



Technical Assignment #1:

Construction Conditions

And

Construction Project Management



PENNSTATE Borland Laboratory Renovation



Table of Contents

Existing Construction Conditions

A. Project Schedule Summary.....Page 3 and 12

B. Building Systems Summary.....Pages 3-7

C. Project Cost Evaluation.....Pages 7-8 and 13-17

Construction Project Management

A. Site Plan of Existing Conditions.....Pages 8 and 18

B. Local Conditions.....Pages 8-9

C. Client Information.....Pages 9-10 and 19

D. Project Delivery System.....Pages 10 and 20

E. Staffing Plan.....Page 11

PENNSTATE Borland Laboratory Renovation



Project Schedule Summary

Given on page 12 is a basic summary of the Schedule for the Borland Laboratory Renovation Project. You will notice that I have highlighted a lot of the processes that happen before the construction begins. This is for two reasons; first, The Pennsylvania State University has a very complex procedure that must be followed in order to receive permission and funding for a project of this size. Second, as you can see, the project is in the Pre-bid Meeting phase right now. This means the the contract has not yet been awarded, and there is no project schedule at this point. Therefore the 2 major construction phases you can see on the schedule that I have labeled as (estimate) are just my assumptions of how long this task will take.

Building Systems Summary

Demolition

Being a renovation of the existing Borland Laboratory, a lot of time will be spent in the demolition phase for this project. All together, the interior walls on the ground, first, and second floors will all be demolished to make room for a new floor plan. As an effect to this, the HVAC system will be totally removed from the building to make room for a new state of the art system. As for any Plumbing and Electrical fixtures, the supply lines will be cut and terminated at the entry point to the building.



During the construction phase, the existing electrical supply to the building will be metered by Penn State University Office of the Physical Plant (OPP) and used for the temporary construction power. This will be used until the new electrical utility lines are installed across Shortlidge Road between May 20th and August 23rd, 2007. The existing water supply will also be metered by OPP and used during the construction phase.

Along with the demolition phase comes a very large portion of this project. That is to remove the dairy products sales room on the South side of the building and also the garage on the North side of the building. These two portions of the existing building were additions to the original structure. They will be removed and brick will be matched to the original to fill in any spaces needed.

Also the beginning of the demolition phase will include asbestos abatement. Just like many of the other older buildings on The Pennsylvania State University Campus, the Borland Laboratory contains a lot of asbestos fire proofing. Before any other demolition or construction begins, the abatement crew will remove all of the harmful fire protection following the Environmental Health and Safety Codes.

Structural Steel Frame

Since this project is a renovation of the Borland Laboratory, and the existing building envelope will be reused, there isn't a lot of structural steel framing to be done. There is very little structural steel framing on the basement, ground, first, and second floors. Due to the relocation of ductbanks, elevator shafts, and stairs, there will be some W beams added to support the above floors. There is an add-alternate for a Penthouse to be added on to a portion of the second floor. Included in this design is a fair amount of new structural steel work.

PENNSSTATE Borland Laboratory Renovation



A new floor joist and roof truss system will be installed if this alternate is put into effect. The majority of steel connections have been designed with a double angle shear connection, and there is bracing designed for the roof truss system only. The crane size is unknown at this time.

Cast in Place Concrete

The Borland Laboratory project is a renovation, and requires minimal to no cast in place concrete work. The sum of concrete work will be done outside of the building for landscape designs. These sidewalks will be chute poured and require minimal formwork.

Precast concrete

This renovation has very little precast work to be done. It will only be necessary to replace some of the existing precast panels on the exterior façade of the building. After being cleaned and refurbished, the existing panels will be inspected and then a decision for a possible change order will be made to match and replace the existing panels.

Mechanical System

There are two mechanical rooms located in the basement. MB001 contains domestic water pumps, low pressure steam water heaters, and the hot water pumps. Located in MB002 are the chilled water pumps that take the University supplied chilled water and pumps it to the Air Handling Units (AHU) on the above floors.

PENNSSTATE Borland Laboratory Renovation



This project requires 4 Air Handling Units. AHU1 and AHU2 are both located on the Second Floor in room M223. They are designed by [Trane](#) to have a maximum of 14,000 Cubic Feet per Minute (CFM) of air flow. The other two units (AHU3 and AHU4) are located on the room in on the Penthouse floor in room M301. These two units have also be designed by trane and have a maximum CFM of 12,000.

There will be two different types of fire protection utilized on this project. A wet system will be used in all pipe spaces, common areas, offices, and classrooms. Due to some equipment that could be damaged by a water leak, in the mechanical rooms and computer labs, and dry system will be utilized using schedule 40 galvanized piping.

Electrical System

The Borland Laboratory power system is supplied by The Pennsylvania State University's power system. Before entering the building, the power system will run through a transformer supplied by the University. Upon entering the building, the power supply is fed into a 280/120V, 3 phase, 4 wire, 2000 A switchgear. This swithgear then distributes the power to many different areas. The main switchgear carries a total connected and demanded load of 543.6 KW.

The emergency power is also being supplied from The Pennsylvania State University. It will come from the University's campus emergency back-up system. The emergency power for this building is switched at a 240/120V, 2 phase, 3 wire, 150A transfer-switch. This switch will automatically transfer power to the Normal Emergency and Emergency circuits in the case of a power loss.

PENNSTATE Borland Laboratory Renovation



Masonry

The only masonry required for this renovation will be to patch any holes or deteriorated bricks with a pre-approved brick to match the existing finish.

Curtain Wall

For the Borland Laboratory Renovation, the curtain wall along with many other things is also existing. The brick and precast that forms the curtain wall will be cleaned and refurbished to bring back the shine this building once had.

Excavation

There will be the usual excavation done to the exterior of for landscaping and other architectural features. The only excavation needed for the building is a 8'x8'x10' pit for the elevator shaft. At this point the contract for excavation has not been awarded, and the specifications on Trenching and Shoring have not been completed.

Project Cost Evaluation

The Pennsylvania State University Borland Laboratory Renovation project has been put on a very tight budget. The total construction costs for this building have been listed at \$11,800,000 with a total building costs for Penn State of \$15,000,000. With 61,415 total square feet of usable space, that would equal a little over \$244 per square foot.

PENNSYLVANIA STATE UNIVERSITY Borland Laboratory Renovation



Attached on page 13 is a cost per square foot estimate that I obtained using CostWorks. You will notice that the estimate given is about half of the actual cost for this building. This is due to the extensive mechanical and AV/IT system that Borland Laboratory will hold. The estimating system that I used does not allot extra money for such systems.

You will also notice that on pages 14-17 I have attached a parametric estimate that I produced using D4 Cost 2002. Using this program I compared the Borland Laboratory Renovation to a College Expansion & Renovation at Brookhaven College located in Dallas, Texas. The estimate given for this college renovation was for a 20,000 square foot project. I adjusted the provided information to fit the Borland Laboratory project, and produced a fairly accurate estimate. My estimate came within \$400,000 of the actual predicted cost for this project.

Site Plan of Existing Conditions

Please view the site plan showing existing conditions and utility lines that is given on page 18.

Local Conditions

The Pennsylvania State University Park area is a challenging place for a construction firm to work, even though this area hosts a vast variety of projects. With the soil types, recycling laws, and limited parking for construction workers, it becomes a difficult place to get accustomed to working. The soil basically consists of clay and large boulders.

PENNSSTATE **Borland Laboratory Renovation**



However since this project is a renovation and very little excavation is needed, this should not be a problem. The Pennsylvania State University has recycling a plan for construction materials in their [Quality Service Action Plan Summary V for Renovation Services](#). Also as a LEED rated building, the Contract Requirements and General Construction Specifications require 75% of all materials be recycled or salvaged. Parking on campus is one of the largest problems. Due to the great amount of students and faculty that need to park on campus, parking spaces are limited. This causes all of the construction workers to park in Lot 44, a considerable distance from the site, and be shuttled to the project at the contractor's expense.

Client Information

The Pennsylvania State University is ranked 40th among the [world's top 100 global institutions](#). Penn State follows a list of very high quality standards that are backed up by the Office of the Physical Plant's [Construction Services Unit](#). The Construction Services team is in charge of making sure that the project is a safe work environment for the workers and everyone on campus. Their job also consists of ensuring the Universities quality standards are met, that the job stays on schedule, and that the project is built to the specifications. The Construction Services Unit is a big part of any project on campus and more about their role in any project can be found on page 19.

Penn State has chosen to renovate this existing building instead of demolishing it and rebuilding. The main factor in this decision was to preserve a historical site. The Borland Laboratory was first built in 1889 to enhance the research of dairy products. They also produced and sold ice-cream from this facility that has been known as the "University Creamery ever since and has become a landmark at Penn State for anyone visiting.

PENNSSTATE Borland Laboratory Renovation



The creamery has just been moved one block East on Curtain road to a brand new facility. Now that the creamery has been moved, Borland Laboratory is empty and will be used for many different activities for this ever-growing university.

Then Pennsylvania State University has given a construction cost estimate of \$11,800,000 and a total building cost of \$15,000,000. This will include a lot of planning and scheduling on both sides of the project, because the campus is occupied by nearly 40,000 students almost everyday. This makes utility shutdowns and tie-ins very difficult to not disrupt the normal day activities of the students.

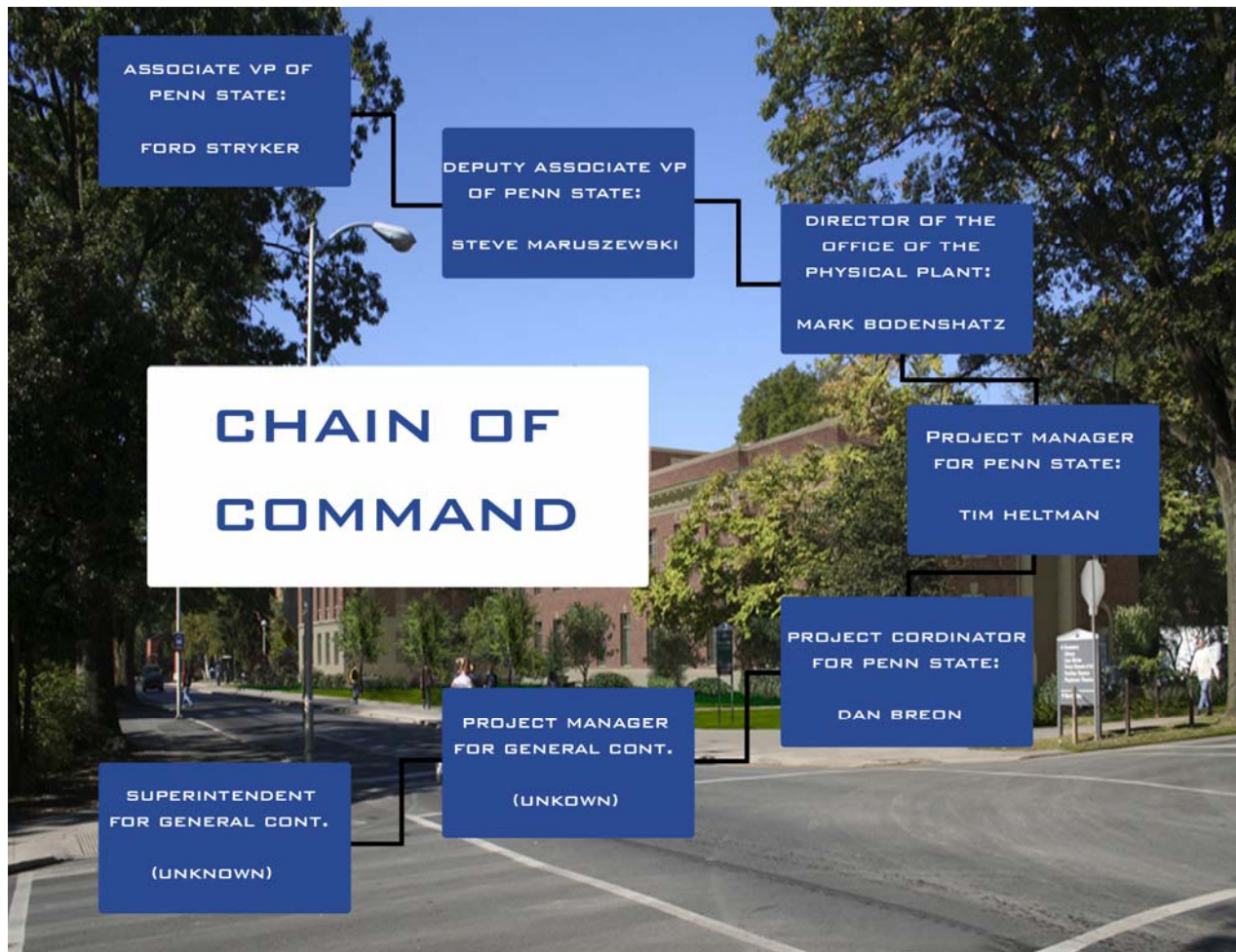
Project Delivery System

The Delivery System on this project will be a design-bid-build. As said in my Executive Summary, the project has been delayed for various reasons. This has allowed the architect to produce 100% complete construction drawings. Even though The Pennsylvania State University Office of the Physical Plant normally uses a design-bid-build system, it is unusual to start a project with complete drawings. On page 20 I have provided a visualization of how the project delivery system for the Borland Laboratory project will work. Also when looking at the delivery system, I have labeled the types of contracts that will be used between trades. Since the contract has not been awarded yet, the General Contractor and their subs are unknown at this time.



Staffing Plan

Bellow I have provided an organizational chart showing the staff is assigned to this job. Again since this project is not yet in the construction phase, I have focused more on The Pennsylvania State Univery Office of the Physical Plant's chain of command. Penn State utilizes a hyarcy sysem to run their projects. This can be better visualized bellow.



Summarized Project Schedule

ID	Task Name	Duration	Start	Finish	January 1	January 21	February 11	March 1	March 21	April 11	May 1	
					2/23	8/31	3/7	9/12	3/20	9/25	4/2	10/8
1	Funding Approval by Penn State	12 days	Tue 2/24/04	Wed 3/10/04								
2	Notice to proceed for Architect	1 day	Tue 12/14/04	Tue 12/14/04								
3	Design Phase	369 days	Tue 4/26/05	Fri 9/22/06								
4	Present project to owner	1 day	Tue 4/4/06	Tue 4/4/06								
5	Obtain Permits	26 days	Tue 8/22/06	Tue 9/26/06								
6	Pre-bid Meetings	11 days	Tue 10/3/06	Tue 10/17/06								
7	Bids Due	1 day	Thu 10/26/06	Thu 10/26/06								
8	Award Contract	1 day	Fri 11/3/06	Fri 11/3/06								
9	Notice to Proceed	1 day	Mon 11/27/06	Mon 11/27/06								
10	Construction Phase	357 days	Tue 11/28/06	Wed 4/9/08								
11	Abatement (estimated)	45 days	Thu 11/30/06	Wed 1/31/07								
12	Demolition (estimated)	48 days	Mon 12/25/06	Wed 2/28/07								
13	Building Power Energized	1 day	Fri 2/22/08	Fri 2/22/08								
14	L&I Building Plan Review	30 days	Wed 2/27/08	Tue 4/8/08								
15	Commissioning	20 days	Wed 3/12/08	Tue 4/8/08								
16	Turnover to OPP	1 day	Wed 4/2/08	Wed 4/2/08								
17	L&I COP	1 day	Tue 4/8/08	Tue 4/8/08								
18	Punch List	51 days	Wed 4/16/08	Wed 6/25/08								
19	Final Inspection	1 day	Wed 5/14/08	Wed 5/14/08								
20	As-Built Drawings submitted	1 day	Wed 5/21/08	Wed 5/21/08								
21	Building Flush for LEEDs	11 days	Thu 6/26/08	Thu 7/10/08								
22	Move In	25 days	Fri 7/11/08	Thu 8/14/08								
23	Complete Bond Inspection	20 days	Thu 2/26/09	Wed 3/25/09								
24	Close Out Project	20 days	Thu 3/26/09	Wed 4/22/09								

Project: Borland Schedule.mpp Date: Thu 10/5/06	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

D4 Estimate

Estimate of Probable Cost

Penn State University Borland Labor - Oct 2007 - PA - State College

Building Sq. Size : 61415
 Bid Date : 10/26/2006
 Project Height : 56
 1st Floor Size : 18000
 1st Floor Height : 12
 No. Of Buildings : 1
 No. Of Floors : 4
 Project Type : REN
 Building Use : Educational
 Exterior Walls : MAS
 Interior Walls : CMU
 Foundation : CON
 Roof Type : BUP
 Floor Type : CON

Building Costs

Code	Division Name	%	Sq. Cost
01	General Requirements	5.88	13.65
838,470			
	General Requirements	5.88	13.65
838,470			
03	Concrete		3.85
8.92	548,006		
	Concrete		3.85
8.92	548,006		
04	Masonry		6.84
15.87	974,567		
	Masonry		6.84
15.87	974,567		
05	Metals		5.44
12.62	775,245		
	Metals		5.44
12.62	775,245		
06	Wood & Plastics	1.83	4.23
260,077			
	Wood & Plastics	1.83	4.23
260,077			
07	Thermal & Moisture Protection	3.62	8.40
	Thermal & Moisture Protection	3.62	8.40
516,117			
08	Doors & Windows	11.23	26.06
1,600,651			
	Doors & Windows	11.23	26.06
1,600,651			



09	Finishes		5.42	
12.57	771,695			
	Finishes		5.42	
12.57	771,695			
10	Specialties		1.94	
4.49	275,883			
	Specialties		1.94	
4.49	275,883			
15	Mechanical	34.45	79.91	
4,907,957				
	Mechanical	34.45	79.91	
4,907,957				
16	Electrical		19.51	
45.25	2,779,017			
	Electrical		19.51	
45.25	2,779,017			
=====				
=====				
	Total Building Costs	100.00	231.99	
14,247,685				

Site Costs

Code	Division Name	%	Sq. Cost	
Projected				
=====				
=====				
02	Site Work	100.00	0.04	
300,040				
	Site Work	100.00	0.04	
300,040				
=====				
=====				
	Total Site Costs	100.00	3.57	
300,040				
=====				
=====				

Total Project Costs
 14,547,725

Building Division Notes

General Requirements

 Bidding requirements, mobilization, bonding, surveyor.

Concrete

 Formwork, reinforcement, precast.

Masonry

 Masonry & grout.

PENNSSTATE Borland Laboratory Renovation



Metals

Structural framing, decking, expansion control.

Wood & Plastics

Rough carpentry, architectural woodwork.

Thermal & Moisture Protection

Waterproofing, manufactured roofing & siding, membrane roofing, skylight, joint sealers.

Doors & Windows

Metal doors & frames, wood & plastic doors, special doors, metal windows.

Finishes

Tile, acoustical treatment, wood flooring, resilient flooring, carpet, painting.

Specialties

Visual display board, louvers & vents, devices, fire prevention, operable partitions, toilet & bath accessories.

Mechanical

Basic materials & methods.

Electrical

Basic materials & methods.

Site Division Notes

Site Work

Earthwork, paving & surfacing, sewerage & drainage, improvements, landscaping.

Project Notes

Estimate Based On Case: EU030140 - College Expansion & Renovation
Location: TX - Other
Date: Jan 2001
Building Size: 21,300

- * Farmers Branch, Texas
- * Construction Period January 2001 to May 2002.
- * Building 1, 7,500; Building 2, 13,800; total, 21,300 square feet.

PENNSSTATE Borland Laboratory Renovation



Brookhaven College is one of eight colleges that make up the Dallas County Community College District that serves the Northwest area of the City of Dallas and the Farmers Branch, Addison, and Carrollton, Texas communities. The Brookhaven College campus opened in 1972 and has experienced enrollment growth that necessitated the expansion and renovation of its Business and Art Department Programs. Brookhaven College selected MPI Architects as the design architects based on their extensive experience with programming college facilities. Johnson/McKibben Architects, Inc. was chosen the Architect of Record, with the responsibility of leading the complete Architect/Engineering Team.

The challenge presented to the design team was to expand and renovate both departments and maintain existing operations. This was achieved by programming sessions with each department to maintain a focus on their individual needs and requirements.

The 10 classroom building addition to the Business School was designed to relieve the growing demands of computer lab training. The facility was wired with the latest technology to accommodate computer stations in all classrooms. The computer lab was centrally located with four surrounding instructional offices. This provides direct interaction between student and instructor.

Lighting in each classroom was also broken up to allow multiple levels based on the type of media used by instructors. Mixtures of fluorescent and incandescent fixtures with dimming capabilities were specific functions to minimize computer monitor glare.

Each computer lab classroom was designed with minimal sized exterior windows. Exterior natural light was achieved by running continuous clerestory windows along the interior main corridors. The natural light was transferred to the classroom lab with interior windows facing the clerestory corridors.

The Art Department consisted of an approximate 8,000 square feet building addition highlighted with the art gallery. This place was the focal point of the expansion to display renowned art exhibits. In addition, new classrooms featured a wood shop, metal shop, new CAD design classroom and an open courtyard foundry for metal sculpture and a wood burning kiln. The interior finishes in this area utilized stained concrete floors, painted CMU walls, and an open ceiling exposed structure and mechanical ducts. A suspended light grid has been installed to allow maximum flexibility with art displays.

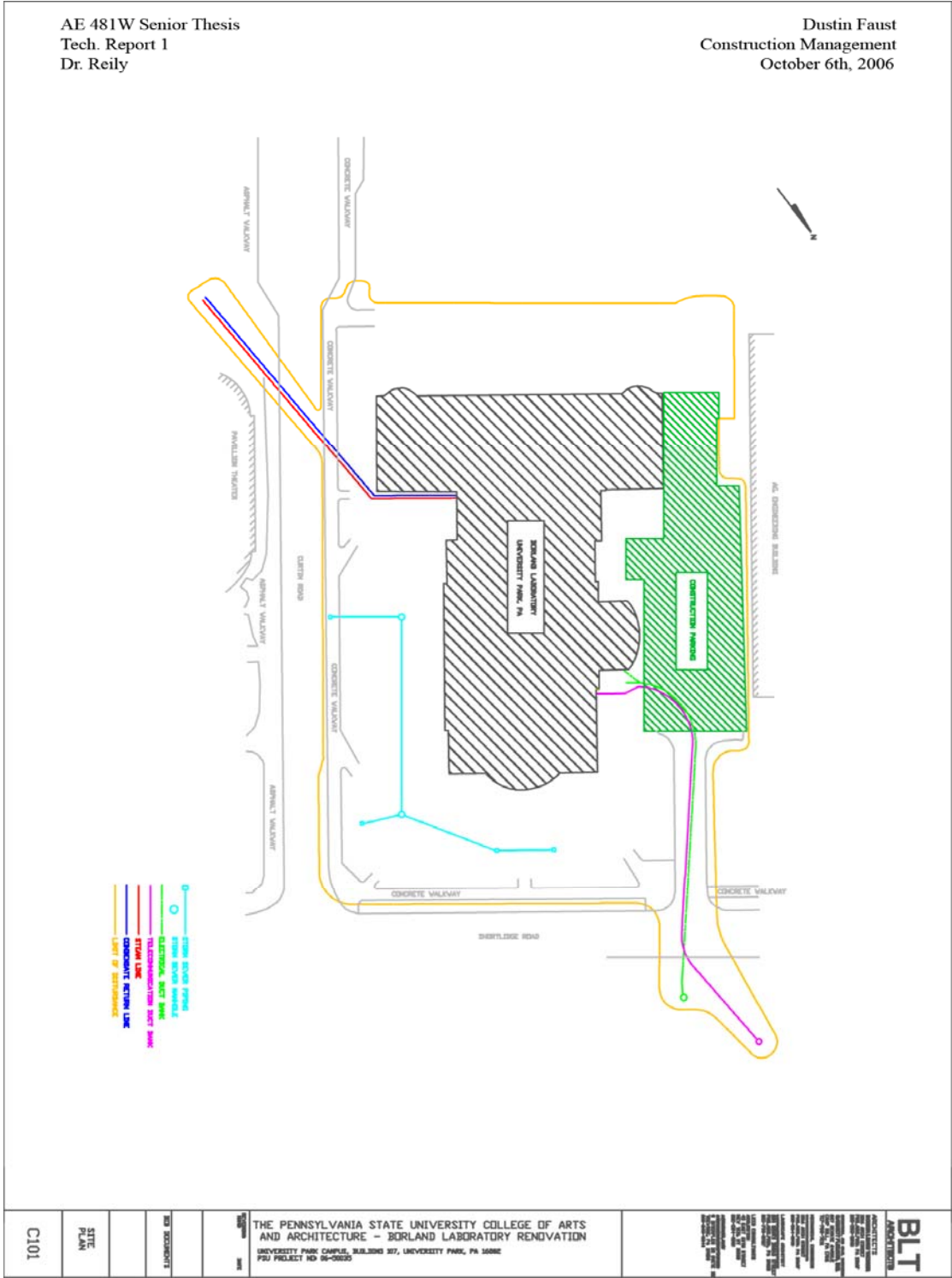
This project also included selective renovations of existing classrooms and shop areas in both the Business School Building and the Art Department. A new chiller was added to the central plant mechanical room to support the existing campus HVAC system.

Manufacturers/Suppliers

DIV 07: Built-Up: Tamko; Metal: Berridge Manufacturing; EIFS: Finestone.
DIV 08: Aluminum Storefront: Vistawall; Tempered Glass: Oldcastle; Wood Doors: Ampco; Hollow Metal Doors: P-W Metal Products.

DIV 09: Carpet: Shaw; Carpet Tiles: Lutyen; Resilient Tile: Armstrong;
 Paint: Sherwin Williams; Acoustical Treatment: USG.

PENNSSTATE Borland Laboratory Renovation



PENNSTATE Borland Laboratory Renovation



QUALITY SERVICE ACTION PLAN CONSTRUCTION SERVICES OFFICE OF PHYSICAL PLANT

OUR CUSTOMERS: Facility Coordinators, Project Managers, Project Coordinators, Contractors, Parking Office, faculty, students, university personnel, community, L&I inspectors, local codes/zoning, police services, Accounting, Design Professionals, Design Services, building users, and other OPP departments.

OUR CUSTOMERS' EXPECTATIONS: Facilitation of the timely delivery of quality projects. They also expect us to be courteous and reliable while being committed to maintaining a positive and safe working environment.

OUR QUALITY SERVICE STANDARDS:

SAFE ENVIRONMENT:

1. Maintain organized and safe project sites.
2. Ensure installation of signage to communicate unsafe areas.
3. Ensure proper separation between occupied and non-occupied spaces.
4. Assure jobsite safety through inspection and observation.
5. Initiate and monitor corrective actions.
6. Focus on the environment around jobsite to ensure public safety.

SERVICE ATTITUDE:

1. Respond in a courteous, positive, and timely manner.
2. Empathetically listen to customers' needs and concerns.
3. Effectively communicate project information to all entities involved.

STEWARDSHIP:

1. Ensure contractors comply with contract requirements and quality standards.
2. Continuously inspect, monitor, and evaluate performance of contractor.
3. Coordinate project requirements to help facilitate the timely completion of the project.
4. Provide leadership at job conferences to resolve project issues.

EASE OF SERVICE:

1. Clearly identify all points of contacts for the work.
2. Ensure availability to allow timely resolution of project issues.
3. Provide continuous customer assistance throughout project process.
4. Pro-actively communicate project status.

EFFICIENCY:

1. Take a pro-active team approach maintaining positive relationships.
2. Establish a quality control action plan for the project.
3. Reduce rework through continuous monitoring of the work.
4. Attempt to review assigned projects during the pre-construction stage.
5. Periodically review and streamline the flow of communication.
6. Monitor project long-lead items to ensure timely delivery.
7. Track project schedule providing input throughout the project.
8. Commit to an efficient close-out/turnover of the project.

DEAR CUSTOMER,

The Construction Services department within Design and Construction Services is committed to exceeding your expectations by providing a positive and safe working environment through leadership

and collaborative efforts. We will continuously strive to ensure all contract requirements are met in a timely manner and at the highest quality.

PENNSSTATE Borland Laboratory Renovation

