Existing Construction Conditions
&
Technical Assignment 1

By Anthony Lucostic

Contents

Executive Summary

The existing conditions report will give a general overview of the entire Food Science Building project. A one page primavera schedule summary is attached showing the key aspects, dates, and durations of the project including design, procurement, structure, building enclosure, production area, and interior finishes. Beginning and end dates will be shown along with duration and what time of the year the action will take place.

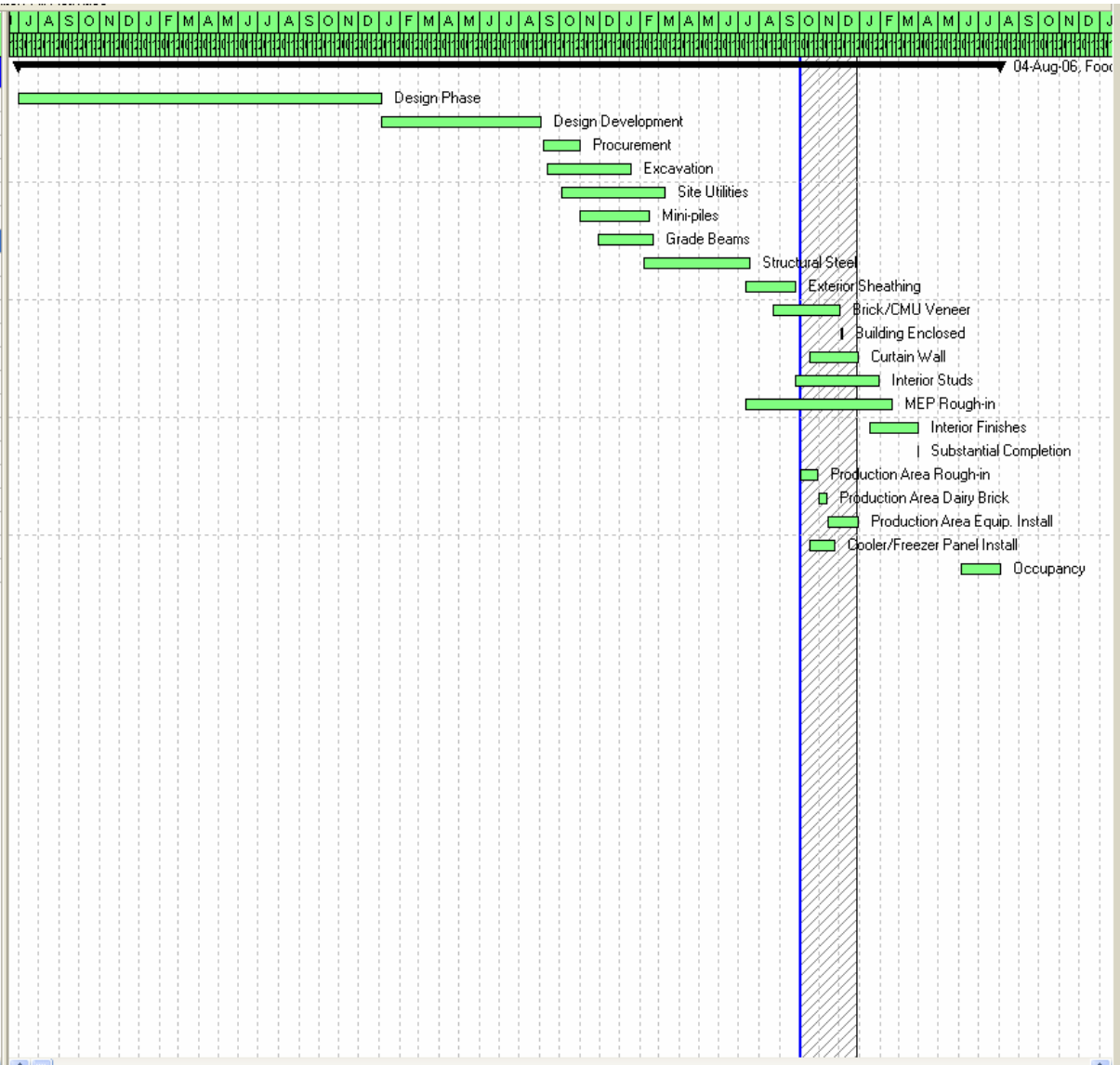
A building systems summary, found below, will also give you a general overview of the systems incorporated in your building; beginning with the demolition of the existing parking lot that has to happen before construction can begin. A mini-pile and grade beam system will then be utilized as the foundation system of your building due to poor soil conditions found in the geotechnical report. The structural system of the building will then follow as a structural steel frame with composite metal decking and poured in place concrete slabs. Some areas will however require precast double tee's due to the requested long span between columns and possible need for future expansion. Additionally, precast concrete stairs will be installed in the four stair towers. The mechanical systems of the building will mainly draw from the PSU steam and chilled water loops. While special attention was made to the cleanliness of the air in the production areas. Similarly, the electrical and emergency power for the building is pulled from an existing campus power supply nearby. The exterior façade is largely covered with four inch ground face block veneer and brick. While on the south façade, floors one and two including a vestibule that runs up the entire building, there is an engineered aluminum curtain wall system.

The building is a 122,000 sq. ft. with four main floor levels, a penthouse level, and partial basement. The total project cost is $45,060,000 while the construction cost is $32,765,261. The building basically serves three main functions under one roof: 1) Food Processing / Production Area, 2) College Classroom and Laboratory, and 3) a Creamery Sales Area. Thus, due to the difficulty of trying to find a similar building to use to compare with for a parametric schedule, I chose to break it up. I searched for and compared the entire Food Science Building to three different buildings, one of each type stated above. The cost comparisons found were useful in analyzing the different systems. On the other hand, because my comparison allowed for many assumptions and error some comparisons did not turn out as planned.

The Food Science Building is a uniquely designed building when looking all the different system and uses under on roof. The budget and schedule are tight but attainable. Please find the below information for your review.

Food Science Schedule Summary

Activity ID	Activity Name	Start	Finish
	Food Science	01-Jul-02	04-Aug-06
A1000	Design Phase	01-Jul-02	05-Jan-04
A1005	Design Development	05-Jan-04	03-Sep-04
A1010	Procurement	07-Sep-04	01-Nov-04
A1015	Excavation	13-Sep-04	17-Jan-05
A1017	Site Utilities	04-Oct-04	11-Mar-05
A1020	Mini-piles	01-Nov-04	14-Feb-05
A1030	Grade Beams	29-Nov-04	21-Feb-05
A1040	Structural Steel	07-Feb-05	18-Jul-05
A1050	Exterior Sheathing	11-Jul-05	26-Sep-05
A1060	Brick/CMU Veneer	22-Aug-05	02-Dec-05
A1065	Building Enclosed	05-Dec-05*	05-Dec-05
A1070	Curtain Wall	17-Oct-05*	30-Dec-05
A1080	Interior Studs	26-Sep-05	30-Jan-06
A1090	MEP Rough-in	11-Jul-05	20-Feb-06
A1100	Interior Finishes	16-Jan-06*	31-Mar-06
A1105	Substantial Completion	31-Mar-06*	31-Mar-06
A1110	Production Area Rough-in	03-Oct-05	28-Oct-05
A1115	Production Area Dairy Brick	31-Oct-05*	11-Nov-05
A1120	Production Area Equip. Install	14-Nov-05*	30-Dec-05
A1130	Cooler/Freezer Panel Install	17-Oct-05*	23-Nov-05
A1140	Occupancy	05-Jun-06*	04-Aug-06



Building Systems Summary

The existing lot where the new Food Science Building now rests used to be a parking lot. The entire area was a parking lot used for student parking. The only demolition necessary was the ripping-up and disposal of the existing blacktop.

The structure of the building is composed of a structural steel frame with moment and shear connections. A composite metal decking along with poured in place lightweight concrete was then utilized throughout most of the building. In the production area of the building a cast-in-place 8" structural slab and beam encasements was utilized. The steel was erected with a 120 ton crawler crane.

Cast-in-place concrete was used for all grade beams, foundation walls, and slabs. All of the vertical formwork utilized reusable "Simmons" forms. The 8" structural slab used an engineered scaffolding formwork system for support. All concrete was placed using a driveable concrete pump.

There are two main areas where precast concrete is used on the building. Above the Pilot Plant area structural precast double tee's were utilized as part of the roofing system due to the long span and possible need for further expansion. As well the four stair towers are made of precast stair sections. A 180 ton mobile (all-terrain) crane was used to erect the double tee's, mainly due to reach.

The mechanical systems of the building tie into the PSU steam and chilled water campus loops for most heating and cooling purposes throughout the building. Steam for the heating and process loads of the Food Science Building will be routed to the building via a new steam utility tunnel that will be connected to PSU's existing steam tunnel running along Curtain Rd. The steam will be reduced to 15 psig to serve domestic hot water, heating hot water, and process steam for the Pilot Plants. In addition, the high-pressure steam will be reduced to medium pressure via a separate PRV station to serve autoclaves, steam-to-steam humidifiers, and steam kettles. The building will be provided with chilled water from the campus-wide chilled water system. Chilled water supply and return piping will enter the building in the basement level mechanical room and connected to the two main chilled water distribution pumps. Chilled water will then be distributed to each of the air handling units throughout the building. Each air handling unit (AHU) will have a two-way control valve. All offices will contain a VAV (variable air volume) AHU including a mixing box. All laboratories will contain a VAV air handling unit that will be 100% outside air. The Production Areas and Creamery Sales Area will be served by a constant volume single zone (CVSZ) air handling unit.

The electrical service for the facility is supplied from a radial extension of the existing campus medium voltage distribution system. The primary services will be routed to the building via underground duct banks. The building's electrical service consists of two unit substations located in the basement electrical room. Distribution voltage is 12,470V/480/277V/208/120V. Utilization voltages are 480/277V, 3 phase, 4 wire and 208Y/120V, 3 phase, 4 wire. The main distribution switchboard "HMDS" consists of two main circuit breakers and a distribution section. The switchboard is rated for 3000A, 480/277V. A sub distribution switchboard "LSDS" is fed via a 480V:208/120V transformer. Switchboard "LSDS" is rated at 208/120V.

The building contains various masonry systems inside and out. The exterior façade of the building contains brick or ground face block veneer. The most typical system is structural steel studs, exterior sheathing, and brick or ground face CMU block veneer. However in areas where structural steel studs do not exist an 8" CMU reinforced block back-up wall is used and ground face CMU block veneer on the exterior. The scaffolding around the building is a combination of "hydro-scaffolding system" and conventional buck scaffolding; depending on the circumstances.

Curtain wall on the building is minimal except on the south elevation, most opening are "punch-out" windows on the north, east, and west façade. However along the south façade of the building the first two stories along with a vestibule that rises to the top of the building is all curtain wall. Nittany Builders are the sub-contractor installing the entire curtain wall system. Nittany is using a Kawneer engineered window system with a reinforced aluminum structure.

Excavation on the Food Science Building did not encounter or need a dewatering system. Although, due to the muddy, sloppy conditions created from the pile driving operation and excavation during the winter 6x stone was brought in and spread to create workable access around the site. The project also included some necessary shoring when excavating for the basement foundation along Curtain Rd. At this location soilder

beam and lagging was engineered for shoring purposes so that this work could occur. Once the work was completed the backfill against the basement foundation wall progressed burrying the soilder beams and lagging in the ground. When digging trenches for pipe lines the earth was either benched back or “pull-along” shoring boxes were used.

Project Cost Evaluation

Food Science Building – University Park, PA

Construction Cost (CC):	$32,765,261
Construction Cost per square foot (CC/SF):	$268.57 / SF
Total Project Cost(TC):	$45,060,000
Total Project Cost per square foot (TC/SF):	$369.34 / SF

Buildings Systems Cost

1) Structural System: TC: $6,574,000
TC/SF: $53.89 / SF

Includes: Piles: $1,019,000
Concrete: $2,865,000
Structural Steel: $2,690,000

2) HVAC System: TC: $4,108,000
TC/SF: $33.67 / SF

3) Electrical System: TC: $2,632,000
TC/SF: $21.57 / SF

4) Food Production / Processing System: TC: $5,338,065
TC/SF: $43.75 / SF

Includes: Food Processing: $3,518,000
Ammonia Refrigeration System: $1,040,900
Coolers & Refrigeration: $779,165

Parametric Estimate using D4 Cost 2002

Due to the range of uses that are contained within this one building producing a parametric comparison estimate was challenging. In order to be able to create a realistic cost comparison I split the building into its' three unique uses: 1) Food Processing / Production Area, 2) College Classroom and Laboratory, and 3) a Creamery Sales Area.

In D4 I was able to find three separate buildings similar to each use. Although the projects found on D4 were similar when comparing uses the cost and size of the buildings were significantly smaller in scale. Therefore I decided to use a cost per square foot analysis to evaluate the Food Science building. D4 building results found are attached. *See results in attached table below.*

Assumptions:

1) The Production Building I used in D4 is not a milk processing facility but it is a food processing building. When comparing the cost per square foot of the Food Science Production facility to the D4 processing facility the numbers were very close, less than a $4 dollar difference.

2) The Creamery Sales area used for comparison in D4 was an ice cream parlor of the same relative square footage; although it was a low ceiling, single floor, and not extremely complex facility. Due to the drastic difference between the two facilities a comparison here was difficult and not noteworthy.

3) The classroom and laboratory building found in D4 was in the neighborhood of the classroom and laboratory space of the Food Science Building. This number I feel is a close approximation to the actual cost

when comparing totaling building cost and thinking about how the building is split up. However, a key difference in the D4 building is that it is a 5 story building without a production area.

Square Foot Estimate using R.S. Means

As in D4, R.S. Means did not have a building that was close enough to compare. I used the same approach as above by splitting the building up into the three main types of building uses that are contained within the Food Science Building: 1) Food Processing / Production Area, 2) College Classroom and Laboratory, and 3) a Creamery Sales Area. *See results in attached table below.*

1) In R.S. Means the closest building found to a Food Production facility was a factory. The factory had a high ceiling and approximately same number of square feet when compared to the Food Science. Dock levelers, bumpers, etc. were all included as similar to Food Science.

2) The nearest type of building found to compare to the Creamery Sales was a convenient store. This was a similarly square foot area but the ceiling height was lower and the interior finishes were of lesser quality when compared to the Food Science.

3) The College Laboratory found was a good comparison to what I feel the labs in Food Science will be like. Although, the building in R.S. Means was only 1 story it did meet the square foot requirements of the labs in food science.

Reference: R.S. Means Square Foot Cost Estimates.pgs:108,120,202.

FOOD SCIENCE BUILDING COST COMPARISON

Actual Building Cost	122,000 SF	$45,060,000	$369.34 / SF
Actual Production Area Cost	122,000 SF	$5,338,065	$43.75 / SF
Approx. Building Square Foot Areas			
Production Area	33,500 SF		
Creamery Sales	6,500 SF		
Classroom / Laboratory	82,000 SF		
D4 Buildings used for Comparison	Building Square Feet	Cost	Cost per Square Foot
Production Building	31,392 SF	$1,383,729	$44 / SF
Creamery Sales	8,000 SF	$35,128	$4.39 / SF
Classrooms & Laboratory	100,000 SF	$13,838,231	$138.38 / SF
R.S. Means Comparison	Building Square Feet		Cost per Square Foot
Factory	30,000 SF		$82.40 / SF
Convenience Store	6,000 SF		$88.60 / SF
College Laboratory	80,000 SF		$127.65 / SF

Comparing the Estimates

The actual cost of the Food Science Building was closely comparable to some of the costs found and far off from others. When calculating actual square foot estimates of the building some are almost unattainable without going into great depth. The Production area however is simply calculated based upon how the contract bid packages are set-up.

The D4 estimate provides an extremely useful comparison number when it came to the production area. This is mostly due to how closely related the facility found was in comparison to the actual. On the other hand, the ice cream parlor found in D4 provides no significant results that can be used when comparing to the

Creamery, even though they are both ice cream shops. This is largely due to the fact that the features incorporated in the Creamery Sales area are above average. The classrooms and laboratories in D4 I feel are also a close comparison when looking at the entire cost of the Food Science.

The R.S. Means factory comparison, while closely related in some features to the Food Science Production area is high in a cost comparison. This is probably related to the difference between a factory and a food processing/production facility. The Convenience Store I feel is a more realistic comparison given the high quality features that are going to be in the Creamery Sales area. If anything I feel that the approximately 6,500 square foot Creamery Sales space would be even more expensive than that of the convenient store. The College Laboratory is again a close comparison when looking at the total building cost; it also remains close to the price found in D4.

In final comparison I feel that the most significant numbers found were the Production facility in D4, Convenient Store in R.S. Means, and the Classrooms/Laboratories found in both D4 and R.S. Means. The greatest differences that would have to be considered when evaluating these numbers further is that fact that each of these estimates include a separate building enclosure / veneer cost for their building. In contrast, the food Science Building houses all of these facilities behind a single façade and roof enclosure. Additionally, the same situation applies to the mechanical systems, etc.

Food Science - Production Area

Food Science - Oct2005 - PA - Altoona

Prepared By:	Tony Lucoritc PSU AE	Prepared For:	Dr. Riley PSU AE
	State College, PA 16803 Fax:		University Park, PA 16801 Fax:
Building Sq. Size:	31392	Site Sq. Size:	83042
Bid Date:	11/1/2004	Building use:	Industrial
No. of floors:	1	Foundation:	CON
No. of buildings:	1	Exterior Walls:	CMU Veneer
Project Height:	31	Interior Walls:	CMU Veneer
1st Floor Height:	31	Roof Type:	Ballasted Membrane
1st Floor Size:	30000	Floor Type:	CON
		Project Type:	NEW

Division		Percent	Sq. Cost	Amount
01	General Requirements	2.52	1.11	34,910
	General Requirements	2.52	1.11	34,910
03	Concrete	27.09	11.94	374,827
	Concrete	27.09	11.94	374,827
05	Metals	5.13	2.26	71,053
	Metals	5.13	2.26	71,053
06	Wood & Plastics	10.93	4.82	151,222
	Finish Carpentry	0.85	0.37	11,703
	Rough Carpentry	10.08	4.44	139,519
07	Thermal & Moisture Protection	2.56	1.13	35,433
	Insulation	0.17	0.07	2,342
	Roofing	2.39	1.05	33,091
08	Doors & Windows	2.99	1.32	41,415
	Doors	2.51	1.11	34,768
	Windows & Glazing	0.48	0.21	6,647
09	Finishes	9.85	4.34	136,330
	Acoustics	0.64	0.28	8,815
	Drywall	1.60	0.71	22,150
	Flooring	0.38	0.17	5,311
	Lath & Plaster	1.47	0.65	20,342
	Painting	5.76	2.54	79,713
10	Specialties	2.37	1.04	32,797
	Specialties	2.37	1.04	32,797
11	Equipment	0.01	0.00	134
	Equipment	0.01	0.00	134
12	Furnishings	0.00	0.00	0
15	Mechanical	18.86	8.32	261,032
	Distribution System	0.00	0.00	0
	HVAC	6.72	2.96	93,037
	Furnishings	0.02	0.01	264
	Plumbing	12.12	5.34	167,730
16	Electrical	17.68	7.79	244,577
	Electrical	17.68	7.79	244,577
Total Building Costs		100.00	44.08	1,383,729
02	Site Work	100.00	1.39	115,206
	Landscaping	18.89	0.26	21,759
	Off-Site Work	10.48	0.15	12,071
	Site Work	70.63	0.98	81,375

Total Site Costs	100.00	1.39	115,206
Total Project Costs	–	–	1,498,934

Food Science - Classrooms and Laboratory

AJL 2 - Nov 2004 - PA - Altoona

Prepared By:
FFKR Architecture Planning
132 Pierpont Avenue Suite 200
Salt Lake City, UT 84101
Fax:

Prepared For:
,
Fax:

Building Sq. Size:	100000	Site Sq. Size:	0
Bid Date:	11/1/2004	Building use:	Educational
No. of floors:	5	Foundation:	CON
No. of buildings:	1	Exterior Walls:	Masonry/Brick/Bloc
Project Height:	84	Interior Walls:	CMU Veneer
1st Floor Height:	15	Roof Type:	MEM
1st Floor Size:	30500	Floor Type:	Terrazzo
		Project Type:	NEW

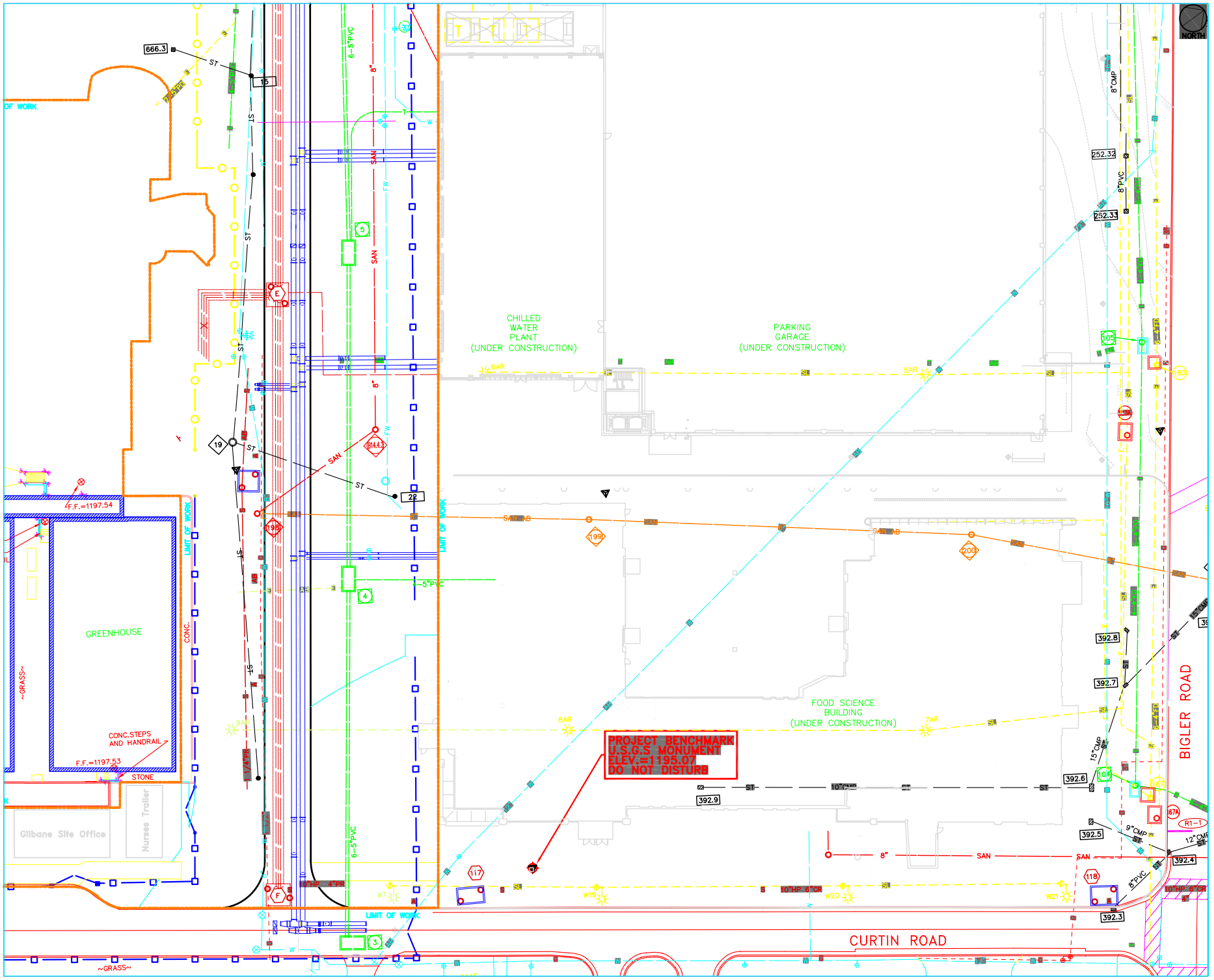
Division		Percent	Sq. Cost	Amount
01	General Requirements	4.41	5.62	562,250
	General Requirements	4.41	5.62	562,250
03	Concrete	14.09	17.97	1,796,542
	Concrete	14.09	17.97	1,796,542
04	Masonry	5.84	7.45	744,625
	Masonry	5.84	7.45	744,625
05	Metals	3.18	4.05	405,300
	Metals	3.18	4.05	405,300
06	Wood & Plastics	1.87	2.38	238,152
	Wood & Plastics	1.87	2.38	238,152
07	Thermal & Moisture Protection	2.19	2.80	279,747
	Thermal & Moisture Protection	2.19	2.80	279,747
08	Doors & Windows	2.44	3.12	311,680
	Doors & Windows	2.44	3.12	311,680
09	Finishes	4.15	5.29	528,534
	Finishes	4.15	5.29	528,534
10	Specialties	0.83	1.06	106,002
	Specialties	0.83	1.06	106,002
11	Equipment	16.86	21.49	2,149,099
	Equipment	16.86	21.49	2,149,099
14	Conveying Systems	1.06	1.35	134,860
	Elevators	1.06	1.35	134,860
15	Mechanical	33.43	42.61	4,261,160
	Mechanical	33.43	42.61	4,261,160
16	Electrical	9.65	12.30	1,230,099
	Electrical	9.65	12.30	1,230,099
Total Building Costs		100.00	127.48	12,748,049
02	Site Work	100.00	0.00	1,090,182
	Site Work	100.00	Err	1,090,182
Total Site Costs		100.00	N/A	1,090,182
Total Project Costs		–	–	13,838,231

Food Science - Creamery Sales

AJL3 - Nov 2004 - PA - Altoona

Prepared By:	Tony Lucostic PSU AE	Prepared For:	Dr. Riley PSU AE
	State College, PA 16803 Fax:		University Park, PA 16801 Fax:
Building Sq. Size:	8000	Site Sq. Size:	0
Bid Date:	11/1/2004	Building use:	Commercial
No. of floors:	1	Foundation:	CON
No. of buildings:	1	Exterior Walls:	CMU Veneer
Project Height:	15	Interior Walls:	CMU Veneer
1st Floor Height:	15	Roof Type:	
1st Floor Size:	8000	Floor Type:	Tile/Ceramic Tile
		Project Type:	NEW

Division		Percent	Sq. Cost	Amount
06	Wood & Plastics	35.00	4.16	33,298
	Finish Carpentry	11.04	1.31	10,500
	Rough Carpentry	23.97	2.85	22,798
09	Finishes	6.62	0.79	6,300
	Flooring	6.62	0.79	6,300
10	Specialties	7.36	0.88	7,000
	Specialties	7.36	0.88	7,000
11	Equipment	31.54	3.75	30,000
	Equipment	31.54	3.75	30,000
15	Mechanical	12.75	1.52	12,130
	HVAC	4.66	0.55	4,430
	Plumbing	8.09	0.96	7,700
16	Electrical	6.73	0.80	6,400
	Electrical	6.73	0.80	6,400
Total Building Costs		100.00	11.89	95,128
Total Site Costs		100.00	N/A	0
Total Project Costs		–	–	95,128



NOTES:

1. THE PROJECT AREA INCLUDES NUMEROUS EXISTING LIVE AND ABANDONED UNDERGROUND UTILITIES. THE INFORMATION SHOWN ON THESE PLANS IS BASED ON AVAILABLE MAPPING PROVIDED BY THE OWNER, FIELD SURVEY, AND CONTRACTOR AS-BUILT INFORMATION. THEREFORE, THEIR LOCATIONS AND SIZES MUST BE CONSIDERED APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS AS MAY BE NECESSARY TO VERIFY INFORMATION FOR CRITICAL UTILITY CROSSINGS AND CONNECTIONS AND TO REPORT SAID INFORMATION TO THE ENGINEER.

2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL FIELD CONDITIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE VERTICAL AND HORIZONTAL LOCATIONS OF ALL UTILITIES WITHIN THE PROJECT AREA.

3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF CONFLICTS AND/OR DISCREPANCIES ARE FOUND IN THE INFORMATION AS PRESENTED ON THESE PLANS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO UTILITIES, PROPERTY, AND APPURTENANCES. IN THE EVENT OF DAMAGE, THE CONTRACTOR SHALL REPAIR/REPLACE UTILITIES, PROPERTY, AND/OR APPURTENANCES TO THE SATISFACTION OF THE OWNER/ENGINEER/UTILITY OWNER AT NO ADDITIONAL COST TO THE OWNER.

5. THE CONTRACTOR SHALL EXERCISE CAUTION AND EMPLOY CAREFUL EXCAVATION METHODS DURING INSTALLATION OF THE FACILITIES TO AVOID DAMAGE TO OR CONFLICT WITH EXISTING UTILITIES. THE CONTRACTOR SHALL PERFORM EXPLORATORY EXCAVATIONS AS NECESSARY AND/OR REQUIRED BY THE OWNER/ENGINEER TO ASCERTAIN THE HORIZONTAL AND VERTICAL ALIGNMENT OF EXISTING UTILITIES PRIOR TO CONSTRUCTION IN AFFECTED AREAS AND MAKE THE APPROPRIATE ADJUSTMENTS IN THE FIELD IF CONFLICTS OCCUR. NO SEPARATE PAYMENT SHALL BE MADE FOR THE HEREIN DESCRIBED PROVISIONS AND SHALL BE INCLUDED IN THE COST OF THOSE ITEMS FOR WHICH PAYMENT SHALL BE MADE AS IN THE BID SCHEDULE.

6. DESIGN IS BASED UPON AVAILABLE INFORMATION. SHOULD THE CONTRACTOR ENCOUNTER A SITUATION WHERE IT IS BELIEVED THAT THAT AN EXISTING UNDERGROUND UTILITY WILL NEED TO BE RELOCATED BY THE CONTRACTOR, HE SHALL NOTIFY THE OWNER/ENGINEER AND A DECISION WILL BE MADE WITHIN TWO (2) WORKING DAYS. PAYMENT FOR RELOCATION OF EXISTING UNDERGROUND UTILITIES SHALL BE A NEGOTIATED LUMP SUM PRICE BASED ON THE SIZE, TYPE, AND LENGTH OF UTILITY TO BE RELOCATED, AND A CHANGE ORDER SHALL BE ISSUED.

7. THE OWNER AND ENGINEER DO NOT GUARANTEE THE ACCURACY, PRESENCE, EXISTING OR LOCATION OF ANY SUBSURFACE UTILITY INSTALLATION WHICH MAY OR MAY NOT BE SHOWN ON THESE PLANS.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL HAZARDOUS ENVIRONMENTAL CONDITIONS CREATED BY ANY MATERIALS OR EQUIPMENT BROUGHT TO THE SITE BY THE CONTRACTOR, SUBCONTRACTOR, SUPPLIERS OR ANYONE ELSE FOR WHOM CONTRACTOR IS RESPONSIBLE.

No.	Description
3	
2	
1	

DWG ISSUE & REVISION HISTORY

Stamp

Key Plan

Project Title:
PENNSYLVANIA STATE UNIVERSITY
East Subcampus
Food Science Building
Existing Site Plan

Drawing Title:
EXISTING CONDITIONS

Project No. 01-11781.02 Scale 1"=40'-0"
Drawn By: A.J.L.
Checked By:
Approved By:
Date: 10/4/05

Drawing No. C1-1

Local Conditions

There are many preferred methods of construction and building used in the Center Pennsylvania Region. These methods are utilized due to many factors; some being the availability of materials, soil conditions in the area, and available/qualified contractors to perform the work. The structure of the buildings in University Park, PA typically consist of mini-piles, grade beams, a structural steel frame, and composite metal decking with poured in place concrete slabs. Mini-piles are often used to support the building structure due to typical pour soil conditions in the area, however there are a few areas were spread or continuous footings are acceptable were solid bedrock is found. When using mini-piles, cast-in-place concrete grade beams or foundation walls are then utilized due to the multiple contractors able to perform this work in the area. However, this area lacks the skilled contractors necessary to build cast-in-place horizontal formwork and shoring of cast-in-place concrete structural slabs, etc. Therefore, because we are in central Pennsylvania and surrounded by numerous old mining and steel towns a steel structure is a standard choice. Additionally, there are various steel mills, fabrication shops, and skilled contractors available to perform this work at a competitive bid.

When working in University Park, PA on the campus of Penn State University it is a well known fact that during excavating there is always a risk hitting a sink hole. Although none were found on the Food Science Building the chance was there. The site was formerly used as a parking lot, therefore once the blacktop was stripped off the base was found to be a layer of gravel then clay. The building excavation then needed to be taken down approximately four more feet. Due to the excess water made from driving pies and because we were performing this work during winter drainage on the site was pour and 6x stone had to be brought in to make sufficient access around the site for driving, crane, etc.

Recycling is available in the area and tipping fees could have produced a minimal savings to the job if used. However, when recycling on a construction site multiple dumpsters are needed on site for the separation of materials. Because the site conditions were already extremely confined it was decided that the space needed for 4 to 5 dumpsters on site would slow access and progress around the site and ultimately would not produce a savings.

Client Information

The owner of the Food Science Building is The Pennsylvania State University. The user group of the Food Science Building is The Department of Food Sciences and the Creamery Staff which are both part of the the College of Agriculture at PSU. The new building will provide an infrastructure to allow the College of Agricultural Sciences to remain current with researchers in the food science departments in the Big Ten Conference and the Northeast. Additionally, a well-thought-out Creamery salesroom was designed with consideration for efficient response to periodic large influxes of customers.

The quality of the building is of extreme importance, especially in the Production and manufacturing Areas. The building is going to serve as a food processing plant therefore everything in these areas must be perfect or it will not pass the multiple inspections necessary to operate. The characteristic that makes this food processing plant's quality even higher is because it processes dairy products, which is actually very acidic. All rough-ins in these areas must be in the floor or ceiling slabs and any thing else exposed basically needs to be made of stainless steel or some other approved substance. This is because they wash the entire production area down every week with extremely potent chemicals to sanitize the place; these chemicals can eat right through carbon steel. The floor is pitched in every direction to multiple floor drains at an 1/8" per foot slope or greater. If the floor puddles water during any time the area will not pass inspection.

The Food Science Building Project is an OCIP (Owner Controlled Insurance Program) job therefore safety is always an issue. Gilbane, the construction manager, additionally has a very high safety program which is implemented on all of their projects. Both organizations perform safety walk-throughs regularly, which provides raised awareness of the safety issues to the workers. Between both of these organizations performing their duties towards safety the job site maintains as safe as you can get a construction site. The project has passed two OSHA inspections with flying colors and typically rates at an average percentage of 90% or higher on Gilbane's monthly reports.

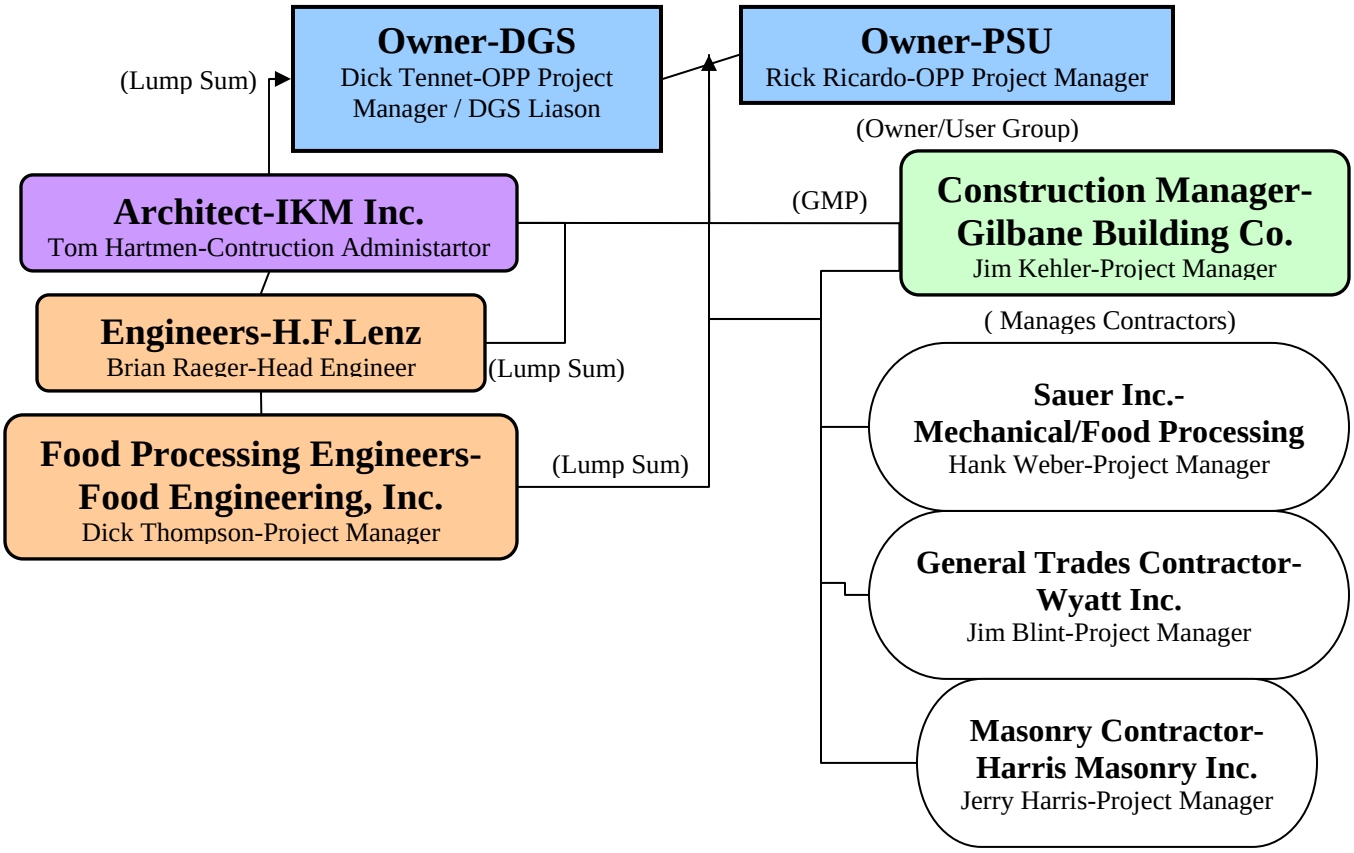
Cost on the Food Science Building is closely watched because it goes through so many channels. The project is a DGS job therefore the state also wants to track the cash flow. The cash flow on the project is closely watched between PSU's Office of Physical Plant (OPP) and DGS. Allowances in everyone's contracts are minimal and therefore any and all changes require an additional work order that goes through PSU and DGS so that the money is approved for payment.

The projects schedule is tight but achievable. The most critical portion of the building is the Production and Pilot Plant areas. These are the areas that are necessary for the Creamery relocation and operation by April of next year. The remainder of the building is a typical higher education building with classrooms many laboratories. These areas are typical and do not pose any threat to the schedule. As far as phased, dual or joint occupancy requirements go there really are none. Although, we are supposed to begin turning over the Production areas by April to allow for set-up and testing, substantial completion of the remainder of the building is June 2006.

Project Delivery System

The Food Science Building is being delivered in the traditional Design-Bid-Build approach. A construction manager, Gilbane Building Co., was selected to oversee and manage the building of the project due to its' complexity. The staff alone at OPP would not have been able to completely perform the necessary management functions adequately to see the whole building through. The design-bid-build approach was chosen for two main reasons. First, because it is a DGS job and you have to go to the state with a building project cost and the only way to accurately do this is to have and evaluate a complete set of documents. Secondly, due to the complexity of the planning necessary to build a creamery production plant inside an education and sales building a design-build job was out of the question.

Below is an organizational chart for project:

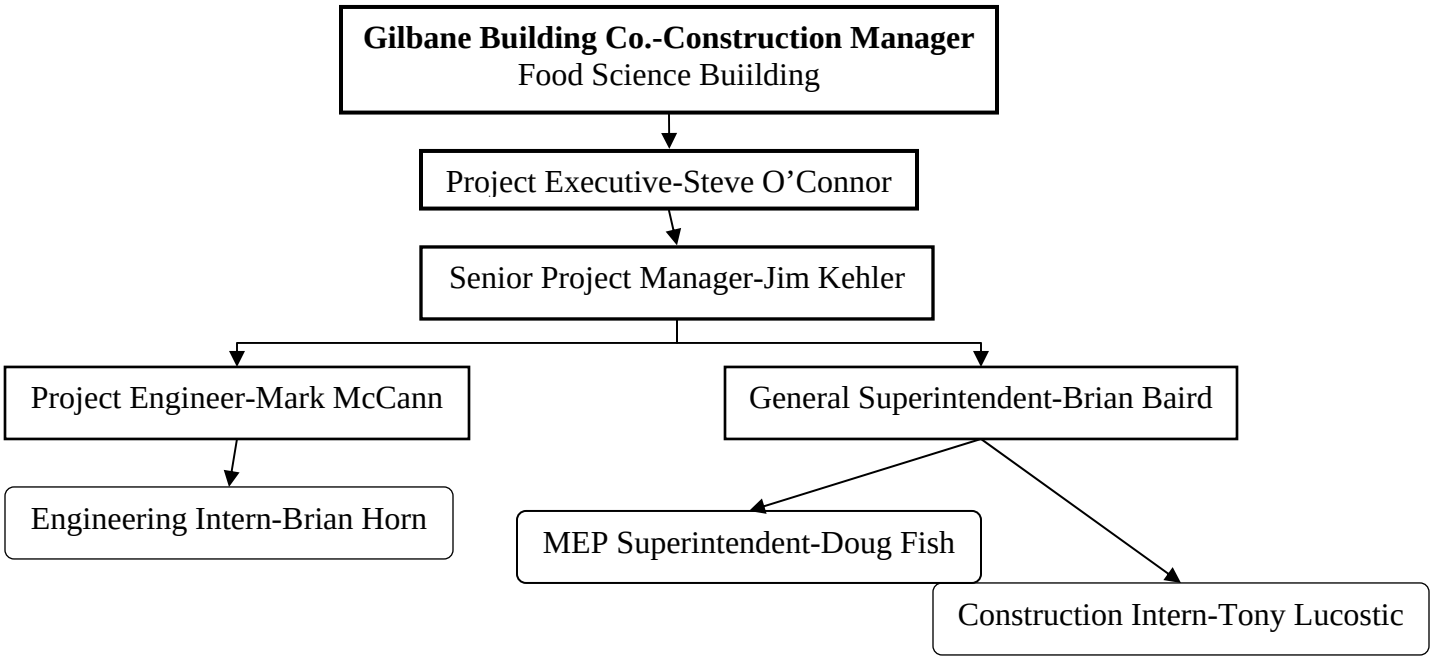


The Food Science Building Project was given some state appropriation funding therefore it is a DGS project. On this particular DGS projects, DGS oversees all of the contracts. Therefore all of the money is

closely reviewed by the state as well as OPP. OPP still holds all managerial and owner responsibilities as they would on any building they are building and performs their functions as usual. The major difference on this project is that there is more than one PSU project manager to talk to when discussing changes. Dick Tennet a PSU project manager acts as the liason for DGS and he must okay everything also. The owner, PSU, hired IKM as the architects at a lump sum price to design the building. IKM then hired H.F. Lenz to engineer the building at a lump sum contract price. H.F. Lenz performed all engineering on the building including civil, structural, MEP, and fire protection. PSU also hired a specialized engineering firm, Food Engineering Inc., to deal with the design of the production and food processing areas at a lump sum price. Food Engineering worked with IKM and PSU to meet the owners requirements.

A pre-qualified bidders list was a mandatory requirement to be on before you were allowed to bid work at PSU. Contractors for the project were selected based upon lowest bid. Each contractor was required to be fully insured and bonded for their scope of work.

Staffing Plan



The Project Executive is in charge of managing the multiple projects that Gilbane has going on in the area and is ultimately the person in charge of the project. The Senior Project Manager is in charge of the project on more of a daily basis and oversees everything that deals with the project primarily concerning cost, schedule, and delays. The Project Engineer builds the entire job on paper before it gets to the field. He makes sure that everyone is building off of the most recent set of documents. He also reviews submittals, warranties, etc. and checks that they comply with the contract documents. The General Superintendent is in charge of actually constructing the building. Managing and coordinating the trades while holding to a schedule and budget.