

EMGT 835 FIELD PROJECT:
***Opportunities and Threats of Green Building
Design for ABC Engineers, Kansas City***

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EXECUTIVE SUMMARY

“If your next project is not a green building, one that is certified by a national third-party rating system, it will be functionally outdated the day it’s completed and very likely to underperform the market as time passes.” according to real estate expert, Charles Lockwood. (Yudelson 2008, 27). The ‘Green’ building revolution has presented a unique opportunity for Consulting Engineering firms specializing in mechanical, electrical, and plumbing (MEP) design, such as ABC Engineers, to capture premium revenue for a limited timeframe. Capitalizing on this opportunity brings challenges that should be strategically planned for to optimize profitability.

‘Green’ building design is a buzz word and is being promoted as an ecologically beneficial concept in the architectural, engineering, and construction industry, but will become the standard expectation in the future. Projected revenues associated with ‘Green’ building design in this project illustrates the potential quick rise and fall of this market segment, therefore a plan of action should be implemented in a timely fashion. The plan must take into account the risks and Legal concerns directly drawn from case studies and professional experiences that can be applied to ‘Green’ building design.

Establishing the competitive advantage of being experts at ‘Green’ building designs could assure capturing additional revenue that would otherwise be lost to other engineering firms. The main risks to having this competitive advantage are related to new legal responsibilities for the professional engineer when working to implement cutting edge green systems, identifying new products, and meeting energy performance criteria. Information included in this field project provides the Principals of ABC Engineers in Kansas City background information to create an applied marketing and business plan for the Green Building opportunities that present themselves in the target market.

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CHAPTER 1: INTRODUCTION/BACKGROUND

Strategic planning is a critical aspect of business, and is many times overlooked in the day-to-day operations of a Consulting Engineering firm. The approach described herein includes defining opportunities and threats associated with the topic of 'Green' Building design that are directly related to ABC Engineers, Kansas City (ABC-KC). This analysis is critical for the Principles at ABC Engineers to further develop a marketing and business plan incorporating the decision to pursue marketing 'Green' Building design services. 'Green' Building Services must be integrated into the ABC-KC 2009 business plan and marketing plan to capitalize on the limited opportunity that this industry shift has presented. If 'Green' Building services are not incorporated into these plans, associated revenue will be lost to competing engineering firms until 'Green' building design becomes the standard expectation and is incorporated into governing building and energy codes. Tools such as a financial model as well as legal case studies presented later in this report show the potential revenue and pitfalls that the Kansas City office should consider. To define how the opportunities and threats of 'Green' Building design will affect ABC-KC this section includes a strategic review of ABC, definition of 'Green' Design and LEED, and current related media.

ABC Engineers: Strategic Review

Statement of General Business Purpose

ABC Engineers (ABC) is a consulting engineering firm based out of Denver, Colorado, with branch offices located in Colorado Springs, Dallas, Kansas City, London, Los Angeles, New York, San Diego, Vail Valley, and Dallas. Each office provides mechanical, electrical, and plumbing engineering services. Project types include sports venues, institutional, commercial, and healthcare facilities, along with high-end residential. The Denver office employs around 90 people, and each branch office varies

from as few as a 2 engineers to over 50. ABC was founded in 1981 and has a built a reputable resume of professional and collegiate sports venues, healthcare facilities, high-rise offices, condominiums and residences. Clients include architects, facility managers, and private owners; while project work includes new construction, renovations, and energy retrofits. (ABC Engineers, 2008) The Architectural clientele will be the focus of this project since they make up over 90% of ABC's revenues. (Billau, 2008)

Architects require services of engineering consultants to produce complete detailed drawings and specifications that can be used for permitting, for bidding by contractors and as construction documents. Typically ABC also provides construction administration services throughout a project to verify that it is built according to the plans and specifications. In addition, ABC may provide commissioning services to ensure that a project is turned over to the owner in optimal operating condition at the end of construction. (ABC Engineers, 2008)

ABC is dedicated to providing high quality and progressive engineering, while striving to meet or exceed the expectations of today's construction industry. Basic scopes of service require ABC to adhere to building codes adopted in each jurisdiction, which often fall well short of 'Green' standards developed in the last several years. The recent increase in energy costs throughout the United States has paved the way for engineering firms to implement technology and designs that greatly exceed the code minimums which can lead to maximum life cycle cost performance for the client. ABC recognizes their commitment as a service organization by providing a staff fully responsive to their client's needs. Several staff members have been certified by the United States Green Building Council (USGBC) for 'Green' design which is later reviewed in this project. (Billau, 2008)

The Kansas City office was opened in the spring of 2006 in the River Market area of downtown. The original intent of the Kansas City office was to help facilitate the Denver Corporate office with the projects in the area. These projects include the H&R Block Corporate Headquarters, The Sprint Center, Arrowhead Stadium, and Kauffman Stadium renovations. As those projects have developed, the Denver office was also awarded the new stadium project for the Kansas City Wizards in which the Kansas City branch office could play a major role. The Kansas City office is expanding its reach within the local market as well as completing existing projects with assistance from the Denver office. Now that the Kansas City office is pursuing their own business growth in addition to the Denver offices efforts, it is an optimal time for the Kansas City office to look at alternative marketing strategies to expand 'Green' services to architects in the metropolitan area. (Billau, 2008)

A strengths, weaknesses, opportunities, and threats (SWOT) analysis of ABC Engineers Kansas City office (ABC-KC) illustrates where they stand in the market. Their strengths include the level of service that repeat clients hire the Denver and other national offices time after time for. These include the Kansas City office's persistent attention to detail, continuous coordination efforts, drive to exceed client expectations, high quality drawings and specifications, excellent construction administration services, and physical centralized location. Weaknesses include a lack of marketing to local architectural firms, staff number limitations, and competitive points of differentiation. The opportunity that has been pinpointed and ABC-KC is pursuing is to expand their services and expertise in the 'Green' building market. There are three main threats that may potentially keep them from succeeding. The first is the number of other local mechanical, electrical, plumbing consulting engineering firms in the same market competing for the same client pool. Second is the slowdown of the local construction industry. The third threat is the challenge finding high quality employees that fit in with

ABC-KC's unique culture and style to expand staff to meet project and marketing goals. (Zorn, 2008)

ABC-KC's strategic intent is to provide the service of mechanical, electrical, and plumbing engineering to meet the needs of the market as well as expand their portfolio of 'Green' Building projects. The Denver office has jumpstarted their client base of four major local architectural firms as well as established a presence in the 'Green' market which ABC-KC will build from. Existing clients attest to the quality of the Kansas City and Denver service and ABC-KC has an impressive array of successfully completed project types within their portfolio. ABC-KC's scope of services can be adapted to fit most client requests within their field of engineering, which will account for a successful transition into 'Green' Building projects. They strive to achieve top of the line service for their clients within an enjoyable working experience. 'Green' Design, and the corresponding heightened level of expectations that accompany it, fits well with these attitudes and beliefs. (Zorn, 2008)

One of ABC-KC's strategic marketing goals is to further establish themselves in the local marketplace as a provider of 'Green' building design. They plan on doing this with the current level of staff and assets for the near future. However, as the 'Green' market continues to grow locally they will begin increasing 'certified' staff as required at a rate appropriate to match the demand. (Billau, 2008) Details of the required certification, as developed by the United States Green Building Council (USGBC), will be discussed later in this introduction.

Brand Equity Review

The brand personality of ABC-KC is a consulting engineering firm that has a unique perspective on engineering design. Their personality is defined through providing consulting engineering services in a manner that is unique to the market by

way of project experience to gain strategic advantages. ABC-KC possess' a quality of social aspiration that clients have found to be focused, practical, low stress, knowledgeable and professional. They do not speak technical jargon that clients do not understand or relate to that is prevalent in other consulting engineering firms. Brand statements related to 'Green' Design that have been established, and are stated on ABC Engineers website are: (ABC Engineers, 2008)

“Shaping the future of a more sustainable built environment”

“Providing 'our component of Sustainable design”

“A vocal member of an integrated team”

“Developing sustainable solutions for the building industry”

While the Corporate office has invested significant resources to their 'Green' Building campaign, the Kansas City office hasn't taken much action on the issue. Analyzing the situation proves that an extra effort from the Kansas City office may pay back financially. Therefore, they are in the process of establishing achievable related marketing goals. (Billau, 2008)

Currently, few methods or mediums are used to convey the 'Green' brand message in Kansas City. The Denver corporate office has created a company-wide 'Green' specific group called the Environmental Physics Group (EPG). The company's corporate website also provides detailed information on EPG's 'Green' services and experience. (ABC Engineers, 2008) In contrast, Kansas City office has not actively utilized these resources nor created one of their own. (Billau, 2008) Because of this lack of differentiation, ABC-KC is missing out on the opportunity to earn additional revenue related to 'Green' services.

Green Design and LEED

'Green', also known as 'sustainable', buildings use key resources like energy, water, materials, and land much more efficiently than buildings that are simply designed and built to meet code minimums. 'Green' buildings can also create healthier work, learning, and living environments. Design professionals may incorporate building features such as day lighting, which lets more natural light deep into the building, and more efficient air distribution systems designed to deliver fresh air directly to the occupants. Features such as these result in improved building occupant health, comfort, and productivity. Sustainable buildings can be designed to be cost-effective over the lifecycle of the building. In publically funded government building 'Green' buildings will save taxpayer dollars by reducing building energy consumption. (Kats, 2007)

LEED (Leadership in Energy and Environmental Design), created by the U.S. Green Building Council (USGBC) described by Auden Schendler and Randy Udall in a 2005 publication, *LEED is Broken... Let's Fix it* (Schendler & Udall 2005, 3), "LEED is both a certification system and a how-to guide for professionals new to green construction. The LEED checklist prompts designers to reduce impacts in five categories ranging from site planning to energy consumption, water useage, indoor environmental quality, and building materials." Points are assigned to design goals and methods in each category and are obtained as the design meets the requirements. (USGBC, 2008) "Pay a fee, satisfy the prerequisites, obtain 26 of 67 possible points, and the building can become LEED Certified. Once a building is completed, a developer submits documentation to the USGBC, where a third-party evaluator determines whether to award a Certified, Silver, Gold, or Platinum rating. It is very difficult to grab the Platinum rating: There are only seven such buildings in the world." (Schendler & Udall 2005, 3) It can also be a challenge to get a building certified at all due to the

complicated documentation process and extensive review by the USGBC. In 2005, five years since the program was implemented there were just 167 certified projects. (Schendler et al. 2005) In 2006 there were 1,642 projects registered to be reviewed by the USGBC for LEED certification of which 265 completed. And in the first 3 months of 2007, when Jerry Yudelson published *The Green Building Revolution* (Yudelson, 2008) 1,059 projects had registered and 112 had achieved certification.

In this fast paced, advancing industry, an updated version of LEED, coined LEED 2009 is being released. This new version incorporates more weight on reducing climate change and global warming by emphasizing reduced building energy use and proximity to mass transit. In addition, the entire format of the program will change to a 100 point base with an additional 10 points available for innovation and regional issues. Scot Horst, chair for the steering committee for the USGBC stated "I expect we are going to get comments from people who feel it may be too difficult." (Engineering News Record, 2008)

USGBC : United States Green Building Council

Council Members

The U.S. Green Building Council (USGBC) is a non-profit organization committed to expanding sustainable building practices. USGBC is composed of more than 12,000 organizations that are working to build environmentally responsible, profitable, and healthy buildings. Members includes building owners and end-users, real estate developers, facility managers, architects, designers, engineers, general contractors, subcontractors, product and building system manufacturers, government agencies, and nonprofit organizations. (USGBC, 2007)

Goals

The USGBC developed the LEED program to “encourage and accelerate global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. (USGBC,2008) Leah Rochwarg, Seyfarth Shaw Attorney’s LLP, restated that the goal of the USGBC is to “promote ‘Green Design’, defined as ‘design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants in five broad areas: 1) sustainable site planning; 2) safeguarding water and water efficiency; 3) energy efficiency and renewable energy; 4) conservation of materials and resources; and 5) indoor environmental quality.” (Rochwarg, 2007)

Professional Certification

LEED Professional Accreditation distinguishes building professionals with the knowledge and skills to successfully use the LEED certification process. LEED Accredited Professionals (LEED APs) have demonstrated an understanding of green building practices and principles and the LEED Rating System. More than 43,000 people have become LEED APs since USGBC launched the Professional Accreditation program in 2001. The LEED AP credential represents the individual's knowledge of the LEED Rating System and its application in practice. LEED APs encourage the “green” design process through the use of the LEED system for certification. (USGBC, 2007)

In The Media

Kansas City Local:

Kansas City has, over the course of the last few decades, become something of an international architectural and engineering center, especially in the fields of sports venue facilities, which ABC Engineers has based their primary efforts. These are typically high profile projects that have considerable impact, culturally, economically, and environmentally, on the communities where they're built. This is one reason Kansas City finds itself in a leadership position in the LEED Green Building Movement, a voluntary initiative by architects and engineers to design and construct buildings that are optimally energy efficient, minimally toxic, and sustainable.

From one of the many forward thinking Kansas City architecture firms, BNIM founder, Bob Berkebile, is "a pioneer in the Green Building Movement" as stated by Doug Worgul, Ingram's. (Worgul, 2007) BNIM has had several opportunities to design 'Green' buildings. Perhaps the most striking example of this is the 27 acre, 1,000,000 sq. ft. IRS complex, located near Union Station on Pershing Rd., which was a joint effort of BNIM and 360 architects, another innovative local 'Green' firm. The IRS campus received a LEED Certified rating. The complex has exceeded expectations in energy savings. A BNIM press release stated "If the savings we've seen in the first months of operation are sustained over time, we'll see savings of more than 30 percent. This is made even more remarkable when you consider the enormous cost of heating and cooling a structure of that size. Even a savings of one percent is a lot of money. When you get into the 30 percent range, the savings are dramatic." (Worgul, 2007) Since the completion of the IRS facility, BNIM has also been a commanding leader in the Greensburg, KS tornado disaster reconstruction described later in this introduction. (BNIM, 2007)

Henderson Engineers Inc. (HEI) “is the city’s largest Mechanical, Electrical, Plumbing specific firm” according to Doug Worgal, Ingram’s. The new Staley High School in the North Kansas City School District is an example of a LEED project Henderson worked on. Staley high school is one of Missouri’s first LEED certified high schools. (Hanson, 2008) One interesting ‘Green’ design element incorporated is a relatively new technology of a geo-thermal heat pump system to heat and cool the facility. The system utilized the stability of the earth’s temperature nearly 500 feet underground to efficiently acquire heat in the winter, and dissipate heat in the summer. Henderson’s Rich Smith, executive vice-president, stated to Ingram’s that “Kansas City is a bit ahead of the curve, compared to other major metropolitan areas, in the quantity and quality of LEED projects.” Drew Rimmer, Smith’s colleague, and a vice-president at Henderson, added that “this is a result of the critical mass of progressive, world-class, architectural, engineering, and construction firms in the region”. (Worgul, 2007)

This concentration of forward thinking design firms in the area has influenced the design and construction of projects to incorporate ‘Green’ concepts even when the project is not seeking LEED certification. The West Edge development on the Plaza will not be LEED certified, but Gould Evans, also an active ‘Green’ architecture firm in Kansas City, told Ingram’s that “many sustainable features have been incorporated into its design, such as vegetated roofs, under-floor air systems and ample use of day lighting.” (Worgul, 2007) As of October, 2008 the West Edge Project has suffered great delays and is currently at a stand-still. J.E. Dunn, the projects general contractor, has pulled off of the site due to Trilogy’s, the ownership group, failure to pay \$10 million. (Vockrodt, 2008) The author of this paper found no ties for the delays, or conflict directly related to any ‘Green’ issues; however, it is an unfortunate situation for all parties involved, including the area surrounding the development.

Green Projects

Green Projects (Local: Johnson County Sunset Office Building)

The Sunset Drive Facility in Johnson County is only the second building in the State of Kansas to receive a LEED Gold Certification from the USGBC, the facility is a high-performance office building that was designed to be very efficient to own and operate. A high degree of adaptability and flexibility was provided through the building's moveable and changeable floor, wall and underfloor air ventilation systems. This approach allows floor plan and workstation changes, to be accomplished quickly, efficiently and in a cost effective manner. The building has been designed and constructed to be extremely energy efficient compared to similar buildings designed to meet code minimums. These efficiencies can be attributed to its highly insulated exterior skin and innovative heating and air conditioning systems. The Sunset Drive building is operating with 43% lower energy costs than the County Administration Building in Downtown Olathe. (Johnson County, 2007)

Green Projects: (Regional: Greensburg, KS)

Over a year now after the nearly complete destruction of Greensburg, KS by an F5 tornado, a new Sustainable Comprehensive Master Plan was approved on May 19, 2008. With 95% of the city being rebuilt from utilities infrastructure up, Greensburg City Council has approved a resolution that all projects will be built to LEED Platinum level standards. Greensburg will be the first city in the world to procure such a remarkable status if this highly ambitious action plan is achieved. National exposure of this tragedy has been further revealed through a new series documentary on the Discovery Channels new network 'Planet Green'. (Greensburg, 2008)

BNIM Architects of Kansas City have gained unprecedented national exposure as the sole planning and design firm dedicated to the redevelopment of Greensburg, KS.

BNIM's website www.deepdesigndeepgreen.com includes 'green' specific project profiles such as Greensburg as well as other marketing material showcasing their leadership and forward thinking on the subject. The Kansas City market is privileged to have innovative firms such as BNIM and others. (BNIM, 2008)

Green Projects: (International: Council House 2, Melbourne Australia)

The CH2 building in Melbourne City, Australia which opened in 2006 was advertised as Australia's best environmental performer. A year after its opening, several of its environmental features did not function as originally designed. These and other issues have left the design team and contractor open for legal claims:

- The sewage recycling system is not yet operating.
- Extra lighting had to be installed after the staff complained it was too dark.
- The staff complained of high noise levels in open-office plans.
- An overwhelming smell of sewer gas leached from waterless urinals.
- The air-conditioning alternative design using "shower towers" mounted to the side of the building was shut down after legionella was found in the cooling system.

Nonetheless, Green Building Council board member Bill McHarg said CH2 had made a "huge difference" to Melbourne's green building credentials. "It's such a prominent new building," said McHarg, "By many accounts it is one of the most advanced, sustainable-designed buildings in the world." (Lucus et al. 2007)

Current Criticism

Current Criticism: (Is LEED a marketing Tactic?)

An Ipsos Reid study was conducted in Spring 2007 on behalf of Icynene, a manufacturer of 'Green' foam insulation products. The study revealed interesting statistics that can be used to assess the attitude of consumers in relation to 'Green' products. Icynene found that 7 of 10 Americans either 'strongly' or 'somewhat'-agree that when companies call a product 'Green' it is usually just a marketing tactic. In the U.S., 75% of men and 65% of women believe that labeling a product 'Green' is just a marketing tactic. Also, 72% of Americans living in the south are the most likely in all U.S. regions to believe that labeling a product 'Green' is just a marketing tactic, while 58% of North-Easterners are the least likely to believe this.

Related to the construction industry, 44% of Americans either completely or somewhat agree that they are not willing to pay more upfront for 'Green' building products even though they know them to be better for the environment, and they could potentially save money in the long run. The report does find that 10% of Americans would not be willing to pay more upfront for home building products, while 46% might be. Study's such as this can help developers and owners analyze the payback associated with constructing LEED certified buildings to satisfy the market demand. (Center for Media Research, 2007)

Current Criticism: (Taxpayer Concerns)

In September 2007, a Fox News report discussed taxpayer concerns that "Building green" may be more about gaining additional taxpayers' dollars than constructing "eco-friendly" buildings. The U.S. Green Building Council, USGBC, is actively lobbying in Congress to introduce an energy bill that would require federal buildings be constructed according to the LEED standard. Steven Miller, Fox News,

stated “The new requirement could be quite lucrative for the USGBC since it charges fees ranging from \$2,200 for small buildings to over \$23,000 for certification.” (Fox News, 2007)

For example, the U.S. General Services Administration (GSA) Web site states that, "all GSA new construction projects and substantial renovations must be certified through the Leadership in Energy and Environmental Design (LEED) Green Building Rating System of the U.S. Green Building Council." Miller added, “Coincidentally, the GSA also has a seat on the USGBC board of directors, which leaves taxpayers wondering if the GSA is enabling the USGBC to grow at their cost and asking the question ‘Are there true taxpayer benefits to building to LEED standards?’.” (Fox News, 2007)

Introduction Summary

ABC Engineers office in Kansas City was opened to facilitate many local jobs as well as better serve some of the major national sports architecture firms located in the area. ABC-KC is growing and looking to establish itself as a major competitor for local projects as well as work with local architecture firms on national projects. The Principals of ABC have the opportunity to capitalize on the timely development of the LEED program by the USGBC since many architects are pushing clients toward having their buildings awarded with LEED certification. The current media buzz and client interest in achieving environmental sustainability in their buildings has also helped drive the ‘Green’ building market. ABC must take the risks associated with ‘Green’ building design into consideration when establishing design fees for this scope of work. Market opportunities and the risk of threats are presented in detail later in this report.

CHAPTER 2: LITERATURE REVIEW

The 'Green' industry has recently received more attention than ever with help from the perceived poor performance of the United States economy, increased oil prices, and heightened environmental concerns. Building owners are now more likely to take life-cycle cost into consideration instead of letting projects first cost solely influence the design. In response, numerous relevant professional journals, blogs, publications, and news articles have been written within the last two years. Literature pertaining to this project was reviewed for material relevant to 'Green' building design, marketing 'Green' building design services, and 'Green' design legal risks for engineers.

'Green' Building Design:

The topic of 'Green' building design provided the largest array of current literature which included everything from the history of the concept to specific materials that are recommended for use in 'Green' buildings. Books include the *ASHRAE Greenguide: the design, construction, and operation of sustainable buildings* (ASHRAE Press, 2006), *Green Building A to Z* (Yudelson, 2007), *The Green Building Revolution* (Yudelson, 2008), *Sustainable Construction: Green Building Design and Delivery* (Kibert, 2005), *Contractors Guide to Green Building Construction* (Glavinich, 2008), *Green Building: Project Planning and Cost Estimating* (RSMeans 2006), *Sustainable Construction* (Halliday 2008). All published since 2005, these resources have up to date information related to the evolution and current status of 'Green' building design.

There are several common underlying themes of these books including how 'Green' buildings have numerous benefits including economics, occupant health, and environmental awareness. Sources provided excellent guidelines that answer the questions of who, what, when, where, why, and how. In addition, information from these

sources was more specifically related to understanding the opportunities associated with 'Green' building design methodologies and why they should be implemented more at ABC-KC. Setting up a 'Green' project involves an Owner who supports and buys into the concept, a dedicated design and commissioning team, and a cooperative contractor. The Mechanical, Electrical, and Plumbing engineering firm plays a very involved role in this process since almost half of 'Green' design concepts involve these building systems. Engineers help analyze the various options to be considered and make recommendations to the architect and owner on which decisions will benefit the project and make the most sense when balancing financial payback time verses actual benefit to the owner and environment. (ASHRAE Press, 2006).

Jerry Yudelson, a professional engineer and marketer accomplished in the 'Green' building industry, has written five books directly related to this subject. His latest book *The Green Building Revolution* (Yudelson, 2008), builds on earlier materials from writings such as *Green Building A to Z: Understanding the Language of Green Building*, (Yudelson, 2007). Yudelson presents a very thought provoking and applicable approach to the 'Green' building process for consulting firms that has been recognized by the USGBC. S. Richard Fedrizzi, president, CEO, and founding chairman of the USGBC, provides a summary of Yudelson's work by stating, "The Green Building Revolution will guide you to a deeper understanding of the problems we face and the numerous solutions now emerging from the creative work of architects, designers, engineers, contractors, building owners and facility managers, insurance and financial organizations, and manufacturers of every type across the country, and even around the world." (Yudelson 2008, xix) Part of the 'deeper understanding' referenced by Fedrizzi is a powerful statement in the book directed to building owners by real-estate expert Charles Lockwood that "if your next project is not a green building, one that is certified by a national third-party rating system, it will be functionally outdated the day it's

completed and very likely to underperform the market as time passes.” (Yudelso 2008, 27)

Another perspective on ‘Green’ building design was presented in *Sustainable Construction: Green Building Design and Delivery* (Kibert, 2005), and similar concepts have been updated in *Contractors Guide to Green Building Construction* (Glavinich 2008). Both of these guides have given the Contractor side of the industry guidelines and key tools when facing such a broad change of perception and requirements in the marketplace. In addition, valuable concepts in these writings can be applied to the engineering design perspective.

The first of these concepts is the question of whether contractors should be reactive or proactive to ‘Green’ construction. In a reactive sense, the contractor would bid and/or negotiate services based on a set of documents including ‘Green’ design from an Architect/Engineer design team and is only passively involved with the ‘Green’ effort. The contractor taking a proactive approach, preparing to incorporate the logistics of ‘Green’ efforts into the budget and schedule in the early stages of construction planning, to be socially responsible and a good corporate citizen has been proven more holistically beneficial to the owner and project. They will also benefit from providing owners better competition between environmentally proactive contractors, encourage field and office employees to focus their personal ‘Green’ efforts, be compliant with environmental laws, lower overhead costs for environmental insurance coverage, and increased positive public perception of the company and project. (Glavinich, 2008).

The second of these concepts is the future direction of ‘Green’ building design. As the ‘Green’ building movement gains more and more momentum, it is transforming the process of design, construction, and operation. Associated challenges include “taking the next technology leap, reinventing the construction industry, and rethinking the products of construction”. (Kibert, 2005). The concept of the future direction has

progressed since 2005 and the challenges discussed have been further developed and have helped define the evolving risks associated with 'Green' building design.

RS Means has always been a standard referenced construction industry guide for materials and labor costs, and in 2006 published *Green Building: Project Planning and Cost Estimating* (RSMMeans, 2006), a guide specific to 'Green' building projects. For ABC-KC, RS Means guides are used for gathering budget numbers to assist a client in the direction of a project and to analyze life cycle costs for system selection. This process would hold true for the 'Green' building guide for associated projects. This RS Means publication includes costs associated with design fees specific to 'Green' building design, which are critical in analyzing opportunities and threats of green building design for ABC-KC. This information is important for the revenue forecast section later in this report.

Sustainable Construction (Halliday, 2008) and *Emerald Architecture* (Greensource Magazine, 2008) are excellent resources for case studies of 'Green' building designs across the world with color photographs. These provide real-world examples of applicable scenarios that assist the industry in visualizing the efforts put into these projects. Commonly, these are broken into categories such as project type: civic and cultural, education, government, offices, residential, and science and technology. They include many details to aid the reader in promoting more green buildings and a better built environment by explaining challenges, applied principles, materials and construction techniques, etc. (Greensource Magazine, 2008) Case studies also give the reader a deeper understanding of how the United States and other countries are pursuing 'Green' building projects.

Marketing 'Green' Building Design Services:

Marketing 'Green' building design services is a relatively new concept that reminds us of the basic principles behind marketing an engineering firm such as ABC-KC. Several books have been written in the last three decades on marketing these services, but only one has been specifically directed toward consulting engineers and 'Green' building design: *Marketing Green Building Services: Strategies for Success* (Yudelson, 2007). As a point of reference, the author of this project has referenced back to past works including *How to Market Professional Design Services* (Jones, 1973) and *How to Establish a Unique Brand in the Consulting Profession* (Weiss, 2002). A source that was published somewhat recently and does address the issue of companies building upon the 'Green' concept is *Green to Gold* (Esty & Winston, 2006). Conceptually analyzing the content included in these three allows the reader to gain an applicable understanding of marketing related to the engineering industry. Analyzing marketing techniques is beneficial to establish an understanding of where ABC-KC currently sits in the marketplace and what opportunities are available for ABC-KC to pursue.

'Creating the new environment' is a task that ABC-KC will have to complete as they pursue working with the 'Green' building market. There is an entire network of clients, trade associations, vendors, and competition to analyze to see where ABC-KC stands in their local market. Consideration should also be given to how pursuing 'Green' building design will affect the current position of ABC-KC in the local market and current successes. Alan Weiss stated in his 2002 publication, "In a complex world, influence at one point will result in change at another, distant point. Brand influence, therefore, is exponential and dynamic, with relatively little effort creating great movement". (Weiss, 2002).

In *Green to Gold*, (Esty & Winston, 2006) important and relevant answers as to why companies should advance their 'Green' goals are presented. "Smart companies get ahead of the Green Wave" (Esty & Winston, 2006) -is a statement from the text that holds true for private owners, but is also very applicable to building design teams and engineering firms. Many companies are pursuing 'Green' buildings and facilities and are looking for design teams that are experts in projects of this type. Several case studies are presented in this text that illustrate how many corporations are looking at upgrading their facilities to be more 'Green'.

The majority of facts and figures that can be attributed to market research, along with the most up-to-date writings on the subject of marketing, can be found in *Marketing Green Building Services: Strategies for success* (Yuleson, 2008) published earlier this year. Surveys as well as professional research prove the theories and trends that earlier published materials, mentioned above, forecasted. Beyond the numbers, marketing 'Green' design services involves a multitude of strategic analysis including segmentation, targeting, positioning and differentiation. But most importantly, the concept of 'Greening' a design firm may keep run-of-the-mill engineering firms from fully developing their 'Green' brand. Surveys concluded that an in-house 'Green' team, internal training, 'Green' information management, available 'Green' Design resources, outside expertise, 'Green' goals, and 'Greening' one's own office, are necessary for a firm to attempt to effectively sell 'Green' building design services. (Yudelson, 2008). Becoming 'Green' is a first, necessary, step in the right direction but a local market analysis as well as a commitment to the future growth of 'Green' services will benefit today's consulting engineering firms.

'Green' Building Design Legal Risks:

Industry professional associations, national law firms, and insurance companies have published up to date literature for 'Green' building design legal risks in the form of blogs, journals, and presentations. Since the concept of 'Green' presents a relatively new concern/opportunity in the construction industry, these sources proved to be the most current and in-depth for this project. Several writings reviewed are the *Green Building Law blog* (Shapiro, 2008), the *greenbuildingsNYC:New York City's Green Real Estate Blog* (Del Percio, 2008), articles in *Risk & Insurance* magazine (Brodsky, 2008), and articles in *Engineering News Record* magazine (Tulacz, 2008). An American Institute of Architecture (AIA) presentation, *Don't Let Green Design Cause Red Ink* (AIA, 2007) showcased the risks associated with the current 'Green' revolution. Also used as a current source for law background is the book *Legal Aspects of Architecture, Engineering and the Construction Process* (Sweet & Schneier, 2007). This combination of legal literature provided the author of this project a well-rounded perspective of the 'Green' building design legal risks and how they are applicable to ABC-KC.

Common to many of these sources is the concept that Shari Shapiro of Obermayer, Rebmann, Maxwell & Hippel LLP expressed "I will guarantee that the next year will bring us the first wave of green litigation" (Shapiro, 2007) which sums up the concerns of ABC-KC pursuing 'Green' building projects. The decision is not as black and white as sources in the 'Green' building design section above attempt to persuade readers. The most prevalent issue related to design professionals is the perceived 'standard of care'. In litigation, professional engineers judged against the 'standard of care' expected from the professional engineer. To meet the standard of care the engineer must exercise the care, skill, and diligence as others in that profession ordinarily exercise under similar circumstances. (Sweet & Schneier, 2007) Therefore, questions must be asked such as; is the standard of care being changed by 'Green'

building design, and is professional obligation being replaced by a guarantee of service or result? (AIA, 2007). Speakers from a number of prominent insurance companies seemed to think so in the 2007 Annual Joint Session on Current Insurance Issues for Design Professionals, as the panel agreed that the standard of care for architects and engineers is “changing rapidly” and have “never seen a standard of care shift so quickly with so much media coverage and political backing” (Del Percio, Dec. 2007)

The use of new equipment technology and new design concepts also seems to be a common risk written about in most sources. Several new materials are available in the market now that meet ‘Green’ specifications written by the design team, but what happens if they don’t work as promised? And who will be responsible for new system designs such as using greywater retention for landscape irrigation? Are engineers ensuring that the use will not result in polluting the surrounding ecosystem when doing so? (Brodsky, 2008). ABC-KC should be wary of informed owners that want to use new untested products and systems because of the potential resulting consequences and litigation.

Design teams must dedicate time and fee for ‘Green’ building projects to inform and drive owners to make good decisions that do not expose any involved party to unnecessary risk. ‘Green’ design brings non-traditional challenges for project stakeholders since ‘Green’ elements add complexity to the process. If an owner has past non-‘Green’ project experience they should consider budgeting extra time and design fee and carefully negotiating the terms of contracts. (Del Percio, Nov. 2007). As an applicable related concern, the design team should also be mindful of their contracts and commitments.

Implied warranties are an issue that are in the limelight with ‘Green’ building design due to expected outcomes in building energy usage performance. Based on the requirement for ‘Green’ certification by the United States Green Building Council, a

detailed energy analysis is common to such projects. Until recently, engineer's contracts prepared by design professional associations did not specify how the design professional's performance would be measured. Now the latest version of the Engineers Joint Contracts Documents Committee (EJCDC) has included language to exclude any outcome-oriented implied warranties that would measure an engineer's performance. (Sweet & Schneier, 2007). Numerous examples were presented in the 2007 AIA convention *Don't Let Green Design Cause Red Ink* (Musica, 2007). One example directly related to this issue occurred where architects and engineers signed a contract that stated that a project would "reduce operating costs by 50 percent" over projects of similar size. The operating energy usage ended up being similar to other similar projects leading to the owner being publically embarrassed and associated claims on the design team. (Musica, 2007).

The overall concern for engineering firms such as ABC-KC that desire to play an active role in the 'Green' building design market is that the associated risks and potential litigation may keep the firm from pursuing some projects. Duane Morris LLP, partner at Edward B. Gentilcore summed up the concern by stating "Letting green building get bogged down in claims will make it more expensive and less attractive" (Tulacz, 2008). However, the author of this project believes that as long as known risks continue to be defined and reviewed as related to each specific project, a firm such as ABC-KC can benefit from 'Green' building designs with limited exposure to risk.

CHAPTER 3: PROCEDURE AND METHODOLGY

This analysis of 'Opportunities and Threats of Green Building Design for ABC Engineers, Kansas City' required the author to: research the current condition of 'Green' design in the commercial sector of the construction industry; analyze ABC Engineer's position in the market; define Kansas City's 'Green' Clientele and needs; research the risks involved with 'Green' Design; and review historical legal cases that closely relate to the issue. Due to the recent rise in energy and fuel costs, 'Green' building is a current topic in the United States. The abundance of recent literature was gathered and significantly focused to fit the efforts of this report to most greatly benefit ABC-KC.

The current condition of 'Green' design was researched to establish a baseline of the consumer attitude and needs for design firms to pursue innovative methods of reducing building energy consumption while increasing occupant health and experience. This research was gathered through many sources including professional journals, blogs, recent publications, and media news articles. Some of this information was tailored toward the general public. However, many construction industry specific sources that added essential facts were used as a platform for this field project.

As an employee of ABC Engineers Kansas City office, the author has utilized several sources to analyze the company. These sources include proprietary company documentation, marketing materials, and financial information. Other valuable information has been retrieved through conversations with Principals and Associates at the corporate office in Denver, CO and in the local Kansas City office. Lastly and most importantly, feedback gathered through discussions with former and current clientele as well as competing engineering firms has added value to the analysis.

An analysis of Kansas City's 'Green' market was required to project the opportunities for ABC Engineers in this market segment. Numerous local architecture firms pursuing and encouraging 'Green' design provided an abundance of viewpoints

and case studies while local chapters of professional organizations such as the USGBC, AIA, and ASHRAE provided invaluable technical resources. Local business journals and media also added documentation to projects, decisions, and concerns expressed in the Kansas City market.

Defining the threats associated with 'Green' building design required research of legal aspects associated with architecture, engineering, and construction. The most valuable risk analysis information came from recent blogs and publications from legal firms who are currently dealing with associated issues. Insurance providers for professional services have also published their viewpoints on threats of 'Green' Design to assist Professionals in keeping a clean record of business. An unnamed Sr. Attorney with a non-competing engineering firm also dealing with issues similar to 'Green' design concerns was utilized to clarify the legal jargon and legal aspects included in this analysis.

Dozens of historical legal cases were researched and pared down to a handful of those which the author found to relate to the subject of this field project. These legal cases provide an eye-opening perspective on past United States judicial rulings for issues relative to 'Green' design concerns for engineers such as ABC Engineers. Review of such cases provides an interesting vantage point as to why concerns exist with the associated threats of designing 'Green'.

These five areas of analysis were developed in conjunction with the financial, marketing, business strategy, and law coursework performed in the Engineering Management department at the University of Kansas. The framework of those courses added significant influence and provided the author a professional vantage point of the topic. Information from these aspects was used to generate the directly applicable analysis of opportunities and threats of 'Green' Building design for ABC-KC presented in the results section of this report.

CHAPTER 4: RESULTS

Opportunities and threats are evident for ABC Engineers Kansas City office in 'Green' building design. These results provide a baseline for the company to use when considering their place in the market, how much effort must be put forth to proceed down this path, and what to watch out for when doing so.

Opportunities

The following analysis of opportunities available for ABC-KC includes several components used to create a marketing plan. This format was the authors' choice as an efficient, easily adaptable method to define such opportunities. The components herein include a market review, customer review, assumptions/risks, competitive advantage, forecast, value equity, and relationship equity. These components provide and understanding of how ABC-KC fits into the grand picture of 'Green' building design. Information included within this section expands beyond published text and applies current data and market facts to this specific company.

Market Review

Market Analysis

A broad overview of the market that the author of this project illustrates ABC works within is shown in diagram D-1: Market Hierarchy. In the Construction industry, ABC focuses on the commercial segment. For the purpose of this analysis the author considers ABC-KC to work in the traditional design method with the new focus in 'Green' Design. ABC-KC then will provide these solutions to their customers.

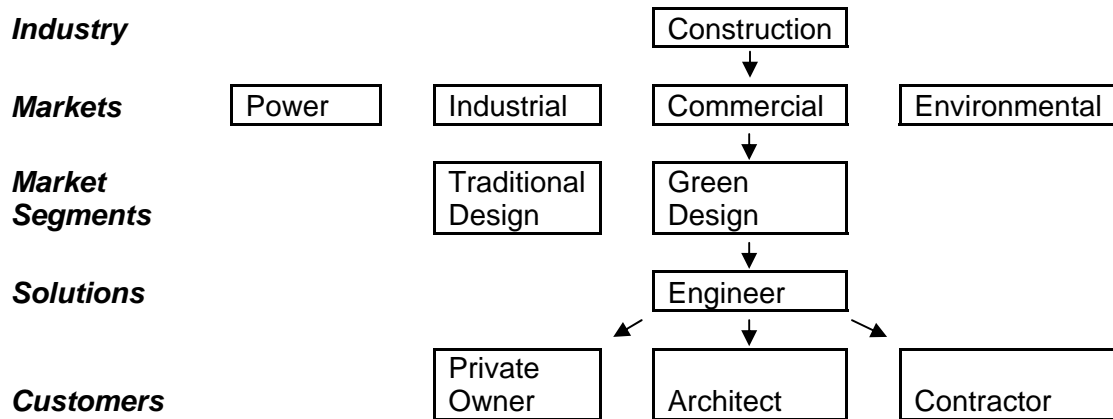


Diagram D-1: Market Hierarchy (according to author)

The following market research summary illustrates critical information related to the Market Hierarchy pictured above. The construction industry and commercial market is split into ‘Traditional’ and ‘Green’ market segments. A consulting engineering firm such as ABC-KC is in a unique situation and is in the position of being a mandatory part of a ‘Green’ Design solution. Owners expect an increased level of quality, ingenuity, and professional responsibility in ‘Green’ building designs. Higher expectations are often due to the fact that traditional design techniques and traditional specified equipment are being replaced with newer system types and technologically advanced equipment that the clients are not familiar with. They can no longer rely on their own experience and knowledge to guide their decisions when planning a project such as budget, equipment lead times, energy payback projections and satisfaction with the finished product.

To gain an understanding of the construction industry and bring this market into perspective, a summary from the 2002 U.S. Census reported that the value of work performed by mechanical and electrical contractors in the construction industry is over two hundred billion dollars per year. (U.S. Census Bureau, 2002). Looking at a local level, the overall construction value in the Kansas City area is around 5 billion dollars per

year. The number of employees working in construction in Kansas City is nearly eighty-thousand. (ThinkKC, 2006).

The USGBC's LEED certification has the best documentation on 'Green' buildings. The trend for 'Green' building design has rapidly grown between 2002, 38 LEED certified projects, and 2006, 265 LEED certified projects. Most of these projects were in new construction, however about 25% were certified renovations or other. The building type most dominant in the growth of certified projects are multi-use facilities, 18.6%, commercial office, 13%, and higher education, 6%. (Yudelson, 2008). Looking specifically at ABC's corporate focus on sports venue projects, the Washington Nationals Ballpark was the first sports venue to become LEED certified, silver and was a great opportunity for ABC to expand their 'Green' portfolio. (Billau, 2008)

Other 'Green' programs that are helping drive the market are Energy Star, CHPS, and Standard 189. Energy Star was developed in the early 1990's by the U.S. Environmental Protection Agency (EPA) to set appliance efficiency standards. A recent EPA survey reported that Energy Star buildings save \$0.50 per square foot and operate 35% more efficiently. The Collaborative for High Performance Schools, CHPS, is a program that was created in 2000 to provide technical resources, and a benchmark system for school districts. The CHPS is known for helping school districts build healthier, energy efficient schools. Standard 189 is currently being developed by the USGBC, ASHRAE, and the Illuminating Engineering Society of North America (IESNA) to be a baseline 'Green' building standard. Their intent is to bring 'Green' building practices into mainstream building design and construction by incorporating the standard into local building codes in the future. (Yudelson, 2008).

The local market in the Kansas City area accommodates over ninety architecture firms. (AIA Kansas City, 2008). Many of these architecture firms market their own

services to a broad range of project types within the realm of ‘commercial’ and several focus their efforts on a more narrow area such as retail, churches, education, offices, or sports facilities, etc. Out of this group, twenty-three firms are registered with the Kansas City chapter of USGBC. (USGBC Kansas City, 2008) These architecture firms as illustrated in Diagram D-2: Kansas City Architecture Firms.

180 Degrees Design Studio, LLC	Fredrick Truog & Assoc Architects, Inc.	Pendulum Studio LLC
***360 Architecture	***Gastinger Walker Harden Architects	Peters & Associates, Inc
3F30 Architects, Inc	Gentry Design Studio	***PGAV Architects
Architeam	***George Butler Associates, Inc.	Piper-Wind Architects, Inc
ASAI Architecture (See PGAV Architects)	go studio	Rafael Architects, Inc
ATA Architects, LLC	Gossen Livingston Associates	RDM Architecture
Atha Architecture P.C.	***Gould Evans Associates	Rebecca Riden AIA Architect
BeFree Architecture LLC	Guenther Mills Keating Architects, Inc	Reed Architects
Bell/Knott & Associates	***Helix/ Architecture + Design	River Bluff Architects, Inc
***Berger Devine Yaeger, Inc	***HNTB Architecture, Inc.	Ron Reid Associates, P.C.
BlueBike Architects	***Hoefler Wysocki Architects, LLC	Rose Design Group, Inc.
***BNIM	***HOK Sport Venue Event	Rosemann & Associates, PC
Bowman Bowman Novick, Inc	***Hollis & Miller Architects	SFS Architecture
***BRR Architecture	***Horst, Terrill & Karst Architecture, P.A.	Shaw Hofstra & Associates
Bucher, Willis & Ratliff Corporation	Howard & Helmer Architects P.A.	Solomon Associates Architecture
CP & Associates Architects and Planners	hufftprojects llc	Stark Wilson Duncan Architects Inc
***Crawford Architects, Inc	Innovative Design and Renovation	Summit Architecture, P.C.
Davidson & Associates, Inc	International Architects Atelier	Susan Richards Johnson & Associates
Davidson Brown, LLC	James Brown Architect & Associates	Tevis Architectural Group PA
Davison Architecture + Urban Design LLC	James D. Marshall, Jr., AIA	The Clark Enersen Partners
Dean W Graves, FAIA Architect	Junk Architects	TK Architects
Design Build Team, Inc.	Linscott Haylett Wheat Architects	***Tompkins Architects
***DLR Group	Mantel Teter: Architects	***Trenor Architects, P.A.
E. Crichton Singleton, FAIA, Inc.	Mary T. Cyr Architect	Urban Prairie Architectural Collaborative, P.C.
E. Eugene Young, Architect, AIA	McHenry Shaffer Architecture	Warman Design Group Architects
Easom J. Bond III, AIA, LEED	Moody Nolan, Inc	Warner Nease Bost Architects, Inc
Ecological Architecture P.A.	***Nearing Staats Prelogar & Jones AIA Architects	Wellner Architects, Inc
***el dorado inc.	Neil E. Minter Architects	Wendlandt & Stallbaumer
Ellerbe Becket	***Nevius Serig Palmer Architecture	***Williams Spurgeon Kuhl & Freshnock Architects, Inc.
Endecott Architecture	Nolte & Associates, P.A.	***Wilson Johnson Embers
Frank Zilm & Assoc., Inc	Patric J. Tierney Architect AIA PA	

Diagram D-2: Kansas City Architecture Firms (bold, starred firms registered with USGBC) (AIA Kansas City, 2008) (USGBC Kansas City, 2008)

The local market in the Kansas City area accommodates almost twenty engineering firms that are direct competitors with ABC-KC. These firms commonly market their MEP consulting services to the same architecture firms as ABC-KC and pursue similar project types. (Blue Book, 2008). Out of this group, thirteen firms are registered with the Kansas City chapter of USGBC. (USGBC Kansas City, 2008) These consulting engineering firms are illustrated in Diagram D-3: Competing Kansas City MEP Engineering Firms.

***BGR Engineers	***Gibbens, Drake, & Scott	***M.E. Group
***George Butler Associates	Gladfelter Engineering Group	***Olsson Associates
***W.L Cassell & Associates	***Henderson Engineers	***PKMR
Clark Enerson Partners	InSite Group	***Professional Engineers
***CRB	***Lankford & Associates	***Smith & Boucher
Custom Engineering	***Larson Binkley	Sys-Tek Companies
FSC		

Diagram D-3: Competing Kansas City MEP Engineering Firms (bold, starred firms registered with USGBC) (Blue Book, 2008) (USGBC Kansas City, 2008)

Today's 'Green' building market is one of which many firms have developed 'Green' marketing techniques and achieved great successes in doing so. With the USGBC approaching fifteen years in existence and the LEED certification program seven, several engineering firms have taken a leading role in the 'Green' market segment. (Yudelson, 2008) ABC as a corporate entity ranks 311 out of the top 500 design firms in the United States. As for being 'Green', ABC doesn't make the list, which Engineering News Record reports the top 100 Green Design Firms. (Tulcaz & Taylor, 2008)

Why are owners interested in building green? LEED buildings command rent premiums of \$11.33 per square foot over their Non-LEED peers and have 4.1 percent higher occupancy. LEED buildings are selling for \$171 more per square foot than their Non-LEED peers. There are several benefits as to why LEED buildings are bringing in

higher revenues, but it really comes down to the fact that supply has not kept pace with demand. There is a strong economic case for building 'Green'. (Burr, 2008) According to a Costar Group study, at year end 2006 Kansas City had 18M sf of Class A office space, commanding rent of \$20.3/sf. In comparison, there was 53.5M sf of Class B office space earning \$16.66/sf. There is only 17.5M sf of Class C office space earning \$13.5/sf. Class A, B, and C had vacancy rates of 15.5, 14, and 13% respectively. (ThinkKC, 2008) These statistics did not include several projects under construction around the Kansas City area that will be classified as Class A office space. Any 'Green' office space, especially those that are LEED certified, will most likely fall into the Class A category based on the values presented by Andrew Burr. (Burr, 2008)

This project's author has experienced the 'Green' market trend for Kansas City significantly increase in the last five years. Large facilities such as the IRS complex, as well as smaller entities such as the J.E. Dunn corporate office building and Johnson County Sunset Office Building have chosen to build 'Green' facilities in both the downtown and suburban areas. Johnson County, KS (part of the Kansas City metro area) recently completed its LEED Gold Certified project and gained national attention. (Johnson County, 2006) A Kansas City Star newspaper article survey reported that the Sunset Office Building is one of the top 10 favorite buildings in the metro area. (Kansas City Star, 2008) The construction of the new Wizards stadium located near the Grandview Triangle area, accessible from many areas of the Kansas City metropolitan should spark interest in more 'Green' building efforts as the owners and design team are considering several 'Green' design concepts (Zorn, 2008). These 'Green' projects, along with several others, have helped build interest in the 'Green' market in Kansas City.

It is evident that Kansas City is full of opportunities for 'Green' building design, but even more beneficial to ABC-KC is that several local architecture firms stand out

above and beyond the crowd as mentioned in the introduction. Of the large architecture firms, HOK ranked first based on 2007 billings for 'Green' building design. Nationally they employ 612 LEED certified staff and reported \$151M in 'Green' revenue accounting for 23% of their total revenue, mostly in retail office and government projects. (Tulcaz & Traynor, 2008). HOK expressed an early commitment to 'Green' buildings and published their shared expertise on the subject in the late 1990's in one of the leading texts on 'Green' buildings. (Yudelson, 2008). A second edition was released in 2006. (Mendler et al. 2006). It should be noted that HOK Sport+ Venue+ Event, in Kansas City, is the architecture firm with the highest billings for ABC through the efforts of the Denver corporate office. (Billau, 2008)

The 'Green' engineering market offers an opportunity for growth and profit for ABC-KC because of the strong push from the USGBC and the Department of Energy to reduce energy usage in all types of facilities. Consulting Engineering firms such as ABC-KC must stay ahead of the game and exceed the recommended standards in design to sustain the high level of service they have built their reputation on.

Company Analysis

ABC-KC's performance in the Kansas City market has just recently started being tracked separately from the Denver office since the office opened. ABC reported a 2007 total revenue of 39.8M with 97% in the commercial building market. (ENR, 2008). When the Kansas City office was opened in 2006, as described in Chapter 1, with 2 employees all of the projects were financially tracked out of the Denver office. It didn't take long for a required staff increase to take place due to need for a local presence to assist the Denver corporate office as well as work on jobs specific to the Kansas City office marketing efforts. (Billau, 2008)

Until now it has been difficult to analyze what percentage of the local business ABC-KC holds out of the total of 19 direct competitors. Additional clarity is expected for 2008 as ABC-KC continues financially tracking more projects through the Kansas City office. (Billau, 2008)

Market Choice

The 'Green' Building market is the right choice for ABC-KC. ABC-KC's Engineers are highly competent with skills readily adaptable from traditional design to 'Green'. All of their Engineers have a strong opinion on environmental issues and are dedicated to increasing sustainability in good engineering design. There will continue to be a strong market in Kansas City as more Coastal cities take the lead and locally owners become more increasingly aware of the benefits to building 'Green'. Also, government agencies continue to evolve requirements for reduction in overall energy usage, which is being written in nationally adopted building codes.

The 'Green' Building market matches the strategic goals of ABC-KC. An increasing opportunity exists for ABC-KC in this market since there are many Architectural firms in the Kansas City metropolitan area that are also pushing 'Green' Design. As previously mentioned a successful start to meeting the current goal of working on a USGBC 'LEED' Certified project is yet to be accomplished. Doing so will gain local recognition and open a door for architects to inquire about services for additional 'Green' Projects.

Customer Review

Customer Characteristics

ABC Engineers Kansas City office (ABC-KC) customers have been defined by the historical projects and needs established from the Denver office and are being refined internally since the company's inception to meet the local demand. In order to continually refine the customer base, the customer types, and problems customers experience in the market, feasible customer's evaluative criteria are frequently reviewed. The information analyzed is critical to the future planning and ultimately the success of ABC-KC.

The targeted customers can be categorized as ultimate, intermediate, and feasible. Ultimate customers are everyone in the market that could use ABC-KC's services. Although future plans are to expand to a wider market, the current marketing strategy applies to the local Kansas City area. Therefore, the ultimate customers are defined as all architectural firms that are located around Kansas City. The intermediate customers are narrowed down to those that "can afford" and "want" ABC-KC's services. This eliminates all architects who work on small residential projects who do not want to pay for quality, detailed engineering services. Also removed from this category are architects that are located out of town and those that employ "in house" engineering. Lastly, feasible customers with whom ABC-KC expects to work throughout the next year are architects who work on 'Green' projects with requirements of size, schedule, and location, and are comfortable with associated billing rates in relation to the level of quality service provided.

Customers in this market often face problems finding a good match with an engineering firm that consistently meets the defined scope of work. All too often schedules are delayed and the engineer doesn't put enough effort into coordinating the

design with all other trades. Another common problem is that over billing occurs when the firm puts more effort into a project than requested and the client agreed to be billed on an hourly basis. In addition, customers may be displeased if immediate design changes are requested when a project is under construction and the engineer is busy on non-related projects. In this case, the engineer may not be able to devote immediate attention to the customers concern.

Several opportunities that customers see in this market exist. They actively seek out engineering firms to provide consulting services on these projects. Many architects see each project as a unique opportunity to involve the best engineering firm suitable for the project type. The right firm must be found at the right price for the architect or contractor to develop the most efficient team possible to meet budgets. In the end, if the correct engineering firm is hired, the project has the best chance to be profitable.

Feasible customers, including the architects previously discussed evaluate engineering services prior to selecting a firm to work on a project. Evaluation criteria include several aspects of business, technical expertise, relationship, and value. Aspects of business are evaluated to ensure that the firm has good leadership, stable finances, an adaptive schedule, and a quantity of personnel to staff the project. Technical experience is evaluated by analyzing the company portfolio of past projects and requesting the project engineer's resumes. Relationships with an engineering firm's principals and associates may be established. However, architects and contractors can interview a firm, speak with other architects and contractors that have worked with a firm, and contact references supplied by the firm if a relationship is not established. Feasible customers can evaluate value by agreeing on the level of service expected with the engineering firm and defining the scope of a project. With this information, a firm will be able to formulate a cost for the requested services. It is then up to the customer to

determine if the value is over/under or fairly priced. These are typical items that feasible customers evaluate prior to selecting an engineering firm to ensure that the most suitable firm is selected.

Feasible customers may prioritize the evaluative criteria differently depending on the type of project and services for which they are hiring an engineering firm. For example, if an architect already has a good relationship with several firms, they may ignore the business aspects and evaluate based on technical expertise and value. If an architect is working on a 'Green' project, and/or a state of the art, unique facility they may look at the relationship, business, then technical experience and pay little attention to value. Another example is an architect searching for a firm to work on a laboratory or medical office in which technical experience may outweigh relationship, business, and value. Contractors commonly use similar guidelines; however value and relationship are frequently of higher importance than anything else. Feasible customer's criteria can be defined as being very "fluid" and change from project to project.

Customer Demand

Research for each level of demand including ultimate, intermediate, and feasible has unveiled how many customers make up the Kansas City market as mentioned earlier. At the ultimate level there are 214 architecture firms. Intermediate customers account for about 40% of the ultimate customers with 83 architecture firms. The feasible customers currently include approximately 40% (34) of the local architecture firms.

Customers are analyzed under various conditions. All of the customers at the feasible level are considered current. Some of these customers have already requested repeat business from ABC-KC since the relatively short existence of the office. There

are feasible customers that look to hire ABC-KC on a back-to-back basis resulting in a consistent flow of work. The remainder of feasible customers only hire ABC-KC at very limited intervals. All intermediate customers are considered to be prospective customers and as ABC-KC expands their client base they will look to this group for future growth.

Customer Database

ABC-KC is in the process of organizing a client database that can be easily used as a reference for contacting customers and distributing marketing materials. The database will be relatively simple and is organized by individual customer names and includes the company they work for, address, phone, and email information. Information that could make the database more useful would include more functionality such as searching for customers by company name. Also, it would be beneficial to track the projects that each customer was involved with, the fees, and the profit/loss of each.

In order to expand in the market and transition intermediate customers into feasible customers, ABC-KC must strive to obtain information on each. This information typically comes from three main sources. When an architect hires ABC-KC to work on a project for an owner that does repeat business, the owner may hire a different architect for a future project and request that the architect use ABC-KC for the engineering services. The new architect is immediately added to the database and will be moved into the feasible category. The second method of obtaining information on intermediate customers is when the customer hears of ABC-KC and calls to request services. This customer is not considered a feasible customer at this point but is added to the database. Lastly, when individuals that work for architects or contractors make career changes and move to a new company they typically introduce ABC-KC to that company and continue their working relationship. All of these ways have proved to be effective means of gathering information on intermediate customers.

Assumptions/Risks, Competitive Advantage, and Forecast

Assumptions and Risks

Assumptions are necessary to forecast the future trends of ABC-KC's customers and market. These assumptions are categorized into primary and secondary for tracking the relevance of each. Primary assumptions include all issues that are feasible and represent a legitimate level of risk. Secondary assumptions include issues that are low risk but require documentation.

Primary assumptions ABC-KC has pinpointed are that Architects:

- will continue experiencing the recent level of growth
- do not shift to hiring more extreme specialized engineering firms that solely work on 'Green' building design
- continue progressing the trend for incorporating 'Green' concepts, products, and certifications
- do not attempt to provide all of their 'Green' priorities in-house and continue to use consultants
- give ABC-KC the opportunity to work on innovative 'Green' projects that extend beyond the current level of experience.

Secondary assumptions ABC-KC sees are that Architects:

- continue to operate from offices located in the downtown area in close proximity to ABC-KC's office
- understand the value of the quality service vs. price
- pay their invoices in a timely manner.

Primary assumptions ABC-KC established for the market as a whole include:

- local code inspectors will continue requiring professional engineers seal to obtain building permits
- the local Kansas City market boom will continue throughout the metropolitan region
- the market continues to push “Green Building” environmentally friendly design that ABC-KC has capitalized on as a growth opportunity.

Secondary assumptions ABC-KC sees include:

- the number of similar local consulting engineering firms seen as “competitors” remains constant or decreases
- there is an increased opportunity for working with architects outside of Kansas City
- the available fees for engineering services relative to overall project cost remain constant.

Risks are always present in the consulting engineering business. There are two types of risk that have been identified for ABC-KC; internal risks and external risks. Risks are required to be taken every day inside the office, speaking with clients, and meeting with contractors. These items include those that liability insurance is not in place for. Liability insurance is required simply to operate in the market similar to many other professional industries such as medical, legal, etc. Even though liability insurance is required, it only covers a small percentage of the overall risk for a company.

Internal risk associated with the customer and market is not covered by insurance and do not offer any reward. It is the risk taken when communicating with clients, working with vendors, and maintaining relationships with contractors throughout any project. These risks will create, maintain, or change the reputation and branding of ABC-KC and can have a “make or break” affect on business. Relationships may be the single riskiest internal item that can be controlled through processes and maintenance.

External risk includes items that are out of ABC-KC's control. Included in this category are the economy, government, and weather. Economic ups and downs have been experienced throughout the last century and even in the last decade. There is a direct relationship between the construction industry and the market. Government rules and regulations mandate everything from engineer's requirements for permits to environmental impact regulations. These external risks generally affect all similar engineering firms and may impact the entire industry.

Competitive Advantage

ABC-KC has many competitive advantages when working with architects in the Kansas City area that has led to increased success. While other local firms may have competitive advantages of their own, none have duplicated the working set that ABC's corporate office in Denver has built throughout the years. As other firms encroach on a competitive advantage, the reaction is to modify the advantage, increase the effectiveness of the advantage, or redefine the advantage and establish new.

The current advantages consist of those that distinguish ABC-KC from other similar local consulting engineering firms include:

- advanced production software is used that directly integrates with the platform used by architects. Many engineering firms continue to work with dated software that limits accuracy and coordination
- employee retention continues to be an advantage. Training is minimized and culture is easy to maintain under this condition; premium level of quality and attention to detail during engineering design allows clients to obtain the best possible end product
- consistency in project deliverables is notable from several references. Clients like to know what they are getting.

Several ways in which a focus on 'Green' design has benefited other companies include: (Yudelson, 2008)

- Differentiation for the company in the marketplace, helping it stand out from competitors
- Adds to the company's "skill set" in a way that brings value to clients
- Builds employee morale by integrating a company's values with its practice
- Assists in recruiting new employees who value sustainable design
- Helps keep experienced employees with the firm (because of the current shortage of experienced green designers, many other firms will be trying to hire them)
- Attracts new business and helps retain current business from clients who want the benefit of green buildings without paying to help a firm learn about them.

Previously defined strengths match the feasible customer's evaluative criteria. ABC-KC operates in a way where the staff can adapt to changes, the type of projects available to work on, and client's requirements and desires. Client's problems change daily and expectations can vary greatly. Being flexible continues to be a key strength that stands the test of time in the consulting engineering business. There are no problems or opportunities defined that ABC-KC is not prepared to handle in the future. Problems are faced head on as challenges and opportunities for new experiences.

While some architects request the services of ABC-KC based on their strengths, notably detail and coordination, others do not. The attention to detail requires more time. If the client's schedule does not allow for the typical strengths to be applied to a given project, an agreement can be made up front to deliver a given project or group of projects at a rapid schedule with a decreased level of detail and coordination, and fee. While the architect wants the project to be "constructible", they may have a good working relationship with their contractor and want the majority of coordination to be done on the job site, not on paper in the engineer's office. However, if an architect is truly looking for the best of speed and price (i.e. faster, cheaper) they typically do not seek services from ABC-KC. There are other local engineering firms that specialize in that market segment.

ABC-KC's direct competitors consist of a few other local consulting engineering firms that target the same architects and the same types of projects. Each firm has its own unique strength which gives them a unique competitive advantage over their competition. Competition truly exists when firms try to sell themselves on the same strengths as other competition. Since most local architects know the choices available for engineering services they can determine up front what firm they would like to work with. There are six (6) engineering firms that can be categorized as direct competitors in the local market and four (4) that indirectly compete.

ABC-KC is currently estimated to staff the lowest number of engineers and earn the lowest annual revenues when evaluating the 6 local competing engineering firms. There is a direct correlation in this industry between these two values, however the key value that ABC-KC prides itself on its profitability. Unfortunately, since most engineering firms are privately held companies, other firm's balance sheets are not easily obtained. It is suspected that as a matter of percentage, ABC-KC is above average in the group.

Therefore, this discussion of competitive advantage illustrates that ABC-KC currently operates as effective as or more effective at meeting the needs of architects than any of the direct local competitors. ABC-KC must continue to forecast customer and market changes and stay ahead of the competition to match architects constantly changing needs and requests. Success can be measured by simply talking with repeat clients about ABC-KC's performance on past projects in addition to reviewing profitability of each.

Forecast and Objective

Forecasting and defining objectives plays an integral role in the success of any consulting engineering firm. ABC-KC must do so to stay in-line with the market place, which in turn increases overall revenues and profitability. Based on past experience, along with market research reviewed earlier in this report, the author has forecasted the expected number of 'Green' projects for the coming year, 2009. These projects have been broken up into small, medium, and large each with their respective average revenue. In addition, once a project is defined to be 'Green' the projected fee is increased 25%, 20%, and 15% for S/M/L projects respectively due to the heightened expectations, effort, and liability. The following revenues reflect only the additional value related to the 'Green' premium charge.

Tracking project types helps illustrate the focus of the company. Small projects are considered projects with an average revenue of \$25,000 with a \$6,250 'Green' premium. Medium projects have revenues averaging \$75,000 with a \$15,000 'Green' premium. Large projects have revenues averaging \$150,000 with a \$22,500 'Green' premium. The author forecasts to have the following number of each project based on the 2009 target revenue of \$950,000 as determined by ABC Engineers: (Billau, 2008)

Overall Projects and projected revenues:

- Small Projects Qty=8 Revenue= \$200,000
- Medium Projects Qty=6 Revenue= \$450,000
- Large Projects Qty= 2 Revenue= \$300,000

Total # Projects = 16 Total Revenues= \$950,000

'Green' Projects and projected revenues from associated fees.

- Small Projects Qty=0 Revenue= \$0
- Medium Projects Qty=1 Revenue= \$15,000
- Large Projects Qty= 1 Revenue= \$22,500

Total # 'Green' Projects = 2 Total Revenues= \$37,500

The long term overall sales forecast is that of constant growth is constant at 10% per year. However additional revenues expected from 'Green' services will have a rapid growth of 15%, 25%, 40%, 60%, 85% for the next 5 years and will flatten out at the rate of 75%, 65%, 50%, 30%, 5% as the 'Green' building concept becomes an industry standard and can no longer be charged as an added service. Therefore, a graph of total anticipated revenues from 'Green' projects over the next ten years is as indicated in Diagram D-2:

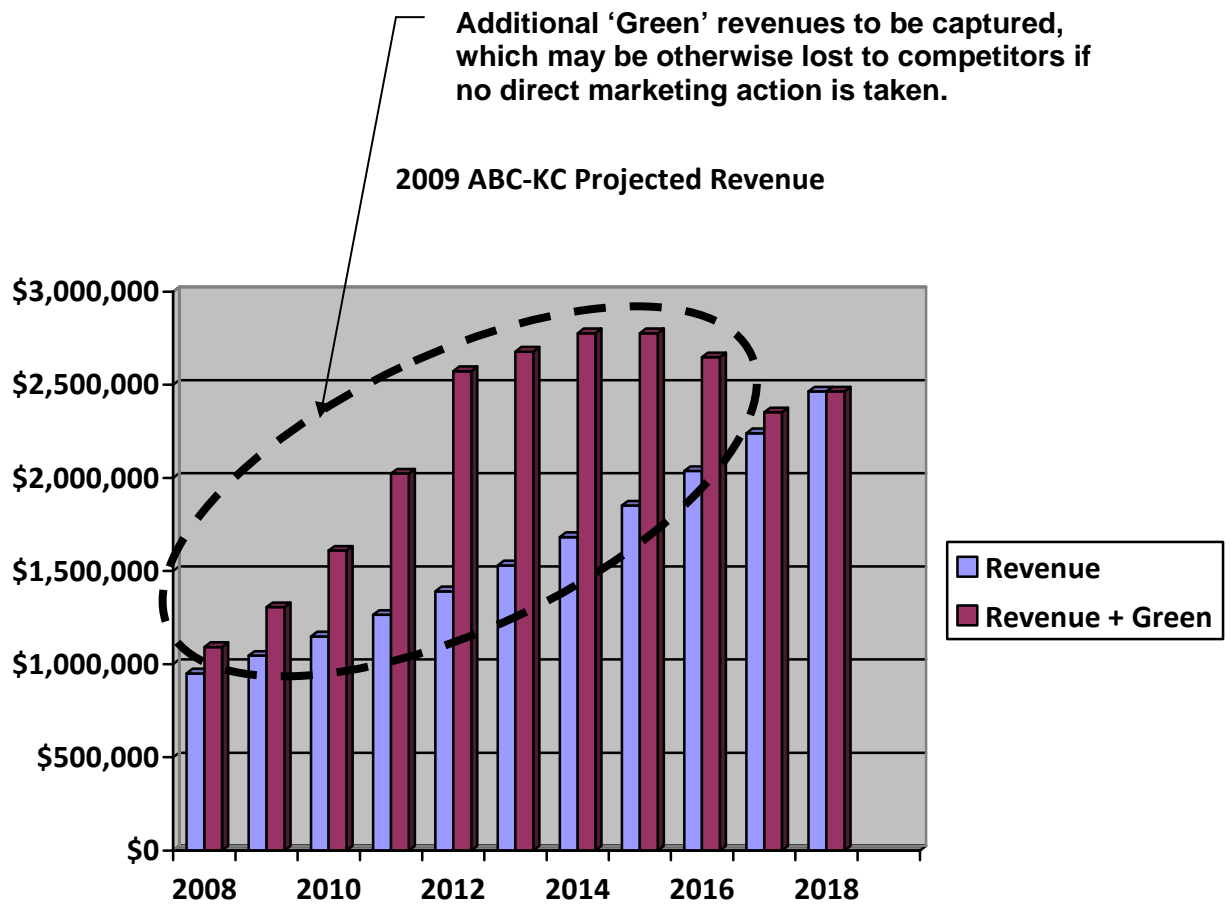


Diagram D-2: 2009 projected revenue based on 'Green' project assumptions

This forecast in project and revenue growth has been developed to meet the objectives of increased market share, company growth, and overall profit. These numbers are dependent on the actions taken by the Associates of ABC-KC including

increasing marketing, sales, workforce, and customer satisfaction. These numbers are obtainable if ABC-KC continues to create and maintain good working relationships with new clients and those that exist. It is not foreseeable that ABC-KC's client base would want the work style or service type to not incorporate the latest trends of building design such as 'Green'. Modifications will be made if the 'Green' market shifts to project types outside of ABC-KC's current scope.

Measurable objectives that have been set to reach the projected 'Green' project and revenue goals are the following:

- Require every Engineer in the KC office to obtain their LEED certification from the USGBC.
- Register every Engineer in the KC office with the Kansas City USGBC chapter www.usgbckansascity.org
- Become a Kansas City USGBC chapter Silver Level Sponsor, which is equal to feasible clients and competitors. The following rate schedule applies to the current sponsorship levels:
 - Platinum - \$5,000/yr
 - Gold - \$3,500/yr
 - Silver - \$1,500/yr
 - Green - \$500/yr
- Attend Kansas City USGBC Chapter meetings
- Attend USGBC seminars and courses related to 'Green' building design.
- Designate single point of contact in the KC office to keep up with current 'Green' market trends, pursue 'Green' client relations, track upcoming

local 'Green' projects, update and organize 'Green' proposal materials, etc.

- Familiarize all KC office employees with the already established Environmental Physics Group (EPG) and associated website based out of the Corporate Office in Denver, and utilize this as a marketing tool in the local KC area.
- Add a Kansas City representative to the Environmental Physics Group Team based out of the Denver office.
- Assist Denver office in updating Environmental Physics Group Website with Kansas City projects and information.

Value Equity

Objectives

Measurable goals and objectives have been established to improve ABC-KC's competitive position. These goals and objectives will add "value" to the customer and are in place to increase the overall quality that ABC-KC has defined as a premium level of service to their clients. These goals will continue to establish the reputation that ABC-KC is striving to achieve. The goals and objectives defined by the author are as follows:

- Provide marketing materials for all 'Green' projects being presented on when part of a design team including high resolution photographs, summary write-ups of systems types, etc.
- Inform clients of 'Green' design practices available for each project type

- Design building to acquire 'Green' certification objective by owner on established construction budget.
- Deliver projects and 'Green' information to the USGBC by promised delivery date and time.

Goals for knowledge enhancement have been established to keep ABC-KC's employees informed of 'Green' technological and product enhancements, innovative design strategies, and current codes and regulations in the industry.

- Attend one USGBC event per person per month
- Have one vendor who manufacturers 'Green' products come into the office and give presentation per month
- Include clientele in the meetings and serve as a 'Green' learning center

Strategies

A strategy has been developed to accomplish each goal and objective defined above. These strategies will help ABC-KC find success in the defined goals. All of the following goals related to 'Green' projects are the responsibility of the Engineers in the office, and not the direct responsibility of designers and administrative staff. Because of this, it is important that each Engineer believes that the goals and objectives listed are obtainable and will provide greater service and satisfaction to ABC-KC's clients.

The first two goals, providing marketing materials and informing clients of 'Green' design practices, are achieved early in the marketing and design process of any project. When architects assemble project teams for selection by an owner to work on a project they often ask a consulting engineering firm to join them in presenting project portfolios

to an owner. Having professional quality marketing materials, (ex: website, PowerPoint presentations, and leave behinds) for the client to incorporate into their presentation upon request can be a great added value as well as indicate to the owner that an experienced, knowledgeable Engineering firm is part of the team. Informing clients about 'Green' design practices available for the project type assists them in the early stages of planning so that the 'Green' elements can be part of the project.

The third goal, designing a building to acquire 'Green' certification on budget, is derived from the fact that often Engineers in the industry do not typically do a satisfactory job at designing to budget. This becomes especially true when designing 'Green' projects where equipment is state-of-the art and at a premium price, construction techniques to install 'Green' systems may be somewhat unfamiliar and require more coordination and installation time than commonly budgeted for. It is the Engineers' responsibility to keep the client aware of the potential general budget implication of any systems that are required for LEED certification from the USGBC. Last minute, major budget corrections may prevent a project from achieving the 'Green' status goals established early in the projects conceptual design, with a negative impact on client respect, trust, and overall relationship status.

The fourth goal, delivering 'Green' projects on time, makes or breaks an entire project. Often engineers work to the wire on designs, however it has been discussed with clients in the past that they would rather receive deliverables on time and have to go back for minor corrections, than to have a project delivered late. This is commonly a difficult concept for engineers, who are known to be perfectionists of sorts, to comprehend.

There is a price/value relationship for each of the goals and objectives discussed. These goals are all achievable if they are made a priority and budgeted time is

appropriately allocated to accomplish each. From a client's perspective, the elevated level of detail and coordination related to a 'Green' project will be a reality when a project is under construction. Both detail and coordination are directly related to how much time is spent on a project, which as in most businesses time equals money.

Relationship Equity

Current and Future State

Maintaining good relationships in the consulting engineering business is critical for the success of any firm. Satisfied clients lead to repeat business in engineering projects negotiated directly with clients, which is the largest percentage of projects. Engineering firms such as ABC-KC analyze the current and future state of relationships with customers to rate past performances and make adjustments to achieve the future outcome sought after.

The current state of relationships with 'Green' architects is one in which clients are unaware of ABC-KC's interest and capabilities in 'Green' design. However, ABC-KC has created a "brand" that architects identify as a quality service that they can rely on for traditional projects. This benefits ABC-KC because the architects have a tendency to be more forgiving of mistakes and miscommunication, knowing that it is not typical of the brand. Also, the "brand", which is associated with the name, logo, and employees, can be spread by word of mouth through vendors, contractors, and project portfolios. However, the "brand" is not strong enough at this point to convince customers that ABC-KC's services are the only solution available for 'Green' projects.

ABC-KC is continually trying to gain new 'Green' architects as customers as well as increase current architect's repeat 'Green' business. It is extremely beneficial when a customer gives testimonials of exceptional experiences that can be used in 'Green' marketing materials.

Marketing Communications

Commonly, consulting engineering firms in the industry have had a challenging time finding effective means of communicating with existing and new customers. Currently, 'Green' marketing mediums are limited and only consist of the Denver offices Environmental Physics Group website. While this medium is effective in establishing awareness of 'Green' design, it does not directly attract new customers. The current medium only applies toward the feasible market. No tools are in place to market toward the intermediate market. A new idea to expand the marketing strategy to include the intermediate market is becoming involved with the local chapter of the USGBC by following the objectives described earlier in this report.

Relationship Budget

The authors defined 2009 'Green' annual revenue is \$37,500. This budget has been determined based on the current number of engineers and designers and associated billing rates. It also represents a sales increase of 0% from 2008. The 2008 'Green' marketing budget was 0% of sales, which were also non-existent. ABC-KC will increase the marketing budget to 20% for 2009 in order to begin informing clients of the 'Green' services available. If 15% of the 'Green' revenue is profit, the cost of this initial 'Green' marketing effort may exceed the income, however this loss will be regained in following years.

ABC-KC will be able to increase the budget again in 2010 thru 2014 and will evaluate the situation on an annual basis. The budget will decrease after 2014 since the projected profitability of 'Green' projects will subside as previously mentioned.

A breakdown of the projected marketing budget is as follows:

Obtaining LEED Certification (\$250 per Engineer):	\$750
Annual USGBC Registration (\$50 per Engineer):	\$150
USGBC Kansas City Sponsorship (Silver level):	\$1,500
Attending USGBC Chapter Meetings:	\$1,000
Attending USGBC Seminars and Classes:	\$2,000
Creating Marketing materials for future use:	<u>\$2,000</u>
Total (20% of projected 'Green' revenue):	\$7,400

Controls and Monitors

Monitoring the marketing plan is crucial to the success of the plan. Due to the fact that ABC-KC is set up as a small company, the Engineers are responsible for acting upon, and ensuring the success of the marketing plan and being each other's checks and balances. Meetings will be held the first Wednesday morning of every month to review the previous month's marketing attempts, successes, and especially to discuss issues from client meetings. This is also an opportunity to discuss the future month's meetings and give an opportunity to cross collaborate efforts. The budget will be maintained through the Denver office software, keeping track of all time and expenses per project and specific client.

A semi-annual 'Green' marketing planning meeting will be held as a full day planning session in the Denver Corporate office to review the current state of the company's 'Green' marketing efforts. Modifications to the plan will be made at this time as needed. Outside marketing assistance may be requested to review the data acquired throughout the previous period and to provide expert advice for future actions.

Opportunities Summary

Opportunities are analyzed by utilizing several marketing tools to assess the state of 'Green' building design. These are a market review, customer review, an assumptions/risks, competitive advantage, and forecast analysis, as well as a definition of value and relationship equity. These tools are used to gather the basic information required to write a full marketing plan and prove that the opportunity exists. The forecast, which is the piece most directly tied to revenue, illustrates the additional revenue that can be obtained by pursuing 'Green' building design if the risk of threats are minimized and relative legal principles are adhered to, which are presented in the following section.

Threats

Legal Concerns

When Engineers engage in LEED projects there are several legal concerns that need to be evaluated to minimize overall risk. This discussion includes an elevation of the standard of care, client expectations, new equipment technology, owner driven decisions, and energy usage payback. Other related legal issues that Principals and their respective Attorney's need to be aware of include drafting construction and design contracts that incorporate the following (Shapiro, Shari, Obermayer Rebmann Maxwell & Hippell, 2007) :

- green building standards,
- navigating the local building and zoning approvals processes
- securing public financing
- negotiating with insurance and financial institutions
- resolving disputes over green building projects that fail to achieve their sustainability goals.

"Green building is not just a passing trend - it has taken hold and is here to stay," says Sonya Newenhouse, president of Madison Environmental Group, an award-winning, Madison-based environmental consulting firm that assists businesses and individuals with, among other things, green building strategies. According to Newenhouse, "Any attorney who is not at least somewhat conversant with the issues and terminology of green building will be behind the game." (State Bar of Wisconsin, 2007)

LEED Certification Timing

To have a building LEED certified all of the documentation and fees must be submitted to the USGBC. Many requirements included in the documentation require post-construction information from the design team and contractor. An example would be purchase orders proving that a certain amount of material used met the requirements for being recycled. The USGBC will also inspect the facility to make certain that no requirements were included in the documentation, but missed on the project site. Since certification does not occur until the construction is complete and the inspection occurs, it is too late to make design, construction process, or material changes without incurring a substantial cost. (AIA Risk Management Committee, 2007)

LEED Certification Cost

Higher certification targets usually mean higher design and construction costs which clients expect to recover once the building is in operation. Owners think that the upfront costs they bring upon themselves in the course of building a “Green” project will definitely be recouped over the life of the building. Financial expectations that don’t happen lay the foundation for fraud and misrepresentation claims for the Engineer. (AIA Risk Management Committee, 2007)

Auden Schendler and Randy Udall, referenced in the introduction, who are associated with Aspen Skiing Company wrote an interesting perspective on the associated costs in 2005 based on their experience with the issue:

“Green design substitutes intelligence and ingenuity for energy. But brainpower isn’t free; we routinely pay \$125 to \$200 an hour for it. LEED pancakes additional costs on the consultant fees. First, properly commissioning a new building to make sure its mechanical systems are performing as designed, a LEED requirement, costs on the order of \$25,000 for a small building. Granted, commissioning should be part of

business as usual, but it is not. Second, to get LEED's energy points you have to computer model your buildings performance. For something under 20,000 square feet, \$15,000 would be a steal. Next, there's a LEED registration and certification cost of \$2,250 plus USGBC membership of \$12,000, the latter not required but politically expedient. Adding the more sophisticated energy management control you need can be \$5,000 or more."

"Next, you've got to gather and collate the information you'll need to prove your case to the USGBC. If you outsource the documentation, only a saint or a fool would do it for less than \$20,000. So you're already in the hole \$68,450 for a small building. Then, near the project end, when you realize you are a few credits short of a full LEED certification, come the unanticipated expenses of upgrading the air handlers or eliminating HCFC's from the chillers or purchasing green power from your local utility." (Schendler & Udall, 2005)

Owner Financial Risk

The main concern is that clients may expect, and count on the certification and performance of the project. The "Green" design decisions may also be based on the expectation of favorable tax or financing treatment which may not happen if certification does not take place as expected. (AIA Risk Management Committee, 2007) The design team responsible for the 'Green' design may be held accountable for the projects' LEED certification. If an Owner is not eligible for the financial tax and financing benefits they were counting on due to the project unexpectedly falling short of the requirements defined by the USGBC for LEED certification, they may attempt to recover these costs from the design team by way of litigation. (Tulacz, 2008)

Standard of Care

LEED provides a standard for measuring and documenting success for every building type and phase of a building lifecycle. (Worgul, 2007) Malpractice claims are often based on the Engineers failure to comply with the “Standard of Care”. This is defined as doing that which an Engineer of similar training, education and experience, practicing in the same or similar locale would do. In other words, the “Standard of Care” requires the Engineer to do that which is reasonably expected of him or her. Unless the “Standard of Care” is somehow heightened, the Engineer is only required to use “ordinary” care. Where clients form reasonable expectations, the law may hold those expectations and the “Standard of Care” is raised accordingly. Thus, where heightened expectations are invited and are formed, heightened requirements will result. Engineers, specifically consulting Engineers, are not typically certified in specialties. However, LEED Certification changes that general rule. Engineers seek LEED certification for one reason – to sell their clients and prospective clients the belief that they are better suited to deal with the challenges of “Green” design than non-certified Engineers. Because of this, LEED certified Engineers will therefore likely be held to a higher “Standard of Care”. (AIA Risk Management Committee, 2007)

There are a number of ways in which the standard of care for a design professional in the LEED context can be changed, either voluntarily or involuntarily. A voluntary change can take place in contract language or by volunteering extra services, but may be perceived simply if the design professional is LEED certified. A design professional that specializes in ‘Green’ design and is LEED certified may be measured by a different standard than the average design professional unless the standard of care is explicitly addressed in the contract. Even if the design professional’s insurance carrier agrees with the case, the defense may be required to prove that they performed to a higher standard. Ultimately, the strategy of many firms to increase the number of LEED

accredited staff and principals may experience a voluntary perceived increase in the standard by the courts. The courts may also conclude that if a substantial portion of the office is LEED certified, the company should be held to a higher standard of care.

Involuntary increases in the standard of care may eventually raise the standard for all Professionals. As the number of LEED certified professionals continues to grow, at some point in the near future a break point may be reached whereby all design professionals, whether accredited or not, will be expected to possess the typical skill, ability and judgment associated with LEED or some comparable standard. This is particularly the case in places such as Chicago, California or Arkansas, where such a standard has been statutorily or administratively adopted. It is easy to imagine that ten years from now an owner might seek damages from a design professional for not suggesting or including design options that would have saved him 30% of his energy costs for the lifecycle of project. In the same way that the standard of care for physicians is subject to change depending on the state of the field and certifications in the various specialties, design professionals may too find themselves judged by an evolving standard of care. (Vyas, 2007)

Because of the gaining popularity of building green, and the increased adoption of the USGBC's LEED rating system, contractors must become familiar with the system. Compliance with the LEED standards will be mandatory when they are made part of the construction contract. Failure to comply with the LEED system may result in a claim by the owner for breach of the agreement. As with traditional construction projects, an effective risk management plan for a Green Building project should begin with a thorough review and understanding of the contract documents, which generally include the contract for construction (including any requirements or documents incorporated by reference therein), specifications, general and supplementary conditions, addenda and modifications. (Rochwarg, 2006)

Client Expectations

In LEED Projects, clients tend to have increased expectations. It is the Engineers responsibility to educate the client so that they maintain realistic expectations. Often the client will look to the Engineer to provide this education as part of the design scope. An uneducated client may require an inadvertent elevation of the standard of care, leading to fraud and misrepresentation claims, warranty claims, and the use of new and untested materials and technology. (AIA Risk Management Committee, 2007)

Predictably, with these new opportunities come new risks. Owner expectations regarding energy savings may be misplaced, and the contractor and Architect/Engineer may find himself having to explain any actual or perceived performance deficit. Owners may represent in marketing a specific certification level which fails to transpire. Lenders, lessees, purchasers or others may seek redress for decisions made relying on these representations. General contractors may find themselves in the difficult position of ensuring that subcontractors supply the documentation required for submission to the USGBC to obtain the certification. Contractors and owners may both find themselves in situations where a default or bankruptcy of a contractor on the project may prove fatal to achieving the requisite certification as well as implicate complex performance bond issues. (Vyas, 2007)

New Equipment Technology

'Green' building often requires the use of innovative systems and equipment having no significant track record for production or installation. Therefore, owners, contractors, designers and vendors are far less familiar with these processes and products and their applications. Not surprisingly, this lack of familiarity often leads to an increased risk of problems arising on the project, which may undermine the heart of the planned result. (Rochwarg, 2006)

New equipment technology used in LEED projects can add operating efficiency at a higher initial cost. However, the relative newness and lack of a track record or history of mainstream use of green technologies and systems can make designers, architects and clients conservative when using them. They may oversize green building systems and not fully integrate them into the building, thereby reducing cost savings and other benefits. Similarly, cost estimators may add uncertainty factors for new green technologies they are not familiar with, and these can compound, further inflating cost estimates. (Kats, 2003)

Katrina Gerber is an example of an engineer promoting new 'Green' designs. She is a LEED certified Professional Engineer and Principal of BGR Engineers, who is known to be the first LEED accredited professional in Kansas City. If a project in the early stages of design is considering being 'Green', Katrina evaluates the use of high efficiency systems such as geothermal heating and cooling. "When it is appropriate, we then educate everyone about why it makes sense." Linda Hall Library at UMKC, nationally known for engineering research, installed a brand new physical plant in 1989, but in 2005 was replaced based on Katrina's analysis that the required 400 ton geothermal plant would pay for itself in 8 ½ years. (Gerber, 2005)

The use of new and untested equipment, methods, and materials in "Green" building design introduces greater risk to the design engineer due to the unfamiliarity of product and its application. Many of these lack an established track record. As an architectural example, what would the condition of a "Green" roof be in 5, 10, or 20 years? Historical data on materials and systems provides valuable insight into anticipated future performance. Coal tar pitch roofing survives an average of 22.5 years, which is more than any other known roofing material. An architect can therefore safely suggest to a client that a coal tar pitch roof will last for over 20 years. Information on reliability is developed through experience with the product. That history, and the

comfort it carries is missing with respect to some modern “Green” equipment, methods, and materials. (AIA Risk Management Committee, 2007)

Owner Driven Decisions

Owners are concerned with three things 1) what will it look like? 2) When will I get it? 3) How much will it cost? These driving factors influence owners to direct Engineers to utilize “Green” building designs which may increase the associated project risk and result in the misconception of a related “Warranty” provided by the Engineer. Traditionally, Engineers do not warrant their designs or their work product documents. However, the promise of LEED certification and/or the energy savings it can create may find the claim that the Engineer is warranting that the design and/or the construction will in fact achieve target certification and/or the projected cost savings. Engineers calculate building performance and energy savings based on architectural aspects of a project along with equipment manufacturers’ published efficiency data. Unless the Engineer can demonstrate the appropriate advice was documented to be by the owner, any dispute will be the Engineer’s word against the Clients. (AIA Risk Management Committee, 2007)

Energy Usage Payback

Energy Usage and payback calculations are extremely complicated requiring the Engineer to follow both ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) guidelines and LEED protocol. Intelligent modeling early in the design process can save lots of energy, money, and pollution. But the costs of modeling don’t scale with building size, and risks are present because the numbers can only be as accurate as the information that the engineer has available to start with. (Schendler & Udall, 2005)

The uneducated owner may consider an engineer's service of energy modeling a warranty for the actual energy performance of the facility. Professional liability insurance coverage may not exclude coverage for services such as energy modeling performed at a level beyond or outside the general standard of care. This can result in a more difficult defense for design resulting in increased litigation costs for the professional or insurer. The settlement value of any claim may be in the plaintiff's favor. (Vyas, 2007)

Design Team Fee Structure

When considering taking on LEED Certified projects, the firm must take into account the design team costs and develop an appropriate fee structure. Higher certification targets usually mean higher design and construction costs which clients expect to recoup through energy savings over the lifetime of the project. (AIA Risk Management Committee, 2007) The design and construction process for the first green building of a client or engineering firm is often characterized by significant learning curve costs, and design schedule problems such as late and costly change orders. Engineers take note that design fees may be a greater increased percentage than overall construction costs due to unfamiliar system types, equipment, and the Certification process. However, for the owner the added cost impact of designing green may be very small compared with other building costs such as the cost of land and infrastructure. (Kats, 2003)

LEED certification also must be considered and appropriately planned for up-front in a project, prior to beginning design, when design service contracts are being negotiated. Phaedra Svec, an architect and sustainable design consultant in the Elements division at BNIM, Kansas City, answered when questioned why the new Kauffman Center for the Performing Arts facility is not seeking LEED Certification, "It would be costly and disruptive at this point to redesign with LEED as an objective. But

the design team is committed to sustainability, and where it can be achieved, it will be.”
(Worgul, 2007)

Relative legal principles:

There are no reported court decisions directly addressing LEED certified projects. However, there are well-established legal principles concerning ‘Green’ designs including the standard of care, design and performance specifications, and implied warranties. As a general proposition, courts characterize the information an Engineer provides an owner for use by a contractor for the construction of a building as a design specification or as a performance specification. (Blake, 2006) In the 2007 AIA National Convention, several examples of ‘Green’ claims that had been brought to court against design professionals. These included situations such as the following: (AIA, 2007)

- A seemingly innovative solar panel design turned out to already be patented.
- A school project required to reduce operating costs by 50% failed to do so.
- A homeowner required their project to have improved indoor air quality and reduced energy costs, but was not satisfied with the result.
- A new product was specified to be on a project, but was not in full production and caused project delays.
- A specified recycled cork flooring system resulted in water retention and mold issues.

Standard of Care

The scope of a design professional's exposure to a successful lawsuit involving design services is most often based on a showing that the professional standard of care was not met. A plaintiff seeking to prove negligence, if there was injury to person or property, or a breach of contract, must demonstrate that the design professional did not exercise the appropriate "learning, skill and care ordinarily possessed and practiced by others in the same profession in the same locality, at the same time." *Paxton v. Alameda County*, 119 Cal. App. 2d 393, 406 (1953). This standard is commonly met by expert testimony provided by other design professionals. In the area of sustainable design and building, few if any "experts" are available or can say with any certainty what the characteristics constitute the heightened standard of care. (*Paxon v. Alameda County*, 1953)

Design Specifications

Design specifications describe in detail how the project is to be built, leaving little if any discretion to the contractor concerning how it achieves the final result. *Blake Constr. Co., Inc. v. United States*, 987 F.2d 743 (*Fed. Cir.* 1993). The relevance of this case has directed the Construction industry to analyze, review, and agree upon signed contracts with both private parties and government authorities in an effort to limit their liability. This case built upon a question of contract, which the AIA, EJCDC, and others have strived to create standard agreements that in many cases require little modification and include clear direction on liability issues. (*Blake Construction Inc. v. United States*, 1993)

Performance Specifications

When Designers intend to include Performance specifications within a project, they must refrain from confusing the contract obligations by restricting the contractor to supplying specific products. A good performance specification will include the desired performance result, but allows flexibility for the contractor to have another party design the system to achieve the specified results. *Rhone Poulenc Rorer Pharm Inc. v. Newman Glass Works*, 112 F.3d 695 (3rd Cir. 1997). In this case, a true performance specification may have required the installing contractors judgment based on their knowledge of the site conditions when selecting products. (*Rhone Poulenc Rorer Pharm., Inc. v. Newman Glass Works*, 1997)

Performance Requirement met by the Design Specification

In the Professional Design industry, decisions are made daily that can help or hurt the design intent that the professional strives to document in construction documents. Often times differing interpretations of written specifications or drawings can lead to litigation. *R.J. Crowley, Inc. v. United States*, No. 90-1150, 1990 U.S. App. LEXIS 21618 (Fed. Cir. Cec. 12, 1990). At the same time, contractors must take responsibility for asking questions about any glaring conflicting information or items lacking appropriate information for the contractor to adequately bid and construct. This case allowed the contractor to potentially be relieved of its obligation to satisfy the performance requirement if it was reasonable to believe that the performance requirement would be met by following the design specifications. (*R.J. Crowley, Inc. V. United States*, 1990)

Implied Warranty

Unknown elements related to project sites must be carefully dealt with in the contract verbiage. *United States v. Spearin*, 248 U.S. 132 (1918). Engineers and Contractors should proceed with caution and be sure to limit their liability in these situations in an effort to cover all potential risk. Unfortunately, owners do not want to bear the risk either. A costly analysis may be required by the contractor bidding work with this level of unknowns to assess the situation. To the contractor's advantage, there is an implied warranty that if a contractor complies with a design specification, he is not responsible for results that are unsatisfactory to the owner. (*United States V. Spearin*, 1918)

Threats Summary

Additional design fees must be charged for ABC-KC to incorporate 'Green' building design services due to the associated risk of threats. These threats are the legal concerns that insurance companies and several attorneys have documented, as found in the literature review, such as; LEED certification timing and cost issues, owner financial risk, the standard of care, and client expectations. In addition, the use of new equipment technology, allowing owner driven decisions, and estimating an energy usage payback are three areas of great risk that must be carefully planned. Insurance company representatives and the attorneys referenced in the literature review agree that taking on these risks must be offset with an increased the design team fee structure.

Legal principles that must be understood in making the decision to pursue 'Green' building design include the standard of care, design and performance specifications, and implied warranty. Specific legal cases were used to illustrate each of these important principles and how they impact engineers attempt to capitalize on this opportunity.

CHAPTER 5: SUMMARY AND CONCLUSIONS

Summary

This field project presents information on the opportunities and threats of 'Green' Building design related to ABC Engineers Kansas City office. The introduction and background includes information on ABC-KC, 'Green' Design and LEED, and examples of 'Green' in current media. The literature review presents current resources to provide an understanding of 'Green' building design, Marketing 'Green' building design services, and 'Green' building design legal risks. The procedure and methodology explains how research was performed and this field project was developed. In addition, the main content of this field project presents the opportunities and threats that ABC-KC will use to make the decision to incorporate 'Green' building services into the 2009 business and marketing plans.

The opportunities section includes several marketing tools used to assess the state of 'Green' building design. These are a market review, customer review, an assumptions/risks, competitive advantage, and forecast analysis, as well as a definition of value and relationship equity. These tools are used to gather the basic information required to write a full marketing plan and prove that the opportunity exists. The forecast, which is the piece most directly tied to revenue, illustrates the additional revenue that can be obtained by pursuing 'Green' building design if legal concerns are minimized and relative legal principles are adhered to.

Several legal concerns presented provide a case of reason for engineers charging clients higher fees to offset the associated risk. Legal concerns such as timing and cost issues related to LEED certification describe the complexity of the USGBC's certification process. Owner financial risk, the standard of care, and client expectations are all delicate owner related issues that engineers can mediate with premium owner communication. The use of new equipment technology, allowing owner driven

decisions, and estimating an energy usage payback are three areas of great risk that must be carefully planned. All of these risks will increase the design team fee structure.

Legal principles that have been justified as the basis of legality for issues related to 'Green' building design include the standard of care, design and performance specifications, and implied warranty. Owners have an unjustified expectation for an elevated standard of care that must be clarified by engineers. 'Green' building design typically includes cutting edge materials, systems, and energy performance, but does not imply that an engineer shall provide any greater level of service than any other engineer, on any other project at a similar time and location. Design and performance specifications can be a point of contention and must be clarified so that the owner fully understands what services they are paying for and the consultants and contractors scopes include. Owners also have impractical expectations that engineers will provide warranties on the products specified, services provided, and any energy usage estimates be met or exceeded by actual building performance. Specific legal cases were used to illustrate each of these important principles and how they impact engineers in 'Green' building design.

Conclusions

The Principals at ABC Engineers must integrate 'Green' Building Services into the ABC-KC 2009 business plan and marketing plan to capitalize on the limited opportunity that this industry shift has presented. If 'Green' Building services are not incorporated into these plans, associated revenue will be lost to competing engineering firms until 'Green' building design becomes the standard expectation and is incorporated into governing building and energy codes. The business case has been made for 'Green' building design through the above results along with the many referenced industry publications and data. The decision to go 'Green' is an opportunity that cannot

be passed, and with the associated threats defined, ABC-KC can move forward with creating a formal marketing and business plan. Some figures to drive home the points made in this report come from a 2006 survey of nearly 900 industry participants. Out of these, 39% said that “acquiring sustainable building expertise has helped them attract new clients or projects”, with 11% saying it had “resulted in a ‘significant’ amount of new business”, and 53% saying it had “resulted in ‘some’ new business. 77% expected “significantly more green building activity over the next two to three years”. (Yudelson, 2008)

CHAPTER 6: SUGGESTIONS FOR ADDITIONAL WORK

Many relevant professional journals, blogs, recent publications, and media news articles have been written within the last couple years. Information included in them well defines the 'Green' organizations pushing sustainable design, the history and trends of 'Green' buildings, case studies, design concepts, and available products. These resources are critical for engineering firms such as ABC-KC to analyze the opportunities and threats associated with 'Green' building design. However, the following suggestions for additional work could fill in some of the more finite questions that Engineers may have related to the subject.

The first suggestion would be to do a survey of the Principals, managing partners, or perhaps even entry level designers in the Kansas City metro area. The same could hold true for nearby college students studying construction, architecture, and engineering preparing to enter the construction industry. This survey would help further define the current state of 'Green' buildings in the local Kansas City market. With so many local architecture firms as well as the surrounding Universities including the University of Kansas, Kansas State University, and the University of Missouri Rolla, this survey could assist everyone in the local industry. It would be interesting to see the trends in differing beliefs, thoughts, and level of 'Green' activities being pursued by each group of people as well as from architecture firm to architecture firm.

A second suggestion for additional work would be a more in-depth research and analysis relating the concepts of legal case studies and their relation to 'Green' design. Studying the foundation of our legal system and how the basic rulings have been made related to similar concepts and issues can be directly applied to many of the concepts that insurance companies and attorneys are now concerned about with 'Green' design. Too often companies pursue objectives in unfamiliar areas without understanding the associated legal risks.

A third suggestion for additional work specific to ABC-KC would be to develop both the marketing and business plans specific to 'Green' design. As previously mentioned, this project was intended to provide a baseline and point of initial research for the company to build from. These plans may be most effectively written with the assistance of outside resources such as marketing agencies and business consultants, requiring invested capital to achieve a successful end result.

A fourth suggestion for additional work would be to investigate the impact of the current economic conditions on 'Green' building design. The overall slowdown in the market may have an impact on overall projected revenues, as well as additional revenues available from 'Green' projects. Although one may find that the USGBC's LEED – Existing Building (EB) may see heightened attention if owners begin renovating facilities in lieu of building new due to the poor economy. Heightened concerns may present themselves, such as owners having even greater expectations that engineer's energy performance modeling accurately represent the final building energy usage.

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APPENDIX

Standard of Care

Paxon v. Alameda County, 119 Cal. App. 2d 393, 406 (1953)

Title and Citation

Paxon Appellant v.

Alameda County et al., Appellee.

No. 15382. District Court of Appeal, First District, Division 1, California.

July 28, 1953.

Rehearing Denied August 27, 1953

Hearing Denied September 24, 1953

Facts of the Case

- Case Description: Amos Paxon was injured while applying a tar and gravel surface to the roof of a livestock pavilion which was in course of construction at Alameda County Fair Grounds. He brought action against the architects who designed the pavilion and prepared the plans and specifications for it.
- Relevant Law: Contract Law (Standard of Care)
- Summary of the Complaint:
 - o Paxon was carrying two 50-lb. buckets of hot tar along the roof toward the place of intended application.
 - o The sheathing under Paxon's left foot gave way.
 - o Paxon fell through up to his thigh, sustaining injuries to his left arm, wrist and hand from the spilling of hot tar.
 - o Paxon was an employee of a roofing sub-contractor at the time.
 - o Andrew T. Hass and Thomas J. Kent were the architects that designed the pavilion and prepared the plans and specifications for it.
 - o Hass specified 1"x6" sheathing with a spread of 30" between rafters.
 - o Paxon argued that the sheathing and spacing was too thin for covering such a span, resulting in a dangerous and defective condition for workmen.
 - o Paxon claimed the county was equally negligent because the board of supervisors who approved the plans and specifications were responsible for approving the plans and specifications and supervising and inspecting the work of construction as it progressed.

- Actions Taken by lower courts:
 - o Paxon recovered judgement for \$25,000 against the County of Alameda and against Andrew T. Hass and Thomas J. Kent

Issues

1. Does the evidence sustain the implied finding that the defendants were negligent?
2. Was the failure of the general contractor to comply with the specifications as to the grade of lumber used a supervening act which broke the causal connection?
3. Did plaintiff fail to exercise due care for his own safety?
4. Were the damages awarded excessive in amount?
5. Did the trial court commit prejudicial error by allowing the county to cross-examine defendant Hass?
6. Did the trial court commit prejudicial error by assertedly refusing to permit inquiry concerning plaintiff's second injury?
7. Did the trial court commit prejudicial error by giving its instruction to the jury concerning future losses?

Decisions

1. No evidence was found.
2. The general contractor was found to have no bearing upon the issues here involved.
3. Nothing was found to take the issue of contributory negligence out of the fact for determination as a matter of law.
4. The award was found to be not excessive due to the nature and extent of injuries.
5. Found unnecessary to decide this issue.
6. No merit was found in this point.
7. No. It was clear that the court gave these instructions contingently for use only if the jury should find physical disability and impairment of future earning power.

Reasoning

1. The test used during the course of the trial for determination of the negligence, if any, of the defendant architects is reflected by the instruction thereon to which none of the parties has taken exception:
 - “By undertaking professional service to a client, an architect impliedly represents that he possesses, and it is his duty to possess, that degree of learning and skill ordinarily possessed by architects of good standing, practicing in the same locality. It is his further duty to use the care ordinarily exercised in like cases by reputable members of his profession practicing in the same locality; to use reasonable diligence and his best

judgment in the exercise of his skill and the application of his learning, in an effort to accomplish the purpose for which he is employed. In determining whether the defendants architects' learning, skill and conduct fulfilled the duties imposed by law, as they have been stated to you, you are not permitted to set up arbitrarily a standard of your own. The standard is that set by the learning, skill and care ordinarily possessed and practiced by others of the same profession in the same locality, at the same time. It follows, therefore, that the only way you may properly learn that standard is through evidence presented in this trial by other persons in the field of architecture, called as expert witnesses. Accordingly, in considering your verdict as to the liability of the defendants architects, you are entitled to consider only evidence, if any, which would support that specific charge of alleged negligence, namely, the charge that said architects were negligent in specifying sheathing of insufficient strength to support the workmen who would go on it.”

2. The negligence of the county through its board, officer or person having authority to remedy the dangerous or defective condition need not be the sole proximate cause of the injury.
3. As a roofer of 14 years experience the county claimed that he must have been acquainted with the hazards and therefore assumed the risk. This point was further argued because Paxon was not wearing long sleeves or gloves as advised in the Industrial Accident Commission. It was determined that while such action was a requirement for the men running the kettle, but not when working up on the roof.
4. It is deemed not necessary to decide the question in view of the determination that the architects are not liable under the issues presented in the complaint.
5. The conclusion that the architects were not liable made it unnecessary to decide this issue. The disposition of the question carried no inference that the court deems the allowance of those questions in any way erroneous.
6. Wearing casts on his arms at the trial, Paxon testified that the casts had nothing to do with the injuries received on the roof, but from another incident that happened on a later construction job. When a second question was asked related to the casts and sustained, the court successfully pursued the line of inquiry as far as it desired at this trial.
7. The county contends it was error to give instructions on the subject because there was no evidentiary basis. The county furnished records that which does not disclose the source of any of the instructions.

Separate Opinions

1. None reported.

Analysis

Design professionals are required to provide a standard of reasonable care, and is required to ‘exercise a degree of care, skill, and diligence in professional practice that is

equivalent to what may be reasonably required of one in that profession given the specific time, place, and circumstances'. However, when uncontrollable factors arise, the design professional is not required to provide perfect design documents and specifications as long as they follow the letter of the code along with other industry standards. The relevance of this case has presented a legal interpretation that design professionals can infer from. This case built upon a question of contract, which the AIA, EJCDC, and others include clear direction on the standard of care. Understanding that the industry is ever-changing, it is the responsibility of the design professional to continually be aware of such, in conjunction with insurance and attorney relationships.

Design Specifications
Blake Constr. Co., Inc. v. United States, (Fed. Cir. 1993)

Title and Citation

Blake Construction Company, Inc. Appellant v.
United States of America, Appellee. United States of America, Appellant v.
Aetna Casualty and Surety Company, Appellee.
No. 15948. No. 16049. United States Court of Appeals District of Columbia Circuit.
Argued January 23, 1961.
Decided August 3, 1961.

Facts of the Case

- Case Description: A government building was renovated for a lump sum amount with 5% profit with the contractors understanding of a possible renegotiation which did not end up in the contract, therefore a government audit was performed to consider negotiating with the contractor but it was found that he had been overpaid so the government sued for the overpayment.
- Relevant Law: Contract Law (Reformation)
- Summary of the Complaint:
 - o The Public Building Service of General Services Administration negotiated with Blake Construction Company for the renovation of a portion of a government building.
 - o A letter of understanding from the GSA stated that Blake was to perform the work in accordance with GSA specifications for a lump-sum figure with 5% profit.
 - o A formal contract was agreed to include a clause providing for renegotiation at the completion of the work.
 - o Another letter stated the proposal and incorporated provisions of government standard forms that the contract would be subject to renegotiation and that all disputes concerning questions of fact arising under the contract would be subject to review.
 - o Blake accepted the presented terms.
 - o The formal contract was submitted 5 months later when the work was substantially complete.
 - o The formal contract stated a lump-sum price for the work but did not include the renegotiation provision.
 - o After completion the government proposed an audit of Blake's accounts before they would renegotiate.

- Blake maintained that there was no contractual provision for renegotiation, but allowed the audit since the contract might be subject to the Renegotiation Act of 1951.
 - The contracting officer ruled that Blake had been overpaid \$57,281.
 - Blake contested this determination before the GSA Board of Review on the ground that the contract was not subject to renegotiation.
 - The Board concluded that the renegotiation provision had been omitted from the formal contract inadvertently, and that both parties assumed that the contract was subject to renegotiation.
 - The Board also expressed that if it was assumed that the renegotiation provision was intentionally omitted, the modification of the original contract in favor of Blake was not supported by consideration.
 - The government sued Blake for the overpayment in the District Court
 - The government sought judgment against Aetna Casualty and Surety Company, who was surety on the performance bond provided by Blake.
- Actions Taken by lower courts:
- The District Court granted summary judgment for the government in its action against Blake and granted judgment for Aetna in that part of the action.

Issues

1. Assuming that the renegotiation provision was intentionally omitted from the formal contract, did the government receive consideration for relinquishing its right to renegotiate?
2. If there was consideration, is appellant nonetheless bound by the government's lack of authority to enter into a cost-plus-percentage-of-cost contract which did not include a renegotiation provision?
3. If not so bound, was the determination by the Board of Review that the provision was intentionally omitted binding upon the District court as a finding on a "question of fact arising under" the contract?
4. Is the surety, The Aetna Casualty and Surety Company liable for any sums which the government might be entitled to recover from Blake?

Decisions

1. Consideration was received.
2. Judgment cannot be affirmed on this ground.

3. A Summary judgment based on the administrative record alone is not the appropriate remedy.
4. No.

Reasoning

1. If the exchange of preliminary letters did not constitute a valid contract, we assume that the letters were not sufficiently definite, therefore, the formal contract was agreed to be sufficiently definite . Until the execution of the formal contract, no fixed price was determined which presented Blake an opportunity of increasing its profit margin, however, the government had acquired the benefit of a fixed maximum on the amount of its cost for the project. Therefore, the formal contract was valid by consideration.
2. It is a difficult process of dealing with the government with one charged with knowledge of the extent of the actual authority of the governments contracting agent since no agent of the government can hold out to have any authority not sanctioned by law. If the contract was made without authority, then perhaps no contract exists, but he contractor is nonetheless entitled to the reasonable value of the benefits conferred. The record does not reveal that such a computation would result in the precise amount determined by the contracting officer pursuant to eh renegotiation provision which he believed to be a part of the contract. Hence, the judgment cannot be affirmed on that ground.
3. Neither agency's expertise in evaluation nor the need for an immediate decision calls for determination of the reformation issue by the Board of Review. The District Judge was surely as well equipped, if indeed not better equipped than the Board, because of his experience in questions of general contract law, to resolve the reformation issue. Therefore, a summary judgment for the government based on the administrative record alone is not the appropriate remedy.
4. A bond can be read a referring to the letter contract which was dated and numbered as indicated in the bond. Only the formal contract, which did not contain the renegotiation provision, was attached to the bond. Therefore, Aetna is not liable for any renegotiation that occurs outside of the written contract.

Separate Opinions

1. The District judge was well equipped, if not better equipped than the Board, because of his experience in questions of general contract law, to resolve the reformation issue. Therefore, it was determined that a summary judgment for the government based on the administrative record alone is not the appropriate remedy. The District court did not reach the question of an independent judicial determination of the reformation of the contract. The case was remanded to the District Court for further proceedings consistent with this opinion.
2. It was found that the District Court correctly granted judgment in favor of the surety company, Aetna. Although Aetna should have made inquiry to determine that the

entire obligation of Blake was stated in the formal contract since the backdating on the contract made it an irregular transaction, only the formal contract, which did not contain the renegotiation provision, was attached to the bond.

Analysis

Design specifications describe in detail how the project is to be built, leaving little if any discretion to the contractor concerning how it achieves the final result. The relevance of this case has directed the Construction industry to analyze, review, and agree upon signed contracts with both private parties and government authorities in an effort to limit their liability. This case built upon a question of contract, which the AIA, EJDC, and others have strived to create standard agreements that in many cases require little modification and include clear direction on liability issues. Also, bond companies must base their services on the written contract, but be careful to analyze any irregular verbiage.

Performance Specifications
Rhone Poulenc Rorer Pharm. v. Newman Glass, (3rd Cir. 1997)

Title and Citation

Rhone Poulenc Rorer Pharmaceuticals Inc; Turner Construction Co., Appellants v. Newman Glass Works; Employers of Wausau, Appellees v. Spectrum Glass Products, Inc.; Interpane Coatings, Inc. ; Interpane Acquisition co.; CUH2A Architects, Engineers, Planners.
No. 95-2022. United States Court of Appeals, Third Circuit.
Argued Oct. 3, 1996.
Decided May 5, 1997.

Facts of the Case

- Case Description: Spandrel glass was installed per the specifications but was exposed to heat in excess of the manufacturer's recommendations and failed.
- Relevant Law: Contract Law (Warranties)
- Summary of the Complaint:
 - o Phone contracted with Turner Construction Company to install opaque spandrel glass in Rhone's headquarters and research facility.
 - o Turner subcontracted with Newman Glass Works to install the opaque spandrel glass that comprised the structure's curtainwall.
 - o The subcontracts specify the type of glass Newman was to install and listed 3 manufacturers from whom Newman could purchase the glass.
 - o The specification for the spandrel glass required it to be ¼" thick heat strengthened float glass coated on the face with opaque colored ceramic coating or black polyethylene opacifier on the rear surface.
 - o The specification included a product i.d. number, the color, and type of glass specified from each manufacturer
 - o Newman started installing the specified glass from Spectrum Glass Products, one of the 3 manufacturers.
 - o Spectrum attached the opacifier coating to the glass with a glue that product literature stated normally could be expected to perform in temperatures exceeding 180 degrees F.
 - o The glass was exposed to temperatures exceeding 180 degrees F after the installation.
 - o Before the installation was complete, the opacifier coating began to delaminate from portions of the glass.

- Turner and CUH2A noticed the delamination because portions of the installed glass had a mottled appearance.
 - Turner demanded in writing that Newman replace the defective glass.
 - Newman refused to replace the glass and Turner considered this action a breach of contract.
 - The district court denied both parties' motions for judgement as a matter of law and Turner was awarded damages of \$225,691.
 - The district court granted Newmans renewed motion for judsment as a matter of lww without addressing the import of the Newmans express warranties against defective materials.
 - The district court held that Newman complied with the subcontracts specifications in purchasing and installing the opaque spandrel glass, and that the jury could not reasonably fin Newamn in breach.
 - The court entered judgment for Newman on its counterclaim for \$111,668, the balance owed under the subcontracts.
 - Turner appealed.
- Actions Taken by lower courts:
- Newman was granted motion for judgment as a matter of law pursuant to Federal Rule of Civil Procedure. The District court exercised diversity jurisdiction.

Issues

1. Should Newman be held liable for the selection of materials provided, or selecting a glass based its investigation of the site?
2. Should the glass specification be considered a 'performance specification', and therefore, require Newman to use judgment in designing and selecting the appropriate glass for the application?
3. Did the general contract and subcontracts include warranty provisions?
4. Is Turner's warranty provision in the contract valid in shifting liability to the subcontractor?
5. Had Turner approved and inspected the glass samples provided to be installed on the project?
6. Was the defect of the glass within the implied warranty of the specifications?

7. Did Turners specification include a provision stating that the subcontractor remained liable for any and all latent defects in materials?

Decisions

1. No, the contract documents specified the exact materials.
2. No, the specification is a 'design specification'.
3. Yes, included in section 4.5 'Warranties' of the general contract and Section X of the Subcontracts includes warranties.
4. No, the specified glass was provided and installed per the contract documents.
5. Yes, Samples were provided and approved.
6. Yes, the defect was within the implied warranty of the specifications.
7. No, this clause was not included.

Reasoning

1. Rhone cannot be held liable for any defects in the glass because it complied with the specification in the subcontracts which required the glass to be manufactured by one of 3 'approved manufacturers'.
2. The design specification required Newman to provide an exact type of glass and allowed them no flexibility in selection.
3. Section 4.5.1 of the general contract requires Turner warrant to Rhone that all work be free from faults and defects. However, Newman assumes this warranty toward Turner in the subcontracts. The Subcontract required Newman to remove and replace all materials that Turner or the architect see as unsound, defective, or improper.
4. Newman provided and installed the glass specified in the contract documents and therefore assumes no liability because those specifications produced an unsatisfactory result.
5. Turner inspected and approved glass samples that Newman provided prior to installation, as required under this contract.
6. Newman fulfilled its subcontract for the glass panels, and therefore, are not liable for the latent defect they contained. The defect caused the opacifier to separate from the glass after installation because the glue used to attach it to the glass became 'tacky' under the temperatures in the curtainwall. However, because that defect related to the particular glass used, which Turner specified, and not how it was installed, the defect was within the implied warranty of the specifications.
7. Turner dictated the terms of the contract and included very precise specifications for the glass to be installed. A provision stating that the subcontractor remained liable

for any and all latent defects in materials supplied even though said materials otherwise conformed to the requirements of the contract could have been added. However, no such terms were included.

Separate Opinions

1. It was concluded that Newman was entitled to judgment as a matter of law and therefore would affirm the district court's order.
2. The petition for rehearing filed by the appellee was denied after being submitted to the judges who participated in the decision of the court and to all other available circuit judges of the circuit in regular service, and no judge who concurred in the decision having asked for rehearing, and a majority of the circuit judges of the circuit in regular service not having voted for rehearing by the Court.

Analysis

Responsibilities in this situation ran all the way through the system from Professional designers to Product vendors. When Designers intend to include Performance specifications within a project they must refrain from confusing the contract obligations by restricting the contractor to supplying specific products. In this case, a true performance specification may have required the installing contractors judgment based on their knowledge of the site conditions when selecting products. General Contractors share responsibility for products being supplied through vendors to subcontractors when shop drawings are submitted and reviewed.

Performance Requirement met by Design Specification
R.J. Crowley, Inc. v. United States, (Fed. Cir. 1990)

Title and Citation

R.J. Crowley v. United States
No. 90-1150. United States Court of Appeals, Federal Circuit.
December 12, 1990.

Facts of the Case

- Case Description: Roofing was installed on two government buildings being renovated based on an interpretation that did not meet the intent of the plans or specifications.
- Relevant Law: Contract Law (Interpretation)
- Summary of the Complaint:
 - o Crowley was awarded a contract to install roofing and repair exterior walls on two government buildings.
 - o Crowley's bid incorporated a subcontractor's bid for roofing and insulation.
 - o Specifications required actual installed thickness of insulation to provide a U-value, through completed roof construction, not to exceed 0.03 BtuH.
 - o Specifications required insulation to be laid in two or more layers.
 - o The drawings include a 'Table of coefficient for new roofing' which includes a 7" slab along with standard values for a lath and plaster ceiling below with air film values. Also included is a line item for Isocyanurate Insulation with a respective R-Value. The total R-value of the assembly is 34.24 which results in a U-value of 0.29.
 - o The drawings include three building sections that each reference the 'Table of coefficient for new roofing'. Each section indicates 2 layers of insulation above an existing concrete deck.
 - o A note on the sections had a single leader that pointed to the 2 layers of insulation that read "New Roof Insulation W/R-value min. 12.5"
 - o Another area of the drawings indicated 2 layers of insulation with the same note.
 - o The subcontractors interpretation of the drawings was that the 2 layers of insulation had to provide a total R-value minimum 12.5.

- Crowley recognized that insulation with a total R-value of 12.5 would not meet the required U-value of 0.03 (R-Value 33.3).
 - The subcontractor believed that the existing insulation usually present in the lath and plaster under a suspended ceiling would make up the difference in U-value and would have been known by the arch/engr.
 - After the project was awarded, the subcontractor communicated to the government that the ceiling insulation or other varying inside conditions were assumed to be existing.
 - The government informed Crowley that each of the 2 layers of insulation indicated must have a minimum R-Value of 12.5, twice what Crowley believed.
 - The government also informed Crowley that even with the 2 layers of insulation providing an R-12.5, the overall U-value of 0.03 (R-value 33.3) could not be met without contribution of other unknown elements.
 - The subcontractor installed 2 layers of insulation with a total R-Value of 30.96.
 - Crowley submitted a claim for the cost of the additional insulation of \$89,667.09.
 - The contracting officer failed to issue a timely final decision
 - Crowley appealed to the Board pursuant to Section 6.c.5 fo the Contract Disputes Act. 41 U.S.C. Sec. 605.c.5 1988.
 - Crowley's claim was denied by the Board because even though the contract was patently ambiguous, Crowley failed its duty to inquire.
- Actions Taken by lower courts:
- Crowley was denied its claim for an equitable adjustment for insulation installed during performance of the Contract. Only the issue of entitlement was before the Board.

Issues

1. Did the Board of Review deny Crowley's claim on the ground that the contract was patently ambiguous and that Crowley had failed to satisfy its duty to inquire?
2. Did the Board's decision meet the 'Standard of Review'?
3. Was an ambiguity created by the drawings and specifications so glaringly obvious that Crowley had a duty to seek clarification prior to bidding?
4. Was Crowley's interpretation of the contract reasonable?

Decisions

1. Yes, based on the fact that the additional contribution was more than 50% of the total amount required.
2. The Board's review is final and conclusive, however patent ambiguity in contract must be decided by court.
3. No, even though there was ambiguity between the drawings and specs, it was not so glaringly obvious to impose a duty of inquiry.
4. Yes, the interpretation was reasonable.

Reasoning

1. The Board did not state that Crowley's interpretation of the contract documents was not reasonable, however since the value was more than 50% of the total amount required it was the Board's opinion that it was Crowley's duty to inquire whether its assumption was correct. Therefore, there was a patent discrepancy about which Crowley should have inquired.
2. The decision of the Board on any question of fact shall be final and conclusive and shall not be set aside unless the decision is fraudulent, or arbitrary, or capricious, or so grossly erroneous as to necessarily imply bad faith, or if such decision is not supported by substantial evidence. However, the existence of patent ambiguity in contract must be decided by the court.
3. Patent ambiguity is such that a reasonable man would find to be patent and glaring, and is one that blatantly jumps out at the reader, as where a direct numerical conflict exists or where the contract contains an obvious internal inconsistency. The Board did not point out such a blatant conflict in the contract documents, however, concluded that to the extent that Crowley relied on the existing conditions to satisfy the required U-Value created a 'large discrepancy' in the contract. The court found that while there was a 'large discrepancy' in Crowley's interpretation, it does not itself constitute a patent ambiguity. Also, since both parties estimated a contribution of U-value from existing conditions, along with the details including a single plan note and leader pointing to the 2 layers of insulation, which called out a minimum R-value of 12.5, there was no patent ambiguity in the contract.
4. The specification requiring insulation to provide a U-value for the completed roof not in excess of 0.03 can be considered a performance specification. However, if this were a pure performance contract, Crowley would have had complete discretion to determine how it would perform that work. But in this case, Crowley had little discretion to select any means it wished and the specifications were restrictive. In fact, performance in this case was controlled by the design specifications of the contract, and satisfaction of the terms of the contract cannot, and was never intended to be tested solely on the basis of whether the stated performance standard was met. Therefore, Crowley had reasonably interpreted the contract drawings and specifications.

Separate Opinions

1. Since the contract was not patently ambiguous, no duty of inquiry can be imposed on Crowley. Crowley reasonably interpreted the contract as requiring installation of two layers of insulation with a combined R-Value of at least 12.5. Having installed additional insulation to satisfy the Government's post-award order, Crowley is entitled to an equitable adjustment. Therefore, the judgment of the Board denying Crowley's claim was reversed and further proceedings implementing the decision were remanded.

Analysis

In the Professional Design industry decisions are made daily that can help or hurt the design intent that the professional strives to document in construction documents. Often times differing interpretations of written specifications or drawings can lead to litigation. At the same time, contractors must take responsibility for asking questions about any glaring conflicting information or items lacking appropriate information for the contractor to adequately bid and construct. This case allowed the contractor to potentially be relieved of its obligation to satisfy the performance requirement if it was reasonable to believe that the performance requirement would be met by following the design specifications.

Implied Warranty
United States v. Spearin, (1918)

Title and Citation

Spearin v. United States

No. 44, 45. Argued Nov. 14 and 15, 1918.

Decided December 9, 1918.

Facts of the Case

- Case Description: A Navy dry dock was under construction per the governments direction which included relocating a large branch drainage sewer line and reconnecting it to the main, however during heavy rain and high tide the main was found to be dammed and caused hazardous site flooding causing the contractor to stop work, the Navy annulled the contract, redesigned the project, and had other contractors perform the work.

- Relevant Law: Contract Law (Warranties)

- Summary of the Complaint:
 - o Spearin contracted to build a dry dock at the Brooklyn Navy Yard.
 - o Plans and Specs were prepared by the government.
 - o Site was intersected by a 6-foot brick sewer that had to be moved before construction of the dry dock could begin.
 - o Plans and Spec provided scope of relocating the sewer including the dimensions, material, and locations.
 - o Spearin complied to the contract documents.
 - o Sewer was 37 to 50 ft from excavation for the dry dock, but was within area designated for contractors operations.
 - o Before and after the relocation, the 6-foot sewer connected within the Navy Yard, but outside the designated operation area, to a 7-foot Basin.
 - o Approx. 1 year after 6-foot sewer relocation a heavy rain and high tide forced water up the sewer to a depth of 2 ft or more.
 - o Internal pressure of water depth broke the relocated 6-foot section in several places and flooded the dry dock excavation.
 - o Investigation showed that there was a 5 to 5 ½ ft dam in the 7 ft sewer which diverted into the 6 ft section causing the internal pressure.
 - o Both sewers were part of the city sewer system.

- The dam was not indicated on any of the city's plans or blueprints submitted to Spearin, and the 7 ft sewer was indicated to be unobstructed.
 - Government officials involved with the project were unaware of the dam.
 - Government officials were aware, before construction began on the dry dock project, that the area was on low ground and had flooded from time to time.
 - Government officials did not inform Spearin of any flooding in the past.
 - Spearin made a superficial exam of the site and sought information from the civil Engineers office at the Navy
 - Spearin made no special exam of the sewers or special inquiry of flooding.
 - After the site flooded, Spearin notified the government that he considered the sewers a menace to the work and that he would not continue work until the government made good or assumed responsibility for the damage already incurred along with making changes in the sewer system to remove the danger or assume responsibility for future damage that may occur due to insufficient capacity and location of the existing sewers.
 - The estimated cost of restoring the sewers was \$3,875.
 - It was unsafe to proceed with work due to the flooded condition.
 - The government insisted that correcting the issue was the contractors responsibility.
 - After 15 months of negotiations, the Navy annulled the contract and took possession of the plant and materials on the site.
 - The dry dock was completed by other contractors after plans were radically changed, and the discontinuing the use of the 6 ft sewer, and then reconstructing it by modifying its size, shape, and material to remove all danger of it breaking from internal pressure.
 - At the time of the annulment Spearin expended \$210,939 and had received \$129,758 from the government.
 - The court found that Spearin would have received \$60,000 in profit had the contract been completed.
- Actions Taken by lower courts:

- The Court of Claims found judgment that Spearin be issued \$141,180 for the balance alleged to be due and damages for the contracts annulment.

Issues

1. Was the government entitled to annul the contract?
2. Was the amount claimed by Spearin as recoverable justified?

Decisions

1. No, the government wrongfully annulled the contract.
2. Yes, when the government wrongfully annulled the contract Spearin became entitled to compensation resulting from all losses resulting from its breach.

Reasoning

1. Spearin was justified in refusing to resume work when the government claimed no responsibility for the past and for making working conditions safe in the future. The government was responsible for an implied warranty when they provided information on the character, dimensions, and location of the sewer such that if the specifications were complied with, the sewer would be adequate. The government was subject to a breach of warranty in this instance and had no justification for annulling the contract.
2. Spearin was under no obligation to repair the sewer and proceed with the work, while the government denied responsibility for providing and refused to provide conditions safe for the work. When it wrongfully annulled the contract, Spearin became entitled to compensation for all losses resulting from its breach. Spearin was awarded not the difference between his proper expenditures and his receipts from the government, but the difference between such receipts and the value of the work, materials, and plant.

Separate Opinions

1. Language in the findings of fact concerning damages lends possibly some warrant for that contention; but the discussion of the subject in the opinion makes it clear that the rule enunciated in *United States v. Behan*, which claimant invokes, was adopted and correctly applied by the court. Therefore, judgment of the Court of Claims is affirmed.

Analysis

Unknown elements related to project sites must be carefully dealt with in the contract verbiage. Contractors should proceed with caution and be sure to limit their liability in these situations in an effort to cover all potential risk. Unfortunately, owners do not want to bear the risk either. A costly analysis may be required by the contractor bidding work with this level of unknowns to assess the situation. To the contractor's advantage, there is an implied warranty that if a contractor complies with a design specification, he is not responsible for results that are unsatisfactory to the owner.