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BCDC EXPANSION
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I. Executive Summary

The following report has detailed information concerning the delivery method of the Baltimore County Detention Center Expansion. Included within in this report is information regarding the contracts, contractor selection method, the project staffing plan, design coordination, project controls and building system analysis.

The owner Baltimore County holds contracts with the architect/engineer, construction manager and contractors. The A/E and CM were hired at fee while all the contractors have lump sum contracts. The contractors selected for the BCDC expansion were prequalified for a competitive bid process. The low bid was awarded the project. A superior alternative delivery method to be investigated is a design-build method with a GMP contract.

The general conditions cost covered by the County includes the following staff: a project executive, a project manager, a superintendent, two project engineers, an office engineer and a MEP coordinator. Each of these individuals has specified responsibilities for the time they are allocated to the project.

Design coordination is required by all contractors especially the MEP & security contractors. Meetings are held weekly to ensure proper design installation and coordination. Coordinating activities in advance help control the projects cost and schedule.

The project controls such as cost, schedule, quality and safety are all monitored by Gilbane with various implemented programs and software. Some of the software being used on the BCDC project is Prolog Manager and Suretrack, a smaller version of Primavera.

Finally, this report analyzes the building systems for superior alternatives. The elements of the design that were analyzed include; the structural system, the plumbing system and the building façade. The structural system could be altered to eliminate the structural steel in the administration area and replace it with C.I.P. concrete. The plumbing system could use the existing solar system to heat the water supply rather than install boilers. The façade could be changed from architectural pre-cast panels to slender wall to better match the existing structure. There are many other alternatives but the above mentioned will best fit the BCDC Expansion project.



II. Contracts

The owner Baltimore County holds separate contracts with the Architect/Engineer, the construction manager and each of the contractors. The type of contract and relationship between the participating parties is visually shown below in figure1.

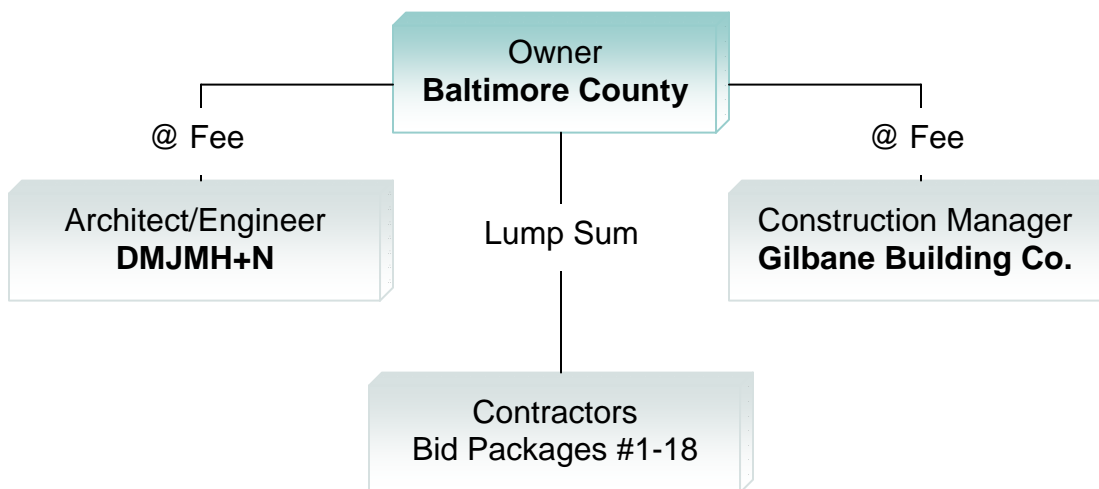


Figure 1: Contract Organizational Chart

The Architect/Engineer, DMJMH+N was contracted by the county to perform all work regarding the design and engineering of the Baltimore County Detention Center Expansion for a set fee of \$4,516,779. The construction manager, Gilbane Building Co. was employed to manage all construction activities of the Baltimore County Detention Center Expansion for \$2,718,185. Each of these contracts has specific terms and conditions in which the owner and contracted party must adhere to. Although these contracts are imperative parts of the BCDC Expansion the majority of the risk associated with the contracts resides within the lump sum contracts between the County and each of the contractors.

The County holds 18 different lump sum contracts between 16 different contractors. Figure 2 below shows the different contracts and contractors for each of the bid packages for the BCDC Expansion.

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BP #	Description	Contractor
1	Site Work	Cherry Hill
2	Foundations	Dance Brothers
3	Garage Concrete	Dance Brothers
4	Elevators	Otis Elevators
5	Pre-Cast Concrete	OldCastle Pre-cast
6	Housing C.I.P. Concrete	Dance Brothers
7	Structural Steel	Jarvis Steel & Lumber
8	Electrical	Primo Electric
9	Mechanical & Plumbing	Poole & Kent
10	Security Detention Equipment & Electronic Security	G-S Company
11	Glass, Glazing & Curtain Walls	Emmitsburg Glass Co.
12	Fire Protection	National Fire Protection
13	Integrated HVAC Controls and Fire Alarm	Siemens Building Tech.
14	Masonry	Moehrle Masonry
15	Roofing	Not yet bid
16	General Trades	Commercial Interiors
17	Landscaping	Not yet bid
18	Special Equipment – Kitchen & Laundry	Not yet bid

Figure 2: Bid Package/Contract Break Down

Excluding the dissimilar scopes of work for each of these bid packages the underlying contractual agreements are comparable. Each lump sum contract has specified requirements for bonds, insurance, DGS requirements, submittals, payments and special site conditions.

The lump sum contract between the owner and contractor is the value that the contractor submitted as a competitive bid during the bidding process. This means that all work within the contract documents is to be completed by the contractor at their submitted bid price. Any changes to the contract such as differing site conditions or design errors & omissions will be paid to the contractor at a negotiated cost via a change order. To ensure the validity of the contractor's bid a bid bond was required.

The bid bond was one of the three bonds the contractors were required to have to be awarded the project. The County also required that the contractor have

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performance and payment bonds to ensure the contractor would complete the job and pay all subcontracted parties.

Once awarded the contract and prior to the issuance of the notice to proceed the contractor was required to submitted a certification of insurance. By law the contractor is required to have general liability, automobile insurance and workers compensation. All other insurance is bought at the contractor's preference.

In addition to the laws requiring certain types of insurance, contractors are required by the Department of General Services (DGS) to employ a certain percentage of disadvantaged/minority businesses. For the BCDC Expansion each contract required 10% disadvantaged business participation (DBE) and a 2% women business enterprise (WBE). Upon bidding the project contractors were required to submit a good faith minority statement and then provide documents proving compliance once the project was awarded.

Accompanying the insurance, bonding and DGS requirements, division 1 of the project specifications provides additional procedures that are to be met by each contractor. These include submittal, payment and construction site conditions. Division 1 of the specification was typical of any contract with modifications including the time construction work is permitted and the parking available for the construction workers.

Baltimore County is a well-experienced construction owner having built numerous new facilities for the County. The County has offices set up for managing construction projects including a contract, public works and planning offices. However, the size of the BCDC Expansion would have been overbearing for the capacity of the County's in-house construction management so Gilbane was hired to assist in the construction. The County has the resources and experience to take on the legal and financial aspects of the project just not the managerial staff thus a multiple prime lump sum contract was selected with a CM agent. This delivery method and contract system seemed the most logical for this project.

The Catawba County Jail Expansion project in North Carolina was similar to that of the BCDC Expansion. The owners are both counties and each project had multiple prime lump sum contracts. As a public project both were competitively bid with the low bidder winning. A superior alternative would be a design- build

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method with a guaranteed maximum price. Currently this method is being implemented by the Federal Bureau of Prisons in multiple locations.

The design-build method would allow for the earlier coordination between the design and constructability of the project. This would have resulted in value engineering cost savings as well as a fast tracked project. These are two project controls that have been seriously neglected. Further research will be performed investigating the design-build alternative.

III. Contractor Selection

The contractual agreements made with each of the contractors for the BCDC Expansion were based on a prequalified competitive bid process.

Baltimore County requires that all contractors be prequalified at least 10 days prior to the bid opening. To be considered a prequalified bidder a contractor must:

- 1) Possess sufficient capital to undertake and conduct the work proposed
- 2) Possess and/or have available sufficient equipment appropriate to perform the classifications of work proposed or the posses the assets to purchase or lease the necessary equipment
- 3) Have previous satisfactory work performance with the County and/or experience elsewhere which can be verified so as to be acceptable to the committee

A committee selected by the county assesses a contractor's ability to meet the above qualifications through a written application, financial statement, contractor rating, facility & equipment and a qualification limit. If approved a contractor is then invited to bid on a variety of County projects.

Since the detention center is an expansion project many of the contractors that constructed the existing facility in 1980 and 1994 were invited to bid on the new project. The familiarity with the existing design will be an advantage to these contractors but not a guarantee that they will be awarded the project.

All County projects are competitive bid. Each contractor interested must submit a bid by the time specified within the contract. There are typically 3-6 bidders for



each project bided. The winner is the contractor that submitted the lowest bid. The contractor then must meet all requirements as specified in the contract concerning such items as insurance and bonding.

IV. Staffing Plan

The staffing of the construction manager, Gilbane will be included within the general conditions cost. The general condition cost will be covered by Baltimore County. Outlined below in figure 3 and 4 are the hierarchal organizational chart of the staff on the BCDC Expansion project as well as the time they will spend on the project.

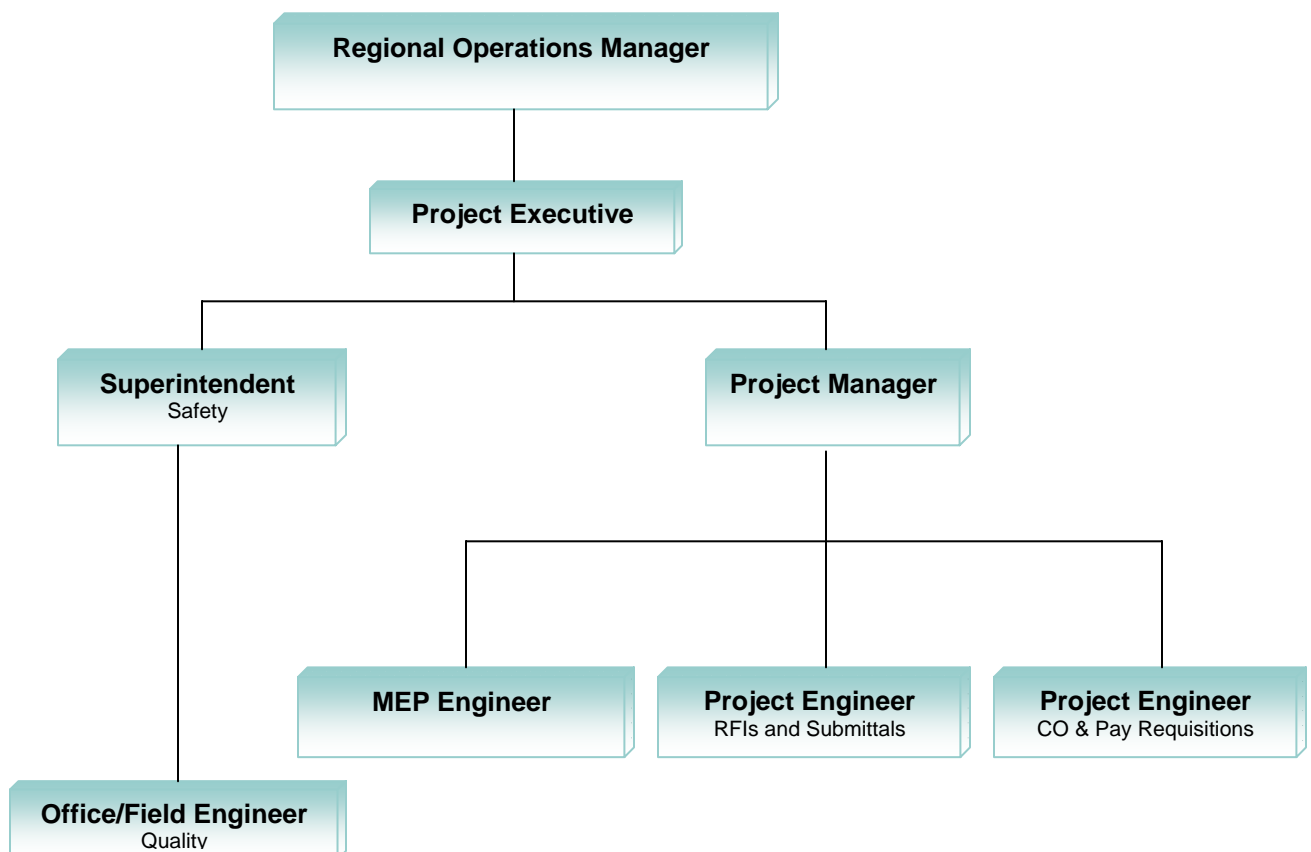


Figure 3: Staff Organizational Chart

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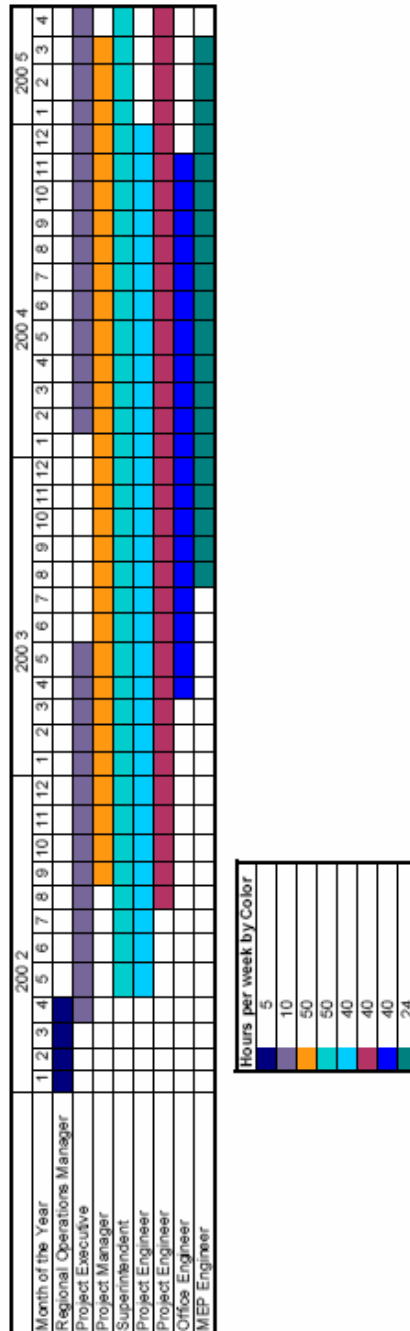


Figure 4: Staff Time Allocation Chart



V. Design Coordination

Design coordination between the mechanical, electrical, plumbing and security (MEPS) contractors is an important aspect of the BCDC Expansion project. By contract the MEPS contractors are required to submit coordination drawings. The coordination drawings are to include floor plans, elevations, reflected ceiling plans and indications of sequencing movements. This past July after the value engineering process was completed and all contracts had been executed the coordination process began.

The first step taken in coordinating the four systems was via auto cad. An auto cad file of the BCDC floor plans was distributed to the MEPS contractors. Figure 5 below is a flow chart showing the precedence of the distribution of the coordination drawings.

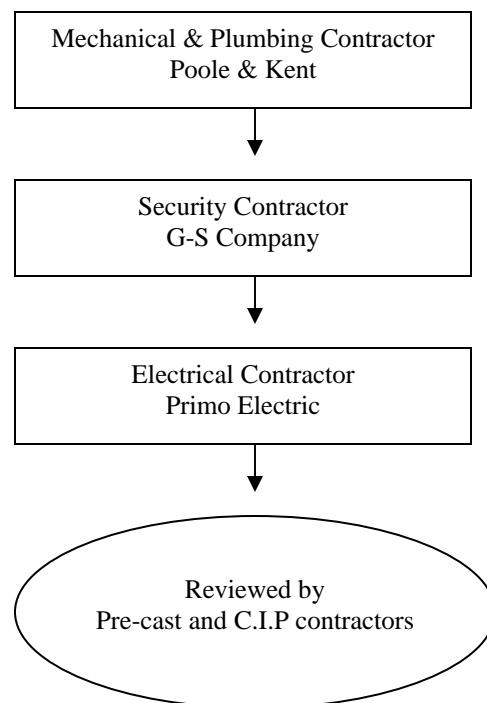


Figure 5: Flow Chart of Design Coordination Precedence

Once the auto cad file was completed by each of the contractors a coordination meeting was held.

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After the original coordination meeting that altered any major conflicts of the MEPS systems coordination meetings were scheduled weekly for the infield supervisors to assure proper installation. These meetings were led by the construction manager's part time MEP engineer/coordinator. The presence of the engineer alone will prevent many costly conflicts within the field.

One of the main MEPS conflicts thus far in the project has been the coordination within the required mock-up. Each of these contractors by contract is required to install their designed system within a plywood mockup of a typical chase located between the dormitories/cells in the housing units. The plywood mockup has been constructed by the pre-cast contractor at their plant located two hours away from the BCDC site. The pre-cast contractor is insisting that the MEPS contractors have insurance certificates before coming to their plant to install their system within the mock-up. This was an irresolvable problem and the mock-up had to be moved on to the already overcrowded BCDC site. An advanced solution could have been a computerized mock-up using an immersive environment that would have provided the same results as a physical mock-up without the tribulations. This alternative will be explored in more detail at a later date.

Along with the coordination of the MEPS systems each of these contractors are required to submit the following based on the specifications included in their scope of work: product data, welding certificates, material test reports, preconstruction test reports, compatibility test reports, field test reports, extra materials and O & M data. There are also requirements for training an owner's representative to operate and maintain the machinery upon project turnover.

VI. Project Controls

In order to complete the BCDC Expansion to the owner's satisfaction the construction manager Gilbane has different programs implemented to control the project cost, schedule, quality and safety.

Cost

The County holds the financial liability for all the contracts of the BCDC Expansion but the budget is monitored by Gilbane. Typical Gilbane would use J.D. Edwards software to supervise the budget but since Gilbane is not at risk Prolog Manager is used to control the cost of the project.

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Prolog Manager is set up based on the schedule of values the contractor submitted in accordance with their contract. The approved schedule of values will determine the payment amount the contractor will submit on their monthly pay requisition depending on the percentage of work completed that month. There are certain guidelines within the contract that determine what the County considers billable.

The county has directives concerning off site stored materials, hand tools, equipment and T & M tickets. The County will pay for materials stored off site if Gilbane has inspected the materials prior to the submission of the pencil copy pay requisition. Small hand tools can not be billed for and any equipment charged must be at blue book value. Also any time and material tickets must be signed off by a Gilbane representative on the day the work was completed. These are just some controls Gilbane and the County have set up within the BCDC contracts to ensure an on budget project completion.

Schedule

The schedule for the BCDC Expansion was monitored using Suretrack software. Suretrack is a smaller version of Primavera. Once the project took off and all the contracts were executed a card trick was performed to ensure the sequencing of all the activities on the schedule. The schedule was then implemented with weekly meetings with the field supervisors reviewing a two week look ahead.

Other than the actual construction schedule another important schedule pertains to the submittals. A submittal register was created using Prolog Manager. The register shows what submittals each contractor is required to submit. This was crucial to ensure that all items with long procurement times would be approved, purchased and delivered to site at the required times.

Quality

Gilbane has an entire program dedicated to delivering quality projects. A few of the main components of this program are benchmarks, mock-ups, pour cards, first delivery inspections and rolling completion list.

For the BCDC Expansion project an Excel spreadsheet was composed to show all required mock-ups and benchmarks. When required the benchmarks and

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mock-ups were approved by the architect/engineer and owner to ensure construction at the intended design quality.

As construction progressed pour cards were signed off by each of the contractors to ensure all materials and embeds were installed within the walls, columns and slabs prior to the concrete pours. Along with pour cards any equipment or materials being delivered to the site are checked to ensure accuracy. Since the site space was limited first delivery inspections are conducted regularly.

To ensure an on time completion rolling completion list were maintained for each of the contractors to minimize the number of punchlist items at the end of the project. The rolling completion lists were distributed to the contractors on a bi-weekly basis.

Safety

Gilbane also has a safety plan in place that is well above the OSHA standards. The primary items include hardhats, eye protection, drug testing, training and fall protection.

Gilbane requires hardhats and eye protection 100% of the time. It is also required that appropriate work boots and clothing are worn at all times. Pants and sleeved shirts are required.

Prior to working on the BCDC job site or any of Gilbane's job sites a drug test is required. Either every employee must be drug tested or the company must have a 12% random drug testing policy. Within the first days of being onsite each employee is also required to watch a 20 minute safety video.

Another safety requirement is fall protection. Any worker working on a ledge six feet above the ground is required to be tied off with a harness and two lanyards. OSHA only requires this when ten feet above the ground. This is one example of the Gilbane's safety policy that is over and above standard requirements.

The site is also inspected once a week by a Gilbane safety representative to ensure a safe construction site. This far in the project there has been only one recordable accident and no lost time accidents.



VII. Building Systems Analysis

The following section is composed of a description and a proposed alternative for the structural components, the façade and the plumbing systems.

Structural

Existing Structural System

The expansion of the detention center is composed of three different structural elements based on the intended use of the area. The following is a structural breakdown of the areas:

C.I.P. concrete - Garage and Foundations

Pre-cast concrete - Housing Units

Steel - Administration

The pre-cast concrete modular units are the standard structural element for correctional facility construction. The decision to use the steel and C.I.P concrete in the administration area and garage respectively was a design preference.

The C.I.P. concrete was used for the garage because the garage was placed below grade. Garage structures are typically concrete and since this garage was designed below grade C.I.P. concrete was the best solution to prevent potential problems with waterproofing. Had pre-cast concrete been used for the garage and the housing units despite the constructability issues the pre-cast concrete contractor may have been contracted over their capacity with the projects time constraints.

The steel used within the administration area is a standard design for office construction. The steel will provide the capacity for large open spaces as well as the acoustical benefits.

Alternative Structural System

The existing structural system has obviously been well thought out; each area using a specific structural design to fulfill its purpose. The only design change that may be worth investigating is if the administration area could meet the design criteria if it were constructed with cast-in-place concrete rather than steel.

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The C.I.P concrete will continue the structural consistency up from the garage into the administration area. The concrete will eliminate the procurement time required for the steel and possibly be cheaper. However, the concrete design will limit the amount of open spaces within the administration area which are currently minimal. The acoustical design might also be put in jeopardy.

Façade

Existing Façade

The façade of the BCDC Expansion is composed of architectural pre-cast concrete panels incorporated with a glass curtain wall. The façade was design to look like a class 'A' office building. The existing detention center is composed of a brick veneer. Aesthetically the new and old structures do not mesh.

Alternative Façade

Due to security constraints the exterior façade encompassing the housing units must be either brick or pre-cast panels. In order to match the existing structure a slender wall may be supplemented for the architectural panels used for the housing area. Upon further investigation some time may be saved in procurement but the cost would remain relatively the same.

Plumbing Systems

Existing Plumbing System

The existing BCDC structure has all of its hot water supplied by 10,000 ton underground water tanks that are heated with solar panels located atop of the roof. The new structure will have all of the water heated by two horizontal fire-tube boilers with a 6,690 MBH capacity that are located within the central plant.

Alternative Plumbing System

An alternative to the using the boilers would be investigating the potential of use of the present solar panels to heat the water for the BCDC Expansion. It may be necessary to add more solar panels to heat the water for the new structure.

This method will cost more to install but in the long run it will be more energy efficient and cheaper.