EXISTING CONSTRUCTION CONDITIONS

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A. EXECUTIVE SUMMARY

This document provides an introduction to the existing construction conditions for Medlar Field at Lubrano Park, located in University Park, Pennsylvania. In the assignment, the building is analyzed in terms of its project schedule, building systems summary, and project cost evaluation.

Medlar Field at Lubrano Park is a fast-track traditional project delivery system. Barton Malow Company was hired by Penn State University to serve as the construction management agency for the project, whereas L. Robert Kimball & Associates is the lead project architect. The construction schedule for the project shows that construction began in June 2005 and will finish in time for State College Baseball's first minor league baseball game slated for June 2006. An in-depth look at the building systems shows that the stadium shell is constructed using steel and load bearing masonry walls with brick veneer. The seating bowl is shaped using a slab-on-grade approach to form the seating risers. The original project cost when construction began in June 2005 was $23.8 million; however the cost has since risen to $30.8 million. This actual cost compared to D4 Cost Estimating and previously managed Barton Malow minor league baseball facilities is significantly higher than expected; a higher cost is the result of many factors which cannot be discussed.

B. PROJECT SCHEDULE SUMMARY

Please see Appendix A for the Schedule Summary.

Foundation Sequence

Medlar Field at Lubrano Park is constructed on a conventional spread footing foundation system. Foundation construction began in area D and moved to area E and B. Concurrent construction of the field wall and area A foundation also occurred. Before foundation construction could begin, there were eight (8) weeks of mass excavation to the entire project site.

Structural/Exterior Phases

The current steel erection sequence is divided into seven (7) phases by areas of the stadium; the stadium is divided into areas A, B, C, D, and E which are arranged in a counter-clockwise direction around the building. Steel erection will begin in area D, and then move to area B, followed by area C, and then finish with area A and E. Steel erection will finish with the erection of the light towers and scoreboard structure. The concrete floor slab construction will follow the structural steel erection sequence. The masonry sequence begins with construction of load bearing walls in areas B and E and then will follow with areas C and D.

Finish Sequence

Finishes were sequenced through the building from area D to C and finishing in area B. The majority of finishes in area D are in the basement level while area B and C are at the suite level.

After HVAC and other major overhead equipment were in place, the finishes will be phased in the following manner:

- Metal studs
- MEP Rough-In
- Ceiling Grid
- Electrical Fixtures and Diffusers
- Ceiling Tiles
- Insulation
- Gypsum Board
- Electrical/Telecommunications work
- Painting
- Carpeting and Other Floor Installations
- Furniture

C. BUILDING SYSTEMS SUMMARY

Work Scope	YES	NO
Demolition Required	X	
Support of Excavation	X	
Structural Steel Frame	X	
Cast-In-Place Concrete	X	
Precast Concrete		X
Masonry	X	
Curtainwall	X	
Mechanical System	X	
Electrical System	X	

Demolition Required

The site for the project encompasses approximately 35 acres currently used for Beaver Stadium event parking. There is a significant north-to-south slope where the actual building will rest. In order to construct the stadium facility, existing utilities must be relocated. These utilities include, but are not limited to: existing overhead power lines, an 18' effluent line which will require a live tap to the new line, and a 6" force main extension from the baseball stadium site to the adjacent Bryce Jordan Center facility.

The erosion and sediment control procedures are outlined to occur in three (3) stages with the initial installation duration being 2-3 weeks. A bioretention facility design is integral to the erosion and sediment control procedures. The bioretention facility consists of: a gravel layer with Class IV geo-textiles on the sides and at the top of the layer); a soil/sand layer; and three-inches (3") of shredded mulch. A six-inch (6”) perforated PVC subsurface drain is located at the bottom of the gravel layer.

There were also several curbs and a fill area that had to be removed. Not part of Barton Malow’s contract but items that still had to be addressed were the relocation of overhead power lines and the relocation of a gas line through the site.

Support of Excavation

There was no special sheeting or shoring methods for this project. The excavation was sloped in accordance with OSHA standards. Erosion and sediment control procedures were put in place to help control the affect the site construction had on adjacent areas.

C. BUILDING SYSTEMS SUMMARY

Structural Steel Frame

The structural system for Medlar Field at Lubrano Park is a basic force resisting system with ordinary steel moment frames and masonry shear walls. The lateral load system consists of floor/roof diaphragms and shear walls. Steel beams throughout are fabricated with camber to help control deflection.

The steel erector plans to use an 80-ton mobile crane to erect the 600 ton project. The proposed crane consists of a boom and a jib, therefore carrying a lighter load over longer distances. The current steel erection sequence is divided into seven (7) phases by areas of the stadium; the stadium is divided into areas A, B, C, D, and E which are arranged in a counter-clockwise direction around the building. Steel erection will begin in area D, and then move to area B, followed by area C, and then finish with area A and E. Steel erection will finish with the erection of the light towers and scoreboard structure. During the steel erection phase, there will be several crane re-mobilizations, but this is necessary due to the nature of the project.

Cast-In-Place Concrete

The floor system for Lubrano Park consists of slab-on-grade at the basement level and some areas on the concourse. All elevated slabs are on composite metal deck with five or six inches of normal weight concrete. There is also a split-slab waterproofing system on the concourse level which consists of two layers of concrete (3½" and 1½") with a waterproofing layer between the two layers. Each concrete slab area is reinforced with welded wire fabric. The concrete foundations were earth formed and all slabs will use various sizes of lumber for the slab pours. Slab-on-grade will be poured via truck and buggy, and also a concrete pump. Slab-on-decks will be poured using a concrete pump.

The sixteen (16) foot-high concrete retaining wall in the locker room area is very labor intensive. There are many different sizes of horizontal and vertical reinforcing bars to help support the loads that the wall will receive. To help minimize the labor costs on constructing the wall, the concrete company used a Siemen's vertical formwork system. This formwork system allows the forms to stay together upon completion of a pour in one area and move to the next area which greatly reduces labor costs.

C. BUILDING SYSTEMS SUMMARY

Masonry

There are several types of masonry being used to construct the Stadium. Throughout the project there is load bearing 8" concrete masonry unit (CMU) wall grouted with vertical rebar. The masonry façade for the project is a combination of jumbo brick and tinted CMU block. Barton Malow has established a mixing area that will be stationed for the duration of the project for the masonry contractor. All masonry is erected using traditional metal-frame scaffolding.

Curtain Wall

The curtain wall above the entrance gate of the stadium is comprised of an aluminum frame with glass and glazing. The aluminum frame is first connected to the structural steel frame. The curtain wall is then anchored to the edge of the concrete floor slab. Upon completion of the above items, the glass panels are to be installed into the frame. The architect and structural engineer worked jointly to design the curtain wall system.

Mechanical System

The mechanical room for the Stadium is located in the basement level of area D. The mechanical system for Lubrano Park consists of three (3) indoor air handling units and two (2) roof top units. There are two (2) ductless split system air-conditioning units for refrigeration. Throughout the facility there are electric unit heaters, electric baseboard heaters, exhaust fans, and a kitchen air make-up system. The climate control is done with a VVT damper system.

The domestic water system in Lubrano Park operates on two (2) 500MBH, 600 gallon gas water heaters along with two (2) 20 GPM hot water re-circulation pumps. The system serves all three levels of the facility. The three levels include shower facilities in the locker room area, gang bathrooms and concession areas on the concourse level, and eighteen (18) individual bathroom and kitchenette areas on the suite level. There is also a bathroom which contains an instantaneous water heater located in the visiting team dugout at field level. All of the plumbing equipment is located in a central mechanical room at the basement level.

An automatic fire sprinkler system shall be provided in concession stands, retail areas, press boxes, and other accessory use areas. The main system pipe size is 8" with pendant, concealed, sidewall head design distributed throughout the facility. The fire protection system is a combined dry and wet sprinkler system as required by hydraulic design.

C. BUILDING SYSTEMS SUMMARY

Electrical System

The main electrical system for Lubrano Park consists of a 2000A, 480/277V system with a 2500 bus duct. The system is tapped off a current underground electrical duct bank adjacent to the site with the main electrical room next to the central mechanical room at the basement level. Barton Malow Company is not required to install a step-down transformer out of the electrical duct bank. An emergency generator (230 kW, 287.5 kVA, 480/277V) is also part of the electrical system. The main electrical room is mostly comprised mostly of: two (2) main switchboards; two (2) low-voltage control panels for emergency lighting; and the emergency generation. Distributed throughout the facility are thirty-three (33) panel-boards to serve various spaces. As part of the low-voltage system, there is a photocell on the roof.

D. PROJECT COST EVALUATION

Square Footage Summary

Medlar Field at Lubrano Park: Square Footages	
Building Square Footage	152,194 SF
Project Square Footage	4,474,950 SF

Cost Summary

Medlar Field at Lubrano Park: Costs	
Actual Building Cost	$27,600,000
Total Project Cost	$30,800,000

Cost Comparisons

Medlar Field at Lubrano Park: Cost Comparisons	
Construction Cost / Buidling Square Foot (CC/SF)	$181
Total Project Cost / Building Square Foot (TC/SF)	$202
Construction Cost / Project Square Foot (CC/SF)	$6.17
Total Project Cost / Project Square Foot (TC/SF)	$6.90

Building Systems Budgeted Costs / SF

Medlar Field at Lubrano Park		
Building System	**Budgeted Cost**	**Cost / Building SF**
Superstructure	5,100,000	$33.51
Plumbing	1,100,000	$7.23
HVAC	800,000	$5.26
Fire Protection	400,000	$2.63
Electrical	2,000,000	$13.14
Sound System/Distributed TV	600,000	$3.94
Stadium Seating	500,000	$3.29

D. PROJECT COST EVALUATION

Building Systems Actual Costs / SF

Medlar Field at Lubrano Park		
Building System	**Actual Cost**	**Cost / Building SF**
Superstructure	5,900,000	$38.77
Plumbing	1,000,000	$6.57
HVAC	700,000	$4.60
Fire Protection	325,000	$2.14
Electrical	2,200,000	$14.46
Sound System/Distributed TV	No Contract Award Until 11/2005	
Stadium Seating	440,000	$2.89

Square Foot Estimate Using R.S. Means

A square foot estimate is not possible using R.S. Means. I have performed additional estimates to use for the project. Typically for sporting facilities, estimates are based on cost/seat which I have listed below and averaged.

D4 Cost Estimating

Please see Appendix B for the D4 Cost Estimate Print-Out.

D4 Cost Estimating	
Southwestern Bell Bricktown Ballpark (AAA)	$21,835,787

Cost / Seat Historical Data Comparison

Cost Per Seat based on Historical Data: Baseball Facilities				
Project	**Year**	**2005 Adjusted Cost**	**Number of Seats**	**Cost / Seat**
Medlar Field at Lubrano Park	**2005**	**$30,800,000**	**6,000**	**$5,133**
Lancaster Baseball Stadium (Independent)	2005	$26,200,000	6,400	$4,094
Greensboro Baseball Stadium (Independent)	2004	$32,000,000	7,200	$4,444
Jacksonville Baseball Grounds (AAA)	2004	$28,000,000	8,200	$3,415
Georgia Tech Baseball Stadium	2001	$16,000,000	6,000	$2,667
Oriole Park at Camden Yards	1989	$188,000,000	48,000	$3,917
Comiskey Stadium	1989	$157,200,000	43,000	$3,656

Cost Per Seat based on Historical Data: Multi-Use Arenas				
Project	**Year**	**2005 Adjusted Cost**	**Number of Seats**	**Cost / Seat**
Jacksonville Arena	2003	$145,000,000	13,000	$11,154
Philips Arena (Atlanta)	1998	$210,000,000	17,000	$12,353
Pepsi Arena (Denver)	1998	$195,000,000	18,000	$10,833
Gund Arena (Cleveland)	1994	$152,000,000	20,500	$7,415

D. PROJECT COST EVALUATION

Cost Per Seat based on Historical Data: Football Stadiums				
Project	**Year**	**2005 Adjusted Cost**	**Number of Seats**	**Cost / Seat**
Reliant Stadium (Houston)	2002	$458,000,000	69,500	$6,590
Denver Broncos	2000	$600,000,000	76,000	$7,895
Soldier Field (Chicago)	2003	$500,000,000	66,950	$7,468
Gillete Stadium (Boston)	2001	$305,000,000	68,000	$4,485
Cincinnati Bengals Stadium	1999	$340,000,000	65,000	$5,231
Lincoln Financial Field (Philadelphia)	2003	$525,000,000	68,500	$7,664

Compare / Contrast Estimates

By calculating the cost/seat ratio and comparing the ratios, it is easy to see that a baseball facility is typically the least cost sporting facility venue when using the cost/seat ratio. Medlar Field at Lubrano Park was found to have the highest cost/seat ratio out of any of the baseball stadiums. However, this data may be skewed in the fact that all project costs may not be included in the costs that were given to me.

APPENDIX A

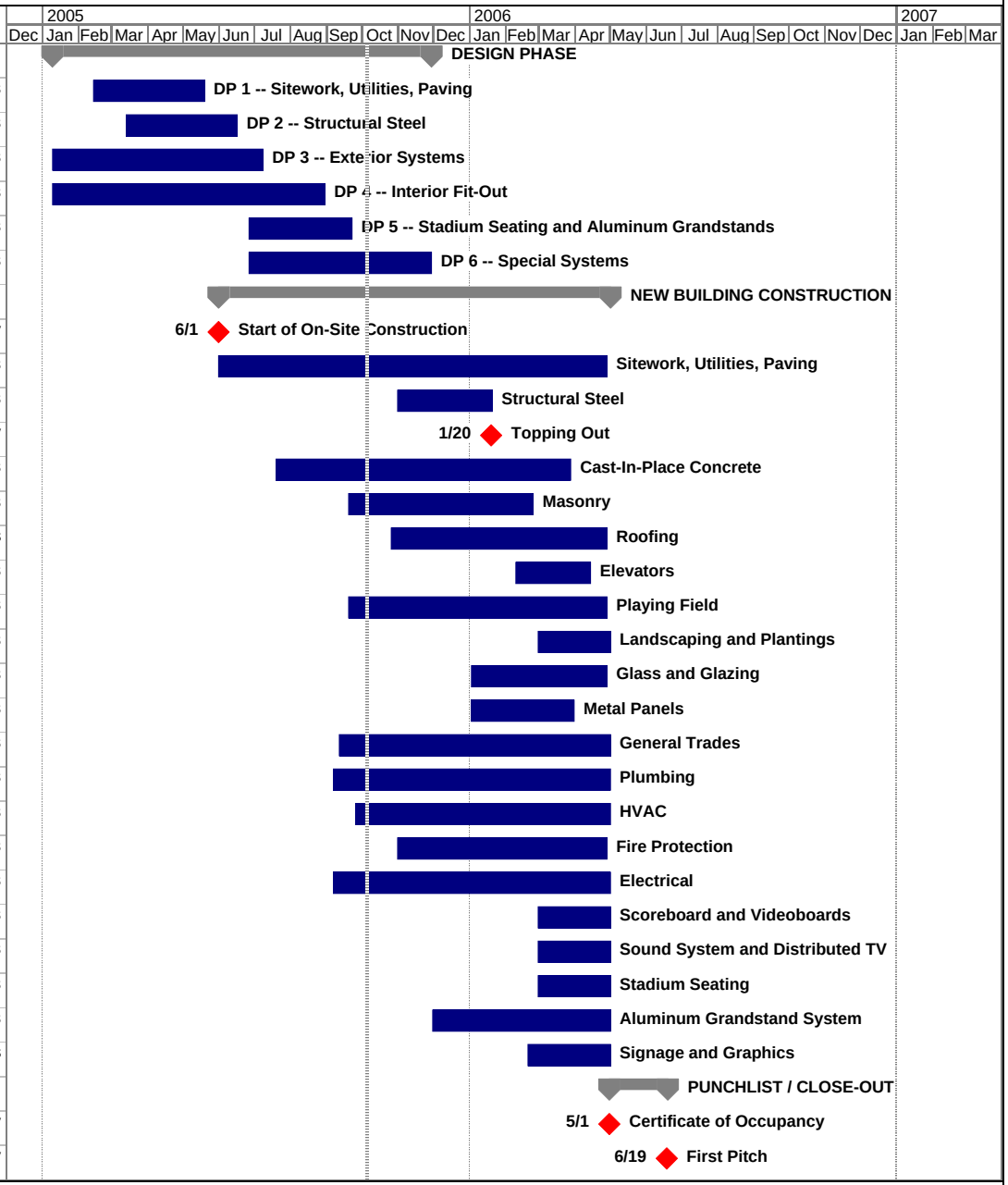
Medlar Field at Lubrano Park
Project Summary Schedule

Barton Malow

Medlar Field at Lubrano Park

University Park, PA

ID	Task Name	Start	Finish	Duration
1	**DESIGN PHASE**	**Mon 1/10/05**	**Tue 11/29/05**	**227 days**
2	DP 1 -- Sitework, Utilities, Paving	Mon 2/14/05	Thu 5/19/05	69 days
3	DP 2 -- Structural Steel	Mon 3/14/05	Thu 6/16/05	68 days
4	DP 3 -- Exterior Systems	Mon 1/10/05	Fri 7/8/05	128 days
5	DP 4 -- Interior Fit-Out	Mon 1/10/05	Tue 8/30/05	165 days
6	DP 5 -- Stadium Seating and Aluminum	Mon 6/27/05	Thu 9/22/05	62 days
7	DP 6 -- Special Systems	Mon 6/27/05	Tue 11/29/05	108 days
8	**NEW BUILDING CONSTRUCTION**	**Wed 6/1/05**	**Mon 5/1/06**	**233 days**
9	Start of On-Site Construction	Wed 6/1/05	Wed 6/1/05	1 day
10	Sitework, Utilities, Paving	Wed 6/1/05	Fri 4/28/06	232 days
11	Structural Steel	Tue 11/1/05	Fri 1/20/06	55 days
12	Topping Out	Fri 1/20/06	Fri 1/20/06	1 day
13	Cast-In-Place Concrete	Wed 7/20/05	Tue 3/28/06	175 days
14	Masonry	Tue 9/20/05	Fri 2/24/06	110 days
15	Roofing	Wed 10/26/05	Fri 4/28/06	128.56 days
16	Elevators	Fri 2/10/06	Fri 4/14/06	46 days
17	Playing Field	Tue 9/20/05	Fri 4/28/06	155 days
18	Landscaping and Plantings	Wed 3/1/06	Mon 5/1/06	44 days
19	Glass and Glazing	Tue 1/3/06	Fri 4/28/06	84 days
20	Metal Panels	Tue 1/3/06	Fri 3/31/06	64 days
21	General Trades	Mon 9/12/05	Mon 5/1/06	162 days
22	Plumbing	Wed 9/7/05	Mon 5/1/06	165 days
23	HVAC	Mon 9/26/05	Mon 5/1/06	152 days
24	Fire Protection	Tue 11/1/05	Fri 4/28/06	125 days
25	Electrical	Wed 9/7/05	Mon 5/1/06	165 days
26	Scoreboard and Videoboards	Wed 3/1/06	Mon 5/1/06	44 days
27	Sound System and Distributed TV	Wed 3/1/06	Mon 5/1/06	44 days
28	Stadium Seating	Wed 3/1/06	Mon 5/1/06	44 days
29	Aluminum Grandstand System	Thu 12/1/05	Mon 5/1/06	106 days
30	Signage and Graphics	Mon 2/20/06	Mon 5/1/06	50.81 days
31	**PUNCHLIST / CLOSE-OUT**	**Mon 5/1/06**	**Mon 6/19/06**	**35 days**
32	Certificate of Occupancy	Mon 5/1/06	Mon 5/1/06	1 day
33	First Pitch	Mon 6/19/06	Mon 6/19/06	1 day



Penn State Ballpark -- 2005/2006

APPENDIX B

Medlar Field at Lubrano Park
D4 Cost Estimating Comparison Print-Out

Parametric Estimate

Medlar Field at Lubrano Park - Jan 2006 - PA - Altoona

Prepared By:	**Jason McFadden** **The Pennsylvania State University** **University Park, PA 16802** **(610) 914-8346 Fax:**	Prepared For:	**Architectural Engineering CM Faculty** **The Pennsylvania State University** **104 Eng. Unit A** **University Park, PA 16802** **(814) 865-6394 Fax:(814) 863-4789**
Building Sq. Size:	**152194**	Site Sq. Size:	**400000**
Bid Date:	**8/1/2005**	Building use:	**Recreational**
No. of floors:	**3**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**MAS**
Project Height:	**51**	Interior Walls:	**MSD**
1st Floor Height:	**17.4**	Roof Type:	**MET**
1st Floor Size:	**7678**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**0.00**	**0.00**	**0**
01	**General Requirements**	**0.00**	**0.00**	**0**
03	**Concrete**	**27.16**	**31.76**	**4,834,226**
	Concrete	27.16	31.76	4,834,226
04	**Masonry**	**10.16**	**11.89**	**1,808,899**
	Masonry	10.16	11.89	1,808,899
05	**Metals**	**16.77**	**19.61**	**2,983,995**
	Metals	16.77	19.61	2,983,995
06	**Wood & Plastics**	**0.25**	**0.30**	**45,291**
	Wood & Plastics	0.25	0.30	45,291
07	**Thermal & Moisture Protection**	**4.16**	**4.87**	**740,603**
	Thermal & Moisture Protection	4.16	4.87	740,603
08	**Doors & Windows**	**2.74**	**3.20**	**487,715**
	Doors & Windows	2.74	3.20	487,715
09	**Finishes**	**7.73**	**9.04**	**1,376,191**
	Finishes	7.73	9.04	1,376,191
10	**Specialties**	**1.90**	**2.23**	**338,702**
	Specialties	1.90	2.23	338,702
11	**Equipment**	**1.98**	**2.32**	**353,193**
	Equipment	1.98	2.32	353,193
12	**Furnishings**	**4.46**	**5.21**	**793,166**
	Furnishings	4.46	5.21	793,166
13	**Special Construction**	**0.00**	**0.00**	**0**
14	**Conveying Systems**	**0.93**	**1.09**	**166,254**
	Conveying Systems	0.93	1.09	166,254
15	**Mechanical**	**9.36**	**10.94**	**1,665,498**
	Mechanical	9.36	10.94	1,665,498
16	**Electrical**	**12.38**	**14.48**	**2,204,136**
	Electrical	12.38	14.48	2,204,136
Total Building Costs		**100.00**	**116.94**	**17,797,869**
02	**Site Work**	**100.00**	**10.09**	**4,037,917**
	Site Work	100.00	10.09	4,037,917
Total Site Costs		**100.00**	**10.09**	**4,037,917**

Total Project Costs	**--**	**--**	**21,835,787**