ABSTRACT

BAKER CONCRETE CONSTRUCTION, MONROE, OH
AN INTERNSHIP REPORT

by Dennis Morrish

The purpose of this report is to describe my experiences during an internship with Baker Concrete Construction, Monroe, Ohio. Baker Concrete is one of the largest concrete subcontractors in the United States, with offices in Ohio, Florida, Texas, Arizona, and Colorado. Sustainability has become an important issue within the construction industry and Baker Concrete is beginning to work on ways to approach the issue. During the internship a great deal of what I did had to do with researching sustainability and identifying ways and means for applying it to Baker Concrete. In this report I describe those efforts along with detailing my preparation for the LEED Accredited Professional (LEED AP) exam.
BAKER CONCRETE CONSTRUCTION, INC. MONROE, OHIO

An Internship Report

Submitted to the
Faculty of Miami University
In fulfillment of the requirements for the degree of
Master of Environmental Science
Institute of Environmental Sciences

By
Dennis Morrish
Miami University
Oxford, OH
2009

Advisor: _______________________________
Dr. Mark Boardman

Reader: _______________________________
Dr. David Russell

Reader: _______________________________
Mr. Scott Johnston
# TABLE OF CONTENTS

**INTRODUCTION** ............................................................................................................. 1

**EXPERIENCE AT BAKER CONCRETE** ................................................................. 2

**BAKER CONCRETE CONSTRUCTION** ................................................................. 3
  - The Mission Statement ........................................................................................ 3
  - History ............................................................................................................... 3
  - Today ............................................................................................................... 4
  - Future ............................................................................................................. 5
    - Wind ............................................................................................................ 6
    - Solar .......................................................................................................... 6
    - Ethanol ....................................................................................................... 7
    - Nuclear ...................................................................................................... 8

**Emerging Green Markets** ..................................................................................... 9
  - Pervious Pavement ....................................................................................... 9
  - Concrete Recycling ..................................................................................... 14
  - Dam Restoration or Removal ..................................................................... 15
  - Mass Transportation ................................................................................... 16
  - Ecological Services .................................................................................... 17
  - Bike Trails .................................................................................................. 17

**Leadership in Energy and Environmental Design** .......................................... 18
  - USGBC ........................................................................................................ 18
  - LEED .......................................................................................................... 19
  - LEED Accredited Professional ................................................................. 20
  - The LEED AP Exam .................................................................................. 21
    - Exam Basics ............................................................................................ 22
      - Preparation ............................................................................................. 24
    - LEED for New Construction & Major Renovations Version 2.2 PDF ................................................................................. 24
    - Practice Exams ...................................................................................... 25
INTRODUCTION

The following internship report is relevant to the periods May through August of 2008, and January through March of 2009. During these periods I was employed at Baker Concrete Construction, Inc., Monroe, Ohio. The internship fulfills the research requirement, one of three credit hour requirements (the other two being the core curriculum hours and the area of concentration hours), and along with a defense of the internship, is the final requirement to complete the Master of Environmental Science from Miami University’s Institute of Environmental Sciences (IES).

I have a long history with Baker Concrete that dates back to 1985 when I worked during the summer break between my junior and senior year of high school. I continued working for Baker during summer vacations while pursuing my bachelor’s degree in geography from Miami University. After graduation from Miami I remained with Baker on a full-time basis until August of 2007, when I left in order to begin pursuing the Master of Environmental Science.

The fact that the Institute of Environmental Sciences allowed me to return to Baker to complete the internship requirement is a testament to the flexibility of the program. I could have chosen to complete the research requirement via a thesis or practicum, but being able to do the internship at Baker allowed me to accomplish something that is extremely important to a married man with three children: earn money! My family and I are very thankful that the IES has the flexibility that it does.

During both phases of my internship I worked under the direction of Mike Schneider, a Vice President and Baker Concrete’s Chief People Officer. Because the concept of sustainability is new to Baker Concrete, Mr. Schneider purposely gave me a great deal of freedom to continue to educate myself and research means and methods by which Baker could develop a plan of action in regards to sustainability.

During the first phase of the internship the majority of my time was dominated by two major themes: preparing for the LEED AP exam, and investigating, influencing, and participating in sustainability initiatives either independently, or in concert with the newly formed “Green Committee.”

During the second phase of the internship I spent a great deal of my time investigating and documenting Baker Concrete’s LEED experience, tracking all new
LEED projects, and working on a roll-out plan for a company-wide sustainability initiative. During this period I continued involvement with the Baker Green Committee and, as the only LEED AP employed by Baker Concrete at the time (we presently have five), I worked on creating my own niche as, for lack of a better term, Baker’s “LEED guy.”

**EXPERIENCE AT BAKER CONCRETE**

During the periods when I worked over summer breaks from school I was employed as a laborer, which meant I had many different responsibilities, but the most common and arguably most important was raking concrete. Raking concrete is the physically grueling job of taking a concrete rake and smoothing out the concrete as it comes out of the concrete truck so that the finishers can strike it off. At Baker Concrete this is the task that pretty much separates the men from the boys. Back in the days when I was a young laborer (I was 16 when I started) if you couldn’t rake concrete all day long you weren’t going to make it. It was common to put new guys on the “circuit” which meant traveling from slab pour to slab pour on a daily basis. This often entailed driving as far as Indianapolis, Columbus, or Louisville for one day of work then waking up very early the next day to do it again. Many people don’t survive on the circuit very long. I survived.

After graduating from Miami in 1991 I chose to continue with Baker on a full-time basis and was eventually promoted to a leadership role as a finisher/foreman. The first projects I ran as a foreman were small site work jobs in the Dayton, Cincinnati, and Northern Kentucky regions. Usually these projects consisted of forming, placing and finishing, sidewalk, curb and gutter, and paving.

Over the years I have worked on hundreds of projects in 10 states and the Bahamas. I list some of the more noteworthy projects in Appendix A.
BAKER CONCRETE CONSTRUCTION

The Mission Statement
“Our mission is to be the preeminent concrete construction company through continuous improvement and our commitment to the following: Safety, People, Quality Service, Customer, and Value. We will move forward with balance and make lasting contributions to our people, our communities and the construction industry.”

You might note that the Mission Statement has nothing to say about sustainability. This is, in my opinion, a very big problem at present. It has become my personal mission to bring sustainability to the forefront as a key ingredient in our corporate mission.

History
Click the History tab on the company website and this is the first sentence you will read: “Baker Concrete Construction was built by the hands, the grit, and the values of Dan Baker, the visionary leader who continues to guide and inspire the company today.”

Here are a few brief highlights of major events in the history of Baker Concrete:

- **1968** Using a station wagon to haul their work tools around, Dan Baker, with his brothers Jim and Ken, started Baker Concrete. Initially their small company performed residential work in Oxford, Ohio.
- **1972** Baker Concrete got its first commercial contract from Gebhart Constructors to place the concrete for First National Bank in Hamilton, Ohio.
- **1979** Baker Concrete completed its first project greater than 1 million square feet: Montgomery Ward Distribution Center in Cincinnati, Ohio.
- **1981** Project work in Florida led to opening a regional office in Fort Lauderdale.
- 1982 Southern Operations office in Houston, Texas opened. In that same year Baker Concrete broke the US record for executing the largest continuous mat placement at the 64-story Transco Tower in Houston.
- 1988 Central Florida Operations Office opened in Orlando.
- 1992 Baker performed mainline paving at the Greater Cincinnati Northern Kentucky Airport.
- 1998 Baker founded Baker University, a comprehensive training program, with a vision to develop a world-class workforce. In that same year Baker opened Rocky Mountain Operations in Aurora, Colorado after securing work on Invesco Stadium, home of the Denver Broncos.
- 2007 Highrise Concrete Systems, Inc. was brought in as part of Highrise Operations. This accentuates Baker’s expertise in the tunnelform construction method often employed for multi-story concrete buildings.

Baker has been ranked among Engineering News Record’s Top 3 Specialty Concrete Contractors for the past 20 years. Baker ranked number one in revenue on Concrete Construction Magazine’s most recent listing of top 100 commercial concrete contractors for the year 2007. For the fiscal year 2007, Baker Concrete - the company that used a station wagon as its first “work truck” - completed over $750 million in work.

Today
Baker currently has seven operations offices and a corporate office. These include:

- Corporate Office, Monroe, OH.
- Northern Operations, Monroe, OH.
- Central Florida Operations, Orlando, FL.
- Rocky Mountain Operations, Aurora, CO.
- South Florida Operations, Fort Lauderdale, FL.
- Southern Operations, Houston, TX.
Southwest Operations, Phoenix, AZ.
Highrise Operations, Grand Prairie, TX.

Here’s a snapshot look at a few of our larger profile projects currently under construction:

- On January 18, 2009, we completed the 5,940 cubic yard mat pour for the Great American Tower in Cincinnati. Turner Construction Company is the General Contractor on this $210 million, 810,000 square foot project. The tower will become the tallest building in Cincinnati at 41-stories, and will seek LEED- Core and Shell Certification. It will also include a 1,700-car parking structure and 25,000 square feet of retail space. This project will take about two years to complete.
- Another high profile project currently underway is the MD Anderson Cancer Center Administrative Support Building, in Houston, Texas. This project required two mat pours, one of 4,000 cubic yards which was completed on December 12, 2008. The second mat pour, completed on December 19, 2008, required a massive 17,500 cubic yards and was completed by 100 Baker co-workers in less than 24 hours. This project rates second only to the Venetian Hotel in Las Vegas, Nevada as the largest mat pour ever performed in the United States.
- In May of 2007 Baker began work on the Mixed Oxide Fuel Fabrication Facility (MFFF) in Aiken, South Carolina. Known as the MOX, this facility is being built as a result of the US-Russia Plutonium Disposition Agreement, signed in 2000. Under the agreement the two countries will each dispose of 34 metric tons of plutonium. This will be accomplished in the US by processing the plutonium into mixed-oxide fuel which will then be shipped to two commercial nuclear reactors owned by Duke Energy Corporation. This huge project covers over 600,000 square feet and includes over 170,000 cubic yards of concrete.

**Future**

Baker Concrete continues to widen its scope of services. Recently, the broadening scope of work has taken an environmental flavor. For example, over the last five years we have seen extensive growth in Leadership in Energy and Environmental Design (LEED) projects. To date, we have been the principle concrete contractor on over 60 LEED projects, valued at more than $575 million and in 13 states (APPENDIX B).
In addition to LEED projects we are also seeing growth in wind, solar, ethanol and nuclear. After describing our experience in those areas I look into some potential emerging green markets.

**Wind**

We have been actively bidding work on wind farms since 2006. Because some of the larger wind turbine foundations can require as much as 1,000 cubic yards of concrete there is excellent potential for business opportunity in the wind market. Additionally, the rural nature of wind projects often requires that a concrete batch plant be set up to supply the project’s concrete needs. This is a service we are capable of providing. We have a number of batch plants that we set up in areas when we feel local ready-mix plants can’t meet our demands.

We recently secured a foundation package for the Flat Ridge Wind Farm in Wichita, Kansas. This was not a large job, but it marked what will hopefully be a successful entry into the wind market. We are currently bidding 66 turbine foundations for the High Plains Wind Farm in Albany County, Wyoming. We are also looking at wind farms, currently in the planning stages, located in Vermont, Colorado, Texas and Maryland.

As the United States continues to push towards more sustainable energy alternatives, Baker Concrete will have opportunities in the wind energy market.

**Solar**

The need for concrete is nowhere near as vast on solar projects as on wind projects. Solar panels, when ground-mounted, require small foundations to support their relatively light weight. However, we recently finished construction of the large Denver International Airport Solar Array (Figure 1) where 945 caissons including above ground extensions (similar to light pole bases) were built to mount the solar panels. This project required approximately 1,350 cubic yards of concrete, and was valued at approximately $700,000. The project at the Denver Airport covers 7 and half acres and produces 3 million kilowatt hours of electricity per year.
We are currently preparing to bid the Gemini Solar Project in Austin, Texas. This project is still in the planning stages, but if it comes to fruition, would become the largest solar array in the US. The project is set to be built on 300 acres of property owned by Austin Energy. This 30-megawatt array would more than double the next largest array in the US. The current leader in that category is located at Nellis Air Force Base, Nevada, and produces 14.2 megawatts.

As the United States continues moving towards sustainable energy alternatives, Baker Concrete will have opportunities in the solar energy market.

**Ethanol**

In recent years there has been a rush (although slowing somewhat lately) to build ethanol plants. This construction surge has been a response to the controversial ethanol mandate. All debates about the ethanol mandate aside, the important point for Baker Concrete is that these projects are large and require a great deal of concrete.

We recently completed construction of the Anderson Ethanol Facility in Greenville, Ohio, which is a four line, 110 million gallon ethanol production plant. This
was a 160,000 square foot, 15,000 cubic yard project. We are also in the pre-bid stage on projects planned for Georgia, Nebraska, Mississippi and Ohio. The increasing prices of corn and controversies inherent in ethanol production may or may not put these projects on hold. However, if the projects are ultimately built our successful experience may give us the competitive edge we need to win the contracts.

**Nuclear**

The enormity of the MOX facility (Figure 2) and our successful involvement in that project (contracts currently over $197 million) has led to the development of *Baker Nuclear* a new division within the Northern Projects division of Baker Concrete.

![Figure 2. MOX Fuel Release 1. A portion of the MOX facility project (Image courtesy of Baker Concrete).](image)

Baker Nuclear’s mission is to secure work on future nuclear projects. Most of these projects are currently in the conceptual or planning stages, and are years away from construction if they are ever built. Development of these nuclear projects will certainly be contingent upon reconciliation of entrenched stakeholder positions over a range of political, environmental and economic concerns. Besides leaping those very high hurdles there is the not-small factor that to get a nuclear project to the shovel ready stage requires approximately $150 million in licensing and design fees. Add to that the $2 billion (a conservative number by some reports; I’ve seen $4 billion) price tag for construction. And last, but certainly not least, the 10-year (minimum!) construction schedule.
From Baker Concrete’s standpoint the investment in preparing for these projects now is worthwhile. In all likelihood a major contract on a nuclear project would run far beyond the nearly $200 million we’ve done so far at the MOX facility in Aiken, South Carolina.

I was surprised to find that so many nuclear projects are in the planning stages. Some of the projects we are now looking at include:

- Exelon Victoria County Nuclear, Victoria, TX.
- Glen Rose Comanche Peak Nuclear Expansion, Glen Rose, TX.
- Dominion Nuclear Power Plant, Troy Township, OH.
- Duke William States Lee III Nuclear Station, Gaffney, SC.
- Entergy Power Nuclear Plant, Port Gibson, MS.
- Georgia Power Nuclear Plant, Waynesboro, GA.
- NRG Energy – South Texas Nuclear Power, Bay City, TX.
- TVA Southern Nuclear Power Plant, Spring City, TN.
- TVA Watts Bar Nuclear Power Station, Spring City, TN.
- Wadsworth South Texas Nuclear #3 and #4 Addition, Wadsworth, TX.

Emerging Green Markets

I have spent a great deal of time researching active and potential “green” markets in which Baker might expand business opportunities. I discuss these markets in the following sections. We have ventured into most of the areas I discuss only slightly. Some of the potential opportunities would be completely new to Baker but I anticipate that they will take on greater importance in the future.

Pervious Pavement

Pervious pavement is a mixture of coarse aggregate, cement, water, and (unlike regular concrete) little to no sand. The resulting mix creates an open-cell structure that freely allows water to filter through it (Figures 3, 4, and 5). Pervious pavement is normally placed on top of a thick (as much as 8” for pavements suitable for motor vehicles) sub-base of washed aggregates (Figure 6) that further encourages infiltration into the native soil below.
Figure 3. Water flowing thru pervious concrete. (Image courtesy of NRMCA).

Figure 4. Typical pervious surface. (Image courtesy of NRMCA).
Although pervious pavement has been widely used in Europe since the end of the Second World War (Huffman, 2005), its application in the United States has been much less common. The first uses of pervious pavement in the U.S. occurred in Florida in the late 1970’s and were a response to Florida’s strict stormwater runoff laws. Nationally,
the US EPA Phase II regulations which require owners of newly developed sites of 1 acre or more to have on-site management systems for treating all stormwater (quantity and quality) before it leaves the site, have further encouraged the use of pervious pavements in recent years (Huffman, 2005).

Treating stormwater on-site can be an expensive proposition for developers. It often means that costly retention basins must be developed. Retention basins - and the swales, ditches, pipes, catch basins and other conveyance measures (both above and below ground) that are needed - are not only expensive, but they often take up as much as 20% of the overall site (Huffman, 2005). This is land that could otherwise be used in an economically positive fashion by developers. Also, retention basins represent potentially expensive insurance liabilities often requiring that fencing be installed to prevent public access. All in all, retention basins are not attractive propositions for developers. The huge advantage of pervious pavement is that, when properly designed, pervious pavement parking lots can eliminate the need for retention basins and the other costly underground structures required by traditional stormwater management.

Pervious pavement is recognized as a Best Management Practice (BMP) by the US EPA. According to the US EPA, conventional stormwater management strategies can allow up to 90% of runoff pollutants into rivers and streams without any treatment. Typically, pervious pavement removes 95% of total suspended solids (TSS) and 60 – 71% of total phosphorous from stormwater (US EPA). In addition to pollution originating from vehicles on paved surfaces, conventional stormwater management strategies have habitually contributed to flash flooding, road, culvert, water and sewer line washouts, severe erosion along stream banks, and increased water temperatures in nearby streams (Stormwater Problems & Impacts). Several advantages of pervious paving include: recharging the local aquifer, improvement of water quality thru filtration, allowing for a more efficient use of land, improved sound absorption characteristics, reduction of water spray, reduction of hydroplaning and skidding, increased skid resistance, and reduction of black ice formation (Schaefer, 2006). Pervious pavement is also said to improve habitat for nearby plantings because water is allowed to infiltrate into roots rather than shedding away.
Along with the government mandates requiring stormwater management, another factor boosting the growth in pervious pavements is the green construction movement. Developers pursuing LEED certification, for example, are increasingly employing pervious pavement because of its substantial advantages over asphalt paving. The LEED-specific and other advantages of pervious concrete paving are discussed in-depth in Appendix C and Appendix D.

Figure 7. Parking places and driving lanes at corporate office (Image courtesy of Rob Ford, Baker Concrete, 2006).

To date, our only pervious paving experience is a small project that we donated to the Lakota School District and the parking lot at our Corporate Office in Monroe, OH (Figure 7). I feel there is huge potential for pervious paving to become an important product we have to offer sustainable construction projects. I am very hopeful that in the near future projects that support sustainability will consider all of pervious pavement’s advantages and incorporate it into their designs.
Concrete Recycling

As our country moves towards more environmentally sound construction practices there should be a higher demand for recycled concrete products. The use of virgin materials for road base (and in the production of concrete for that matter) is not sustainable in the long run, and will ultimately need to be limited or phased out altogether. Groups like the quickly growing Green Highways Partnership (greenhighways.org), a public/private initiative working to “incorporate environmental streamlining and stewardship into all aspects of the highway lifecycle,” will undoubtedly have influence in this area.

In my opinion, Baker Concrete needs to work towards a zero land-filling policy when it comes to concrete demolition projects. In the past we have spent resources looking for places to dump old concrete we have removed from projects. We need to change this attitude. Recycled concrete aggregate needs to be looked at as a potentially valuable resource not an inconvenient by-product of demolition.

Ruttura & Sons is a concrete construction company located in New York City with whom we have completed joint ventures in the past. In addition to concrete construction services Ruttura & Sons also have a Recycling Corporation. They began this arm of the company as a response to the difficulty they were having disposing of concrete on Long Island. They were facing increasingly high tipping fees (fees for dumping into landfills) and recognized that recycling concrete and the steel in it was a better option. Ruttura & Sons have invested in several concrete crushers that are used to turn concrete into #4 modified blend which they use for sub base on their projects or sell to other contractors. They also separate the steel reinforcing found in old concrete and sell it for scrap. In this way they have been able to take a former expense of doing business and turn it into profit.

Many of our large heavy highway paving projects in the past have included a demolition portion. A project on which I was the lead finisher foreman in 2002, Edwin C. Moses Boulevard, in Dayton, Ohio, required that approximately 10,000 cubic yards of concrete pavement be removed. We were fortunate that the University of Dayton wanted to fill a large area adjacent to the roadway so we didn’t need to truck the concrete far, and we didn’t need to pay to dump it either. However, we could have turned that “waste
product” into a valuable fill material if we had used a crusher. Also, we could have easily removed the steel from the concrete and sold it for profit. I consider this a lost opportunity. Not only was this a lost financial windfall, but it was also poor environmental stewardship.

I intend to propose the purchase of a portable concrete crusher when and if we get a similar project in the future. In fact, if we are able to consider the advantages of employing a crusher on specific projects, it might give us the advantage we need to out-bid our competitors. Bringing our own crusher to a site could also put us at an advantage on LEED projects where the re-use of the recycled aggregates would help achieve points.

**Dam Restoration or Removal**

A look at the 2009 American Society of Civil Engineers (ASCE) infrastructure report card shows us that dams in the United States are in terrible shape (ASCE, 2009). The ASCE gives our nation’s dams a grade of ‘D’ and notes that “as dams age and downstream development increases, the number of deficient dams has risen to more than 4,000, including 1,819 high hazard potential dams” (ASCE, 2009). They further go on to point out that “over the past six years, for every deficient, high hazard potential dam repaired, nearly two more were declared deficient” (ASCE, 2009). It is commonly noted that most of the low-level and medium-level dams in the United States were only built to last about fifty years. There are more than 85,000 dams in the US. The average age of those dams is fifty-one (ASCE, 2009). Dam restoration or removal has the potential to be an important business opportunity for Baker Concrete.

In 2004 we placed a bid on the Lake White State Park Dam Improvements Project, in Pike County, Ohio. Even though we didn’t secure this job it is interesting to note what the project entailed. The project called for a major reconstruction of the existing dam and spillway with primary quantities of work including 35,600 cubic yards of roller-compacted concrete, 23,000 square yards of plain concrete pavement, 13,000 cubic yards of rock channel protection, 18,400 cubic yards of roadway-related excavation, and 21,400 cubic yards of embankment. In addition, two 68-foot long hinged crest gates would have been constructed. There would have been 1,000 cubic yards of
concrete for spillway repairs and 2,450 cubic yards of concrete for retaining walls. Our estimate was nearly $8 million.

I have researched dam restoration and removal extensively and I’ve found that there is strong support for removing dams altogether. Many large, high profile projects are scheduled for removal soon. For example, removal of two dams on the Elwha River in Port Angeles, WA, at an estimated value of $308 million is expected to begin in 2011 (Cornwall, 2009). Removal of the Matilija Dam on the Ventura River in Southern California, with a price tag of $144.5 million is expected to begin sometime between 2010 and 2012 (Collins, 2007). And finally, removal of four dams on the Klamath River in Northern California and Southern Oregon is expected to begin by 2020, and has an estimated cost as high as $450 million (Fimrite, 2009). All of these projects are aimed at salmon habitat restoration and salmon recovery. If these projects successfully restore salmon populations, more dam removals are sure to follow.

I consider restoration or removal of dams to be a growing business opportunity for Baker Concrete.

Mass Transportation

Baker Concrete is currently helping construct the Miami Intermodal Center (MIC) in Miami, Florida. This project, sponsored by the Florida Department of Transportation, is expected to offer significant benefits to Miami-area commuters. It will provide connectivity for all forms of transportation at the Miami Central Station, including light and heavy rail systems, buses, taxis, rental cars, bicycles, and pedestrian (micdot.com). It will link all of these transportation modes to the Miami International Airport via the “MIA Mover,” an automated people mover system. The project also consists of a massive Rental Car Center (RCC), the Miami Central Station, and major roadway improvements (micdot.com). This project is expected to greatly reduce traffic congestion to and from the airport.

Our current contracts on this project include work on the MIA Mover (a LEED registered project), the Orange Line Rail, and the MIC Rental Car Facility. To date, our portion of the project consists of more than $135 million.
As LEED and similar green building initiatives continue to grow in popularity, mass transportation projects will see growth. Baker Concrete has interest in prospective mass transportation projects because they tend to be rather large and incorporate a great deal of concrete. In the past we have looked at projects in the development stages to be located in Seattle, Houston, Cincinnati, Columbus, Louisville and Orlando. Ultimately, none of these projects were built. However, as the United States moves towards higher levels of sustainable development, the potential for Baker to secure work in this sector is improving. Our experience at the MIC may well give us the competitive advantage we need to win bids on future projects.

**Ecological Services**

One of the defining tenets of the LEED rating system is the emphasis on low-impact development. To that end, the USGBC has encouraged development on brownfield sites. This has led to increased construction on what were otherwise undesirable sites. With brownfields becoming more viable building sites the need for qualified cleanup has increased.

At Baker we are starting to see more and more projects requiring site remediation. This has always been considered something to “sub out.” However, there could be potential for business growth in this area if we undertake this work ourselves.

An ecological services division could become a very viable asset. Along with brownfield site mitigation this division could specialize in such things as building constructed wetlands or specializing in building rain gardens and bioswales. Stream restoration and erosion control services might also become viable business opportunities for an ecological services division.

**Bike Trails**

In the last few years we have completed construction of three separate bike trails. One of these is located in Lawrenceburg, Indiana and the other two are located in Southwest Ohio. All three of these projects would be described as “for recreational use.” They aren’t in areas that are going to serve any large numbers of everyday commuters.
However, our experience on these projects should help us secure future projects, some of which might help get vehicles off the road.

Experience with bike trails is an important ingredient to what I believe makes Baker Concrete a very valuable team member on LEED (or other green) projects. I think it will be important, going forward, to emphasize our project experience in the areas I’ve mentioned (bike trails, mass transit, pervious concrete) and note our desire to expand into other areas (dam restoration/removal, concrete recycling, ecological services), so that we can position ourselves as a contributor to green projects on multiple levels. We have much more to offer than simply placing concrete slabs or paving. In order to separate ourselves from the competition we need to emphasize that we are a valuable partner in construction when it comes to green construction.

**Leadership in Energy and Environmental Design**

*USGBC*

The U.S. Green Building Council (USGBC) is a 501(c) (3) non-profit community of leaders working to make green buildings accessible to everyone within a generation (USGBC.org). This quasi-governmental coalition of leaders from across the building industry works to promote buildings that are environmentally responsible, profitable and are healthy places to live and work (USGBC.org). The LEED (Leadership in Energy and Environmental Design) Green Building Rating System is the driving force behind the USGBC’s mission to transform the built environment. The LEED rating system has quickly become *the* standard by which sustainable projects are judged.

I am pleased that in February of 2009 I was able to convince leadership within Baker to join the USGBC as a full member. This was really long overdue (*many of our competitors have been USGBC members for multiple years*). I consider this to be an important step in Baker Concrete’s journey to become a company that seriously embraces sustainability as an essential component of doing business.

Joining the USGBC entitles Baker Concrete to a listing in the online member directory and use of the USGBC member logo. In addition, all of our full-time employees are able to receive discounts on USGBC products and services, as well as
access to on-line tools and resources. Membership in USGBC connects a company with a powerful and diverse network of professionals (USGBC). Our membership fees are $4000 per year. As of March, 2009 there were more than 18,000 member organizations in the USGBC. Members represent nonprofits, utilities, landscape architects, interior designers, contractors, code officials, architects, financial representatives, product manufacturers, building owners, property managers, building tenants, and Federal, State & Local governments (USGBC).

**LEED**

LEED is a rating system administered by the USGBC primarily for the construction and renovation of buildings. The LEED rating system offers third-party certification, and is “the nationally accepted benchmark for the design, construction and operation of high performance green buildings” (USGBC). The stated mission of the USGBC is “to transform the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous environment that improves the quality of life” (USGBC). The vision of the USGBC is a lofty one: “Buildings and communities will regenerate and sustain the health and vitality of all life within a generation” (USGBC).

There are currently nine different LEED rating systems. These include:

1. New Construction
2. Commercial Interiors
3. Existing Buildings: Operations & Maintenance
4. Core & Shell
5. Neighborhood Development (currently in a pilot program)
6. Schools
7. Healthcare
8. Retail
9. Homes
By far, the most popular rating system is New Construction. As of March, 2009, LEED-NC accounted for nearly 60% of all certified and registered projects (USGBC). New Construction is where virtually all of Baker Concrete’s LEED building experience, and expected experience, lies. Unless otherwise stated, I will be referring to the New Construction rating system throughout the remainder of this draft.

Under the current certification regime (the LEED rating system will update to LEED 2009 in the latter part of this year) buildings can achieve one of four levels of certification. These certification levels reflect the project’s commitment to environmental design.

LEED-New Construction certification levels:

- **Certified**: 26-32 points
- **Silver**: 33-38 points
- **Gold**: 39-51 points
- **Platinum**: 52-69 points

The points available can come from 6 categories. These include:

- **Sustainable Sites**: 14 points possible
- **Water Efficiency**: 5 points possible
- **Energy and Atmosphere**: 17 points possible
- **Materials and Resources**: 13 points possible
- **Indoor Environmental Quality**: 15 points possible
- **Innovation in Design**: 5 points possible

The growth in LEED projects has been fantastic. Since the USGBC began rating buildings under the LEED rating system in 1998, LEED has grown to encompass more than 20,000 projects in 50 US States and 91 countries covering over 5 billion square feet of commercial building space (Green Building Facts).

**LEED Accredited Professional**

According to the USGBC a LEED Accredited Professional (AP) is an individual who has demonstrated the ability to serve on a LEED project team and who has proven, detailed knowledge of LEED project certification requirements and processes. A LEED AP has a command of integrated design principles. LEED accreditation is awarded to
building industry practitioners who successfully demonstrate these proficiencies on a comprehensive exam (USGBC.org).

The growth in LEED AP’s has been extraordinary. The latest data from the USGBC puts the number of LEED AP’s at more than 80,000 (Green Building Facts). This is astounding when you consider that there were less 7,500 LEED AP’s by the end of 2003. The growth in LEED AP’s is really a testimony to the significance of the LEED certification system. Especially, when you consider that the LEED AP exam is not only expensive, ($400 for non-USGBC members, $300 for members) but it is also very difficult. The USGBC doesn’t give out information on the exam’s pass/fail rate, but the commonly-held belief is that the pass rate is about 60%. I have personally spoken with, and read cases of numerous individuals who have needed to take the exam two or three times.

When you consider the massive growth in LEED construction and take into account that Baker Concrete has worked on more than 50 LEED projects with our portion of the work valued at nearly $400 million, it is amazing that up until I passed the exam in August of 2008, Baker Concrete employed not a single LEED AP.

The LEED AP Exam

The following information refers to my preparation for the LEED-NC 2.2 exam. The rating system changed in 2009 and LEED AP credentialing changed along with it. The changes to the new rating system are not radical and, therefore, the information provided should continue to be valuable to people preparing for the new exam.

According to the Green Building Certification Institute (GBCI), the organization that administers the LEED AP exam, there are no prerequisites for taking the LEED exam.

They do recommend that candidates have:

- Building industry knowledge and tenure in green building.
- Familiarity with the documentation process for LEED certified projects.
- Knowledge of LEED credit intents, requirements, submittals, technologies, and strategies.
- Practical experience working with multiple design disciplines.
• Understanding of the life cycle costs and benefits of LEED.
• Familiarity with LEED resources and processes (GBCI.org).

The GBCI’s list of recommendations is extensive and somewhat daunting; however, you can basically acquire all of these experiences through the studying process. It would be best to have actually worked on LEED projects, taking an active role in the design, documentation and construction. However, it isn’t a prerequisite to taking the exam. You can prepare for and pass the exam without all of the prescribed experience. I did.

In the LEED NC 2.2 version of accreditation there were three exam tracks available for achieving the LEED AP. These included LEED for New Construction (LEED-NC), LEED for Commercial Interiors (LEED-CI), and LEED for Existing Buildings (LEED-EB). If you passed any of these exams you were a LEED AP and qualified as such on any LEED project no matter what rating system was being used. Overwhelmingly, LEED AP candidates chose to take the LEED for New Construction exam. That is the exam I took, and thus, the following information is in reference to that exam.

**Exam Basics**

The LEED exam sounds simple enough: 80 questions, multiple choice, and you get two hours to complete it. No problem.

The exam must be taken at a Prometric professional exam administering facility. According to Prometric there are more than 3,000 testing sites in more than 130 countries (prometric.com). Virtually every major metropolitan area in the U.S. has at least one Prometric site. I took my exam in the Sharonville area of northern Cincinnati.

When you arrive at the testing facility you will be given a key to a locker and must put everything in it. You can not take *anything* with you into the examination room. We’re talking keys, wallet, chewing gum, nothing. Once inside the examination room Prometric staff will give you a pencil and a piece of scrap paper for any notes you want to write down (you can not take it with you when you are finished).

The exam is computer-based. Before you begin there is a ten minute instructional period where you learn how to take the exam. The process is very simple and anyone with the most basic computer skills will have no problem with it. So during the ten
minute instruction period many people use the time to do a “brain dump.” This entails writing down as much information as possible so that you can refer back to it during the exam. While taking the exam you have the ability to flag questions that you want to return to. Any questions left blank are marked incorrect so be sure to go back and check your flagged questions.

Somehow, and no one really knows the formula GBCI uses to achieve this, your answers to those 80 questions will result in a score based on a 200 point scale. Get a 170 and, congratulations, you are a LEED AP! Get a 169 and you get to pony up the $300 or $400 to take the exam again. There are no discounts for re-takers.

There are four sections to the test:

- Knowledge of LEED Credit Intent and Requirements
- Coordinate Project Team
- Implement LEED Process
- Verify, Participate in and Perform Technical Analyses

The exam isn’t broken up into four different parts though. The four sections are interspersed throughout the exam. In reality, how you perform on specific sections isn’t that important, it is the overall score that counts. So after you’ve completed the exam, hold your breath, hit the submit button, and then hit the results button. You are given your test results immediately. The results break down your performance on each of the four sections. (You can see my scores posted below).

The biggest difficulty I encountered with the exam is in how the multiple choice questions are structured. These aren’t the simple “choose either a, b, c, d, or e” questions. Many of the questions will ask you to choose several of multiple options. If a question asks you to choose three of six options, and you get two of those correct but miss the third, the whole question is wrong. Attention to detail is absolutely critical. You must read the questions very carefully. I went back and re-read every question (you can make changes to any answer before you submit), and read the ones I wasn’t completely sure of several times.
Preparation

The first thing I did to prepare for the LEED AP exam was print off a practice exam. I found an exam on the GBCI website via the link Download Exam Specification and Sample Questions. Considering my extensive experience (I’ve worked in construction for most of my adult life) I assumed I would perform pretty well on an exam that was, to my knowledge at the time, somewhat regarding the subject of construction. Sadly, intuitive and experiential knowledge wasn’t going to work. I got three correct out of the twelve questions provided.

Not easily defeated I found another free LEED exam on BuildingGreen.com and printed it off. (Note that this exam is not entirely accurate. There are a couple questions/answers that are simply wrong. But overall it is a good free source that allows you to test your knowledge, or lack thereof. And by the way, learning why a provided question/answer is wrong is another good way to learn LEED.) I sat down with a piece of paper and a pencil and got to work. My score? Approximately 35%.

Having been knocked down a few pegs, I decided I better get more serious about my preparation. The very first step take for anyone interested in taking the exam should be to go to the GBCI website and download the LEED AP Candidate Handbook. This will tell you everything you need to know about how to sign up for the exam.

In my preparation there were basically four things that were indispensible to my success:

- The LEED for New Construction & Major Renovations PDF that is free on the USGBC website.
- Practice exams. Any that are available free on the internet. And even more valuable, the two exams I purchased.
- The mountains of flashcards I created.
- Internet resources like intheleed.com, and especially, the anecdotal information provided by people who have passed, failed, or are in the process of preparing for the exam, that is available on AREforum.org.

LEED for New Construction & Major Renovations Version 2.2 PDF

The LEED for New Construction & Major Renovations document that is available on the USGBC website is NOT the complete reference guide. The reference guide is available for purchase ($200 for non-members, $150 for members) and is over
400 pages long (LEED 2009 is 645 pages and includes Core & Shell and Schools). The free version available on-line is a 78-page document that basically amounts to a Cliff’s Notes version of the full guide. Knowing myself, I felt that I wouldn’t get much out of sitting down with the 400 page document. That’s just too much for me to retain so I chose not to purchase it. *(I don’t know that I would encourage everyone to prepare the way I did but I will tell you that I still haven’t seen the guide. I did all my preparation without it.)*

As I prepared for the exam I found that I was constantly returning to the free document for clarification. This document is a “must have” for anyone preparing for the exam.

**Practice Exams**

There are abundant free quizzes available on the internet. I have already mentioned a couple of these, one from the GBCI and one from *BuildingGreen.com*. Another great resource is the University of Florida’s *Learning to LEED* (www.cce.ufl.edu) website. And, a great site I found recently (I wish I had this available to me when I was studying!) is at *leedapprep.com*. There are more. Find all you can. As I have mentioned before, even if these quizzes are not completely accurate, they will give you an idea of your level of preparedness.

The two exams I purchased were the *Colorado USGBC Chapter’s Study Guide* and *greenexamprep.com*. The Colorado Chapter exam comes in a very helpful booklet that includes test preparation strategies and study materials (I think there is also a LEED- CI quiz). The Colorado Chapter exam is very similar to the real thing. In fact, it is actually a little tougher than the real exam, in my opinion. It costs about $30.

Greenexamprep.com offers four different computer based practice exams with 80 questions each. The computer based format of these exams are very similar to the real thing. You also have the advantage of being able to take any of the four exams as often as you want for 60 days. One thing I really like about the Greenexamprep exams is that the questions and answers do not stay in the same order. This prevents you from associating an answer with a specific question number. For example, you can’t think in terms of… “Question #17? Oh the answer is C.” The next time you take the test,
question 17 will be different, and the answer to the previous question #17 will also be mixed up. You have to learn the answer.

Leading up to the test, I relied heavily on the Greenexamprep tests. I actually saved the fourth test, not taking it until the final days of my preparation. This was a way for me to test how close I was to being ready. These exams were $60, and that was money well spent.

Flashcards
I don’t see how anyone could prepare for and pass this exam without flashcards. There is just way too much information to know. Remember, in the LEED NC Version 2.2 rating system there are a total of 69 possible points coming from 6 different categories. Within the 6 categories there are varying numbers of sub-categories relevant to each point. There are also 7 different prerequisites associated with 4 of the categories. You need to know each sub-category backwards and forwards. Some sub-categories are pretty simple and straightforward, some are very complex and confusing.

Here is an example of what you need to know for a relatively simple credit, Materials & Resources Credit 4.1 from the LEED New Construction Version 2.2 Reference Guide:

- **Title of the credit** – MR Credit 4.1: Recycled Content: 10% (post-consumer + ½ pre-consumer) 1 point.
- **Intention of the credit** – “Increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.”
- **Implementation processes for the credit** – Differentiate between post-consumer and pre-consumer recycled content. Excludes MEP (mechanical, electrical, plumbing) and elevator equipment. Includes anything else that is recycled. Furniture can be used, only if it consistently used in MR Credits 3.1 through 7. Steel products without documentation can only assume 25% post consumer recycled content.
- **Calculations involved in the credit** – Based on cost of the total value of the materials in the project. 45% of total construction cost is the default.
- **Standards or codes applicable to the credit** - International Organization for Standards (ISO) 14021 – 1999. ISO defines what recycled content is.
• **Whether or not there is an innovation in design point possible** – ID credit for achieving 30% (next incremental percentage above MR 4.2 – 20%).

• **When the submittal phase for the credit is** – submit *during* construction phase.

This is the information you need to know for one sub-credit! Needless to say, I ended up with mountains of flashcards. I was routinely running through over 100 flashcards multiple times a day.

One thing I did with the flashcards that seemed to work well for me was leaving space on the cards so that I could add more detail. As I studied the flashcards I would get the simple stuff down pat, and then add more information to the cards until I had all of the details about the credit covered. You can buy flashcards on the internet but I felt that writing them out on my own would better help me learn the information.

Anyone preparing for the exam should plan on investing a great deal of time creating and studying piles and piles of flashcards. The LEED AP exam requires a massive amount of memorization.

**Online Resources**

In my opinion, the single greatest source of information available to someone preparing for the LEED AP exam is located at [intheleed.com](http://intheleed.com). Intheleed.com was started by a guy who was going through the process of preparing for the exam. On his website he put out a lot of information that other people found valuable. The site has vastly grown in popularity. If you have a question about the exam, you will find either the answer or a link to an answer at intheleed.com. I strongly encourage anyone preparing for the exam to become well-acquainted with this resource.

As I prepared for the exam I found that anecdotal information provided from people who had either taken the exam or were in the process of studying for it was very valuable. A great place to find this information is [AREforum.org](http://AREforum.org). The [AREforum.org](http://AREforum.org) (there are links at intheleed.com) is actually a forum set up for people studying for the architectural registration exam, but they have many, many discussions about LEED. Anyone preparing for the exam should check this forum out. You can find exam-specific
pointers on what to study and what not to worry about. You can read about people’s successes, and disappointments (what not to do). And you will get a better sense of what it takes to prepare.

**A Final Word about the Exam**

The LEED AP exam is tough. You need to be able to dedicate a large amount of time to studying. Although I have heard of people studying for two weeks and passing I certainly wouldn’t recommend trying it. It is not an exaggeration to say that I “studied” for two months. At first I just searched around for information about LEED, educating myself on the basics of what it is and how it works. I kept it pretty simple. Reading magazine articles about LEED projects is a good place to start.

I didn’t begin to hard memorize until about three weeks prior to the exam. However, by that time I had already created most of my flashcards and was beginning to memorize some of them. I had also found most of the free quizzes available on-line, and taken them (performing poorly). And, I had discovered the places I needed to go online for further information. The point I’m trying to make is that I couldn’t have prepared for the exam in a short period of time. Give yourself plenty of time.

There are many other study options available that I have not mentioned. I left these out because I didn’t use them. That doesn’t mean other people wouldn’t find benefit from these options. For example, many workshops and various LEED courses are available. Some of these are sponsored by the USGBC and some are private operations. I don’t know a great deal about these workshops but I can tell you that a person at Baker Concrete who recently passed the exam paid $1200 to attend a 3-day, 8 hour per day LEED exam course. *My total expenses by the way: LEED AP exam, Colorado Chapter Study Guide, and Greenexamprep tests, and index cards... about $500.*

If you search around, you can probably find people in your area who are interested in group-study. I personally don’t see the benefit of “sharing some of the work of preparing,” which is something I have heard a few people espouse, but others might find this type of study beneficial.

One of the most important things you need to do seems incredibly obvious but it needs to be mentioned regardless. *Register to take the exam.* Go to the GBCI.org
website and follow the instructions to register for the exam. Set a date! You probably are not going to seriously prepare until you have circled a date on a calendar. Once the date is set you can pace your preparation so that by the time the test date rolls around you are prepared to your maximum potential. In my case, I hit a wall about two days before the exam. I had studied so much that I felt like I couldn’t study anymore. That’s actually a pretty good feeling.

One last thing; I got to the exam center more than an hour early. I did this for a couple of reasons. First, it is easy to motivate yourself to last minute studying when you are sitting outside the place where you will take the exam. And second, I did NOT want to run myself short on time getting to the test site. On exam day, you want to be worrying about one thing only: passing the exam.

Here’s the breakdown of my scores. I was surprised by my scores in two sections. I did better than expected in Implement LEED Process, and worse than expected in Verify, Participate in and Perform Technical Analysis. Overall though, 185 is a very respectable score, especially when you consider that many people don’t pass the first time around.

Score: 185 (170 needed to pass, 200 possible).
Sections:
Knowledge of LEED Credit Intent and Requirements 82%
Coordinate Project Team 78%
Implement LEED Process 100%
Verify, Participate in and Perform Technical Analyses 64%

Baker Concrete and LEED

It is commonplace in the construction industry for the larger general contractors to emphasize experience in green building in their marketing materials. If you visit the websites of companies like Turner, Webcor, Skanska, or Bovis Lend-Lease you will find many web-pages dedicated to sustainability and project-specific experience in regards to LEED construction. To date, Baker’s website mentions nothing about sustainability or LEED experience. The question for me became, “what are our competitors doing?” “What do they have to say in regards to sustainability, the environment, going green, or LEED construction?”
I got a copy of Engineering News Report’s (ENR) list of the top 20 pure commercial concrete contractors in the US for the year 2007 (Figure 8). These are our biggest competitors. As you can see Baker Concrete tops the list. That is where we intend to stay.

<table>
<thead>
<tr>
<th>Company</th>
<th>Commercial Revenue** ($ million)</th>
<th>Concrete Revenue ($ million)</th>
<th>Growth 2006–2007 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baker Concrete Construction (1)</td>
<td>488.0</td>
<td>610.0</td>
<td>47.3</td>
</tr>
<tr>
<td>2. Miller &amp; Long (2)</td>
<td>435.5</td>
<td>439.9</td>
<td>11.7</td>
</tr>
<tr>
<td>3. Bonnel Construction (5)</td>
<td>252.0</td>
<td>360.0</td>
<td>10.8</td>
</tr>
<tr>
<td>4. Capform (14)</td>
<td>198.0</td>
<td>198.0</td>
<td>1.0</td>
</tr>
<tr>
<td>5. S&amp;F Concrete Construction (17)</td>
<td>142.2</td>
<td>158.0</td>
<td>11.3</td>
</tr>
<tr>
<td>6. United Forming (11)</td>
<td>118.5</td>
<td>237.0</td>
<td>33.1</td>
</tr>
<tr>
<td>7. Largo Concrete (22)</td>
<td>117.6</td>
<td>120.0</td>
<td>13.2</td>
</tr>
<tr>
<td>8. Keystone Concrete (13)</td>
<td>115.3</td>
<td>208.7</td>
<td>31.3</td>
</tr>
<tr>
<td>9. Madison Construction (24)</td>
<td>114.1</td>
<td>114.1</td>
<td>17.9</td>
</tr>
<tr>
<td>10. Southern Pan Services (26)</td>
<td>108.9</td>
<td>108.9</td>
<td>7.4</td>
</tr>
<tr>
<td>11. Urban Concrete Contractors (16)</td>
<td>95.4</td>
<td>159.0</td>
<td>37.1</td>
</tr>
<tr>
<td>12. Scutter Concrete Construction (27)</td>
<td>90.0</td>
<td>100.0</td>
<td>25.0</td>
</tr>
<tr>
<td>13. Southland Concrete (29)</td>
<td>87.7</td>
<td>98.5</td>
<td>13.5</td>
</tr>
<tr>
<td>14. Structural Group (3)</td>
<td>85.5</td>
<td>427.3</td>
<td>34.4</td>
</tr>
<tr>
<td>15. Rutten &amp; Sons Construction (35)</td>
<td>82.0</td>
<td>82.0</td>
<td>34.4</td>
</tr>
<tr>
<td>16. Suntec Concrete (21)</td>
<td>75.3</td>
<td>134.5</td>
<td>69.8</td>
</tr>
<tr>
<td>17. TAS Commercial Concrete Construction (15)</td>
<td>85.8</td>
<td>188.0</td>
<td>22.1</td>
</tr>
<tr>
<td>18. Precision Concrete Construction (39)</td>
<td>92.3</td>
<td>75.0</td>
<td>36.4</td>
</tr>
<tr>
<td>19. Urate &amp; Sons Cement (33)</td>
<td>55.8</td>
<td>85.8</td>
<td>46.5</td>
</tr>
<tr>
<td>20. SAK Construction (42)</td>
<td>55.4</td>
<td>69.3</td>
<td>117.3</td>
</tr>
</tbody>
</table>

*Companies that earn more than 50% of total revenue from commercial concrete work.
**Total revenue from commercial cast-in-place structural concrete and floors, slabs, and industrial concrete construction.

Figure 8. Top 20 Pure Commercial Concrete Contractors (Image from ENR Magazine, 2008).

I searched the internet looking at each of our competitors’ websites to see which companies were touting a commitment to sustainability. What I discovered is that Baker Concrete is not behind the competition when it comes to sustainability, at least in terms of how it is marketed on the internet. Of the 20 companies on the list, only Miller & Long mentions anything about LEED project experience on their website. In fact, Miller & Long doesn’t have a sustainability tab on their home page; it takes some work to find the LEED experience page on their site. No other company even mentions the environment or sustainability. So from a marketing standpoint my research results were good news.
A question I had from the earliest days of my internship was, “how many LEED projects has Baker Concrete worked on?” No one knew the answer. My thinking was that we could advertise our experience on LEED projects as a way of separating ourselves from our competitors. If we had a lot of LEED project experience we should be able to sell that experience to future clients. I found out that Baker Concrete had never tracked its experience on LEED projects.

Based on my own experience I was able to think of about six LEED projects that we had completed. Certainly there were more. The question became “how do I find them?” The problem was that there was no system in place for tracking our LEED experience. We have a database of our projects that is held within the Baker Concrete Business Development System (we call it commence). Within this database job-specific information is available. The data provided varies based on who does the input, but in general, the project name, number, value, scope of work, project manager, estimator, and operations person are listed. There is nothing about LEED.

So in an effort to determine our level of LEED experience I printed a list of all of our projects dating back to 2003. This list consisted of 1396 projects spread across the United States. I sat down with the list and searched each job against the registered and certified projects databases on the USGBC website (usgbc.org). Anyone can search the USGBC website to determine if a particular project is registered or certified. This can be done by going to the usgbc.org homepage and clicking on Project Certification under the LEED link. Next click on LEED Project Directory and you can search the database for either certified or registered projects by location, project name, project owner, or certification level.

The USGBC has been overwhelmed by the number of projects registering for LEED certification and has not been able to maintain an up to date database of registered projects. Therefore, many projects that are seeking LEED certification don’t show up as registered on the USGBC site for months after construction has begun. This can be confusing. I will hear or read that a project is seeking LEED certification, but it won’t be listed as registered on the USGBC site. This means that I have to continually check to see if projects ever register or not. The Excel spreadsheet of LEED project data I maintain is in constant need of updating.
Because of project naming issues I also use Google to search for information about specific projects. Project names registered to the USGBC may or may not be the same as those names in Baker Concrete’s database. Here are a couple examples: the USGBC includes North Adams Elementary School in Seaman, Ohio, as a registered project. Our name for the project is Adams County North Elementary. Metropolitan II, in Miami, Florida, is listed on the USGBC database. Our name for this project is Met 2. These might sound like very trivial and easily addressed “problems,” and in a way they are, except when you consider that there were 1396 projects (we’ve since added about one hundred more projects) to look at and in many, many cases the only way to find out information as to the LEED status of the project is to conduct a Google search with the project name, location, and “LEED” or “LEED construction.” Oftentimes, several websites need to be visited.

Another common problem in determining if a project is LEED is due to the fact that many projects do not pre-certify with the USGBC. Instead, they wait until near completion (or in some cases much later, even years) to begin the certification process, which is usually long after we have completed our portion of the project. Therefore, we sometimes will be unaware that we were even working on a LEED project. This has occurred on a few occasions; I have contacted a few of our project managers in order to find out what experiences they encountered on specific LEED jobs and they were surprised to find out that the job was LEED!

A further complication is when a project claims to be built to LEED standards but does not actually attempt certification. For the most part this is nothing more than greenwashing, using the LEED name to promote the “greenness” of the project without actually doing enough to qualify for certification. The big problem with these circumstances is that an internet search will tag these projects because they refer to LEED in their promotional literature. Only careful investigation will reveal that these projects actually are not seeking LEED certification.
Office Recycling

In Monroe we have two offices, the Corporate Office (Corporate) is located on Garver Road which is a couple miles away from the building where I work which is known as the Main Street Office (Main Street), and not surprisingly, is located on Main Street. At Corporate we have worked out a deal with Rumpke Recycling to pick up all recyclables. Rumpke provides two 9-yard dumpsters. One dumpster is used for cardboard only and the other is for any other recyclables (comingled). Corporate has two 95-gallon wheeled containers which the cleaning staff empty into the appropriate dumpsters as needed. Corporate pays Rumpke for the dumpster service, but the cost is somewhat offset due to the fact that there is less need for traditional garbage pickup, an advantage of recycling that is often overlooked!

At Main Street there is recycling only for cardboard and office paper. During the summer of 2008 I spent a great deal of time trying to determine ways to offset our recycling costs (i.e. handling costs). The area I spent the most time on was office paper and blue prints. The mountains of blueprints and office paper that we were throwing in the garbage everyday were astonishing. I felt that if we could recycle these products we could create meaningful reductions in the amount of garbage we were sending to the landfill.

After a surprisingly large amount of research I was able to find a Fairfield paper company, Royal Paper Stock, that would come to our location and pick up our office paper. Royal Paper Stock provide us with gaylords (these are basically big cardboard boxes attached to wood pallets) that we fill with paper and when we have enough for a full load (about 8 gaylords) we call them for pick up. The best part is that Royal Paper Stock pays us for the paper. (We have since switched paper recycling services to Hanna Paper. They pay a little more.)

Putting this relatively simple arrangement into action was a difficult enterprise. Our facilities manager had serious concerns, not only about who would be responsible for getting the office paper into the gaylords in the shop, but also where he would be able to make storage room for the gaylords. There was also the issue that there was a distressingly large number of people working in the Main Street office who claimed to
not “have time” to sort out their recyclable paper from other garbage, or walk the paper to a recycling container (more on these issues later).

After some negotiations with our facilities manager I was finally able to put our office paper recycling program in place. I created the following simple notice to place above all of our recycling containers (Figure 9):

![Image of notice]

**NOTICE**

We are now recycling paper!

Please place only acceptable paper in this bin:

(No Garbage Please)

<table>
<thead>
<tr>
<th>Acceptable:</th>
<th>Unacceptable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer paper, copy machine paper</td>
<td>Hard-bound books</td>
</tr>
<tr>
<td>Manila/colored folders</td>
<td>Tissue paper</td>
</tr>
<tr>
<td>Letters, brochures</td>
<td>Candy wrappers</td>
</tr>
<tr>
<td>Magazines, newspapers</td>
<td>Dirty plates, cups or napkins</td>
</tr>
<tr>
<td>Colored paper, fax paper, index cards</td>
<td></td>
</tr>
<tr>
<td>Envelopes (white or brown)</td>
<td></td>
</tr>
<tr>
<td>Blueprints</td>
<td></td>
</tr>
</tbody>
</table>

Figure 9. Notice to employees about paper recycling. (Morrish, 2008).

As of this writing I am pleased to report that the office paper recycling is going very well. I do see some recyclable paper mixed in the garbage but it is minimal. Of the six 30-gallon containers I purchased (these were about $30.00 each and more have since been purchased) to place near copiers throughout the Main Street office, one fills up every day and the rest are generally half full on a daily basis. This is in addition to the constant supply of blueprints (which are stored in large rolling containers) that now get recycled rather than thrown away.

The money we receive for our office paper isn’t spectacular. So far we’ve earned about $700 for our efforts. However, this is a better scenario than doing the extra work
for nothing, or not recycling at all. Our facilities manager has also reported that he has seen a noticeable reduction in our total garbage and has been able to decrease the frequency with which he calls Rumpke for pick up.

At the Corporate office they do not separate office paper from their recyclables. We are currently working on a plan for hauling the office paper from Corporate to Main Street but there are some issues to contend with. For one, some of the Corporate folks have questioned if it might be going overboard to ask people to separate office paper from other recyclables. And now, since they have individual desk-side containers for comingled recyclables it has been questioned if we need to supply another container at each desk for paper. A further complication is that the facilities manager has indicated that transferring the paper from Corporate to Main Street, where the gaylords are located, is not a responsibility he wants. *(We don’t have equipment at Corporate to load the heavy gaylords into a truck).* So, as of this writing, the problem of separating office paper from comingled recyclables at Corporate has not yet been resolved.

The reason why our corporate office offers comingled recycling while Main Street only recycles paper and cardboard is because our facilities manager tried comingled recycling a few years ago and it didn’t work out. This is because at Main Street our ability to recycle is complicated by the fact that there is a tremendous amount of traffic in and out of the facility. Main Street has a huge shop that services all of our local fleet vehicles and also contains a form shop which stores and maintains all of the forming systems we use in this region. In addition, Main Street is home to BEAM (Baker Equipment and Materials) which is a tool rental outlet used by many contractors in the area. The constant flow of people in and out of the Main Street facility was a major factor in the continuous contamination problem. People see open dumpsters and clean out their trucks, dump garbage from office trailers, and even bring garbage from their homes. Many people don’t see, or don’t care about signs indicating that dumpsters are for recyclables. At this point in time we still don’t offer comingled recycling at Main Street although we have been discussing ways in which we may be able to make it work.
The Green Committee

The Green Committee formed as a result of a phone conversation between Baker’s President, Dan Baker, and his executive assistant. What basically took place is Dan Baker told his executive assistant he wanted her to get to work making the corporate offices green. She created the Green Committee to organize the efforts to “go green” at Corporate.

Accomplishments of the Green Committee to date:

- The Green Committee has requested, and is still awaiting a budget from Mr. Baker.
- The Green Committee has proposed that Baker Concrete join the “Go Green Challenge.” This program is sponsored by the Cincinnati Children’s Hospital, partnered with Christ Hospital, the University of Cincinnati, Keep Cincinnati Beautiful, and the Hamilton County Solid Waste Management District. The mission of the Challenge is to encourage organizations, both large and small, to reduce their environmental impact (hcdoes.org). Our marketing department is supposed to register us for the Challenge.
- The Green Committee arranged for Mary Jo Lahrmann from the Butler County Solid Waste District to speak about “green initiatives and options” at a Green Open House. The purpose of this luncheon was to raise awareness about company recycling initiatives and promote recycling. The event was held in November of 2008.
- At the Corporate office kitchen high efficiency microwaves were purchased, use of Styrofoam was discontinued, and paper plates and plastic utensils were replaced with Corelle biodegradable dishes and silverware.
- Baker logo coffee mugs were purchased and given out to employees at Corporate (and Main Street) in an effort to minimize use of Styrofoam cups. This has worked relatively well. There are no Styrofoam cups available at Corporate and at Main Street they are seldom used.
- Last summer I mentioned at a Green Committee meeting that I had read that turning off the lights in a vending machine could save as much as $100 dollars a year in electricity per machine. The Green Committee called the vending company and got the lights turned off in the eight machines located in our Monroe buildings.

The problem with the Green Committee is that, on a company-wide basis, it doesn’t have any teeth to it. This is due to the fact that Mr. Baker has never indicated
what powers the Committee actually has. The Committee has no budget, and no directive from Mr. Baker on just what it can or should do to “go green.” So when you go to a Green Committee meeting there is quite a bit of ‘we could do this,’ or ‘we could do that,’ but no one really knows what is acceptable. For the most part, the Green Committee is viewed as only applicable to the Corporate office. We hope to change this.

Green Marketing

I have collaborated with one of our marketing people to develop a brochure entitled “Baker Green.” The purpose of the brochure is to provide marketing collateral that reflects the green aspects of Baker Concrete. Baker Green is a polished, professional pamphlet that begins with a word from the president (I took a great deal of poetic license and wrote this as I hope it would be stated. You can read it below), then delves into the green aspects of concrete, our LEED experience, where we can contribute to LEED projects, pervious concrete and its environmental attributes, and a discussion on recycled materials that can be added to concrete.

The brochure was recently given the green light by Baker’s Leadership Team (the leadership team consists of the president and all vice presidents, along with heads of all our major divisions). Thousands of copies have been printed out and are now being distributed throughout the company.

Word from the president (from Baker Green brochure):

“At Baker Concrete we consider green construction to be a continuation and enhancement of our long-held visions and practices. We maintain our commitment to sustainability as it pertains to our people, our clients and our planet. Baker Concrete is your partner in green construction, contributing our experience and expertise from the earliest stages.”

Another piece of marketing collateral that I have been working on is specific to pervious and traditional concrete paving. In an effort to compete with the asphalt companies who have tended to have a stranglehold on pavements for parking lots, we have developed a concrete parking lot team. The people on this team are presenting the
advantages of designing parking lots with concrete rather than asphalt (a few advantages include: durability, low maintenance, and competitive price) in an effort to compete with asphalt parking lots. Another huge advantage concrete has over asphalt relates to LEED construction. On LEED projects, using traditional and pervious concrete pavement can be a huge benefit in gaining points.

I created the following list of LEED specific advantages of concrete to be included in our marketing collateral (it is up to date with LEED 2009):

**LEED 2009: Pervious and Concrete Pavements**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
</table>
| Sustainable Sites 6.1: Stormwater Design – Quantity Control | 1 Point  
Using pervious allows water to infiltrate into the ground rather than runoff. You can eliminate swales, ditches, underground storm piping, catch basins and concrete curbing. This also means that space-demanding and expensive detention ponds, which are often accompanied by serious insurance liabilities, are not required. |
| Sustainable Sites 6.2: Stormwater Design – Quality Control | 1 Point  
Pervious pavement is a US EPA approved Best Management Practice (BMP) for stormwater pollution prevention. Infiltration through the gravel sub-base cleans stormwater. |
| Sustainable Sites 7.1: Heat Island Effect – Non-roof | 1 Point  
Pervious and concrete pavements have higher reflectivity than asphalt. Therefore they reduce the heat island effect. |
| Water Efficiency 1: Water Efficient Landscaping | 2-4 Points  
Pervious concrete allows infiltration to ground below, reducing the need for irrigation. Pervious can also be designed with underground storage systems to supply irrigation water. |
| Water Efficiency 2: Innovative Wastewater Technologies | 2 Points  
Using captured rainwater for graywater flushing of toilets. |
| Materials & Resources 4: Recycled Content | 1-2 Points  
Concrete can be produced with maximum amounts of recycled materials such as fly ash, slag, and recycled aggregates. Using recycled aggregates for sub-base and fill material is a major contributor to this credit. |
| Materials & Resources 5: Regional Materials | 1-2 Points  
Concrete and its ingredients are generally regionally sourced. |
| Sustainable Sites 5.2: Maximize Open Space | 1 Point  
Using pervious pavement can eliminate the need for detention ponds, thus reducing the developed portion of the site. |
In the early part of 2009 I completed a PowerPoint presentation for Mike Schneider which he presented at a conference held at the South Dakota School of Mines and Technology. The presentation I created, entitled “Construction, Waste, and Sustainability,” was intended to identify Baker Concrete’s sustainability efforts, past, present and future. Major portions of the presentation focused on our LEED experience. For example, case study information about the Scout Achievement Center in Cincinnati, and the Carousel Mall in Syracuse, New York were included.

The presentation also looked at other non-LEED project experience of an environmental nature. Some of these include solar farms and wind turbine foundations. Pervious paving was also included. Sustainability was identified as a Baker core value where our commitments to waste management and green office initiatives were explored. The presentation also looked at the opportunity we have to make a sizeable contribution through the use of fly ash and other supplementary cementitious materials (scm’s) in our concrete mixes. (Fly ash, silica fume, and slag are the most commonly used scm’s). We will place approximately 2 million cubic yards of concrete in 2009. Maximizing the use of scm’s, which are waste by-products from other industrial activities (fly ash comes from coal burning for electric production, silica fume is a by-product created in electric-arc furnaces, and slag is a by-product from blast furnaces used in iron manufacturing), gives us the opportunity to greatly reduce the use of Portland Cement, which is environmentally costly to produce. Production of clinker, which is the material that is finely ground and mixed with a few additives to produce Portland Cement, produces 7 to 8% of total global CO2 emissions (ecosmart.com).

The last portion of the presentation looked at a few of our sustainable practices, including care and maintenance of equipment, maintenance and use of dependable/reusable forming systems, and focusing on safety and training of our people.
Mr. Schneider reported that the presentation went well and that he intends to keep the presentation to present in the future.

**SSQP**

Approximately two years ago Baker Concrete developed a new program known as Safety, Quality and Production (SQP). The program intends to promote an expansion of safety, quality and production by providing a forum for field personnel to suggest new or different means and methods. Through the program suggestion boxes are placed on each jobsite and any worker can write up a suggestion to put into the box that promotes a more productive, safer, or completely new way to improve our on-site safety, quality and production goals. The incentive for the program is a cash reward for the best suggestion on a month to month basis. Usually the cash reward is $50, but it varies from site to site and sometimes gift cards are given out.

Recently National Projects enhanced the program on their jobsites so that it includes sustainability. Their program is now referred to as SSQP. National Projects sees the SQP program as a vehicle by which they can introduce sustainability to field personnel. Since the introduction of sustainability is very new it is difficult to judge the success of the program. However, I recently read a catalog of the SSQP suggestions that have come from the field and of the more than 400 suggestions coming in from National Project sites, only three referred to sustainability. Two of those suggestions were to improve/promote recycling. The other suggestion was to reduce use of lumber, specifically by avoiding cutting long pieces into shorter pieces without first checking to see if there were already pieces that were of the approximate size needed elsewhere on the job. (You would be amazed at how big an issue this is. Carpenters routinely cut 16’ long 2x4’s without ever checking to see if other options are available). The wise use of lumber is actually a good sustainability suggestion. It hits at the heart of the reduce/reuse issue and should be promoted on all of our jobsites. My understanding is that this suggestion was dismissed as being too basic and ambiguous. I find that unfortunate. Had the suggestion been rewarded as a valuable sustainability suggestion more suggestions addressing sustainability would have likely followed. To date the overwhelming majority of SSQP suggestions have focused on safety.
I created the following document defining Baker’s sustainability status and sent it to Mike Schneider. My intention was that the document could be used as an impetus to begin the sustainability discussions among Baker’s leadership team. Although Mr. Schneider felt that the document was thorough and accurate there has yet to be any word as to whether it will be used for the intended purpose.

### Baker Concrete’s Status in Regards to Sustainability

**Current:**
- We have no mention of sustainability in our company mission statement or vision.
- We have seen only disjointed, individual or small group efforts to recycle or promote other sustainable initiatives.
- Employees have no idea what we are doing in terms of sustainability/“going green.”
- We do not include sustainability, or any mention of environmental stewardship, in new hire orientation.
- The Green Committee has no teeth and is struggling without a top-down directive. It has achieved some limited “greening” of the office and kitchen at Corporate, but this is isolated, not company-wide.
- We have no Best Management Practices (BMP’s) that are part of our co-workers’ toolbox in regards to sustainability.
- There is some knowledge base with individuals in different areas of the company but there is very little sharing of information and no apparatus for doing so.
- There is no sustainability director/team/department, etc.
- Our growth in LEED projects has gone from a $5 million project in 2003 to more than $145 million for the year 2008 alone. In total we have completed or are in the process of completing approximately $575 million in LEED work (see chart, Appendix E).
- We currently have 5 LEED AP’s (5/14/09) company-wide.
- National Projects has begun to rollout “SSQP” which adds sustainability to SQP (Safety, Quality, Production). For their own purposes, they have altered the company mission statement in such a way that it includes “sustainability.”

**Market:**
- Massive growth in LEED/“green” work throughout the country and abroad.
- Demand for green buildings has continued, even in a poor economy. Demand is based on a number of factors, but the major motives are lower operating costs of green buildings and government-mandated LEED certification.
- There are more and more expectations for contractors and sub-contractors to contribute to green projects. This includes, not only on the job site, but also during the pre-construction/planning stages.
- “LEED experience” is showing up more often as a pre-qualification to bid specific projects.
- Green building is not a fad. There has been a fundamental shift by developers from a short-sighted upfront cost view, to a long-term savings over the life of the building view.
Needs:
- We need to include sustainability in our mission statement.
- We need to include sustainability goals and BMP’s in new-hire orientation.
- We need a very clear-cut and simple set of BMP’s for co-workers to have as part of their tool box.
- We need to continue to innovate and promote sustainability, not only as environmental stewards, but as a smart business practice.
- We need a company-wide sustainability statement so that our co-workers know what sustainability means to Baker Concrete.
- We need a top-down dedication to sustainability.
- We need a sustainability tab on sharepoint with an area to exchange information and ideas.
- We need sustainability to be an important part of our corporate website.
- We need to market the good things we already do/have done.
- We need a person or group of persons who have sustainability as a responsibility, and power to take action.

Pros:
- Become the preeminent concrete contractor where sustainability is concerned.
  - Creating a competitive advantage over other concrete subcontractors by becoming the industry leader.
  - Be the contractor of choice on LEED projects.
- Increasing profit margins through sustainable actions.
  - Becoming leaner and greener improves the bottom line (less waste + more efficiency = more profits).
- Increasing market share by becoming the recognized positive partner in the green construction process via our experience and expertise.
  - Help builders maximize their LEED points through the use of concrete.

Goal:
- Dan Baker needs to make it clear that sustainability is a priority. Sustainability has to become part of the Baker culture.
- Incorporate sustainability into our everyday practices both on the job site and in the office.
- Sustainability should be a fundamental part of our work both on strategic and operational levels.
- Sustainability should never be looked at as an “add-on” to what we do; it should be an integral part of our business plan.

One of the biggest problems we are having company-wide with the notion of sustainability is that there still hasn’t been an official statement made by our president that clearly defines our stance on the issue. Recently I tried to remedy this situation. Stepping out on a limb somewhat (maybe a lot) I crafted a ‘Letter from the President’ that I proposed could be published in the company newsletter, The Concrete Facts. My
thinking was that if I could get a statement from the president down on paper it might facilitate an actual statement being made. I sent the letter to Mike Schneider:

**Message on Sustainability**

It seems like everywhere you turn these days there are green messages, whether in reference to environmental stewardship, the LEED rating system, or any of a never-ending list of efforts aimed at preserving the natural environment. Sustainability has become the topic of the day. Not surprisingly, many have asked what Baker Concrete will be doing in terms of sustainability. How will Baker Concrete meet the challenge?

First, we need to answer the question, “what is sustainability?” The most commonly cited definition is “meeting the needs of the present without compromising the ability of future generations to meet their needs.” It comes down to wise use of the earth’s resources, especially those resources that are not renewable.

Sustainability comes down to balancing efforts in three areas: earning profits, social responsibility, and environmental stewardship. Over the years we’ve done well focusing on profits and emphasizing social responsibility through superior work ethic, dedication to safety, charitable contributions, and a quest for continuous improvement. In today’s competitive market ignoring the impacts our work has on the natural environment is no longer an option. We have a responsibility to ensure that our children and grandchildren have the same opportunities we’ve had.

I see sustainability as an opportunity more than a challenge. Sustainability isn’t about tree-hugging; it’s a good business decision. As we continue to bid on and secure more and more environment-focused work (some of which include LEED projects, wind farms, solar arrays, and nuclear facilities) we will need to exhibit a commitment to sustainability. Most of the general contractors and construction managers that we work with have already fully committed to sustainability. More and more they are expecting subs to demonstrate similar commitments. Experience on LEED projects is starting to become a pre-qualifier for bidding LEED work. Expectations are growing.

I’m not talking about making radical changes to what has made us a successful company for the past forty years. In many ways we’ve been sustainable all along. Surviving in the ultra-competitive concrete construction world is by definition, an act of sustainability. What we must do now is bring an environmentally-conscious way of thinking into our decision-making. An easy way to think about sustainability is “leaving things better than you found them.” This is an attitude that we can apply everyday, on the jobsite, and in the office. Things that seem relatively small like turning off equipment that is idling without being used, or reducing extra or unnecessary truck trips through better planning are not only good environmental decisions but they are good for the bottom line.
On the jobsite don’t be wasteful with the materials we use. Continue to keep jobsite housekeeping in good order so that we can use the materials we have and order the materials we need. And always try to think of better ways to do things. It’s time to add sustainability to our tool belt.

In the coming months watch for the roll-out of Baker’s Sustainability Commitment. In the meantime, continue to be the best concrete construction company in the nation. Expect More!

Mr. Schneider recently stopped to tell me that he thought the letter was “spot on.” My hope is that the letter finds its way to Dan Baker and perhaps, with a little editing to put it more into Dan’s own words, it could become the official “word on sustainability” that our company so desperately needs. Thus far no action has been taken.

Conclusions

As someone who always worked in the field where you are able to see the fruits of your labor at the end of each day in the form of concrete poured, forms set, or results from any other of numerous physical activities, it is a drastic change to move to an office environment where accomplishments are less tangible. Frankly, it hasn’t been an easy transition for me. On the one hand, I appreciate the routine schedule where I don’t have to travel a great deal and I am able to be home in time to coach my kids in soccer and Little League baseball. On the other hand, I miss the physical aspects of working in the field, where you could get a daily dose of satisfaction from working hard and building things.

Overall, the internship periods I spent with Baker Concrete were productive and very enlightening. I am very pleased that I was able to complete the task of becoming Baker’s first LEED AP. Baker Concrete is a much larger animal than I ever realized when I was working in the field, only concerned with my own projects. In the office I’ve encountered first hand the difficulty of making things happen on a company-wide basis. As someone who wants to bring sustainability to the forefront, this is a battle that I am having difficulty with. However, I am adapting and fully expect to excel in my new career.
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APPENDIX A: Noteworthy Projects I Have Worked on in the Past.

- **1988 Subaru-Isuzu Plant, Lafayette, IN**
  - Over 1,000,000 square feet of slip form paving. My principle responsibility was setting the string-line that our paving machines used for navigation.

- **1992 Harrison Power Paving, Haywood, WV**
  - Worked as a laborer on hand-placed 10” concrete paving.

- **1993 Hap Cremean Clearwells, Columbus, OH**
  - Worked as a laborer, raking concrete on multiple mat pours of 3,000 cubic yards each.

- **1994 Wal-Mart Super Center, Bayou Vista, LA**
  - Worked as a laborer and finisher on site work, including, sidewalks, garden center paving, and loading dock paving.

- **1995 Olympic Village, Atlanta, GA**
  - Finisher/foreman on multiple streetscape projects including base-paving for brick pavers, curb and gutter, and sidewalks.

- **1996 Great Mall of the Plains, Olathe, KS**

- **1996 Federal Prisons: Amarillo, Childress, Snyder, La Mesa, Colorado City, TX**
  - These were building additions where we completed lay-out, piers, spread footers, and sub-grade preparation prior to the placement of slabs on grade. I did a little bit of everything on these projects including lay-out work, carpenter work, rodbuster work, and laborer work.

- **1997 Queensgate, Cincinnati, OH**
  - First large job as the lead finisher/foreman.
  - Ran crew of 10-12 laborers and finishers for the placement of 17,000 cubic yards of hand-placed concrete paving.

- **1997/2000 Federal Express, Indianapolis, IN**
  - Second and third phases of aprons and ramps for air cargo planes. Worked as a finisher on paving crew, slip forming 15” depth paving.

- **1998 Greenhills, OH, curb, walk, drive aprons**
  - $1.2 million in slip formed curb, driveway aprons, and sidewalk. I was the finisher/foreman for a crew of approximately 14 laborers, finishers, and operators.

- **1998 Atlantis Resort, Paradise Island, Bahamas**
  - Worked as a finisher on stamped and colored concrete.

- **1999 Paul Brown Stadium, Cincinnati, OH**
  - Baker Concrete performed all of the concrete work on this project. I worked there during the winter of 1999 as a finisher on concrete pours and also worked on a crew enclosing areas for winter protection.
• **2000 Costco Paving, Atlanta, GA**
  o  150,000 square yards of 8” concrete paving. Slip form and hand-placed paving. I was a one-man form setting crew, took the lead foreman role on hand-placed paving and performed sawing of construction joints.

• **2001 Costco Warehouse, Charlotte, NC**
  o  Total package job including interior slabs on grade, exterior paving, and site work including sidewalks and curb and gutter. Helped with site work and some small interior slabs on grade.

• **2003 Great American Ballpark, Cincinnati, OH**
  o  Helped perform site work on exterior, including sidewalks, concrete stairs, and paving.

• **2004 UC Campus Life Recreation Center, Cincinnati, OH**
  o  The only LEED Certified building I have worked on. Performed paving and sidewalks.
APPENDIX B: BAKER MASTER LIST OF LEED PROJECTS BY YEAR

2009 Fort Bliss Commissary, El Paso, TX
   LEED-NC Registered
   Distribution Center / Warehouse

2009 Aurora (APS) High School, Aurora, CO
   LEED-S Registered
   School

2009 Central Platte Campus, Denver, CO
   LEED-NC Registered
   Slab on Grade

2009 Lake Street Parking Garage, Colorado State University, Fort Collins, CO
   LEED-NC Registered
   Parking Garage

2009 University of Colorado Institute of Behavioral Science Building, Boulder, CO
   LEED-NC Registered
   School / University

2009 University of South Florida Interdisciplinary Science Facility, Tampa, FL
   LEED-NC Registered
   School / University

2009 US Central Command Headquarters, Tampa, FL
   LEED-NC Registered
   Office Building

2009 University of Central Florida Performing Arts, Orlando, FL
   LEED-NC Registered
   School / University

2009 University of Florida Veterinary Education and Clinical Research Center, Gainesville, FL
   LEED-NC Registered
   School / University

2009 Marlins Baseball Stadium, Miami, FL
   LEED-NC Registered
   Stadium

2009 Florida Atlantic University / University of Florida Joint Use Facility, Davie, FL
   LEED-NC Registered
   School / University

2009 396 Alhambra, Coral Gables, FL
   LEED-NC Registered
   Office Building

2009 El Paso Energy Tower Podium, Houston, TX
   LEED EB O&M Registered
   Office Building

2009 Shell Westhollow, Houston, TX
   LEED-NC Registered
   Office Building
2009 UT San Antonio Health Science South Texas Research Facility, San Antonio, TX
   LEED-NC Registered
   School / University
2009 Fort Eustis Training Doctrine Center (TRADOC), Newport News, VA
   LEED-NC Registered
   Police / Sheriff / Public Safety
2009 MSD Engineering Building, Cincinnati, OH
   LEED-NC Registered
   Office Building
2009 AMIS School, Cincinnati, OH
   LEED-S Registered
   School
2009 American Red Cross, Cincinnati, OH
   LEED-NC Registered
   Office Building
2009 Fort Bliss CAB GOV, El Paso, TX
   LEED-NC Registered
   Paving

2008 Streets at Southglenn Garage, Centennial, CO
   LEED-CS Registered
   Garage
2008 Embassy Suites, Denver, CO
   LEED-NC Registered
   Hotel
2008 Auraria Science Building, Denver, CO
   LEED-NC Registered
   School / University
2008 University of Florida Lacrosse Locker Room, Gainesville, FL
   LEED-NC Registered
   School / University
2008 One Harvard Circle, West Palm Beach, FL
   LEED-NC Registered
   Office Building
2008 Harbor Pointe Block C-7, Stamford, CT
   LEED-ND 1.0 Pilots Registered
   Multi / Family Condo
2008 Gables Park Plaza, Austin, TX
   LEED-NC Registered
   Multi / Family Condo
2008 Cemex Center, Houston, TX
   LEED-NC Registered
   Office Building
2008 Shell Woodcreek Phase II, Houston, TX
   LEED-NC Registered
   Office Building
2008 Energy Tower II, Houston, TX
   LEED-NC Registered
   Office Building
2008 North Adams Elementary, Seaman, OH
   LEED-S Registered
   School
2008 Wright Patterson Air Force Base – Human Performance, Dayton, OH
   LEED-NC Registered
   Laboratory
2008 Dan Beard Council – Achievement Center (Boy Scouts), Cincinnati, OH
   LEED-NC Registered
   Office Building
2008 Queen City Square, Cincinnati, OH
   LEED-CS Registered
   Office Building
2008 Miami Valley Heart Tower, Dayton, OH
   LEED-NC Registered
   Hospital
2008 NAC Railcar Facility, Cherokee, AL
   LEED-NC Registered
   Manufacturing Plant

2007 Cotton Center III, Phoenix, AZ
   LEED-CS Silver
   Distribution / Warehouse
2007 Mesa Community College, Mesa, AZ
   LEED-NC Registered
   School / University
2007 Metropolitan Two Hotel, Miami, FL
   LEED-NC Registered
   Hotel
2007 Met II, Miami, FL
   LEED-CS Registered
   Office Building
2007 University of Florida Southwest Stadium Addition, Gainesville, FL
   LEED-NC Platinum
   Stadium
2007 Colonial Townpark 400, Lake Mary, FL
   LEED-CS Silver
   Office Building
2007 Brickell Financial Center, Miami, FL
   LEED-CS Registered
   Office Building

2007 Legacy at Townlake, Austin, TX
   LEED-NC Certified
   Multi / Family Condo

2007 Energy Center Phase I, Houston, TX
   LEED-CS Silver
   Office Building

2007 BP Rodeo, Houston, TX
   LEED-NC Registered
   Office Building

2007 Shands Cancer Facility, Gainesville, FL
   LEED-NC Registered
   Hospital

2007 Carousel Center Mall, Syracuse, NY
   LEED-NC Registered
   Mall

2006 Optima Camelview Village, Scottsdale, AZ
   LEED-NC Registered
   Multi / Family Condo

2006 Northstar Village Phase III, Truckee, CA
   LEED-NC Certified
   Hotel / Resort

2006 Snowmass Base Village, Snowmass Village, CO
   LEED-NC Registered
   Hotel / Resort

2006 Shell Woodcreek Phase I, Houston, TX
   LEED-NC Gold
   Office Building

2006 Nissan Headquarters, Franklin, TN
   LEED-NC Registered
   Office Building

2006 Cincinnati Fire Station #9, Cincinnati, OH
   LEED-NC Certified
   Fire Station

2006 Colgate-Palmolive Oral Care, Morristown, TN
   LEED-NC Silver
   Office Building / Manufacturing
2005 USDA, Ames, IA
   LEED-NC Registered
   Office Building / Garage
2005 Twenhofel/Kenton County Middle School
   LEED-NC Silver
   School / University

2004 Arizona State University IST Building, Tempe, AZ
   LEED-NC Gold
   School / University
2004 Belmar Block 5, Lakewood, CO
   LEED-CS Silver
   Office Building
2004 University of Cincinnati Varsity Village, Cincinnati, OH
   LEED-NC Certified
   School / University

2003 University of Cincinnati Campus Life Recreation Center, Cincinnati, OH
   LEED-NC Certified
   School / University
APPENDIX C: Why you should choose concrete paving

Any project pursuing LEED certification needs to strongly consider designing exterior paved surfaces with concrete. Combining pervious concrete with traditional concrete paving will help a project maximize LEED points.

Where concrete and pervious concrete can contribute to LEED:

- SS 6.1 Stormwater Design – Quantity Control (1 Point)
- SS 6.2 Stormwater Design – Quality Control (1 Point)
- SS 7.1 Heat Island Effect – Non-Roof (1 Point)
- WE 1 Water Efficient Landscaping (2-4 Points)
- WE 2 Innovative Wastewater Technologies (2 Points)
- MR 4 Recycled Content (1-2 Points)
- MR 5 Regional Content (1-2 Points)

Along with the many LEED advantages, there are numerous additional reasons for using concrete.

These include:

- Eliminate detention ponds
  - Means less money required for site development (lower up-front costs)
  - Less site disturbance (may also contribute to SS 5), and land not used for a detention pond can be used for something more productive
  - Avoid insurance premiums and potential liabilities associated with detention ponds, especially where children are present (lower lifetime costs)
  - Avoid maintenance issues associated with detention ponds (pumps, fences, inlets/outlets, grass mowing/weeding, mosquitoes) (lower lifetime costs)
- Reflectivity of lighter colored pavements requires less exterior lighting
  - Fewer fixtures (lower up-front costs)
  - Fewer light poles (lower up-front costs)
  - Less energy demand (also contributes to Energy & Atmosphere) (lower lifetime costs)
- Lighter colored pavements decrease heat island effect which directly contributes to SS 7.1, and:
  - Lower temperatures of the microclimate can allow for a reduction in demand for HVAC (less cooling required in warm months) which reduces average daily cooling loads (lower up-front and lifetime costs)
  - There is a very high likelihood that the state of Ohio will be moving to a year-round school schedule, increasing the need for cooling in schools
- Pervious paving can help a site reduce/eliminate need for curb and gutter/catch basins/underground stormwater systems
  - Properly designed, pervious paving could greatly reduce up-front costs
Asphalt paving requires maintenance costs that pervious/traditional paving does not:
  o Re-sealing
  o Re-striping
  o Potholes are a common problem, especially where there is heavy truck (bus) traffic

Asphalt paving has safety issues in the winter
  o Black ice can be a problem as snow melts and re-freezes; melted ice drains through pervious paving.
  o Puddled water on asphalt can lead to hydro-planing.

-Dennis Morrish, April 2009
APPENDIX D: LEED 2009/Pervious and Concrete Pavements

Sustainable Sites 6.1: Stormwater Design – Quantity Control 1 Point

Using pervious allows water to infiltrate into the ground rather than runoff. You can eliminate swales, ditches, underground storm piping, catch basins and concrete curbing. This also means that space-demanding and expensive detention ponds, which are often accompanied by serious insurance liabilities, are not required.

Sustainable Sites 6.2: Stormwater Design – Quality Control 1 Point

Pervious pavement is a US EPA approved Best Management Practice (BMP) for stormwater pollution prevention. Infiltration through the gravel sub-base cleans stormwater.

Sustainable Sites 7.1: Heat Island Effect – Non-roof 1 Point

Pervious and concrete pavements have higher reflectivity than asphalt. Therefore they reduce the heat island effect.

Water Efficiency 1: Water Efficient Landscaping 2-4 Points

Pervious concrete allows infiltration to ground below, reducing the need for irrigation. Pervious can also be designed with underground storage systems to supply irrigation water.

Water Efficiency 2: Innovative Wastewater Technologies 2 Points

Using captured rainwater for graywater flushing of toilets.

Materials & Resources 4: Recycled Content 1-2 Points

Concrete can be produced with maximum amounts of recycled materials such as fly ash, slag, and recycled aggregates. Using recycled aggregates in sub-base is a major contributor to this credit.

Materials & Resources 5: Regional Materials 1-2 Points

Concrete and its ingredients are generally regionally sourced.

Sustainable Sites 5.2: Maximize Open Space 1 Point

Using pervious pavement can eliminate the need for detention ponds, thus reducing the developed portion of the site.

Sustainable Sites 8: Light Pollution Reduction 1 Point

Concrete is much lighter than asphalt so it requires less lighting at night. Also, there is an upfront savings on light poles and lights in addition to savings based on decreased demand for electric.

Dennis Morrish, Spring, 2009
APPENDIX E: Growth in LEED Projects 2003 - 2009

Value in Millions

-Dennis Morrish, Baker Concrete