

Tracy Lo  
Terrell Place  
575 7<sup>th</sup> Street NW  
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Construction Management



## **Project Delivery Evaluation**

### **Executive Summary**

This assignment provides information on agreements and commitments between the project players and the client. Information was obtained by two ways. Emails were sent out to the general contractor and their replies were very helpful. Other information was obtained from the contract document.

More details are provided in the following area:

### **Contracts**

In this section, description of the relationships between each project players, types of bonds and insurance will be included. Also, it explains how the delivery systems and contract work together for this project.

### **Contractor Selection**

This section briefly describes the basis for selecting a contractor for the project. For this project, the electrical contractor has a special relationship with the owner and it goes into more details in this part.

### **Staffing Plan**

The section describes how the general contractor staffs the project. It explains the structure of the project management and supervision staff. A general conditions estimate will be provided in the next assignment.

### **Design Coordination**

Information for this section was gathered during my summer internship. I attended a few of the coordination meeting and this section explains the MEP coordination process.

### **Project Controls**

Methods for different project control systems were obtained by Clark Construction Group. Details for each control systems were acquired by research.

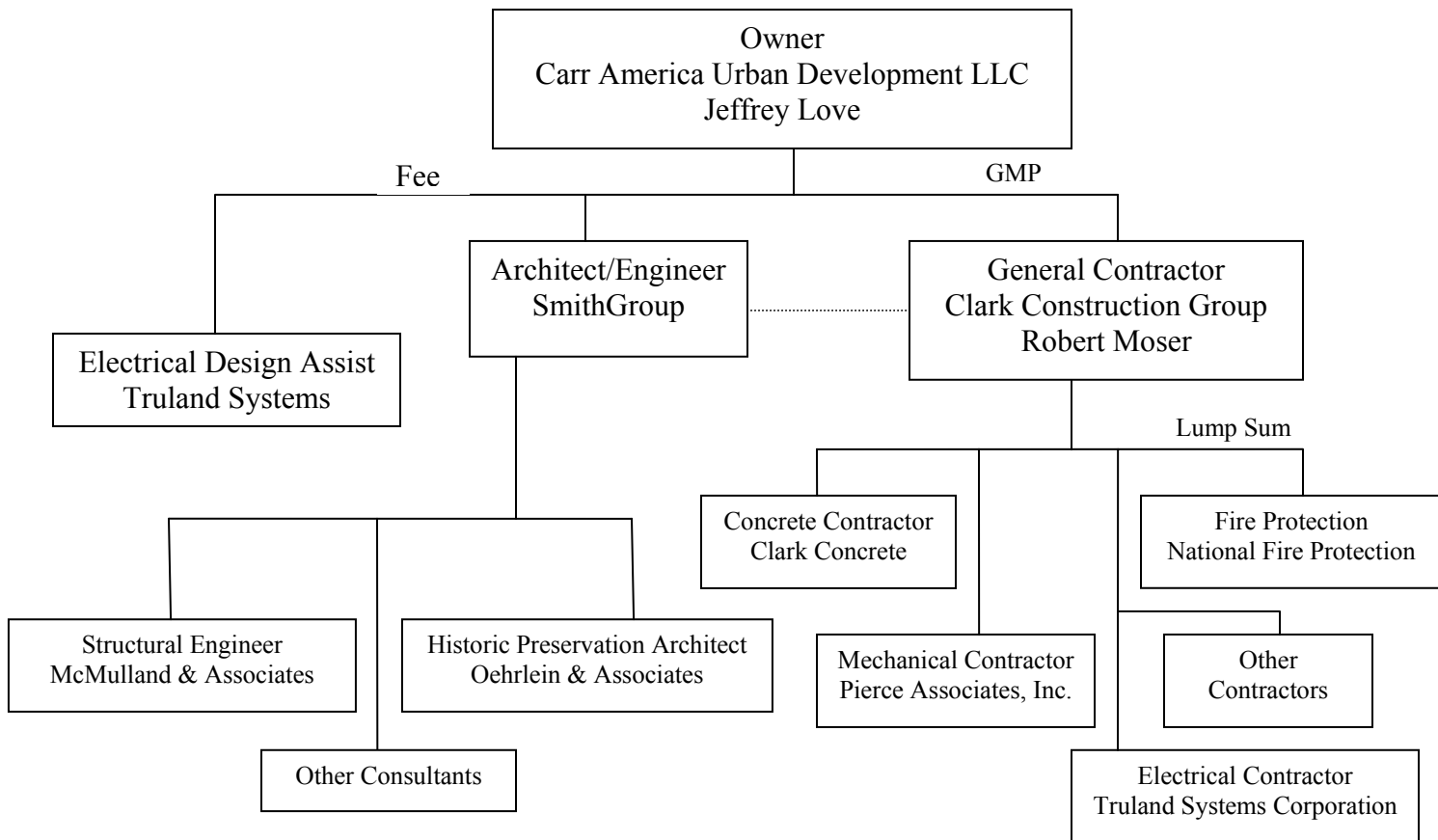
### **Building Systems Analysis**

List alternatives for the systems and techniques used to erect the building structure, façade, and technical systems. A table of advantages, disadvantages and how it impacts the cost and schedule is included.

**Contracts**

The owner, Carr America Urban Development LLC hired SmithGroup as the Architect and Engineer and the contract was fixed fee. The contract between the general contractor, Clark Construction Group and the owner is Guaranteed Maximum Price. In this type of contract, the general contractor is reimbursed at cost with an agreed-upon fee up to the GMP, this is where the general contractor provides a contract value that everything for the scope of work will not exceed this price. All the contracts between the general contractor and subcontractors are Lump Sum. Lump Sum is a single fixed price contract where the subcontractors agree to provide a specified amount of work for a specific sum. If the subcontractors spend less than the lump sum price, they will get to keep the money, but in the other hand, they are responsible for the money they spend over the lump sum price.

Below is **an organizational chart** showing the relationships between major project players for Terrell Place:



**An interesting fact** about the project is the minority agreement in Washington DC. In the agreement, each subcontractor is required to hire minority subcontractors to perform part of the work.

**Bond** is required by the contract document under special circumstances. 100% payment and performance bond is required if the subcontractor's work is greater than \$50,000-\$100,000. If the subcontractor value falls within the range, it is reviewed case by case with the general contractor and the owner. The general contractor does not have to obtain a payment and performance bond because of their reputation.

**Performance bond** is providing the owner a guarantee that the subcontractor will complete the project in accordance with the contract provisions. Payment bond will protect the owner that the contractor, when paid by owner, will then pay its suppliers and subcontractors.

Different **types of insurance** are required by the contract document as well.

- Worker's Compensation
- Employee's Liability
- Commercial General Liability
- Comprehensive Automobile Liability
- Umbrella Excess Liability Insurance
- All Risk Builder's Risk Insurance

Design – Bid – Build methods work very well with lump sum contracts or GMP. When the contractors bid on the job with a full set of drawings and specifications, they can estimate the project cost to a very accurate value. This will inform the owner how much it will cost to build this project. More information about the contractor selection is discussed on the next section.

The following is a table comparing a similar project to Terrell Place. Capital One Headquarters is a design-bid build, office building located at McLean, Virginia.

Projects (location)	Terrell Place Washington DC	Capital One Headquarters McLean, VA
Owner - General Contractor	GMP	GMP
Owner - Architect	Fee	Lump Sum
General Contractor - Subcontractor	Lump Sum	Lump Sum

Both of the projects are very similar in terms of the building method and the types of contracts. They are both design – bid- build projects, this method is very popular in Washington DC area. They hold same types of contract except the contract between the owner and the architect. As stated earlier, Lump Sum and GMP work very well with design - bid - build projects and owner will know what the cost is for the project before construction begins.

### **Contractor Selection**

The **delivery method** is based on the traditional, Design, Bid, Build model with slight modification. First the owner will hire Architect and engineers to design the building with a fee. When the design is done, the owner will bid out the project and select the most appropriate general contractor to perform this job. In this case, they selected Clark Construction Group as the general contractor because they are the lowest bidder. Since there are many contractors in Washington DC, this will cause the value of the bid to become lower due to local competition.

Clark contractor then bid out the subcontract. Subcontractors were selected based on the lowest bidder for this project. However, this was an exception with the electrical contractor, Truland Systems Corporation. Truland is one of the few contractors in the Washington DC area to offer design assist. Carr American selected Truland to assist in the design process. They had an agreed budget in which Truland would work to maintain by utilizing value engineering. As a result, Truland was “named” the electrical contractor for this project.

## **Staffing Plan**

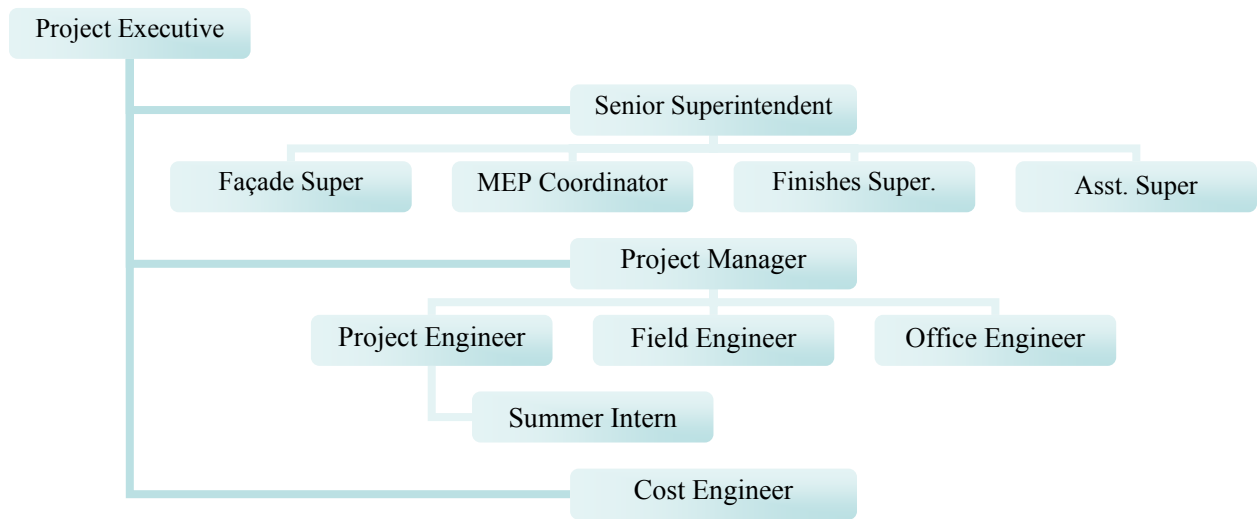
The whole construction process takes about 25 months. It starts in late August, 2001 and it finishes in middle of October, 2003. Clark Construction Group has staff on site all time but also some staff in the office assists the project. Not all the staff works on the project at the same time. Some of them work on the project the whole entire time like the project manager and the senior superintendent. Some of them work have other projects going on at the same time, for example, the project executive will have two jobs under his supervision. Although he is not on site all the time, he frequently visits the site and maintains close communication with the project manager about the process of the construction. See Staffing plan for more details.

The day-to-day responsibilities of each position are stated below:

- **Project Executive**
  - Project procurement
  - Liaison between owner and CM
  - Media liaison
- **Project Manager**
  - Administrative and technical management
  - Supervision of all activities related to contract administration, change orders, submittals, procurement and schedule
- **Superintendent**
  - Responsible for the timely, cost-effective placement of the contracted work
  - Supervision of all field construction work
  - Implement and enforce all pertinent safety and quality control policies and procedures
- **Field Office Manager**
  - Provide administrative support on the jobsite
  - Perform accounting and contract administration
  - Daily reports
- **Field Engineer**
  - Responsible for setting up Total Stations, building levels, reading drawings
  - Perform computations, coordinating work and perform layout
  - Aid to Superintendent
- **Project Engineer**
  - Provide administrative and technical services in the fields of scheduling, cost engineering, subcontract coordination, and general project administration
  - Aid to project manager

Every staff is very significant to the project and each of them contributes something of their skills and abilities to the project. The general contractor follows a line system and the following chart explains the status:

**The structure of the project management and supervision group:**



A general contractor’s staff plan is attached on the following page. It describes how much time each person from the general contractor spend on this project during the construction.

## **MEP Coordination**

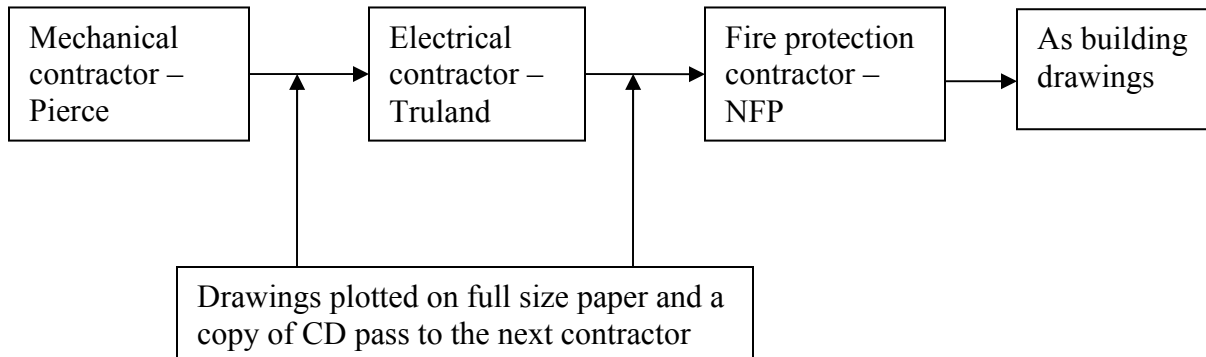
**The scope of Mechanical/ Electrical/ Plumbing coordination** required for the project includes coordination meetings at regularly scheduled times convenient for all parties involved. The general contractor requests a representative from each major contractor to attend the coordination meeting to organize or plan for the construction activities. At the meeting, the project engineer will record meeting result and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting. These coordination are all required by contracts.

There are a few areas present **coordination challenges** in this project. One challenge is the coordination meetings take longer than the general contractor expected. The scheduled MEP coordination meetings started in March, 2002. According to the original schedule, MEP coordination meeting should be completed by June 2002. However, due to late submittal from one of the specialty contractor, the meetings have to push back till August 2002.

Another challenge was due to the uniqueness of the first few floors. Also, the beginning of the coordination process is the most difficult part because of the learning curve; it took a while for the contractors to be familiar with the building. The first two floors are retail space and lobby, the third and fourth floor are office space. These four floors took the contractors the longest time to coordinate. From floor five to nine, they are all repetitions and similar patterns were used for MEP systems in that space.

### **A coordinated MEP construction plan is reached in the following way:**

MEP coordination meetings were set up once a week at the beginning of the construction stage for 6 months. The building was break up into floors and sections for setting up different stages. Electrical contractor, mechanical contractor and fire protection contractor would get together with the general contractor to coordinate MEP plans. All the contractors would receive a set of floor plans on CAD prior to the meeting. First, the mechanical contractor cleared up the architectural drawings and put in his ductwork or other equipments on the drawings. He had a set of drawings plotted out and a copy on CD, handed it over to the electrical contractor on the following meeting. The electrical contractor then put in conduits, ductbank and all other electrical equipments that will go into the plenum space on the drawings and pass it to the fire protection contractor at the next meeting. At the third series of the meeting, the fire protection would either have no conflicts with other contractors, or he would discuss the potential conflicts and need other contractors to adjust the location of the devices. After all the contractors were satisfied with the plans, signed drawings would become the approved as build drawings.



**Field conflicts with structural and MEP systems** always happen in the field. MEP coordination meetings were one way to avoid the problems. Since the structural was going up slightly faster than the MEP systems, structural system has the priority for most of the times. If a conflict was found before the structural go up, the general contractor would attempt to coordinate the problems with the structural engineer and MEP contractors so that the problem can be avoid. If a conflict was found after the structural went up, now the general contractor and MEP contractors had to come up with possible solutions, and implement the best solution so the MEP systems will fit into the space.

**Inspections/ tests/ certificates are required;** they are stated in the specifications.

For mechanical systems, all mechanical systems should meet the requirement from American Society of Testing and Materials. A field test on each component of the mechanical system is required. Load tests are conducted on all motors and it is important to make sure the current reading is not exceeding the nameplate rating of the motor under any condition. Isolator deflection test is required on mechanical vibration and seismic control. Mechanical contractor is also required to test all plumbing and drainage systems by using the water test and air test.

For Electrical Systems, all material and equipment should meet the National Electrical Code. A field test on electrical equipments is required and when they perform the field test, Architect and the owner have the right to observe field work, therefore, contractor need to provide minimum three working days notice of field work.

**Testing** for fire alarm system like pull stations, smoke detector tests and etc is required and all inspections must approve by the local Fire Department.



### **Project Control**

The main project control systems in use by the contractor, including cost, schedule, quality and safety are discussed below; some of them are stated in division 1 of the specifications.

**Cost:** Clark Construction Group used cost account software – J.D. Edwards. J. D. Edwards is a computer software where it uses cost codes and on-line procurement, billing and time inputting to improve communications, accurate performance measurement and integrate processes that increase productivity. The comment from Clark is that J. D. Edwards is a system allows being more function in the past years.

Electrical contractor Truland Systems Corporation used a system called the COIN system. It keeps a record of labor hour and material used in each week. It compares the actual amount and the estimate amount so that the electrical contractor will know how accurate their estimate is and also their status on the job.

**Schedule:** Primavera or Suretrack was used for creating a schedule. It is both a control and management systems that Clark updated the schedule monthly and it is helpful to let everyone know where they were and where they need to go. All the prime contractors obtained a copy of the schedule and they input their comments to make the schedule more practical.

**Quality:** Clark had a quality control program which is utilized on each project by the superintendent and the project manager. They have a quality manual where checklists and other important notes can help.

**Safety:** Clark had on-site safety managers that work diligently in training and reviewing the tradesmen. Clark supervised other subcontractors but also his field employees in the self performing work area.

### **Building Systems Analysis**

This is the first time in thesis that alternative system is discussed. More discussion on alternative systems and methods will be analyzed in the next assignment. The charts on the following page analyze the advantages and disadvantages of structural, foundation, electrical, façade systems. It also has notes on the impact on cost or schedule.

## Building Systems Analysis

Structural System		Advantages	Disadvantages	Impact on Cost/Schedule
Current Systems	Steel	Precise and predictable Light in proportion to its strength	A tendency to corrode in certain environments Loss of strength during severe building fires	More expensive on short building
	Cast-In-Place Concrete (two-way slab)	Any shape can be cast Spans for tenant space	Takes longer time than precast concrete	Less expensive on short building Takes longer
Alternatives	Cast-In-Place Concrete (One-way slab)	More expensive than two way slab	Does not span very far Thicker slab	*See Note
	Precast	Better quality control because mixing and pouring operation is done at ground level	Transport over the roads in downtown Washington DC Use crane to place precast concrete	Erection is faster than cast-in-place concrete

Foundation System		Advantages	Disadvantages	Impact on Cost/Schedule
Current System	Spread footing	May be isolated to support concentrated loads from columns or strip footing under walls	Not all the soil is suitable for this kind of foundation	Less expensive
Alternatives	Caisson (deep foundations)	Suitable for Heavy Structure	Larger Equipments are needed for drilling Required deep excavation	More expensive Takes longer for Terrell Place

Electrical System		Advantages	Disadvantages	Impact on Cost/Schedule
Current System	Ceiling Raceway	Cost less initially	Congestion in plenum space	Need more time to coordinate plenum space with other systems
Alternatives	Under-Carpet Wiring System	Easy for reconfiguration Less congestion in the plenum space	High initial cost, but lower cost to relocate or add services for work station An increase floor to floor height	More expensive during construction
	More energy efficient lighting	Energy Saving	Might be more expensive initially	Less expensive in long term No change in schedule

Façade System		Advantages	Disadvantages	Impact on Cost/Schedule
Current System	Curtain wall, Historic Restoration	Washington DC is providing tax breaks for people to salvage the building	Potential problem with displacement of panels and moisture problem due to temperature difference	Workers can install curtain from the inside of the building, no scaffolding is required
Alternatives	Masonry	Durable material Comes in different colors and textures	Not as aesthetically appealing as curtain wall Scaffolding is required	Takes longer time than installing curtain wall

\*Note: Impact on cost/schedule is unknown at this moment