, 26 December 1973, Box 2001.0814, CRS Center, Texas A&M University.
 35. Memo from Passeur to Mathews, Thompson, Scott, and Thomsen, 18 December 1973, Box 2001.0816, CRS Center, Texas A&M University.
 36. Caudill, Lawyer, and Bullock, *A Bucket of Oil* (1974), 8.
 37. Ibid, 9.
 38. Ibid, 9.
 39. Ibid, 10.
 40. In contrast, performative codes, which dictate what results should be achieved without specifying how this must be accomplished, were the "lesser of evils if we must have codes beyond health and safety protection... Creativity is at least possible with performance codes." Ibid, 10.
 41. Ibid, 10.
 42. Ibid, 10.
 43. Ibid, 12.
 44. Derrida 1995, 9.
 45. Caudill, Lawyer, and Bullock, *A Bucket of Oil* (1974), 12.
 46. Ibid, 12-13
 47. Ibid, 12-13.
 48. The architect of the Hyatt Regency Hotel in Houston was JVIII, a joint venture between Caudill Rowlett Scott, Neuhaus & Taylor, and Koetter Tharp & Cowell. It remains Houston's tallest hotel and is capped by a rotating restaurant named Spindletop after the famous Texas oilfield.
 49. The following details are compiled and compressed from architectural programs and sources held by the CRS Center, Texas A&M University. See also, Fleshman, Fonville, Schweiger, and Wahl, *CRS Stories* (Houston: CRSS, Inc., 1992).