Tech. #1

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[FISK CORPORATE HEADQUARTERS]

Houston, Texas

Executive Summary

The purpose of this technical report is to evaluate the conditions and background information concerning the Fisk Corporate Headquarters project. Thorough investigation of construction characteristics such as the schedule, site conditions, and total costs were evaluated in an effort to achieve a higher level of complete project comprehension.

Fisk Electric is a large, nationally recognized electrical contractor who specializes in the installation of electric, telecom, and security systems in commercial buildings and is owned by a large general contractor by the name of Tutor Perini. The Fisk Corporate Headquarters project is located on the western side of Houston, Texas and will serve as Fisk's new office building and prefabrication shop. Due to Fisk's unusual ownership situation and familiarity with the construction industry, their new project provides a unique opportunity to study and analyze a facility that was constructed and owned by the same business entity.

The idea for Fisk's relocation to a new facility began in early February, 2010. After careful selection of the project team, the design commenced and by the end of 2011, Fisk first broke ground. Currently, the project is scheduled to be completed on October 5, 2012 and Fisk plans to begin moving in on October 13th. Fisk presently believes the total project costs to be 12.8 million dollars with building construction costs equaling approximately 6.7 million dollars. After careful investigation, it was discovered that a large percentage of non-construction costs were incurred through the purchasing and development of the site. When compared to RS Means square foot and assemblies estimates, Fisk Electric's new facilities cost significantly more due the quality of the designed building systems and complications that arose from unsatisfactory subsurface conditions.

Fisk's main goal in the construction of their new headquarters was to build a high quality facility for a low price. Upon purchasing Fisk Electric, Tutor Perini offered assistance in achieving this goal by aiding in the design process and deciding to act as the construction manager for the project. Their combined knowledge of construction allowed them to skillfully employ a traditional Design-Bid-Build delivery method in an effort to achieve this goal. The only potential room for improvement in their project plan would be in the efficiency of their site utilization plan. Overall, the carefully selected project team, combined with Fisk Electric's knowledge of the Houston construction market and local conditions, allowed them to ultimately attain their goals.

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Project Schedule

Fisk's Corporate Headquarters project presents a unique opportunity to study a construction schedule because of the relationship between the owner and the construction manager on the project. The building's owner, Fisk Electric, is actually owned by the project's construction manager, Tutor Perini. Due to this unique relationship, Fisk and Tutor Perini were able to carefully document and meticulously schedule the design phase to directly coincide with their desired construction schedule. The overall project schedule, from initial owner feasibility meeting to move in, spanned a period of 32 months and included an 11 month construction phase.

The project's schedule is broken up into 4 distinct sections or phases that can be labeled as design, site work, office building construction, and fabrication shop construction. The schedule began in the design phase with the first kickoff meeting in early 2010. At this time the principles of Fisk Electric sat down to discuss the potential relocation from their office near downtown Houston, Texas to the City's western edge. Once the principles made the decision to move their corporate headquarters, they were able to draw upon their extensive construction industry network to quickly hire the appropriate consultants and managers to bring their plan to fruition. The entire consulting team was hired within the 2010 calendar year and the tedious process of designing the building began.

Throughout the next year the owner, construction manager, and design team continued to work together to finalize and complete the plans for Fisk's new corporate office. By the end of the year 2011, the construction team had broken ground on the site and began completing the site work phase of the project. At the turn of the year, the design team's efforts brought successful results and the 100% construction documents package was released.

Once construction began, Tutor Perini released a construction schedule that would allow Fisk Electric to move into their new facility by early October 2012. Their construction schedule included activities for both the new office building and fabrication shop and has a set completion date of October 5, 2012. In order to keep true to their schedule, Tutor Perini utilized smart sequencing of some key elements which will be detailed in the following sections.

See Appendix A for the complete Fisk Corporate Headquarters summary construction schedule.

Foundation Sequence

Due to Fisk's Corporate Headquarters' short building height and relatively small building area, an extremely complex foundation system was not required to support the above ground structure. However, the foundations proved to be important for the construction team because the successful installation of both building's structural systems directly depended on the foundation's completion. In order to stay true to their projected schedule, the construction team detailed a foundation sequence that would allow the scope of work to flow, the concrete foundations to cure, and the entire system to be complete in time for the scheduled erection of structural steel. The team worked from the West side to the East side for both buildings installing first the drilled piers, followed by the pile caps and grade beams, and then finally the slab on grade. The following figure shows the direction of work for both the Foundation and Structural sequence along the building's blueprint.

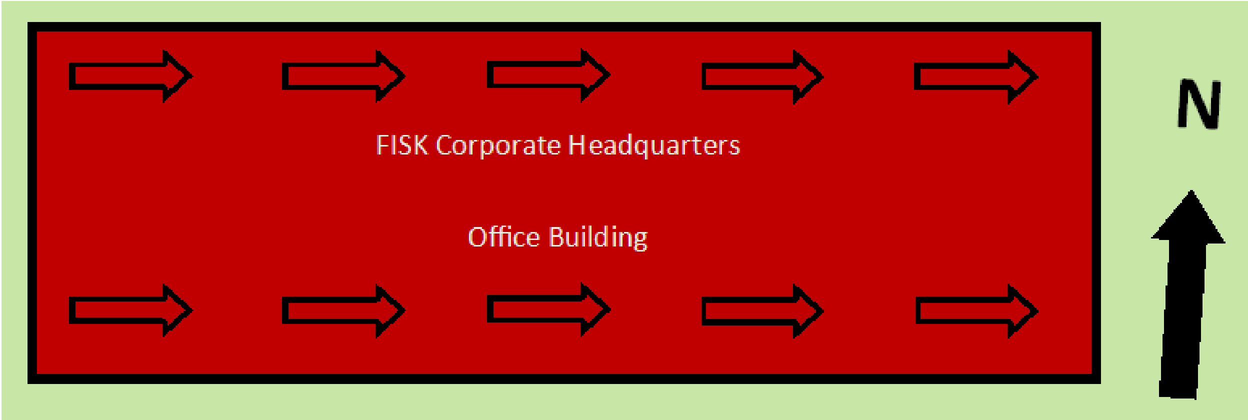


Figure 1: Foundation & Structure Workflow – Created by Stephen Blanchard

Structural Sequence

After experiencing success with the foundation installation, the project team decided to utilize a similar approach with regards to the building's structure. The key sequencing difference between the two systems is the structural systems dependence on shop drawings and steel fabrication. To combat this, the construction team decided to begin the shop drawing process at the same time they began installing the building's foundation system. This enabled the team to experience a seamless transition between foundation completion and steel erection. Like the foundation system, the steel was erected starting at the west end of the building and finishing at the eastern end. The erection sequence began with the steel columns followed by the steel beams. Once the beams were bolted and welded into place, the team installed the building's metal decking system and the shear studs. Figure 2 shows an image of the installation of the steel columns.

Figure 2: Column Erection - Image Provided by Tutor Perini

Finishes Sequence

Unlike the previous two sequencing items, the finishes are different in that no other building system is dependent upon its completion. However, they are equally as important because the building cannot be tested or turned over until all the finishes are installed correctly. In the case of the Fisk Corporate Headquarters project, the construction team was forced to work all the interior building trades concurrently on both floors in an effort to complete the project on time. In order to maintain order and avoid delay, the construction team decided to adopt a top-down approach to the interior finishes installation. They began by installing all the overhead trades before any walls or studs were allowed to be placed. After that, the metal stud crews quickly framed all the walls with the trade rough-ins following close behind. The team was then able to rapidly install the visible finishes in the order of drywall, paint, ceiling grid, acoustical tile, millwork, MEP devices and plates, and carpet. Rounding out the interior finishes sequences by installing all the doors and associated hardware, the team concluded that this sequence allowed all the different trades to not only stay out of one another's way, but also complete the interior finishes phase on time.

Building Systems Summary

The building systems checklist outlined below details the primary systems typically crucial to a building's construction process. Following the checklist are short summaries that describe how each specific system was designed and constructed for the Fisk Corporate Headquarters Project.

Work Scope	Yes	No	If Yes, Topics/Questions Addressed
Demolition Required?		X	Types of Materials, Lead Paint, or Asbestos?
Structural Steel Frame	X		Type of Bracing, Composite Slab, Crane Info.
Cast in Place Concrete	X		Formwork Types, Concrete Placement Methods
Precast Concrete		X	Location, Connections, Crane Info.
Mechanical System	X		Room Locations, System Type, Fire Suppression
Electrical System	X		Size/Capacity, Redundancy
Masonry	X		Load Bearing/Veneer, Connections, Scaffolding
Curtain Wall	X		Materials, Construction, Design Responsibility
Support of Excavation	X		System, Dewatering?, Permanent vs. Temporary

Table 1: Building Systems Checklist - Created by Stephen Blanchard

Structural Steel Frame

Fisk's new Corporate Headquarters is primarily a structural steel framed facility. Walter P. Moore designed the framing system specifically to combat lateral loads and provide stability under gravity loads by implementing what they call a "Lateral-Force Resisting System" in the office building. This system is comprised of two parts. First, the engineer designed steel braced frames consisting of steel diagonal members, steel columns and connecting steel floor beams. He then completed the design by implementing two structural diaphragms located on the second floor and roof levels that are completely attached to all steel floor beams and roof members respectively. The second floor diaphragm is a composite slab that contains shear studs and rests on a 2" deep, 18 gauge composite metal deck.

Figure 3: Structural Steel Frame - Image Provided by Tutor Perini

Due to its simplicity, the pre-fabrication shop was simply comprised of steel columns and a LH roofing truss system that ties into W18x35 beams spanning between the steel columns.

In order to hoist and install the steel members in both the office building and fabrication shop a 50 ton crawler crane was employed by Tutor Perini. This crawler crane was stationed in the area between the two buildings where there was plenty space for steel laydown and safe crane operation. From there, the crane could easily move from building to building as required and lift the members directly into their final positions.

Cast in Place Concrete

Since the Fisk Corporate Headquarters building is primarily comprised of structural steel framing members, very little cast in place concrete was utilized. The only areas requiring cast in place concrete were the foundations, slabs on grade, and the second floor deck in the office building. The foundations consisted of spread footings, grade beams, and drilled piers which were all earth formed and poured directly into the compacted soil. Both slabs on grade were formed using wood members. The concrete was then directly poured from the concrete truck into the slab's rebar mesh. The last cast in place concrete pour occurred on the second floor deck of the office building. This pour can be considered the most unique due to the implementation of a pump truck which aided in moving the concrete vertically to the second floor and its final resting place. The deck was formed using angled steel concrete forms along its edges.

Mechanical System

Fisk's Corporate Headquarters project's Mechanical System is comprised of large packaged rooftop units, fan powered terminal units, and exhaust fans. The office building houses two large 55 and 60 ton rooftop units that can both supply up to 16,000 CFMs of air to the offices below. These rooftop units are connected to 37 fan powered terminal units which distribute the air to the offices for which they are responsible. Three exhaust fans are also housed on the office roof and ventilate the bathrooms and janitor's closets. This segmentation of the distribution system allows greater comfort control of each individual area along with the potential for energy savings when those areas in question are not exposed to direct sunlight. It also eliminates the need for a mechanical room because all the units are either housed on the roof or within the dropped ceiling.

Unfortunately, the fabrication shop does not have the same type of A/C capabilities as the office and is simply comprised of one small 3 ton, 1200 CFM rooftop unit that supplies air to the prefabrication shop offices. The rest of the space is ventilated via fifteen 5600 CFM fans.

In an effort to provide adequate fire protection for the building and its inhabitants, a 100% coverage wet-pipe sprinkler system was specified to be designed by the sprinkler contractor awarded the job. Due to the building size and classification, no other building fire suppression elements are rated by IBC 2006 Table 601.

Electrical System

Drawing on their obvious history in commercial systems, Fisk Electric designed a relatively cheap, yet efficient electrical system for their new Corporate Headquarters. The system requires a demand service of 608.7 kVA. It is supplied via a 480V utility feed that travels through an 800 amp transfer switch directly into the building's main 800 amp distribution board. This distribution board then splits the supply into two different feeds; one 150 amp feed services the fabrication shop and other miscellaneous equipment, while the other feeds the second 800 amp distribution panel board within the system. It is from this second distribution board that a majority of the facility's power requirements are supplied. All of the smaller panel boards that are directly supplied via the two distribution boards are rated at 480/277 volts and primarily service the equipment and lighting loads. They also supply power to the 120/208 volt panel boards by passing through step-down transformers located within close proximity of their location.

The Fisk Electric Corporate Headquarters project implemented two different redundancy systems within their electrical system. The first is a 230 kW generator that they are transferring from their previous location to the new project site. This generator ties directly into the main service feed to the building and can be used to energize the necessary loads during an outage. The second redundant feature can be found in the small data center located on the second floor of the office building. Within this data center resides a small UPS system which will provide uninterrupted power to the data center equipment in the event of an outage intermediately while the generator powers up.

Masonry

Since the Fisk Corporate Headquarters is split into two different building types, it implements two different kinds of masonry construction. The office building utilizes a masonry brick veneer that, in connection with the curtain wall, works as the exterior building envelope. It is backed by a fluid applied membrane air barrier, and glass-mat gypsum sheathing. This assembly ties directly into the building's exterior metal stud wall as seen in figure 4 and was installed in the traditional one brick at a time manner. The second type of masonry was designed for the pre-fabrication shop. Once again, the masonry serves as a veneer but in this case the units were concrete masonry units and are the only material making up the facility's enclosure along with a layer of elastomeric paint applied to their exterior face. They were also installed in the traditional manner of masonry construction.

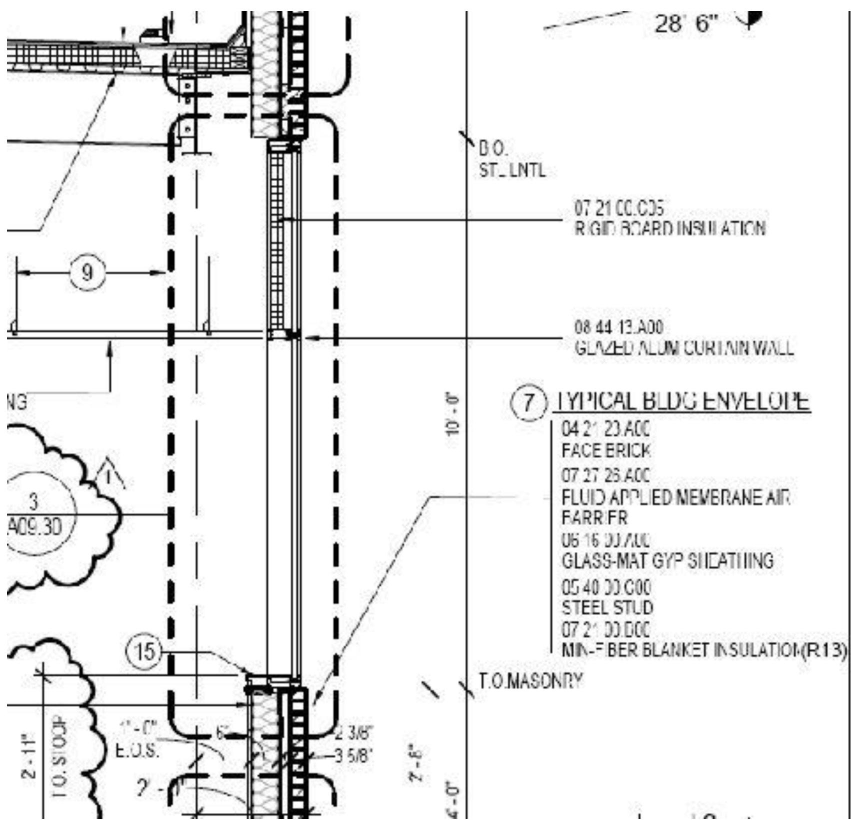


Figure 4: Masonry Detail - Provided by Fisk Electric

Scaffolding techniques range from very basic and traditional to advanced and expensive. Due to the simplicity of the building footprint, traditional scaffolding techniques were used on all building facades in order to effectively install the different masonry veneers. This method of installation is very cheap and, since the project has almost no site constraints, proved to be the most optimal construction method to employ on the Fisk Corporate Headquarters Project.

Curtain Wall

The curtain wall designed for the Fisk office building is a simple, yet elegant system that primarily serves as one of the building's main architectural features. In an effort to break up the simplicity of the building's box-like appearance, Gensler Architects implemented a horizontal curtain wall strip on both levels that is crossed by vertical strips of veneer bricks. This curtain wall works to not only allow the office inhabitants to connect with nature, but also take advantage of Houston's efficient daylight. No curtain wall system was designed for the prefabrication shop.

Figure 5: Facade System - Image Provided by Gensler

Aluminum framing and dual pane low E glass are the only two components of the curtain wall system. The aluminum framing located between the large panes of glass is directly sealed to the steel stud framing wall system located both above and below the curtain wall strip. Due to the simplistic nature of the curtain wall, the construction team utilized a technique known as stick construction during installation. While this installation practice does not take advantage of prefabrication efficiencies, the construction team believed that it was the most viable due to the relatively small size of the curtain wall on the project.

Support of Excavation

Because Houston, Texas has a relatively high water table, a vast majority of both residential and commercial buildings do not possess basement levels and do not require large amounts of excavation. The Fisk Corporate Headquarters building is not an exception to this general rule. However, some excavation was required on both the office and prefabrication facilities because of the geotechnical report conclusions. Due to the unsuitable soil condition below both desired structures, the contractor had to temporarily excavate to a depth of 10 feet beneath each building's footprint. The contractor then immediately backfilled and compacted both excavations with soils capable of supporting each building. During the brief excavation period, the contractor utilized sloping as allowed by local codes when applicable and simple wood sheeting and shoring when sloping was impossible due to a neighboring parking lot. Since the excavation period was used strictly to improve the quality of under-slab soil, no dewatering techniques were required.

LEED/Sustainability

While the original design included many sustainability features, a vast majority of them were value engineered out of the final design to save on initial costs. Both the external shading and outside air/toilet exhaust heat recovery systems were removed. The project team also removed any attempt at LEED certification. However, some sustainability features were kept in the design to help the building's energy efficiency such as the previously stated dual pane low E glass that was installed in the curtain wall system. Motion and vacancy detectors were utilized in an attempt to limit energy consumption within spaces when they are unoccupied. The MEP engineer on the project also implemented CO_2 sensors to control the outside air dampers and in turn reduce the level of outside air intake when possible.

Project Cost Evaluation

When evaluating the costs associated with constructing a facility, it is important to first breakdown those costs into smaller, more descriptive categories. In the case of the Fisk Corporate Headquarters Project, the first step in cost evaluation was to differentiate between the total project cost and the cost of the building as an individual item. It is worth noting that the two different facilities' costs are not broken out separately because that information was not supplied. The results of this analysis can be found below in Table 2.

Actual Building Costs Summary		
Description	Cost $	Cost $ per Square Foot
Construction Costs	$6,739,238	$124.43
Total Project Costs	$12,831,888	$236.93

Table 2: Actual Cost Data - Information Provided by Fisk Electric

As evidenced by the table results, almost 47% of the total project costs were not directly incurred via a construction activity. After further investigation, it was discovered that almost 45% of these non-construction costs came from the price of the land on which the building resides. Furthermore, another 9% was spent cultivating that land to place the building in an aesthetically pleasing environment. The remainder of the costs came from miscellaneous charges and consulting and managing fees. After discerning what comprised the non-construction costs, the next step was to break down the construction costs by building system. This evaluation would give insight to systems in which the owner either under or over values based on their spending breakdown. The results from this breakdown can be found in Table 3.

Building Systems Cost Summary		
System	Cost $	Cost $ per Square Foot
Structural Steel	$1,002,989	$18.52
Enclosure	$998,497	$18.44
Walls and Finishes	$1,380,391	$25.49
Electrical	$1,119,400	$20.67
Mechanical & Plumbing	$826,415	$15.26
Fire Protection	$139,813	$2.58
Elevator	$50,550	$0.93
Earthwork/Foundations	$1,046,380	$19.32
Utilities	$174.803	$3.23

Table 3: Systems Summary - Information Provided by Fisk Electric

After careful review it quickly becomes obvious that the owner prioritized both their electrical system and earthwork/foundation packages. It can be assumed that Fisk Electric prioritized their electrical system due to their knowledge of the system and the benefits that a more expensive system can grant them. The earthwork and foundation package's cost growth can be directly attributed to the information found in the geotechnical report. Upon its completion, the structural engineer calculated that the original soil was unfit to support the structure Fisk desired. The contractor then was forced to take steps to rectify the subsurface condition. This added unforeseen condition greatly increased the total construction cost incurred by the owner.

After investigating the components making up the project cost, analysis was completed using RSMeans in an effort to compare the actual project costs to similar projects throughout the United States. Table 4 below shows a summary result of the square foot estimate. With total estimated costs totaling just over five million dollars, depicting a difference of 1.5 million dollars, it was obvious that the Fisk Corporate Headquarters project was a relatively expensive facility. While part of the 1.5 million difference comes from the lack of subcontractor fees reflected in the estimate, this small percentage does not make up for the large disparity between Fisk's facility and a typical office building. This cost growth can most directly be attributed to the elevated electrical system and earthwork/foundation packages Fisk required on their project. For access to the full square foot estimate, please see Appendix B-1.

Square Foot Building Estimate			
Location	Houston, TX	Date	2012
Office Building		**Fabrication Shop**	
Facility Type	Office Building	Facility Type	Warehouse
Area	37780	Area	16380
Perimeter	582	Perimeter	665
Stories	2	Stories	1
Floor Height	15	Floor Height	30
Total Cost	$4,055,500	Total Cost	$1,166,500
Total Sq. Ft. Estimate Combined		**$5,222,000**	

Table 4: Square Foot Estimate – Values Produced by Stephen Blanchard

The final analysis completed for the project was an MEP assembly estimate using RSMeans. Table 5 shows the difference between the estimated system costs and the actual costs. In most cases, the reason for the slightly lower estimated values can be attributed to the lack of the typically 10% subcontractor fees which were included in the actual costs provided by the owner. The only exception to this rule resides in the electrical system estimate which is lower by more than 10%. In this instance the reason for the disparity lies in the medium of the estimate. RSMeans assembly style estimates do not include transformers or panel boards which would bridge the remaining gap. For a complete printout of the assemblies estimate, see Appendix B-2.

Assemblies Estimate Summary		
System	Estimated Cost	Actual Cost
Mechanical & Plumbing	$740,760	$826,415
Electrical	$939,784	$1,119,400
Utilities	$152,270	$174,803

Table 5: Assemblies Summary - Values Produced by Stephen Blanchard

Existing Conditions

Fisk Electric's new corporate headquarters building is located on the western side of Houston, Texas, just outside of Beltway 8. This location within the city is considered a hub of new growth and construction with recent medical and residential projects being completed in the surrounding areas. Fisk's principles decided this would be a prime location for a new corporate office, relatively central to Houston's main expansion areas, while still being in an area with plenty of available land for expansion. Figure 6 gives the relative location of the new facility with relation to Houston, Texas.

As previously stated, the new location for the Fisk Corporate Headquarters building is located on a site with ample amounts of space. The site was actually purchased by Fisk during the design process. It is surrounded on all four sides by two way streets. The only existing, developed area on the site is a small, fenced in parking lot located on the site's southeastern corner which belongs to the 5 story hospital across the street on the site's eastern side. Barring that, no real structural objects are close enough to the site to hinder construction in any way or become an integral factor in a site logistics plan.

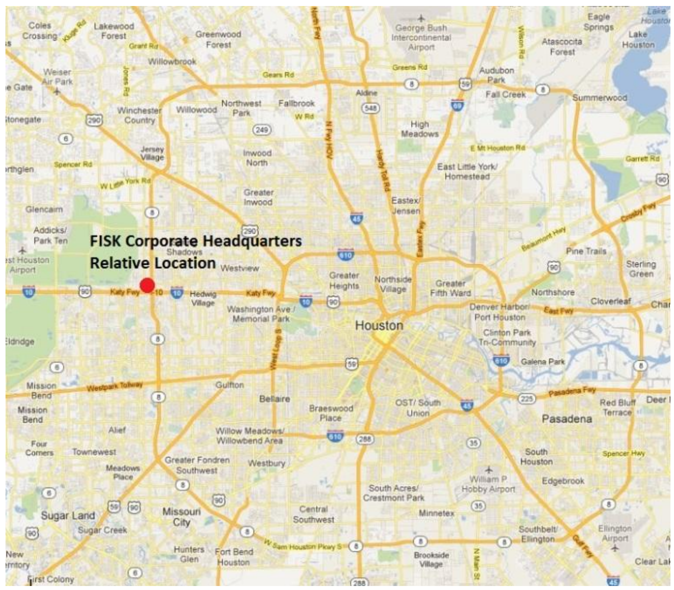


Figure 6: Relative Building Location – Image from Google Maps

Since the site was previously undeveloped, the only underground utilities presently installed on the site are a water main under a sidewalk on the west side of the site and a storm water line located below grade on the eastern and southern site edges. However, accessible fire hydrants and utility manholes do exist either along the site's fringes or directly across perimeter streets. These convenient locations made a majority of the utility connection sequences relatively economical. It is worth noting that the construction team recently discovered the water main next to the site was abandoned by the city approximately one year ago. No alternative utility connection point has yet been realized by the project team. Members of the team have been in constant communication with the city in an effort to find an economical solution.

The site's undeveloped nature also makes it an area rarely utilized by pedestrians and the surrounding streets are relatively vacant. The only potential pedestrian traffic comes from people entering the existing parking lot from the hospital. Luckily, this area is already isolated via an iron fencing system and the pedestrians within the area are safe from any construction hazards. All the sidewalks along the site's exterior edges lie outside of Fisk's property line and a simple, chain-link fence was used to keep pedestrians from entering the potentially dangerous jobsite.

For a complete existing conditions plan, please reference Appendix C.

Site Layout Planning

Due to the relatively large amount of space available on the Fisk Corporate Headquarters project, the construction team could afford to have flexibility in how they organized their site. While site space is normally advantageous, it could prove problematic if a project layout causes laborers to lose valuable time being forced to travel longer than necessary distances during their workday. Figure 7 shows an aerial view of the site at its early stages.

Figure 7: Fisk Construction Site – Image from Google Maps

In the case of the Fisk project, the large site space allowed for many of the site phase plans to remain relatively consistent and still utilize efficient labor rates. However, some of the key project phases differed enough in material and installation requirements that some changes were necessary. The three main differing phases studied in this report were the installation of the building's superstructure, envelope, and interior finishes.

Throughout all three phases, the site's boundaries and fence lines remained in their original installed position. The building's footprint is far enough away from any potential pedestrian or street traffic hazard that no extra precautions had to be taken in any phase other than the property's perimeter fencing. Another constant throughout all three phases was the office trailer location and available project parking. Both were located near the jobsite's southeastern entrance out of the way of any construction activities. One trailer proved to be sufficient because the construction manager's staff were temporarily housed in Fisk's existing building.

One critique of the site plan employed by the general contractor throughout all three phases is the use of only the east side of the project for delivery entry and exit. Contrary to the site plans detailed in Appendix D, this one-sided approach would force every delivery to enter the site, deposit the material, and then find a way to turn around and exit the site. A much more efficient method would be to utilize both sides of the construction site and have the delivery vehicles drive straight through the jobsite without requiring any turn around space and causing potential congestion.

The following sections detail out the site planning differences between each individual phase.

Superstructure

The building superstructure phase was the most important from a site planning perspective due to the large equipment and materials required to complete the phase. The site plan developed in this report shows the crane used for steel erection traveling in a counterclockwise pattern starting from the southwest corner of the office building and ending in the northeast corner of the fabrication shop. Running in between the two building is the area designated for steel laydown and trucking delivery paths. Once the structural steel was installed, the project teams could then install the cast-in-place concrete using the pathways that would be freed up with the removal of the crane. Contrary to the site plan developed by Tutor Perini, these laydown and delivery paths have a definite boundary which forces a higher level of organization on the construction team. Tutor Perini left these areas relatively unorganized and spread out throughout their jobsite plan. While the Fisk jobsite is large enough to house a less organized laydown area, this lack of organization can easily lead to lost time when materials need to be found and moved.

For a complete version of the superstructure site plan developed in this report, see Appendix D-1.

Building Envelope

Following a complete superstructure installation, the next major site phase is the construction of both facility's building envelope. The main difference between this phase and the previous one is the lack of large equipment required for installation. As such, the material delivery paths and storage areas were moved closer to the building footprint. Scaffolding was then erected along the building's perimeter as required. From the nearby locations, forklifts were then able to quickly and efficiently move materials from the storage areas directly onto the scaffolding where the laborers could install them. The large amount of space on the site also allowed the construction team to set aside an area for mortar production in between the two structures. The fresh mortar could then be easily moved to either façade and installed.

Once again, the main difference between the plan developed in this report and the actual construction is the emphasis placed on site organization. While the construction team intuitively followed a similar approach, specific laydown and material movement paths were not specifically designated and some efficiency was lost.

For a complete version of the building envelope plan developed in this report, see Appendix D-2.

Interior Finishes

The last phase studied in this report is the interior finishes stage. Interior finishing is very unique compared to the other two phases in that a majority of the work is done within the building instead of along the exterior. One of the most crucial aspects of this phase from both a safety and efficiency standpoint is the designation of available building entrances to the workers. In the plan developed in this report, three main entrances were designated for man and material movement both into and out of the building. The material delivery and storage paths remain very similar to earlier phases with the only real site difference from the previous phases being the new parking areas which become available closer to the office building's main entrance. Other than the entire project planning differences detailed earlier, the phase plan in this report and the actual construction site plan run relatively parallel to one another.

For a complete version of the interior finishes site plan developed in this report, see Appendix D-3.

Local Conditions

Fisk Electric Corp. has been headquartered in Houston, Texas since its formation in 1913. As an area, Houston has very few natural barriers like rivers or mountains to impede the city's rampant growth. As such, buildings have a tendency to grow horizontally instead of vertically. This fact, combined with the lack of nearby steel production, makes the use of a concrete superstructure typically the most economical choice of support. Contrary to the norm, Fisk's new building utilized a steel structure due to the advantage of smaller support members. The absence of any mountainous regions also makes the soil very soft and devoid of large rocks or boulders. However, Houston's close proximity to the gulf equates to a relatively high water table, resulting in few basements or extensive underground facilities.

In the case of the Fisk Corporate Headquarters project, the subsurface condition of the chosen site ended up having significant design, construction, and cost implications. The results of the geotechnical report concluded that the soil was not adequate to support the structure desired by the owner. As a result, Fisk had to pay for a ten foot deep, temporary excavation of both building's footprints. Afterwards, the construction team then had to backfill the footprints with structural fill. Once the structural fill was in place, the team could then begin drilling and installing the foundations.

Due to the lack of any extensive or permanent excavations, no subsurface water issues came into play. The only water issues prevalent to the job came from the extensive rain Houston experienced in the past year. While this rain created slower working conditions and some minor delays, it was still not considered to be a major factor by the project team.

Fisk Electric and Tutor Perini decided during the design to remove any type of LEED accreditation. Because of this decision, no jobsite recycling applications were implemented. However, Fisk did pay for weekly waste removal which cost approximately 375 dollars a week.

One great advantage to Houston's lack of natural barriers is the amount of space between structures. Parking is rarely difficult to find and the Fisk Corporate Headquarters site is no exception to this rule. The site was such that the construction team was able to designate a large area where all the laborers were able to park on site at a safe distance from the construction work. Contrary to national construction jobs within city limits, the area set aside for parking was actually large enough that no organization was required by the parking team in order to ensure ample space for each laborer's vehicle.

The last concern most construction teams must address regarding local conditions is permitting. However, because Houston has no real zoning codes, obtaining job permits is a relatively simple task. After the city of Houston reviews and approves the construction documents, the project team need only apply for a permit through the Houston Permitting Center and pay the appropriate fees.

Client Information

Fisk Electric Corp. is a top ten ENR ranked electrical contractor. Fisk has branch offices in Los Angeles, Las Vegas, San Antonio, Dallas, New Orleans, and Miami, but their corporate headquarters have always been located in Houston, Texas. Their previous headquarters' location was built in the early 1970s just inside Houston's inner 610 loop. Because of advancements in technology and space requirements, Fisk decided in February 2010 that it was time for them to upgrade their facilities. Fisk felt that the best way to achieve this goal was to use their almost century long knowledge of the construction industry and build a new facility.

When an owner decides to construct a new facility, he has to prioritize between three different aspects of the project. These essential project aspects are cost, quality, and schedule with overall project safety being a fourth aspect which overlays all aspects of a project. In an ideal world, an owner would be able to attain success in all three categories, but in reality one aspect is typically sacrificed. In the case of the Fisk Corporate Headquarters project, the two prioritized aspects were quality and costs. Because Fisk already had a fully operational, existing building, there was no urgency to complete the new facility. As such, Fisk understood that sacrificing some scheduling desires would help ensure success in the other two main facets of the project. Due to their and Tutor Perini's standing in the construction industry, it was understood from the beginning of the project that safety was a top priority and would be treated with the highest level of importance.

Figure 8: Fisk Company Logo - Provided by Fisk Electric

In order to achieve what Fisk considered to be a successful relocation, the quality of the new space had to meet Fisk's standards. After being able to reside in their previous facility for almost forty years, Fisk wanted to make sure their new building had the same potential for longevity. As such, they continued to iterate through their designs until they felt the plan for the new building was exactly what they needed both now, and in the future. The second facet of the project they wanted to specifically prioritize was the cost. With the recent economic downturn, Fisk needed to ensure that their project was affordable, even with their desire for a high quality product. Fisk agreed early in the process that if a decision had to be made between schedule and price, price would always take priority. The next major section within this report details some of the steps Fisk took to ensure they achieved success with regards to project costs.

Because Fisk did not place a heavy emphasis on project schedule, no major sequencing concerns or turnover phasing needs to be addressed. Since the construction manager owns Fisk, the transition from construction to occupancy should be seamless. Upon the building's completion, Fisk will simply begin moving their furniture and accessories from their existing building into the new one.

Project Delivery System

As previously stated, Fisk Electric's two prioritized aspects of their new facility were cost and quality. Because of these priorities, Fisk decided to employ the traditional, slower Design-Bid-Build delivery method. As shown in the project schedule summary, a significant amount of time was taken during the various design phases of the project. The chosen Design-Bid-Build delivery method allowed the owner the time they desired to contemplate exactly what needs and desires Fisk, and by association Tutor Perini, had for their new facility. Once a design was finalized, Fisk was then able to send out the completed design documents for bid. Since the documents were complete at the time of the bidding process, Fisk was able to confirm exact, lump sum prices from the various subcontractors. This ability to maintain their emphasis on project costs can be directly attributed to Fisk's implementation of a Design-Bid-Build delivery method.

Even though Fisk utilized a Design-Bid-Build delivery method, it is worth noting that they strayed from the traditional approach due to their unique ownership situation. Since Tutor Perini, a large General Contractor from Los Angeles, owns Fisk Electric, they decided it would be in their best interest to manage the project themselves. This decision added a somewhat in-house CM Agency to the delivery method process. Because of their obvious interest in the business aspect of a company under their control relocating, Tutor Perini was involved with the project from the very beginning. They were an integral part of many design decisions as well as the choosing of the construction team. In retrospect, choosing Design-Bid-Build for the Fisk Corporate Headquarters project's delivery method was the most appropriate when considering the owner's priorities in building their new facilities. This delivery method, coupled with the in-house CM Agency, allowed the owner to align the construction goals with their prioritized overall project goals of cost and quality.

Contracts

Along with the chosen project delivery method, the contractual relationships between each company can directly influence a project's success. In the case of the Fisk Corporate Headquarters facility, the project team decided to award both cost plus a fee and lump sum contracts.

All the design consultants were awarded cost-plus contracts because of the nature of the service they provide. Because Fisk has years of experience in the construction industry, they understood the design process' timeframe could easily fluctuate depending on the requirements of the owner. Having just been bought by an involved General Contractor, Fisk knew the chances of multiple design iterations being required were a distinct possibility. As such, offering the consultant team the opportunity to be reimbursed for the time they spent working on the project plus a set fee would ultimately prove to be the most beneficial to both parties.

The second type of contract awarded was a lump sum contract. Because Fisk chose the traditional Design-Bid-Build delivery method, they felt confident that few changes would be made to the original bid documents once contracts were awarded. This enabled them to feel comfortable awarding lump sum contracts to all subcontractors without having to worry about the impact of large change orders. Since Fisk works for Houston's large general contractors, they decided it would be best to directly hold the subcontracts which allowed them to build their facility without showing favoritism towards a particular GC.

It is worth briefly detailing the numerous in-house relationships found on the project's organizational chart. Both the MEP system design and the electrical contracting part of the project were completed in house. This decision allowed Fisk to not only save money, but also use their industry experience to design a system aligned with their needs. Tutor Perini also decided to oversee the construction management aspect of the project themselves. Even though they technically own Fisk, Fisk still operates as an independent company and as such, Tutor Perini was awarded a cost-plus a fee contract for their services.

During the selection process, Fisk Electric relied heavily on their familiarity with the construction market in Houston to help make their decisions. They sent out bidding documents to companies they knew had a history of success and experience in the type of facility they wanted to build. In using a combination of cost-plus and lump sum contracts for all designers and engineers, Fisk was able to safely prioritize costs without sacrificing quality. They were also able to identify a way to not show favoritism towards any particular MEP designer or general contractor. The success they experienced shows that their contractual decisions and their evaluation of companies during the selection process both proved to be the optimal choices for them given their project goals.

See Appendix F for a Complete Project Organizational Chart

Staffing Plan

Similar to the Project's Delivery System, the staffing plan for the new Fisk Corporate Headquarters project carries complexity due to the ownership of Fisk Electric by Tutor Perini. Tutor Perini is technically the construction manager under contract. However, Fisk's knowledge of and familiarity with construction allowed them to take on a fairly significant role throughout the process. Furthermore, the joint financial interests of both companies made a combination of one construction management team not only possible, but optimal.

Because of the relatively small size and scope of the building, it was decided that a large staffing plan would not be necessary to complete the project. The figure to the right details all the project's team members involved throughout design and construction. It is important to note that not all individuals were involved in both phases of the project's duration.

During the early development of the building's design, the presidents and regional vice presidents from both companies were heavily involved in the decision making process. From large decisions like floor plan layouts, down to the colors of devices, all four company representatives worked together with the project's architects and engineers to achieve the ideal design for Fisk's building.

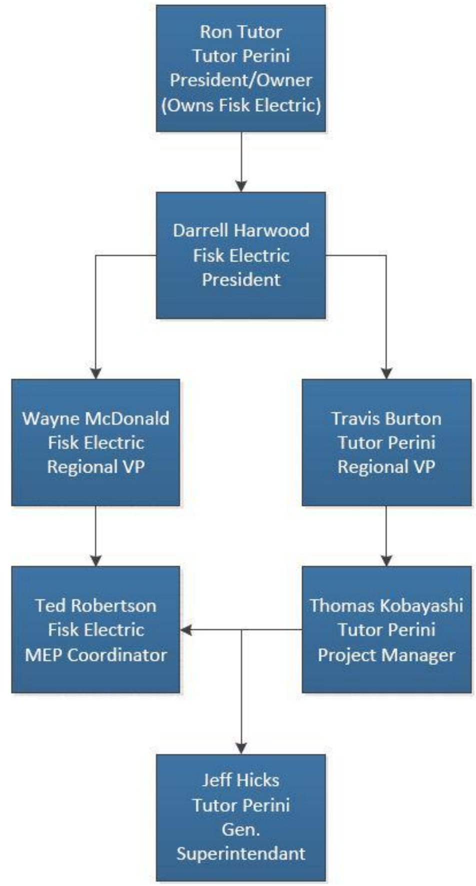
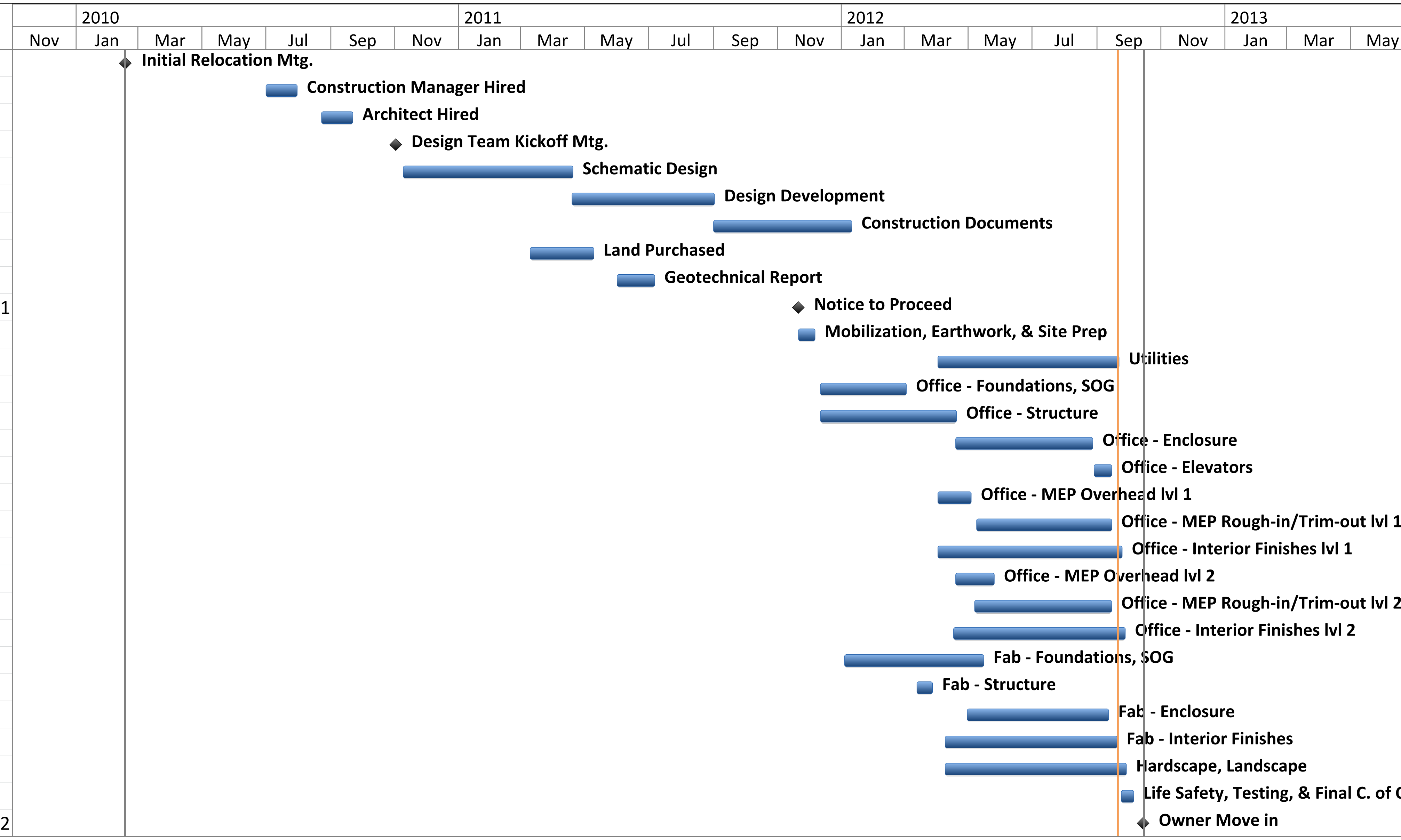


Figure 9: GC/CM Staffing Plan - by Stephen Blanchard

Once the final design was realized, the presidents from both companies stepped back from the project and passed on the responsibility of construction to other members within their respective organizations. Both Fisk Electric and Tutor Perini kept their respective vice presidents involved in an effort to monitor the project's progression. Thomas Kobayashi, a project manager employed by Tutor Perini, became the project manager responsible for the completion of the new office building. Ted Robertson, Operations Manager for Fisk Electric in Houston, stepped in as the building's MEP coordinator, as well as the electrical contractor's project manager. Finally, Jeff Hicks was employed by Tutor Perini to be the general superintendent responsible for the project's labor. It was deemed by Fisk and Tutor Perini that no other office staff would be necessary for the project's success.

Appendix A: Summary Schedule

ID	Task Name	Duration	Start	Finish
1	Initial Relocation Mtg.	0 days	Wed 2/17/10	Wed 2/17/10
2	Construction Manager Hired	22 days	Thu 7/1/10	Fri 7/30/10
3	Architect Hired	22 days	Mon 8/23/10	Tue 9/21/10
4	Design Team Kickoff Mtg.	0 days	Tue 11/2/10	Tue 11/2/10
5	Schematic Design	116 days	Tue 11/9/10	Tue 4/19/11
6	Design Development	98 days	Tue 4/19/11	Thu 9/1/11
7	Construction Documents	94 days	Thu 9/1/11	Tue 1/10/12
8	Land Purchased	43 days	Thu 3/10/11	Mon 5/9/11
9	Geotechnical Report	26 days	Wed 6/1/11	Wed 7/6/11
10	Notice to Proceed	0 days	Mon 11/21/11	Mon 11/21/11
11	Mobilization, Earthwork, & Site Prep	12 days	Mon 11/21/11	Tue 12/6/11
12	Utilities	125 days	Mon 4/2/12	Fri 9/21/12
13	Office - Foundations, SOG	60 days	Mon 12/12/11	Fri 3/2/12
14	Office - Structure	94 days	Mon 12/12/11	Thu 4/19/12
15	Office - Enclosure	93 days	Thu 4/19/12	Mon 8/27/12
16	Office - Elevators	13 days	Wed 8/29/12	Fri 9/14/12
17	Office - MEP Overhead lvl 1	24 days	Mon 4/2/12	Thu 5/3/12
18	Office - MEP Rough-in/Trim-out lvl 1	93 days	Wed 5/9/12	Fri 9/14/12
19	Office - Interior Finishes lvl 1	126 days	Mon 4/2/12	Mon 9/24/12
20	Office - MEP Overhead lvl 2	27 days	Thu 4/19/12	Fri 5/25/12
21	Office - MEP Rough-in/Trim-out lvl 2	95 days	Mon 5/7/12	Fri 9/14/12
22	Office - Interior Finishes lvl 2	118 days	Tue 4/17/12	Thu 9/27/12
23	Fab - Foundations, SOG	95 days	Wed 1/4/12	Tue 5/15/12
24	Fab - Structure	11 days	Tue 3/13/12	Tue 3/27/12
25	Fab - Enclosure	97 days	Mon 4/30/12	Tue 9/11/12
26	Fab - Interior Finishes	118 days	Mon 4/9/12	Wed 9/19/12
27	Hardscape, Landscape	125 days	Mon 4/9/12	Fri 9/28/12
28	Life Safety, Testing, & Final C. of O.	10 days	Mon 9/24/12	Fri 10/5/12
29	Owner Move in	0 days	Mon 10/15/12	Mon 10/15/12



Project: Fisk Corporate Headquar
Date: Thu 9/13/12

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Appendix B-1: Square Foot Estimate (both facilities)

Square Foot Cost Estimate Report

Estimate Name: **Untitled**

Building Type:	**Office, 2-4 Story with Face Brick with Concrete Block Back-up / Steel Joists**
Location:	HOUSTON, TX
Stories Count (L.F.):	**2.00**
Stories Height	**15.00**
Floor Area (S.F.):	**37,780.00**
LaborType	**Union**
Basement Included:	No
Data Release:	**Year 2012**
Cost Per Square Foot	**$107.35**
Total Building Cost	**$4,055,500**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly

		% of Total	Cost Per SF	Cost
A Substructure		**4.6%**	**4.88**	**$184,500**
A1010	**Standard Foundations**		**1.80**	**$68,000**
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	Spread footings, 3000 PSI concrete, load 200K, soil bearing capacity 6 KSF, 6' - 0" square x 20" deep			
	Spread footings, 3000 PSI concrete, load 300K, soil bearing capacity 6 KSF, 7' - 6" square x 25" deep			
A1030	**Slab on Grade**		**2.02**	**$76,500**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**0.07**	**$2,500**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**0.99**	**$37,500**
	Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
	Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**23.2%**	**24.93**	**$942,000**
B1010	**Floor Construction**		**8.59**	**$324,500**
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and wall, 25'x25' bay, 26" deep, 75 PSF superim			
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and wall, 25'x25' bay, 26" deep, 75 PSF superim			
	Fireproofing, gypsum board, fire rated, 2 layer, 1" thick, 14" steel column, 3 hour rating, 22 PLF			
B1020	**Roof Construction**		**3.19**	**$120,500**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns and bearing wall, 25'x25' bay, 20" deep, 40 PSF super			
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns and bearing wall, 25'x25' bay, 20" deep, 40 PSF super			
B2010	**Exterior Walls**		**7.78**	**$294,000**
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			
B2020	**Exterior Windows**		**2.22**	**$84,000**
	Windows, aluminum, awning, insulated glass, 4'-5" x 5'-3"			
B2030	**Exterior Doors**		**0.91**	**$34,500**
	Door, aluminum & glass, with transom, narrow stile, double door, hardware, 6'-0" x 10'-0" opening			
	Door, aluminum & glass, with transom, bronze finish, hardware, 3'-0" x 10'-0" opening			
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			

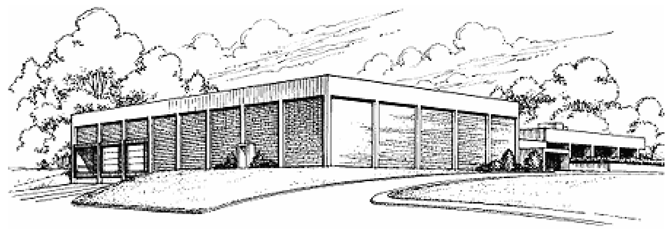
		% of Total	Cost Per SF	Cost
B3010	**Roof Coverings**		**2.24**	**$84,500**
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", duranodic, .050" thick			
C Interiors		**25.3%**	**27.10**	**$1,024,000**
C1010	**Partitions**		**2.02**	**$76,500**
	Metal partition, 5/8"fire rated gypsum board face, no base,3 -5/8" @ 24" OC framing, same opposite face, no insulati			
	1/2" fire ratedgypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		**5.60**	**$211,500**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C1030	**Fittings**		**0.91**	**$34,500**
	Toilet partitions, cubicles, ceiling hung, plastic laminate			
C2010	**Stair Construction**		**4.53**	**$171,000**
	Stairs, steel, cement filled metal pan & picket rail, 16 risers, with landing			
C3010	**Wall Finishes**		**0.94**	**$35,500**
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
C3020	**Floor Finishes**		**7.82**	**$295,500**
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz			
	Carpet, padding, add to above, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**5.28**	**$199,500**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**47.0%**	**50.42**	**$1,905,000**
D1010	**Elevators and Lifts**		**12.10**	**$457,000**
	Hydraulic passenger elevator, 3000 lb, 3 floors,12' story height, 2 car group,125 FPM			
D2010	**Plumbing Fixtures**		**3.27**	**$123,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, vanity top, PE on CI, 20" x 18"			
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"			
	Water cooler, electric, wall hung, 8.2 GPH			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
D2020	**Domestic Water Distribution**		**0.41**	**$15,500**
	Gas fired water heater, commercial, 100< F rise, 100 MBH input, 91 GPH			
D2040	**Rain Water Drainage**		**0.52**	**$19,500**
	Roof drain, CI, soil,single hub, 4" diam, 10' high			
	Roof drain, CI, soil,single hub, 4" diam, for each additional foot add			
D3050	**Terminal & Package Units**		**14.08**	**$532,000**
	Rooftop, multizone, air conditioner, offices, 25,000 SF, 79.16 ton			
D4010	**Sprinklers**		**3.12**	**$118,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 5000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 5000 SF			
	Standard High Rise Accessory Package 3 story			
D4020	**Standpipes**		**0.78**	**$29,500**
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, additional floors			

		% of Total	Cost Per SF	Cost
D5010	**Electrical Service/Distribution**		**2.14**	**$81,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 1000 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 1000 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 1200 A			
D5020	**Lighting and Branch Wiring**		**9.13**	**$345,000**
	Receptacles incl plate, box, conduit, wire, 16.5 per 1000 SF, 2.0 W per SF, with transformer			
	Miscellaneous power, 1.2 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	Fluorescent fixtures recess mounted in ceiling, 1.6 watt per SF, 40 FC, 10 fixtures @32watt per 1000 SF			
D5030	**Communications and Security**		**4.66**	**$176,000**
	Telephone wiring for offices & laboratories, 8 jacks/MSF			
	Communication and alarm systems, fire detection, addressable, 50 detectors, includes outlets, boxes, conduit and w			
	Fire alarm command center, addressable with voice, excl. wire & conduit			
	Internet wiring, 8 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		**0.21**	**$8,000**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7			
	Uninterruptible power supply with standard battery pack, 15 kVA/12.75 kW			
E Equipment & Furnishings		**0.0%**	**0.00**	**$0**
E1090	**Other Equipment**		**0.00**	**$0**
F Special Construction		**0.0%**	**0.00**	**$0**
G Building Sitework		**0.0%**	**0.00**	**$0**
Sub Total		**100%**	**$107.35**	**$4,055,500**
Contractor's Overhead & Profit		**0.0%**	**$0.00**	**$0**
Architectural Fees		**0.0%**	**$0.00**	**$0**
User Fees		**0.0%**	**$0.00**	**$0**
Total Building Cost			**$107.35**	**$4,055,500**

Square Foot Cost Estimate Report

Estimate Name: **Untitled**

Building Type:	**Warehouse with Concrete Block / Steel Frame**
Location:	HOUSTON, TX
Stories Count (L.F.):	**1.00**
Stories Height	**30.00**
Floor Area (S.F.):	**16,380.00**
LaborType	**Union**
Basement Included:	No
Data Release:	**Year 2012**
Cost Per Square Foot	**$71.21**
Total Building Cost	**$1,166,500**



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly

		% of Total	Cost Per SF	Cost
A Substructure		**20.7%**	**14.74**	**$241,500**
A1010	**Standard Foundations**		**1.86**	**$30,500**
	Strip footing, concrete, reinforced, load 5.1 KLF, soil bearing capacity 3 KSF, 12" deep x 24" wide			
	Spread footings, 3000 PSI concrete, load 100K, soil bearing capacity 6 KSF, 4' - 6" square x 15" deep			
A1030	**Slab on Grade**		**10.16**	**$166,500**
	Slab on grade, 5" thick, heavy industrial, reinforced			
A2010	**Basement Excavation**		**0.12**	**$2,000**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**2.59**	**$42,500**
	Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
B Shell		**38.3%**	**27.29**	**$447,000**
B1010	**Floor Construction**		**1.83**	**$30,000**
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and column, 25'x25' bay, 32" deep, 125 PSF su			
B1020	**Roof Construction**		**9.04**	**$148,000**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 25'x25' bay, 20" deep, 40 PSF superimposed load, 60			
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 25'x25' bay, 20" deep, 40 PSF superimposed load, 60			
B2010	**Exterior Walls**		**10.16**	**$166,500**
	Concrete block (CMU) wall, regular weight, 75% solid, 8 x 8 x 16, 4500 PSI, reinforced, vertical #5@32", grouted			
B2030	**Exterior Doors**		**1.04**	**$17,000**
	Door, aluminum & glass, with transom, narrow stile, double door, hardware, 6'-0" x 10'-0" opening			
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			
	Door, steel 24 gauge, overhead, sectional, electric operator, 12'-0" x 12'-0" opening			
B3010	**Roof Coverings**		**4.70**	**$77,000**
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
B3020	**Roof Openings**		**0.52**	**$8,500**

		% of Total	Cost Per SF	Cost
	Roof hatch, with curb, 1" fiberglass insulation, 2'-6" x 3'-0", galvanized steel, 165 lbs			
	Smoke hatch, unlabeled, galvanized, 2'-6" x 3', not incl hand winch operator			
C Interiors		**10.2%**	**7.23**	**$118,500**
C1010	**Partitions**		**0.52**	**$8,500**
	Concrete block (CMU) partition, light weight, hollow, 6" thick, no finish			
C1020	**Interior Doors**		**0.21**	**$3,500**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C2010	**Stair Construction**		**1.47**	**$24,000**
	Stairs, steel, grate type w/nosing & rails, 20 risers, with landing			
C3010	**Wall Finishes**		**2.56**	**$42,000**
	2 coats paint on masonry with block filler			
	Painting, masonry or concrete, latex, brushwork, primer & 2 coats			
	Painting, masonry or concrete, latex, brushwork, addition for block filler			
C3020	**Floor Finishes**		**1.95**	**$32,000**
	Concrete topping, hardeners, metallic additive, minimum			
	Concrete topping, hardeners, metallic additive, maximum			
	Vinyl, composition tile, maximum			
C3030	**Ceiling Finishes**		**0.52**	**$8,500**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**27.3%**	**19.44**	**$318,500**
D2010	**Plumbing Fixtures**		**1.25**	**$20,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, wall hung, PE on CI, 18" x 15"			
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
D2020	**Domestic Water Distribution**		**0.24**	**$4,000**
	Gas fired water heater, commercial, 100< F rise, 75.5 MBH input, 63 GPH			
D2040	**Rain Water Drainage**		**1.47**	**$24,000**
	Roof drain, steel galv sch 40 grooved, 5" diam piping, 10' high			
	Roof drain, steel galv sch 40 threaded, 5" diam piping, for each additional foot add			
D3020	**Heat Generating Systems**		**2.99**	**$49,000**
	Warehouse ventilization with heat system 24,000 CFM Supply and Exhaust			
D3050	**Terminal & Package Units**		**0.76**	**$12,500**
	Rooftop, single zone, air conditioner, offices, 3,000 SF, 9.50 ton			
D4010	**Sprinklers**		**3.33**	**$54,500**
	Wet pipe sprinkler systems, grooved steel, ordinary hazard, 1 floor, 10,000 SF			
D4020	**Standpipes**		**1.83**	**$30,000**
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors			
D5010	**Electrical Service/Distribution**		**0.76**	**$12,500**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 200 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 400 A			
D5020	**Lighting and Branch Wiring**		**4.64**	**$76,000**
	Receptacles incl plate, box, conduit, wire, 5 per 1000 SF, .6 watts per SF			
	Wall switches, 1.0 per 1000 SF			
	Miscellaneous power, to .5 watts			
	Central air conditioning power, 3 watts			
	Fluorescent fixtures recess mounted in ceiling, 0.8 watt per SF, 20 FC, 5 fixtures @32 watt per 1000 SF			

		% of Total	Cost Per SF	Cost
	Fluorescent fixtures recess mounted in ceiling, 2.4 watt per SF, 60 FC, 15 fixtures @ 32 watt per 1000 SF			
D5030	**Communications and Security**		**2.17**	**$35,500**
	Communication and alarm systems, fire detection, addressable, 100 detectors, includes outlets, boxes, conduit and '			
	Fire alarm command center, addressable without voice, excl. wire & conduit			
E Equipment & Furnishings		**3.5%**	**2.50**	**$41,000**
E1030	**Vehicular Equipment**		**2.50**	**$41,000**
	Architectural equipment, dock boards, heavy duty, 5' x 5', aluminum, 5000 lb capacity			
	Architectural equipment, dock levelers, hydraulic, 7' x 8', 10 ton capacity			
E1090	**Other Equipment**		**0.00**	**$0**
F Special Construction		**0.0%**	**0.00**	**$0**
G Building Sitework		**0.0%**	**0.00**	**$0**
Sub Total		**100%**	**$71.21**	**$1,166,500**
Contractor's Overhead & Profit		**0.0%**	**$0.00**	**$0**
Architectural Fees		**0.0%**	**$0.00**	**$0**
User Fees		**0.0%**	**$0.00**	**$0**
Total Building Cost			**$71.21**	**$1,166,500**

Appendix B-2: Assemblies Estimate

Cost Estimate Report CostWorks® RSMeans

10855 Westview Dr.,

Assembly Detail Report

Houston,
Texas , 77043
Year 2012

Prepared By:
Stephen Blanchard
Fisk Electric

Fisk Corporate Headquarters

Date: 14-Sep-12

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
D Services							
D20101102080			Water closet, vitreous china, bowl only with flush valve, wall hung	20	Ea.	$2,595.00	$51,900.00
D20102102000			Urinal, vitreous china, wall hung	4	Ea.	$1,425.00	$5,700.00
D20104101720			Kitchen sink w/trim, countertop, PE on CI, 24" x 21", single bowl	16	Ea.	$1,570.00	$25,120.00
D20104101800			Kitchen sink w/trim, countertop, PE on CI, 32" x 21" double bowl	4	Ea.	$1,695.00	$6,780.00
D20108101920			Drinking fountain, 1 bubbler, wall mounted, non recessed, stainless steel, no back	4	Ea.	$1,835.00	$7,340.00
D20202401820			Electric water heater, commercial, 100< F rise, 50 gallon tank, 9 KW 37 GPH	2	Ea.	$6,200.00	$12,400.00
D20402102280			Roof drain, DWV PVC, 8" diam, 10' high	8	Ea.	$4,625.00	$37,000.00
D20402102320			Roof drain, DWV PVC, 8" diam, for each additional foot add	160	Ea.	$81.00	$12,960.00
D30401321050			VAV terminal, cooling only, with actuator / controls, 1000 CFM	37	Ea.	$6,400.00	$236,800.00
D30501751010			A/C, rooftop, DX cooling, gas heat, curb, economizer, filters, 5 ton	1	Ea.	$14,275.00	$14,275.00
D30501801050			A/C, rooftop, DX cooling, gas heat, curb, economizer, filters, VAV, 60 ton	2	Ea.	$81,400.00	$162,800.00
D30501850600			Computer room unit, air cooled, includes remote condenser, 5 ton	1	Ea.	$23,700.00	$23,700.00
D30903101020			Fume hood exhaust system, 4 FT long, 2000 CFM	2	Ea.	$20,525.00	$41,050.00
D30903201600			Garage, single exhaust, 5" outlet, diesel trucks, 1 bay	16	Ea.	$6,433.45	$102,935.20

D50101200400			Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 800 A	1	Ea.	$15,850.00	$15,850.00
D50102300280			Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A	500	L.F.	$50.50	$25,250.00
D50102300320			Feeder installation 600 V, including RGS conduit and XHHW wire, 400 A	350	L.F.	$100.50	$35,175.00
D50102300400			Feeder installation 600 V, including RGS conduit and XHHW wire, 800 A	1000	L.F.	$271.00	$271,000.00
D50102400280			Switchgear installation, incl switchboard, panels & circuit breaker, 800 A	2.4	Ea.	$24,700.00	$59,280.00
D50201250560			Receptacle duplex 120 V grounded, 20 A with box, plate, 3/4" EMT & wire	170	Ea.	$266.50	$45,305.00
D50201300280			Wall switches, 2.0 per 1000 SF	37780	S.F.	$0.47	$17,756.60
D50201450200			Motor installation, single phase, 115 V, 1/3 HP motor size	37	Ea.	$1,630.00	$60,310.00
D50201450760			Motor installation, three phase, 200 V,20 HP motor size	2	Ea.	$4,625.00	$9,250.00
D50201550680			Motor feeder systems, three phase, feed to 200 V 20 HP, 230 V 25 HP, 460 V 50 HP, 575 V 60 HP	100	L.F.	$18.95	$1,895.00
D50202100500			Fluorescent fixtures recess mounted in ceiling, 0.8 watt per SF, 20 FC, 5 fixtures @32 watt per 1000 SF	54160	S.F.	$2.75	$148,940.00
D50303100440			Telephone systems, underfloor duct, poke thru fittings, high density	39280	S.F.	$4.46	$175,188.80
D50309100220			Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets	1	Ea.	$20,925.00	$20,925.00
D50309100400			Communication and alarm systems, fire detection, non-addressable, 50 detectors, includes outlets, boxes, conduit and wire	1	Ea.	$34,500.00	$34,500.00
D50309200106			Internet wiring, 6 data/voice outlets per 1000 S.F.	39.3	M.S.F.	$1,825.00	$71,722.50
D Services Subtotal							**$1,733,108.10**
G Building Sitework							
G30101102150			Water distribution piping, ductile iron class 250,	1000	L.F.	$35.93	$35,930.00

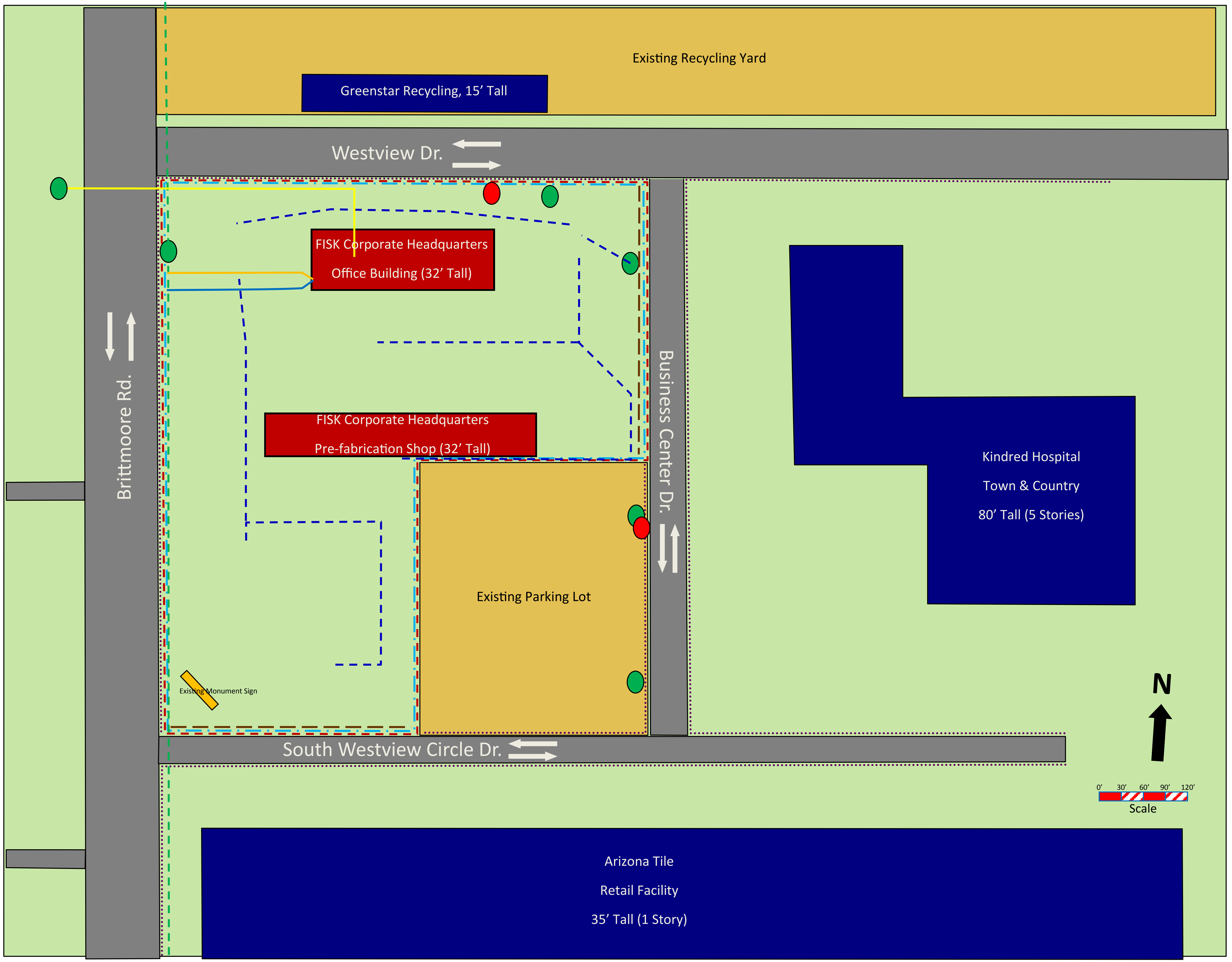
			mechanical joint, 6" diameter, excludes excavation and backfill				
G30201102150			Drainage and sewage piping, 6" diameter, plain, PVC, excavation and backfill excluded	1000	L.F.	$7.94	$7,940.00
G40202100200			Light pole, aluminum, 20' high, 1 arm bracket	24	Ea.	$2,326.50	$55,836.00
G Building Sitework Subtotal							**$99,706.00**

Printer Friendly Print Cancel

To view the Printer Friendly Version you'll need Adobe Acrobat Reader installed on your computer. To download click on the link below.

Get Acrobat Reader

Appendix C: Existing Conditions Plan

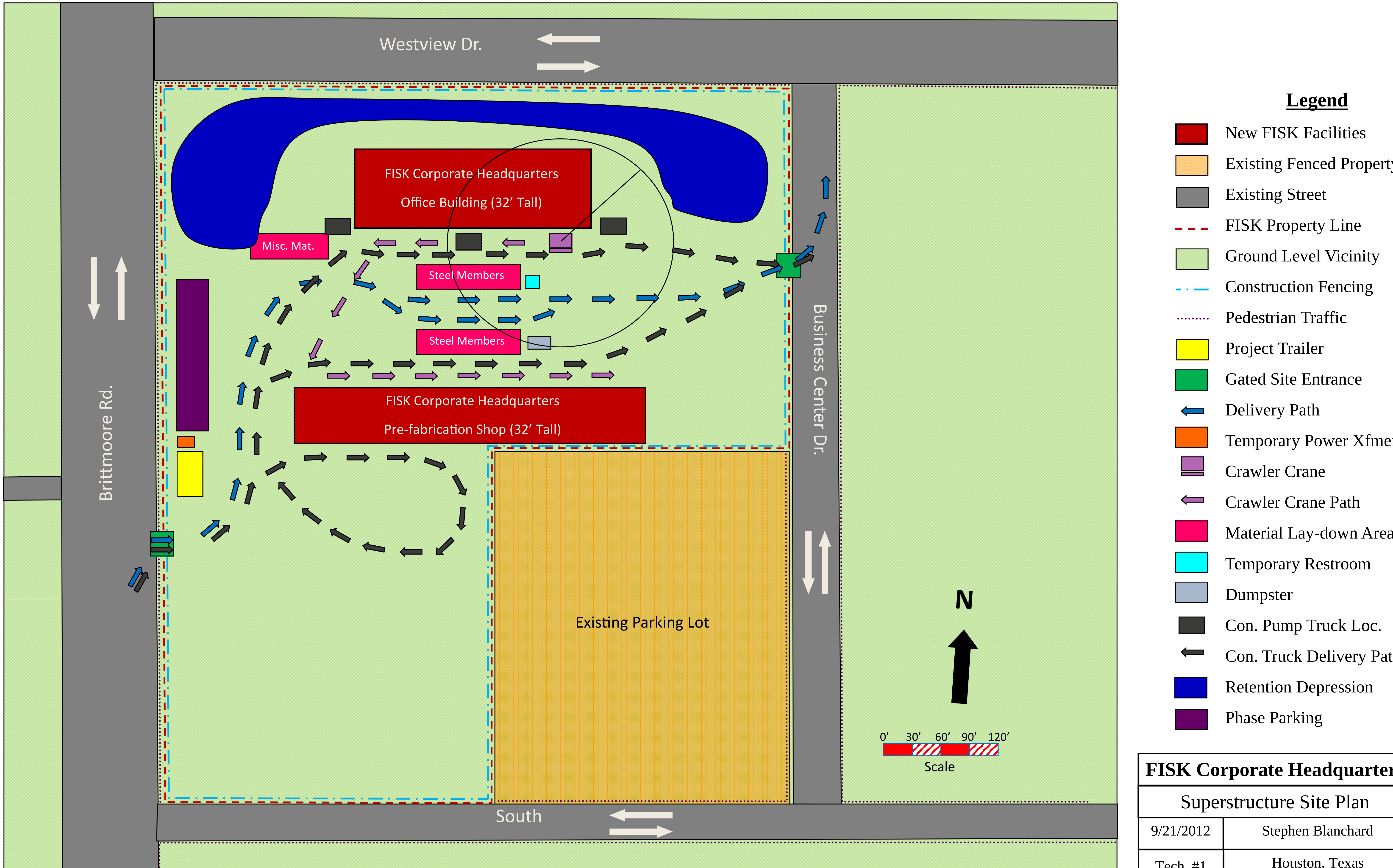


Legend

- New FISK Facilities
- Existing Buildings
- Existing Fenced Property
- Existing Street
- FISK Property Line
- Ground Level Vicinity
- Construction Fencing
- Pedestrian Traffic
- Existing Fire Hydrants
- Existing Manhole
- Existing Sanitary
- New Storm Sewer
- New Electrical & Telecom Utility
- New Dom. Water Utility
- New Cold Water Utility
- Existing City Water Lines (Recently Abandoned)

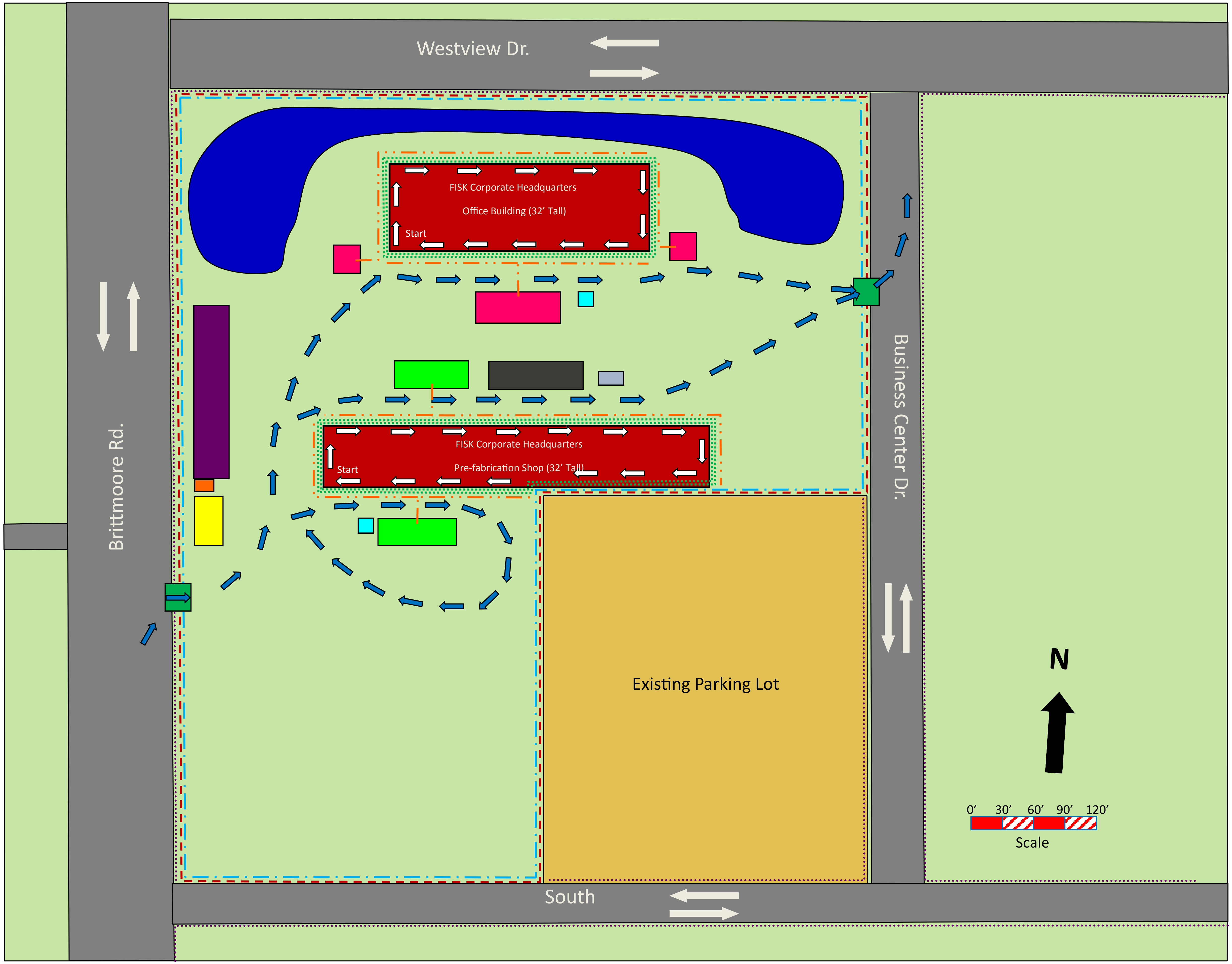
FISK Corporate Headquarters	
Existing Conditions	
9/21/2012	Stephen Blanchard
Tech. #1	Houston, Texas

Appendix D-1: Superstructure Site Plan



FISK Corporate Headquarters	
Superstructure Site Plan	
9/21/2012	Stephen Blanchard
Tech. #1	Houston, Texas

Appendix D-2: Building Envelope Site Plan

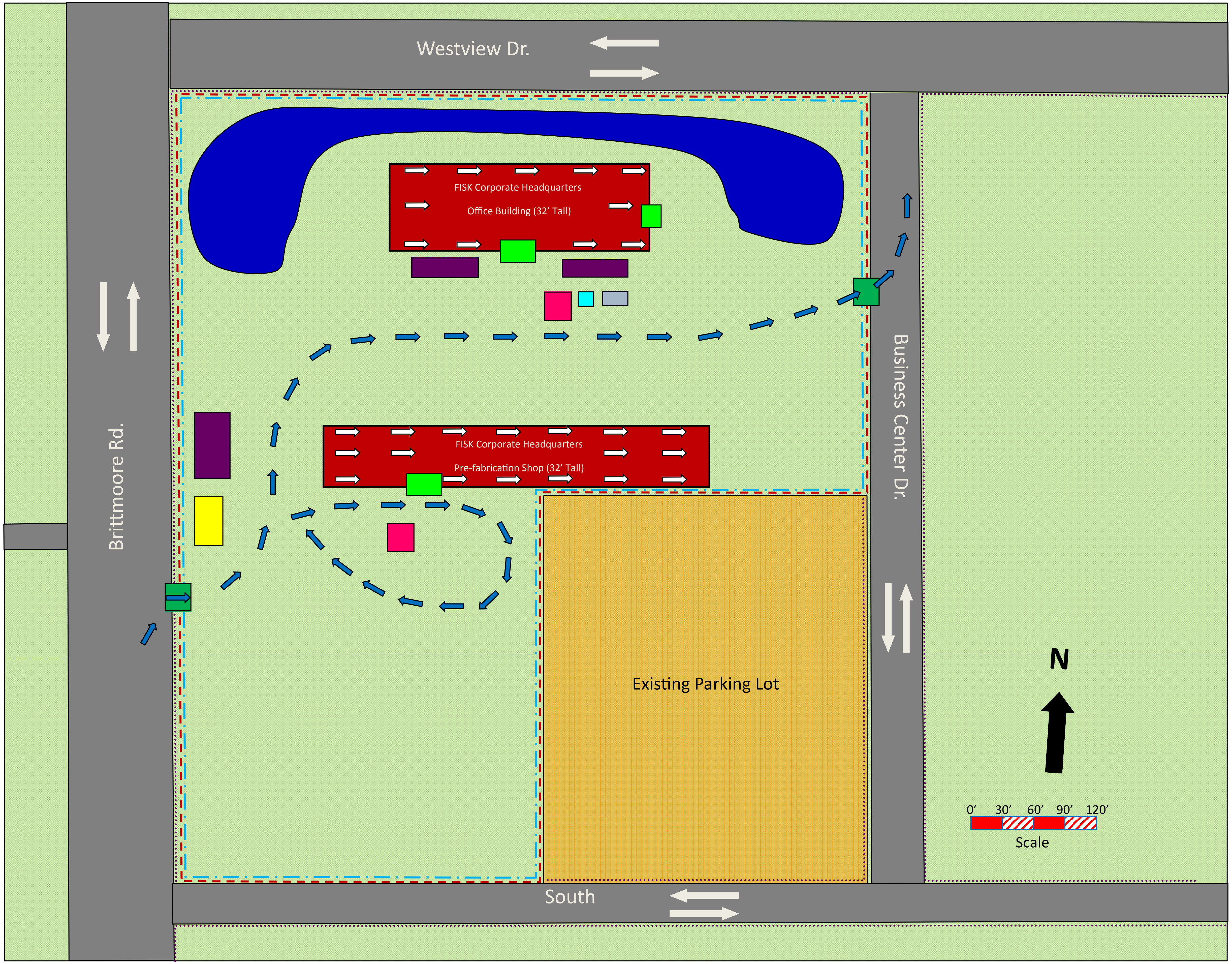


Legend

- New FISK Facilities
- Existing Fenced Property
- Existing Street
- FISK Property Line
- Construction Fencing
- Pedestrian Traffic
- Project Trailer
- Gated Site Entrance
- Delivery Path
- Temporary Power Xfmer.
- Brick/Glass Storage Area
- CMU Storage Area
- Temporary Restroom
- Waste Area
- Scaffolding Location
- Workflow Direction
- Retention Depression
- Forklift Path
- Mortar Mixer & Mortar Material Pile
- Phase Parking

FISK Corporate Headquarters	
Building Envelope Site Plan	
9/21/2012	Stephen Blanchard
Tech. #1	Houston, Texas

Appendix D-3: Interior Finishes Site Plan

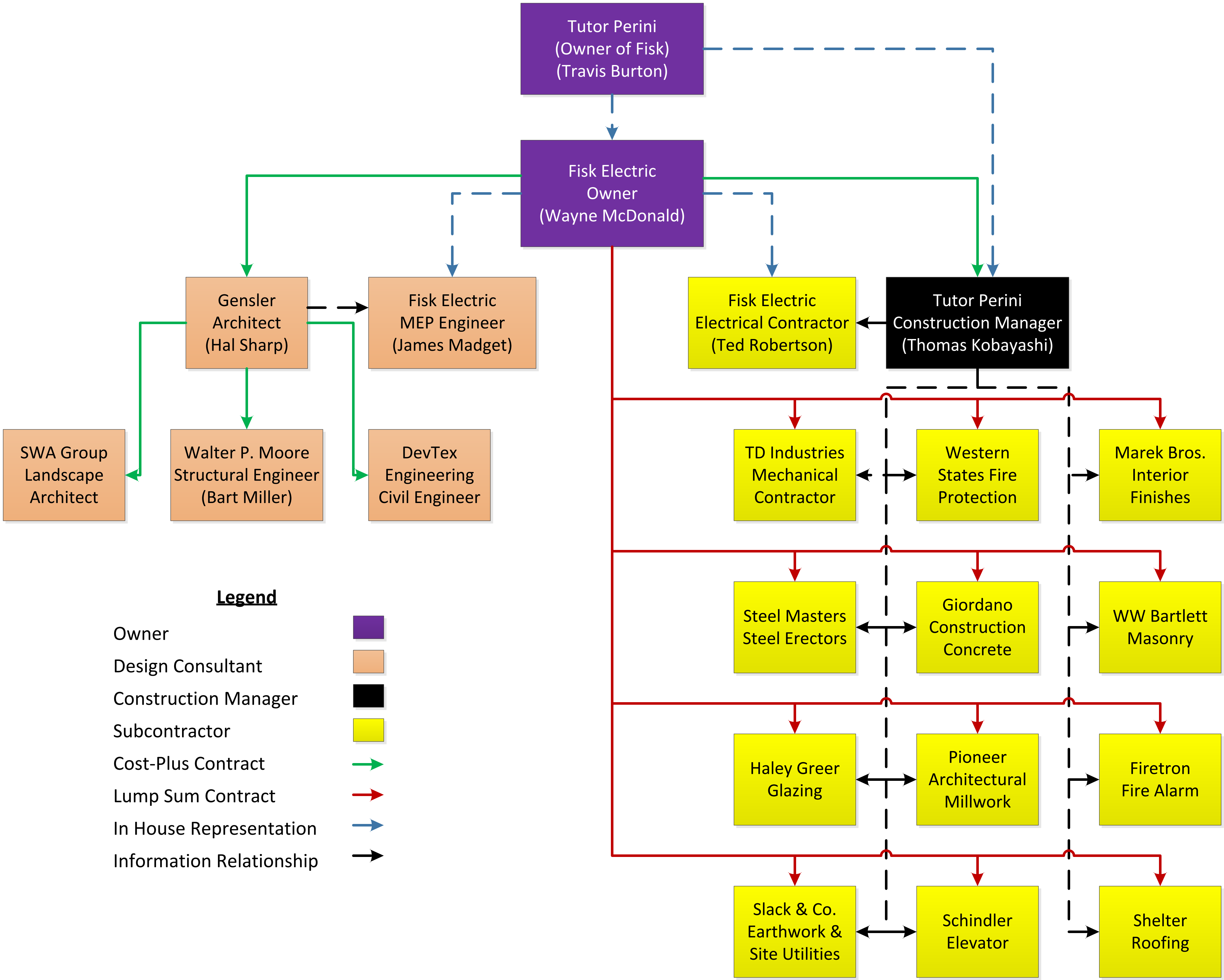


Legend

- New FISK Facilities
- Existing Fenced Property
- Existing Street
- FISK Property Line
- Ground Level Vicinity
- Construction Fencing
- Pedestrian Traffic
- Project Trailer
- Gated Site Entrance
- Delivery Path
- Temporary Power Xfmer.
- Exterior Material Storage
- Building Entrance
- Temporary Restroom
- Waste Area
- Interior Workflow
- Retention Depression
- Phase Parking

FISK Corporate Headquarters	
Interior Finishes Site Plan	
9/21/2012	Stephen Blanchard
Tech. #1	Houston, Texas

Appendix F: Project Organizational Chart



Tutor Perini (Owner of Fisk) (Travis Burton)
Fisk Electric Owner (Wayne McDonald)
Gensler Architect (Hal Sharp)
Fisk Electric MEP Engineer (James Madget)
Fisk Electric Electrical Contractor (Ted Robertson)
Tutor Perini Construction Manager (Thomas Kobayashi)
SWA Group Landscape Architect
Walter P. Moore Structural Engineer (Bart Miller)
DevTex Engineering Civil Engineer
TD Industries Mechanical Contractor
Western States Fire Protection
Marek Bros. Interior Finishes
Steel Masters Steel Erectors
Giordano Construction Concrete
WW Bartlett Masonry
Haley Greer Glazing
Pioneer Architectural Millwork
Firetron Fire Alarm
Slack & Co. Earthwork & Site Utilities
Schindler Elevator
Shelter Roofing
Legend
Owner
Design Consultant
Construction Manager
Subcontractor
Cost-Plus Contract
Lump Sum Contract
In House Representation
Information Relationship