

Existing Construction Conditions

Project Delivery System

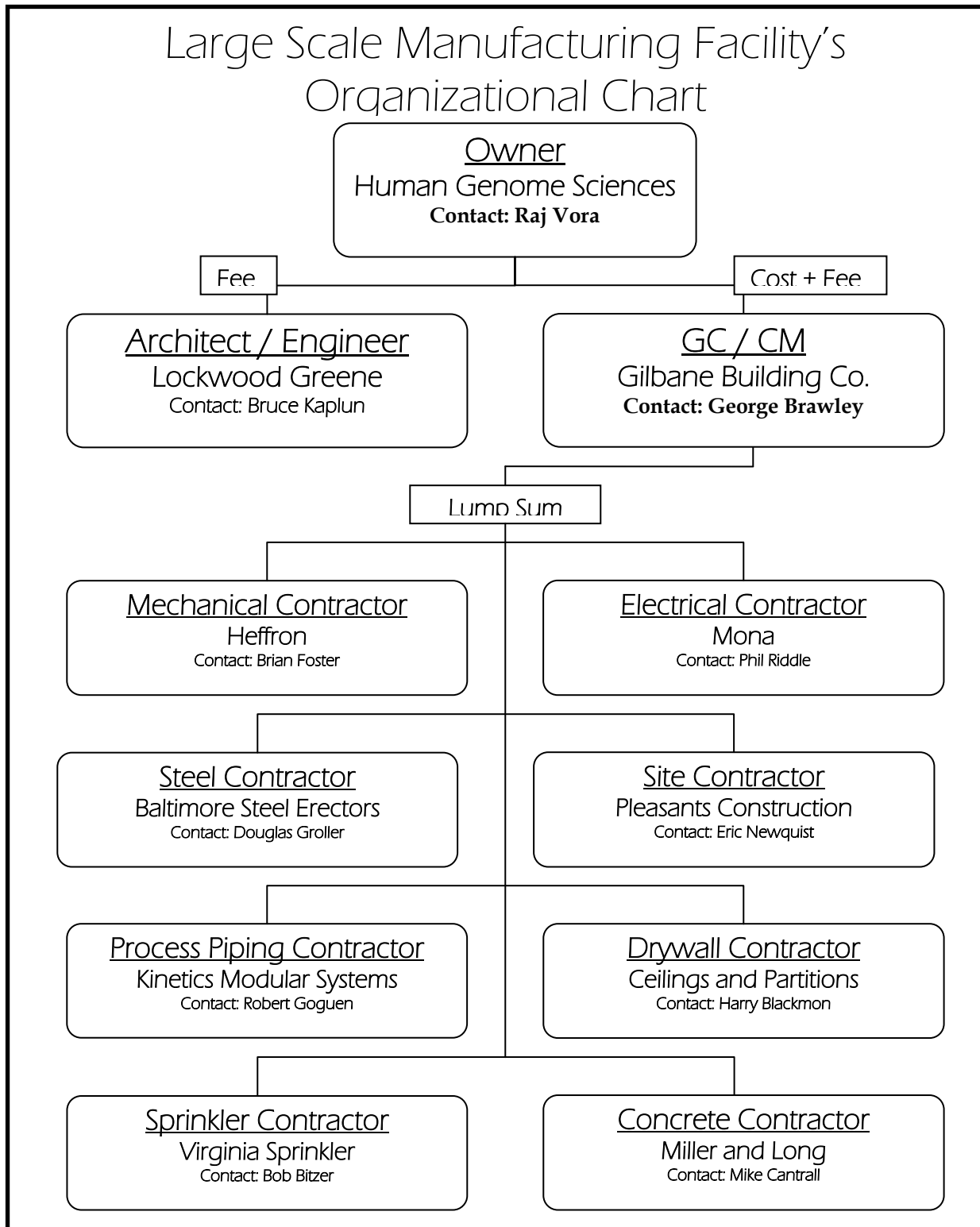
Description

Human Genome Sciences procured this project as a General Contractor with multiple subcontractors. The project was not fully designed when it was procured and some aspects of the building are still currently under design. Value Engineering was also conducted on the building and the exterior skin of the building and structural system for the first and second floors was changed.

HGS hired Lockwood Greene as the architect and engineer for the project with whom they hold a fee based contract. Lockwood Greene does not hold any contracts with any of the equipment suppliers or subcontractors. Gilbane was chosen as the General Contractor for the project; hence they hold contracts with all of the contractors and most of the equipment suppliers. Though Gilbane is the General Contractor, they do not self perform any construction. At the current time the contract held between HGS and Gilbane is cost plus a fee, but Gilbane is in the process of creating a GMP which is to be accepted by the owner. Most of the subcontractors do not hold a direct contract with the owner; instead they hold a lump sum contract with Gilbane.

On this specific project, the owner has chosen to have an OCIP, which is an owner controlled insurance program. This is becoming more and more common with larger construction projects. The main reason why HGS chose to have this type of insurance program is due to a reduction in the total project cost. An owner can reduce the total cost of the project by 1–2% as compared to traditional, fragmented insurance programs.

Organizational Chart



Building Systems Summary

Demolition Required:

- There was no demolition required on this project.

Structural Steel Frame:

Bracing:

- There was no permanent bracing used on site
- Cables and turnbuckles were used for erection and plumbing purposes

Crane Information:

- The cranes used on site ranged from 200 ton truck cranes to 400 ton Manitowoc crawlers
- The cranes were located on the east and west sides of the building.
- The 400 ton Manitowoc crane was moved from the west side to the east
- A 200 ton truck crane was then used to complete the west side

Cast in Place Concrete:

Formwork Type:

- The formwork used on site was 25k scaffolding with aluminum beams and 5/8" forming plywood

Placement Method:

- Concrete was placed using a concrete pump truck and a tower crane

Precast Concrete:

- There was no precast concrete used on this project.

Mechanical System:

Location:

- Chillers and boilers are located in the northern part of the cellar
- The majority of the AHU's are located in the MER rooms, which are on the eastern end on the building on the first and second floors

System type:

- For cooling three 1500 ton chillers are used to supply chilled water via steel piping
- There are also two 800 ton glycol chillers that feed only process equipment

- For heating three 800 hp boilers provide steam serving both process and utility needs. Four hot water skids provide hot water service for the building.

Distribution Types:

- All supply and return air is distributed via galvanized ductwork
- Custom AHU's that feed only the "clean" rooms contain HEPA filters that remove 99.99% of all particles

Fire Suppression:

- The system used is pressurized water that is powered by a diesel fire pump which is located in the cellar

Electrical System:

System Size:

- 11.4 MW capacity
- 13.2 kVA stepped down to 277/480 Y, three phase
- 6.7 MW standby emergency power, powered by diesel generators
- 1200 amp double end switchgear
- 1,200 kVA UPS system

Redundancy:

- Two separate PEPCO (electrical service) feeders feed the building
- Any one alone can run the facility

Masonry:

Type:

- The exterior of the building consists of standard brick with relief angles on the second floor
- There are load bearing masonry walls in the cellar supporting 10" cast-in-place slab mezzanine decks

Scaffolding:

- Scaffolding used for erection was a combination of hydraulic platforms and scaffolding and planks

Curtain Wall:

- Glass curtain wall at main lobby entrance
- Exterior glass consists of punch windows

Support of Excavation:Type of Support System:

- Banked slopes complying with OSHA standards were used for excavation
- The site was carpet blasted then hogged out
- Additional blasting was required as project designs changed

Dewatering System:

- Dewatering was accomplished by surface pumping as required

Project Cost Evaluation

Building, Project, and Design Costs

Building Construction Cost:

Total: \$233,400,000

* This can be found on HGS's annual report at <http://www.hgsi.com>

Unit Cost: \$800/S.F.

Total Project Cost:

This value is to be kept confidential as per Human Genome Sciences request.

Design Cost:

The design cost of the project is roughly less than 10% of the construction cost.

All direct costs related to specific contractors are to remain confidential as per Gilbane's request.

Parametric Estimate

Code	Division Name	%	Sq. Cost	Projected
00	Bidding Requirements	0.38	1.66	480,864
01	General Requirements	1.81	7.89	2,287,037
02	Site Work	5.77	25.10	7,279,693
03	Concrete	9.60	41.72	12,097,840
04	Masonry	2.54	11.03	3,199,506
05	Metals	6.36	27.64	8,015,185
06	Wood & Plastics	0.27	1.17	340,123
07	Thermal & Moisture Protection	2.78	12.10	3,510,309
08	Doors & Windows	0.84	3.66	1,062,593
09	Finishes	3.44	14.96	4,339,506
10	Specialties	0.38	1.66	480,864
11	Equipment	3.39	14.72	4,269,136
12	Furnishings	1.65	7.15	2,074,753
13	Special Construction	0.58	2.51	727,969
14	Conveying Systems	0.16	0.70	204,074
15	Mechanical	43.88	190.78	55,325,670
	Mechanical	25.41	110.45	32030651.34
	Process Piping	18.48	80.33	23295019.16
16	Electrical	16.17	70.29	20,383,142
	Total Building Costs	100.00	434.75	126,078,265

Comparison:

Using the D4 Cost Estimating program, a parametric estimate was developed that partially resembles the LSM facility. The main reason why there is such a difference in total project cost (\$54,000,000) is due to certain machinery and equipment that is to be kept confidential and I do not have access to the costs.

A smart average was not performed due to the nature of the project. There were very few buildings that closely resembled to the LSM project with respect to size, cost, or functionality. The Bryce Jordan Center was used to develop a parametric estimate. In order to have the estimate relate more closely to the LSM project some of the costs were altered. The mechanical cost was increased to 22 million, the electrical to 14 million, and site work to 5 million. It was difficult to determine what other costs needed to be altered with the information provided. The date was also changed to April 2003, the location to Rockville, MD, and the building size to 290,000 S.F.

Square Foot Estimate

Reference:

R.S. Means Construction Cost Data 2004 Edition

Assumptions:

- The LSM project most closely resembles a Research Lab with reference to the building itself not the equipment
- Cost / SF = \$ 127
- Size = 19,000 SF

Calculations:

Total project cost: $290,000 \text{ SF} * \$ 127/\text{SF} = \$36,830,000$

Size Adjustment: $290,000 \text{ SF} / 19,000 \text{ SF} = 15.26$
 Use default value of 0.9
 $\$36,830,000 * 0.9 = \$33,147,000$
 Subtracting adjustment = $-\$3,683,000$

Location Adjustment: Rockville, MD was not available so Baltimore will be used
 Factor of 91.4
 $\$36,830,000 * 0.914 = \$33,662,620$
 Subtracting adjustment = $-\$3,167,380$
 R.S. Means Cost: $\$36,830,000$
 $-\$3,683,000$
 $-\underline{\$3,167,380}$
 $= \$29,979,620$

Comparison

Due to the fact that there was no building that resembled a pharmaceutical manufacturing facility in the R.S. Means book, there is a distinct difference in the building cost estimate.

There are many factors that can be linked to this difference. The most evident distinction is the high tech machinery and equipment that is required for the LSM facility. This cost is to remain confidential as per HGS's request. Some other factors that cause this estimate to be off are is

the spray on fireproofing required in the “clean” rooms which is very expensive, they epoxy floor covering which is expensive and time consuming to install. There is also an enormous amount of process piping inside the building which feed the process equipment.

The R.S. Means estimate proved to be insufficient in providing an accurate estimate for the Large Scale Manufacturing Facility.

Local Conditions

Being close to Washington D.C. there is a large labor force available for use. A major issue with this location is the amount of construction continually at work in the Maryland, D.C., and Virginia areas. This makes it hard at times to find qualified contractors to work on such a high profile project. Many of the contractors on site (i.e. process piping and rigging contractors) were not from the local area and were temporarily relocated to the area. This posed some issues during construction when workload was low. Certain contractors had to send some of their workers home because there was not enough work to perform, and when the workload increased there were problems getting enough workers back to the project.

Some other issues that developed are due to the site location and the area where it is being constructed. Parking became an issue due to the fact that there was no room to park on site, and there were also no trailers for the contractors. Gilbane rented out the top floor of an office building and was only allotted a certain amount of parking spaces. Fortunately a mile down the road Gilbane was finishing up another job for HGS, their corporate headquarters, and contractors were allowed to park there. Busses were provided in the morning and late afternoon to provide the commute from the parking area to the site.

The site, other than being quite confined, did not have many difficult subsurface conditions. The water table was low enough that surface pumping to a temporary pond was sufficient during excavation. The only times when it became difficult was during heavy rains, which this area receives a lot of. Along with that, there was a lot of stone where the excavation of the cellar was located. This was a known fact, so Gilbane obtained blasting permits to eliminate the stone. There turned out to be an excessive amount of stone that was unknown, which provided setbacks in the schedule. The rain also caused some other problems with mud being tracked into the building. All subcontractors are required to complete a daily cleanup since the building is required to be in a "clean" state. As construction progresses the building is required to reach certain clean protocols which are specified in the spec sections. To give a brief overview, it states that daily cleanup must be completed; no food, drink, or tobacco products are permitted inside the building; and at later protocols contractors are required to use clean tools/equipment and wear gloves. The rainy conditions make cleanup difficult and also time consuming, which in the overall scheme of things delays the schedule.

Client Information

Human Genome Sciences is a relatively new pharmaceutical company founded in 1992, which is located in Rockville, MD. Their overall goal is to discover, develop, and market gene-based drugs to cure and treat diseases. Currently HGS has expanded the company vastly with construction of a new Corporate Headquarters, a Pilot Production Facility, a Quality Building, a Biological Sciences Facility, and the LSM Facility.

With construction of the Large Scale Manufacturing Facility, HGS will be able to produce multiple drugs at once in a state of the art facility. Many drugs recently discovered are undergoing clinical trials in patents, and upon approval will enter the development stages at the facility.

Gilbane enforces safety on the construction site, which is also a substantial concern to the owner. All contractors are required to go through safety training before allowed on site, which entails all OSHA standards as well as standards Gilbane enforces. Quality construction is a major factor that HGS will be following closely. They have personnel that are to be present at all first deliveries, inspections, mock-ups, and construction set in-place. Gilbane has incorporated a quality plan that requires all entities involved with the specific process to be present and to sign off on the subject at hand.

Cost is always an issue with any construction project, and though it is the highest importance to HGS, they would like this project to be completed under budget, on time, and with a high level of quality. At times this poses difficulty due to the materials and special construction processes that are required to construct this building in a "clean" state. HGS has set forth project milestones as with most construction projects. In order for this building to be beneficial to the fullest extent, the LSM building needs to be completed on the date set forth. With multiple long lead items, delivery issues, and changes in the building, updating the schedule is a detailed ongoing process.

With hopes of a successful project, HGS plans on becoming a major force in the pharmaceutical market. Only by following the project schedule, completing the project within the allotted budget, and creating a quality facility can they achieve this goal. Gilbane plans of attaining this feat and hopes to continue their relationship with HGS.