

Technical Assignment 2

Cost and Methods Analysis



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Pasadena Elementary School
Technical Assignment 2

Table of Contents

Executive Summary 3
Detailed Project Schedule 4
Site Layout Planning 4
Assemblies Estimate..... 5
Detailed Structural Systems Estimate..... 7
General Conditions Estimate 8
Appendix A Detailed Project Schedule
Appendix B Site Layout Plans
Appendix C Assemblies Estimate
Appendix D Structural Systems Estimate
Appendix E General Conditions Estimate

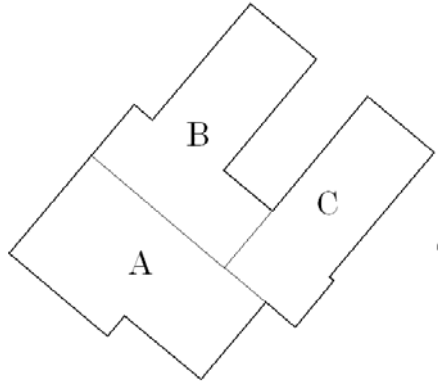
Executive Summary

This technical report, *Cost and Methods Analysis*, reviews in detail the schedule and costs of the Pasadena Elementary School construction project. In the first section that includes the detailed project schedule you will notice that the elementary school was split up into 3 areas during the course of construction. Sequences went from the area of the gymnasium, to a one story classroom corridor and finally to a two story classroom corridor.

Appendix B contains phased site plans that show how the site is laid out during construction. The crawler crane that was used had 3 main positions around the building perimeter. Also there are two phases to the location of the temporary roads on the site.

There are 3 estimates, the first being the assembly estimate of the building envelope which resulted in a cost of \$678,425. A detailed structural systems estimate came out to be \$392,466. The general conditions estimate was a total of \$848,399.

Detailed Project Schedule



Building Footprint

Above is the footprint of Pasadena Elementary School. As you can see, construction took place over 3 different areas A, B, and C. Area A is made of the gymnasium, kitchen and music room. Area B consists of the Media Room and a corridor of one-story classrooms. Area C is two stories high of classrooms. The construction sequence goes from A to B to C.

The detailed project schedule is located in Appendix A. The schedule reflects the two phases of the project. Phase I is construction of the new elementary building that is shown above. Once that is completed, in Phase II the existing elementary school will go through asbestos abatement and will be demolished. Sports fields will take its place.

It is also broken down by each of the prime contractor's scopes for the project and further broken down by areas of the building.

Site Layout Planning

At the beginning of the project the site prime contractor was required to install a temporary road but it did not have to be accessible to the entire site. One and a half months later they were required to extend the temporary road the entire way around the building perimeter. This was done in order to have access to different parts of the building that the temporary road would cover. Also the underground utilities were put

in place before the entire temporary road was installed so stones that made up the road would not have to be dug up and scraped away. The two phases are can be seen in Site Access Plan 1 and SA Plan 2 that are located in Appendix B.

A mobile crane was used so different locations throughout the project would be easy to get to. There were 3 main places that the crane was positioned and these are also shown in Site Plans 1-3 in Appendix B.

Also shown on the site plan are the locations of temporary lots and laydown areas. There are two positions near the east and south elevations. These locations are convenient because they are close to the construction site entrance and are very accessible from the building footprint.

Note on the plans the locations of the construction manager’s trailer, construction fence, temporary water lines, hose bibs, dumpsters and portable toilets.

Assemblies Estimate—Building Envelope

Summary

Individual Elements	Cost
Exterior Walls	\$ 609,124
Exterior Windows	\$ 91,870
Exterior Doors	\$ 46,679
Roofing Membrane	\$ 7,811
Total	\$ 755,484
Total Including Location Factor (89.8)	\$ 678,425

The envelope of Pasadena Elementary School consists of face brick, back-up concrete masonry units and extruded-polystyrene insulation. The estimate also includes exterior windows, doors and roofing membrane. Using the elevations of the building, quantities of each component were found and multiplied by unit costs from RS Means Assemblies 2007. You can find a detailed summary of the estimate in Appendix C.

Exterior Walls

The exterior walls are made up of face brick with 8" CMU backing including insulation.

Assumptions:

- Standard face brick
- Styrofoam insulation was used for calculations because extruded-polystyrene insulation is used in the envelope

Exterior Windows

Windows for the exterior of the building were both sliding and fixed aluminum frames with preglazed glass.

Assumptions:

- Unit prices for the windows were found by interpolation based on square footage
- Some of the window sizes were larger than the numbers given in RS Means so a multiplier was found by dividing the unit cost by the square footage it was based on and multiplying that number by the square footage of the actual window size

Exterior Doors

All exterior doors were made of the same material—hollow metal insulated flush doors.

Assumptions:

- Unit prices included door frames

Roofing Membrane

Bituminous roofing membrane was used.

Detailed Structural Systems Estimate

Summary

Structural Component	Cost
Strip Footings	\$ 87,708
Spread Footings	\$ 47,075
Slab on Grade	\$ 2,102
Steel Columns	\$ 36,335
W-Shaped Members	\$ 153,991
Steel Joists	\$ 109,833
Total	\$ 437,044
Total Including Location Factor (89.8)	\$ 392,466

The structural system is made up of steel members including HSS tubular columns, K and L Series joists and W-shaped members. The foundation is made of concrete. Typical bays or sizes were not used with this estimate. Each member in the structural system is accounted for. A summary of the detailed structural systems estimate can be found in Appendix D.

Note that all concrete prices include 4 uses of formwork, reinforcing steel, placement and finishing.

Strip Footings

Assumptions:

- Interpolation was used for strip footing sizes that were not in RS Means
- For sizes that were larger than sizes in RS Means a multiplier was found the same way that it was for window unit prices in the Assembly Estimate section

Spread Footings

Assumptions:

- Interpolation was used for spread footing sizes that were not in RS Means

Slab on Grade

Assumptions:

- Reinforcement and formwork are included in the unit costs

Steel Members

Assumptions:

- HSS columns, W-shapes and joists all used interpolation to get the unit costs

General Conditions Estimate

Summary

Category	Cost
Personnel	\$ 146,906
Office Supplies	\$ 48,580
Temporary Building	\$ 20,120
Temporary Utilities	\$ 126,083
Misc. Expenses	\$ 506,710
Total	\$ 882,335

- Staffing costs are for the entire project's duration (23 months)
- Relocation was needed for one employee that was a new hire
- 20 weeks was estimated for the crane rental
- Square footage used for scaffolding is 26,801 (268 one hundred square feet)

All of the general conditions are split between the 14 prime contractors. They total about 5% of their contract amount. In addition the construction manager has \$500,000 general conditions budget. The total cost of general conditions is \$1.3 million dollars which is around 9% of the overall cost of the project (\$14,042,006).

The estimate I came up with of \$882,334 is 6.28% of the total project which is less than both the industry standard and the general conditions for Pasadena Elementary School.

This could be partly due to the fact that no overhead costs or taxes were taken into account. A breakdown of these categories can be found in Appendix E.

Appendix A

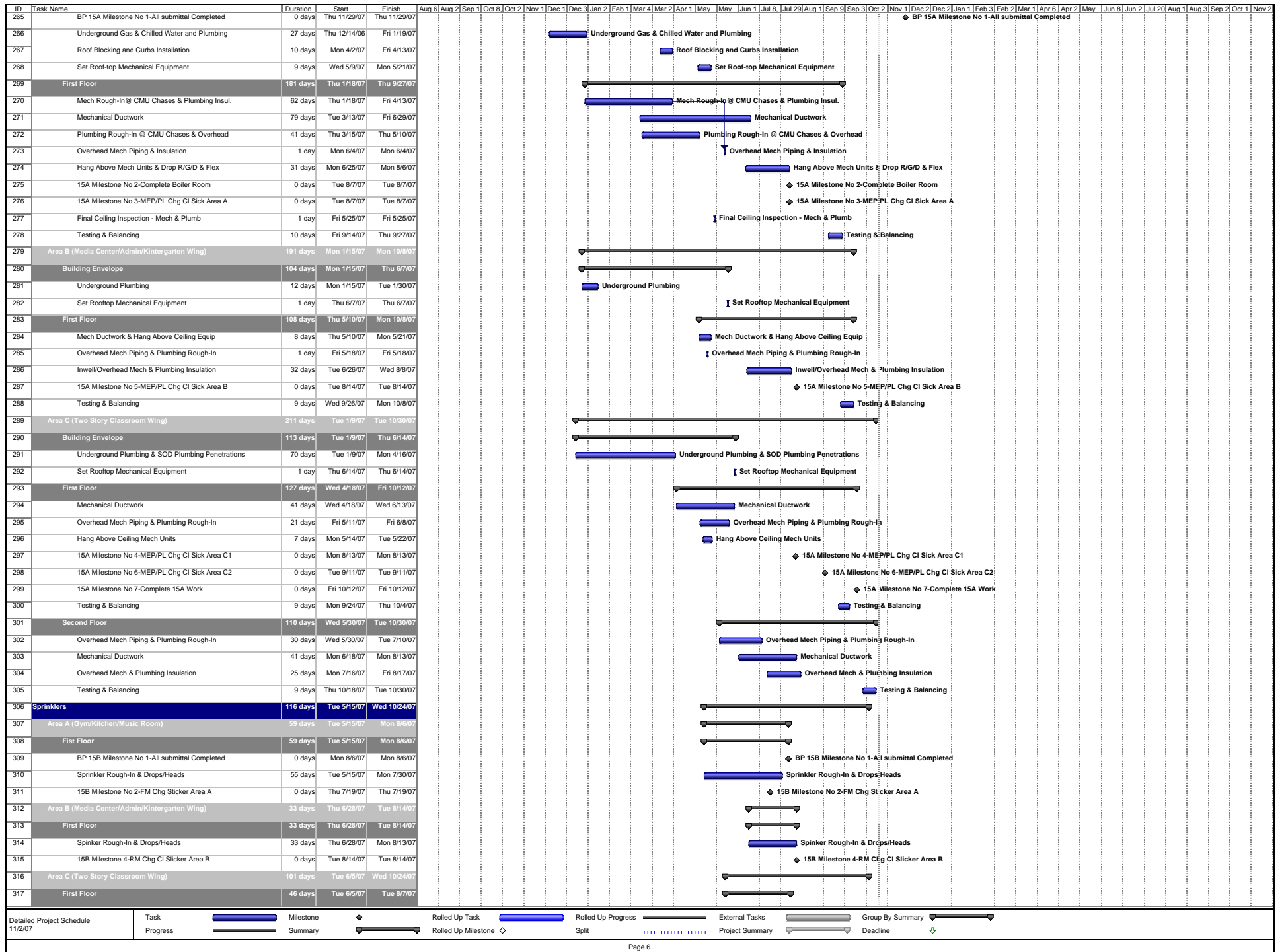
ID	Task Name	Duration	Start	Finish	Aug 6	Aug 2	Sep 1	Oct 8	Oct 2	Nov 1	Dec 1	Dec 3	Jan 2	Feb 1	Mar 4	Mar 2	Apr 1	May	May	Jun 1	Jul 8	Jul 29	Aug 1	Sep 9	Sep 3	Oct 2	Nov 1	Dec 2	Dec 2	Jan 1	Feb 3	Feb 2	Mar 1	Apr 6	Apr 2	May	Jun 8	Jun 2	Jul 20	Aug 1	Aug 3	Sep 2	Oct 1	Nov 2						
1	Sitework	433 days	Thu 9/21/06	Tue 5/20/08	[Gantt bar]																																													
2	Sitework	433 days	Thu 9/21/06	Tue 5/20/08	[Gantt bar]																																													
3	Install New Septic Tanks	40 days	Thu 9/21/06	Wed 11/15/06	[Gantt bar]																																													
4	Install Sediment Control Traps	57 days	Thu 9/28/06	Fri 12/15/06	[Gantt bar]																																													
5	Site Demo/Clear Grub	38 days	Mon 10/2/06	Wed 11/22/06	[Gantt bar]																																													
6	Building Pad/RIC	41 days	Tue 10/17/06	Tue 12/12/06	[Gantt bar]																																													
7	Demo Existing Septic Tank	32 days	Thu 10/26/06	Fri 12/8/06	[Gantt bar]																																													
8	Temp Roads & Lots-Section 1	17 days	Mon 11/20/06	Tue 12/12/06	[Gantt bar]																																													
9	2A Milestone No 2-Prep Site for Bldg. Constr.	0 days	Thu 12/14/06	Thu 12/14/06	[Milestone diamond]																																													
10	2A Milestone No 3-Site U Rough-In/Temp Rds-Lot	0 days	Thu 12/14/06	Thu 12/14/06	[Milestone diamond]																																													
11	2A Milestone No 1-Complete All Submittals	0 days	Fri 12/15/06	Fri 12/15/06	[Milestone diamond]																																													
12	Temp Roads & Lots-Section 2	1 day	Thu 12/28/06	Thu 12/28/06	[Gantt bar]																																													
13	Regrade and Curb & Gutter	30 days	Tue 7/3/07	Mon 8/13/07	[Gantt bar]																																													
14	Sidewalk	22 days	Thu 7/19/07	Fri 8/17/07	[Gantt bar]																																													
15	Fine Grade /Top Soil/Seed	28 days	Mon 7/23/07	Wed 8/29/07	[Gantt bar]																																													
16	Landscaping	11 days	Thu 8/30/07	Thu 9/13/07	[Gantt bar]																																													
17	2A Milestone No4-Phase I Sitework Completion	0 days	Fri 10/12/07	Fri 10/12/07	[Milestone diamond]																																													
18	2A Milestone No 5-Phase II Sitework Completion	0 days	Tue 5/20/08	Tue 5/20/08	[Milestone diamond]																																													
19	Abatement	55 days	Mon 12/3/07	Fri 2/15/08	[Gantt bar]																																													
20	Sitework	55 days	Mon 12/3/07	Fri 2/15/08	[Gantt bar]																																													
21	BP 2B Milestone No 1-All Submittals Completed	0 days	Mon 12/3/07	Mon 12/3/07	[Milestone diamond]																																													
22	Building Abatement Phase 1	9 days	Tue 1/15/08	Fri 1/25/08	[Gantt bar]																																													
23	BP 2B Construction	24 days	Tue 1/15/08	Fri 2/15/08	[Gantt bar]																																													
24	Building Abatement Phase 2	14 days	Tue 1/15/08	Fri 2/1/08	[Gantt bar]																																													
25	BP 2B Milestone No 2-Complete Building Abatement/Phase I	0 days	Fri 1/25/08	Fri 1/25/08	[Milestone diamond]																																													
26	BP 2B Milestone No 3-Phase 2	0 days	Fri 2/1/08	Fri 2/1/08	[Milestone diamond]																																													
27	Building Abatement Phase 3	10 days	Mon 2/4/08	Fri 2/15/08	[Gantt bar]																																													
28	Building Abatement Phase 4	10 days	Mon 2/4/08	Fri 2/15/08	[Gantt bar]																																													
29	BP 2B Milestone No 5-Phase 3/4	0 days	Fri 2/15/08	Fri 2/15/08	[Milestone diamond]																																													
30	Demolition	88 days	Mon 12/3/07	Wed 4/2/08	[Gantt bar]																																													
31	Sitework	88 days	Mon 12/3/07	Wed 4/2/08	[Gantt bar]																																													
32	BP 2C Milestone No 1-All Submittals Completed	0 days	Mon 12/3/07	Mon 12/3/07	[Milestone diamond]																																													
33	Building Demolition	33 days	Mon 2/18/08	Wed 4/2/08	[Gantt bar]																																													
34	BP 2C Construction	33 days	Mon 2/18/08	Wed 4/2/08	[Gantt bar]																																													
35	BP 2C Milestone No 2-Complete Bldg. Demolition	0 days	Wed 4/2/08	Wed 4/2/08	[Milestone diamond]																																													
36	Concrete	125 days	Mon 11/6/06	Fri 4/27/07	[Gantt bar]																																													
37	Area A (Gym/Kitchen/Music Room)	63 days	Mon 11/6/06	Wed 1/31/07	[Gantt bar]																																													
38	Tying Rebar Mats Above Ground- All Areas	7 days	Mon 11/6/06	Tue 11/14/06	[Gantt bar]																																													
39	Concrete Footings Including Backfill	13 days	Wed 12/6/06	Fri 12/22/06	[Gantt bar]																																													
40	SOG (Areas A1-A3)	28 days	Mon 12/25/06	Wed 1/31/07	[Gantt bar]																																													
41	Area B (Media Center/Admin/Kindergarten Wing)	43 days	Tue 1/2/07	Thu 3/1/07	[Gantt bar]																																													
42	Concrete Footing & Piers (Column Footings)	13 days	Tue 1/2/07	Thu 1/18/07	[Gantt bar]																																													
43	Concrete Footings (Wall Footings)	12 days	Tue 1/2/07	Wed 1/17/07	[Gantt bar]																																													
44	Backfill All Footings	10 days	Wed 1/10/07	Tue 1/23/07	[Gantt bar]																																													
45	SOG	23 days	Tue 1/30/07	Thu 3/1/07	[Gantt bar]																																													
46	Area C (Two Story Classroom Wing)	96 days	Fri 12/15/06	Fri 4/27/07	[Gantt bar]																																													
47	Concrete Footings & Piers (Column Footings)	10 days	Fri 12/15/06	Thu 12/28/06	[Gantt bar]																																													
48	Concrete Footings (Wall Footings)	14 days	Fri 12/15/06	Wed 1/3/07	[Gantt bar]																																													
49	Backfill All Footings	13 days	Thu 1/18/07	Mon 2/5/07	[Gantt bar]																																													
50	Elevator Pit Footings	1 day	Thu 12/28/06	Thu 12/28/06	[Gantt bar]																																													
51	SOG	17 days	Fri 1/19/07	Mon 2/12/07	[Gantt bar]																																													
52	SOG (Metal Stair/Column Isolation)	10 days	Mon 4/16/07	Fri 4/27/07	[Gantt bar]																																													
53	Masonry	208 days	Thu 10/19/06	Mon 8/6/07	[Gantt bar]																																													

Detailed Project Schedule 11/2/07
 Legend:
 Task: [Blue bar] Milestone: [Diamond] Rolled Up Task: [Thick blue bar] Rolled Up Progress: [Thin blue bar] External Tasks: [Grey bar] Group By Summary: [Dashed bar]
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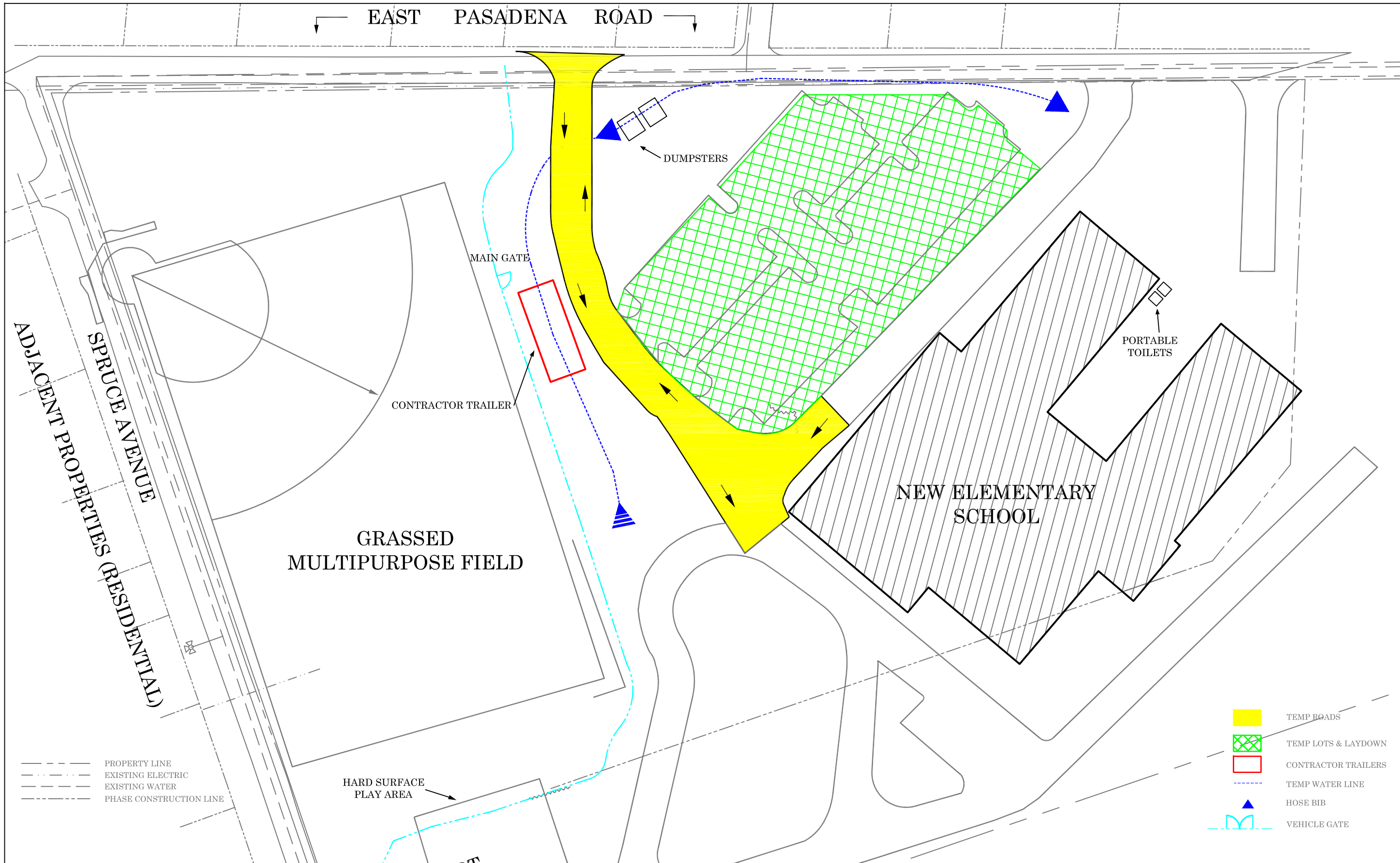
ID	Task Name	Duration	Start	Finish	Aug 6	Aug 2	Sep 1	Oct 8	Oct 2	Nov 1	Dec 1	Dec 3	Jan 2	Feb 1	Mar 4	Mar 2	Apr 1	May	Jun 1	Jul 8	Jul 29	Aug 1	Sep 9	Sep 3	Oct 2	Nov 1	Dec 2	Dec 2	Jan 1	Feb 3	Feb 2	Mar 1	Apr 6	Apr 2	May	Jun 8	Jun 2	Jul 20	Aug 1	Aug 3	Sep 2	Oct 1	Nov 2
107	Area A (Gym/Kitchen/Music Room)	278 days	Mon 9/4/06	Wed 9/26/07																																							
108	Building Envelope	216 days	Wed 11/23/06	Wed 9/26/07																																							
109	BP 6A Milestone No 1-All submittal Completed	0 days	Wed 11/29/06	Wed 11/29/06																																							
110	Set HM Frames @ CMU BW & Parapit Blocking	35 days	Fri 1/12/07	Thu 3/1/07																																							
111	Architectural Wall Louvers-All Areas	3 days	Mon 9/24/07	Wed 9/26/07																																							
112	First Floor	277 days	Mon 9/4/06	Tue 9/25/07																																							
113	Int. HM Door Frames & Temp Wood Doors @ Elec. Rm	29 days	Wed 3/28/07	Mon 5/7/07																																							
114	Interior DW Bulkhead Stud & Close-in Inspection	10 days	Tue 5/29/07	Mon 6/11/07																																							
115	Hang/Finish DW and Bulkheads	12 days	Tue 6/12/07	Wed 6/27/07																																							
116	Ceiling Grid	4 days	Mon 6/25/07	Thu 6/28/07																																							
117	Paint 2nd Finish Coat	1 day	Fri 7/6/07	Fri 7/6/07																																							
118	Exterior Doors & Hardware	24 days	Fri 7/20/07	Wed 8/22/07																																							
119	Tile @ Kitchen & Bathrooms	21 days	Fri 7/20/07	Fri 8/17/07																																							
120	Final Ceiling Inspection, Hang DW Ceiling & Drop Tiles	4 days	Wed 8/8/07	Mon 8/13/07																																							
121	Toilet Compartments & Accessories	3 days	Mon 8/27/07	Wed 8/29/07																																							
122	VCT Flooring/Base	5 days	Mon 9/4/06	Fri 9/8/06																																							
123	Wood Gym Flooring	4 days	Thu 9/20/07	Tue 9/25/07																																							
124	Area B (Media Center/Admin/Kindergarten Wing)	139 days	Fri 3/23/07	Wed 10/3/07																																							
125	Building Envelope	38 days	Fri 3/23/07	Tue 5/15/07																																							
126	Set HM Frames @ CMU Bearing Walls	2 days	Fri 3/23/07	Mon 3/26/07																																							
127	Temporary Exterior Doors & Windows	21 days	Tue 4/17/07	Tue 5/15/07																																							
128	First Floor	107 days	Tue 5/8/07	Wed 10/3/07																																							
129	Layout Walls Interior HM Door Frames--South End	2 days	Tue 5/8/07	Wed 5/9/07																																							
130	Interior Wall Stud Bulkhead	31 days	Fri 5/25/07	Fri 7/6/07																																							
131	Layout Walls Interior HM Door Frames--North End	1 day	Mon 6/4/07	Mon 6/4/07																																							
132	Finish Drywall & Paint 1st Coat	19 days	Fri 6/29/07	Wed 7/25/07																																							
133	Exterior Doors & Hardware	23 days	Mon 7/23/07	Wed 8/22/07																																							
134	6A Milestone No 3-Hang/Finish Drywall Area B	0 days	Wed 7/25/07	Wed 7/25/07																																							
135	Ceiling Grid	2 days	Mon 8/6/07	Tue 8/7/07																																							
136	Paint 2nd Finish Coat	3 days	Tue 8/14/07	Thu 8/16/07																																							
137	Final Building Ceiling Inspection & Drop Tiles	28 days	Wed 8/15/07	Fri 9/21/07																																							
138	Wood Doors & Hardware @ Rooms with Ceramic Tile	2 days	Fri 9/7/07	Mon 9/10/07																																							
139	VCT/Base	5 days	Thu 9/13/07	Wed 9/19/07																																							
140	Wood Doors & Hardware @ Rooms with VCT/Carpet	1 day	Tue 9/25/07	Tue 9/25/07																																							
141	Carpet	1 day	Wed 10/3/07	Wed 10/3/07																																							
142	Area C	284 days	Mon 3/18/06	Thu 10/18/07																																							
143	Building Envelope	150 days	Wed 2/28/07	Wed 9/26/07																																							
144	Set HM Door Frames @ CMU Bearing Walls	2 days	Wed 2/28/07	Thu 3/1/07																																							
145	Temporary Exterior Wood Windows on 2nd Floor	1 day	Wed 5/30/07	Wed 5/30/07																																							
146	Elevator Installation	23 days	Thu 7/26/07	Mon 8/27/07																																							
147	6A Milestone No 5-Complete Elevator Install	0 days	Wed 9/26/07	Wed 9/26/07																																							
148	First Floor	265 days	Mon 9/18/06	Fri 9/21/07																																							
149	Layout Walls & Set Interior HM Door Frames	3 days	Mon 4/23/07	Wed 4/25/07																																							
150	Wall Stud/Bulkhead & Inspection	35 days	Tue 4/24/07	Mon 6/11/07																																							
151	Sound Blanket/Hang/Finish Drywall & Paint	17 days	Mon 6/18/07	Tue 7/10/07																																							
152	6A Milestone No 2-Hang/Finish Drywall Area C1	0 days	Fri 7/6/07	Fri 7/6/07																																							
153	Exterior Doors & Hardware	23 days	Mon 7/23/07	Wed 8/22/07																																							
154	Paint 2nd Finish Coat	3 days	Fri 8/3/07	Tue 8/7/07																																							
155	Wood Door Installation	19 days	Tue 8/28/07	Fri 9/21/07																																							
156	VCT Base	12 days	Fri 8/31/07	Mon 9/17/07																																							
157	Drop Ceiling Tiles	2 days	Mon 9/18/06	Tue 9/19/06																																							
158	Second Floor	97 days	Wed 6/6/07	Thu 10/18/07																																							
159	Layout Walls & Set Remaining HM Door Frame	5 days	Wed 6/6/07	Tue 6/12/07																																							

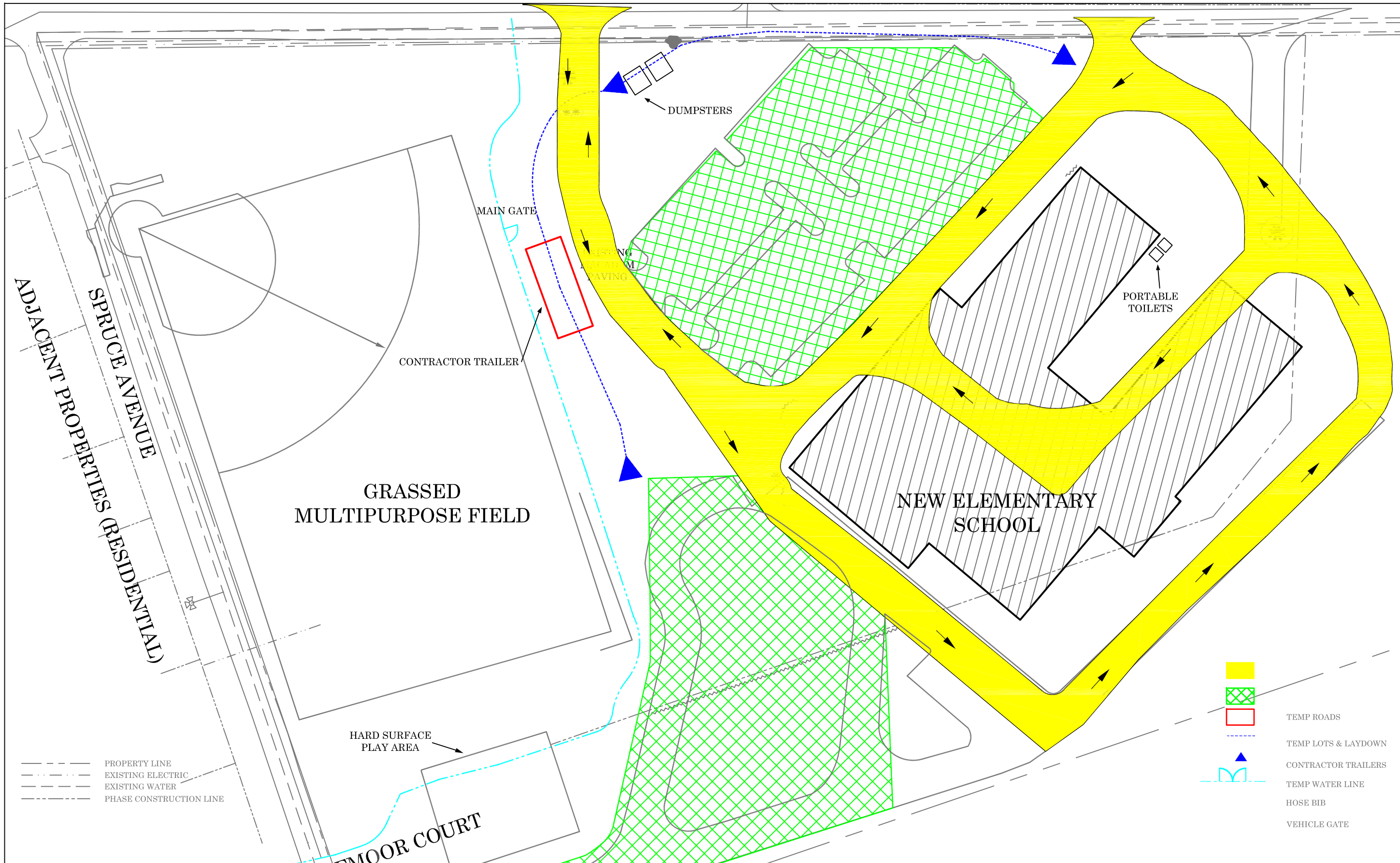
Detailed Project Schedule 11/2/07
Task Progress Milestone Summary Rolled Up Task Rolled Up Milestone Rolled Up Progress Split External Tasks Project Summary Group By Summary Deadline







Page 3







Appendix B





-  TEMP ROADS
-  TEMP LOTS & LAYDOWN
-  CONTRACTOR TRAILERS
-  TEMP WATER LINE
-  HOSE BIB
-  VEHICLE GATE

-  PROPERTY LINE
-  EXISTING ELECTRIC
-  EXISTING WATER
-  PHASE CONSTRUCTION LINE



Site Layout Plan 1



Site Layout Plan 2



Site Layout Plan 3

Appendix C

Assemblies Estimate

		Qty.	Unit	Cost per Sq. Ft.				Total Cost
				Material	Inst.	Equip.	Total	
Masonry	East Elevation	4297	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 116,880
	South Interior Courtyard Elevation	3776	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 102,695
	North Interior Courtyard Elevation	1695	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 46,116
	West Elevation	3500	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 95,205
	North Elevation	4042	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 109,934
	South Elevation	5084	sf	\$ 9.10	\$ 18.10		\$ 27.20	\$ 138,294
	Total							\$ 609,124
Exterior Doors	Single 3' wide steel hollow metal	9	ea	\$ 1,200	\$ 258		\$ 1,458	\$ 13,122
	Double 3' wide doors	9	ea	\$ 2,300	\$ 475		\$ 2,775	\$ 24,975
	Single 4' wide steel hollow metal	1	ea	\$ 1,500	\$ 272		\$ 1,772	\$ 1,772
	Double Entrance Doors	2	ea	\$ 2,900	\$ 505		\$ 3,405	\$ 6,810
	Total							\$ 46,679
Exterior Glazing	Aluminum Sliding Preglazed (5'-4"x5'4")	65	ea	\$ 314	\$ 179	\$ 492	\$ 985	\$ 64,019
	Aluminum Sliding Preglazed (5'-4"x4'2")	2	ea	\$ 277	\$ 155	\$ 432	\$ 864	\$ 1,728
	Aluminum Sliding Preglazed (14'x5'-4")	1	ea	\$ 863	\$ 434	\$ 1,276	\$ 2,573	\$ 2,573
	Aluminum Fixed Preglazed (5'-4"x5'-8")	4	ea	\$ 1,206	\$ 401	\$ 1,588	\$ 3,195	\$ 12,780
	Aluminum Fixed Preglazed (6'-4"x5'-3 5/8")	2	ea	\$ 1,340	\$ 425	\$ 1,765	\$ 3,530	\$ 7,061
	Aluminum Sliding Preglazed (9'x5'-3 5/8")	1	ea	\$ 541	\$ 305	\$ 846	\$ 1,692	\$ 1,692
	Aluminum Sliding Preglazed (10'-8"x5'-4")	1	ea	\$ 645	\$ 364	\$ 1,009	\$ 2,018	\$ 2,018
	Total							\$ 91,870
Roofing Membrane	Bituminous Membrane	492.81	sq	\$ 8.60	\$ 5.85	\$ 1.40	\$ 15.85	\$ 7,811.04
	Total							\$ 7,811.04
Estimate Total								\$ 755,484
Estimate Total Including Location Factor (89.8)								\$ 678,425

Appendix D

Detailed Structural Estimate

Item	Size	Thickness	Qty.	Unit	Material	Labor	Equip.	Total	Cost
Strip Footings									
WF1	2'-0" continuous	1'-0"	20	cy	\$ 133.00	\$ 85.50	\$ 0.51	\$ 219.01	\$ 4,340
WF2	2'-8" continuous	1'-2"	56	cy	\$ 128.00	\$ 68.50	\$ 0.41	\$ 196.91	\$ 11,004
WF3	3'-4" continuous	1'-2"	81	cy	\$ 165.93	\$ 88.80	\$ 0.53	\$ 255.26	\$ 20,697
WF4	4'-0" continuous	1'-2"	19	cy	\$ 199.11	\$ 106.56	\$ 0.64	\$ 306.31	\$ 5,744
WF5	4'-0" continuous	1'-4"	4	cy	\$ 227.56	\$ 121.78	\$ 0.73	\$ 350.07	\$ 1,383
WF6	4'-8" continuous	1'-4"	73	cy	\$ 265.48	\$ 142.07	\$ 0.85	\$ 408.40	\$ 29,734
WF7	5'-4" continuous	1'-4"	20	cy	\$ 303.41	\$ 162.37	\$ 0.97	\$ 466.75	\$ 9,463
WF8	2'-0" continuous	1'-2"	21	cy	\$ 155.17	\$ 99.75	\$ 0.60	\$ 255.52	\$ 5,344
Spread Footings									
F1	4'-0" x 4'-0"	1'-0"	4	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 1,024
F2	4'-8" x 4'-8"	1'-0"	6	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 1,303
F3	5'-4" x 5'-4"	1'-0"	2	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 455
F4	6'-0" x 6'-0"	1'-0"	1	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 256
F5	6'-8" x 6'-8"	1'-0"	0	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ -
F6	7'-4" x 7'-4"	1'-2"	1	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 183
F7	8'-0" x 8'-0"	1'-2"	131	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 30,163
F8	9'-0" x 9'-0"	1'-8"	2	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 640
F9	10'-0" x 10'-0"	1'-8"	2	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 711
F10	5'-4" x 5'-4"	1'-4"	3	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 758
F11	6'-0" x 6'-0"	1'-4"	4	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 1,195
F12	6'-8" x 6'-8"	1'-4"	1	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 379
F13	7'-4" x 7'-4"	1'-6"	5	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 1,128
F14	8'-0" x 8'-0"	1'-6"	9	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 2,052
F15	6'-0" x 10'-0"	1'-4"	9	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 2,051
F16	5'-4" x 7'-2"	1'-4"	4	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 1,087
F17	5'-4" x 10'-0"	1'-4"	3	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 758
F18	6'-8" x 26'-4"	1'-4"	9	cy	\$ 176.00	\$ 54.50	\$ 0.33	\$ 230.83	\$ 2,001
F19	4'-8" x 4'-8"	1'-2"	3	cy	\$ 192.00	\$ 95.50	\$ 0.57	\$ 288.07	\$ 929
Slab on Grade									
3" Thick		3"	126	cy	\$ 1.01	\$ 0.74	\$ 0.01	\$ 1.76	\$ 222
5" Thick		5"	762	cy	\$ 1.65	\$ 0.75	\$ 0.01	\$ 2.41	\$ 1,836
6" Thick		6"	16	cy	\$ 1.95	\$ 0.75	\$ 0.01	\$ 2.71	\$ 43
Steel Columns									
		(Base Plate Size)							
C1	HSS 5"x5"x3/8"	12"x12"x3/4"	44	\$/13 ft	\$ 241.58	\$ 43.88	\$ 29.79	\$ 315.25	\$ 13,871
C2	HSS 6"x6"x3/8"	12"x12"x3/4"	4	\$/13 ft	\$ 300.08	\$ 45.50	\$ 30.88	\$ 376.46	\$ 1,506
C3	HSS 9"x5"x1/2"	12"x12"x1 1/4"	32	\$/13 ft	\$ 528.13	\$ 47.13	\$ 32.23	\$ 607.48	\$ 19,439
C4	8" Dia. Standard Pipe	14"x14"x3/4"	2	\$/13 ft	\$ 677.08	\$ 48.75	\$ 33.58	\$ 759.42	\$ 1,519
W-Shapes									
W5x16			725.75	lf	\$ 10.90	\$ 3.91	\$ 2.61	\$ 17.42	\$ 12,643

Detailed Structural Estimate

W8x15			133.75	lf	\$ 18.15	\$ 3.91	\$ 2.61	\$ 24.67	\$ 3,300
W8x18			7	lf	\$ 21.83	\$ 3.91	\$ 2.61	\$ 28.35	\$ 198
W10x15			408	lf	\$ 18.15	\$ 3.91	\$ 2.61	\$ 24.67	\$ 10,065
W12x16			139	lf	\$ 19.34	\$ 2.66	\$ 1.78	\$ 23.78	\$ 3,305
W12x26			54	lf	\$ 31.50	\$ 2.66	\$ 1.78	\$ 35.94	\$ 1,941
W14x22			769.25	lf	\$ 31.50	\$ 2.37	\$ 1.58	\$ 35.45	\$ 27,270
W16x26			905.25	lf	\$ 31.50	\$ 2.34	\$ 1.57	\$ 35.10	\$ 31,774
W18x35			177.25	lf	\$ 42.50	\$ 3.53	\$ 1.77	\$ 47.80	\$ 8,473
W18x40			356.5	lf	\$ 48.50	\$ 3.53	\$ 1.77	\$ 53.80	\$ 19,180
W21x50			88.5	lf	\$ 60.50	\$ 3.19	\$ 1.60	\$ 65.29	\$ 5,778
W21x57			232	lf	\$ 68.96	\$ 3.24	\$ 1.62	\$ 73.82	\$ 17,126
W24x55			182	lf	\$ 66.50	\$ 3.06	\$ 1.53	\$ 71.09	\$ 12,938
Steel Joists									
16K2			243	lf	\$ 4.76	\$ 1.88	\$ 1.02	\$ 7.66	\$ 1,861
16K4			23	lf	\$ 5.21	\$ 1.88	\$ 1.02	\$ 8.11	\$ 187
16K6			199	lf	\$ 6.10	\$ 1.88	\$ 1.02	\$ 9.00	\$ 1,791
16K6SP			115	lf	\$ 6.10	\$ 1.88	\$ 1.02	\$ 9.00	\$ 1,035
16KCS2			418	lf	\$ 6.10	\$ 1.88	\$ 1.02	\$ 9.00	\$ 3,762
16KCS3			169.43	lf	\$ 6.10	\$ 1.88	\$ 1.02	\$ 9.00	\$ 1,525
18K5			371	lf	\$ 5.80	\$ 1.70	\$ 0.92	\$ 8.42	\$ 3,124
18K7			1016	lf	\$ 6.75	\$ 1.70	\$ 0.92	\$ 9.37	\$ 9,520
18K10			197	lf	\$ 7.70	\$ 1.70	\$ 0.92	\$ 10.32	\$ 2,033
18KCS3			2658	lf	\$ 7.70	\$ 1.70	\$ 0.92	\$ 10.32	\$ 27,431
20K5			1831.5	lf	\$ 6.10	\$ 1.70	\$ 0.92	\$ 8.72	\$ 15,971
20K9			488.75	lf	\$ 8.00	\$ 1.70	\$ 0.92	\$ 10.62	\$ 5,191
20K9SP			323	lf	\$ 8.00	\$ 1.70	\$ 0.92	\$ 10.62	\$ 3,430
22K7			278	lf	\$ 7.48	\$ 1.70	\$ 0.92	\$ 10.10	\$ 2,808
22KCS4			241.86	lf	\$ 7.48	\$ 1.70	\$ 0.92	\$ 10.10	\$ 2,443
22KCS5			241.86	lf	\$ 7.48	\$ 1.70	\$ 0.92	\$ 10.10	\$ 2,443
24K9			442	lf	\$ 9.08	\$ 1.54	\$ 0.83	\$ 11.45	\$ 5,061
40LHSP1			522	lf	\$ 17.55	\$ 1.54	\$ 0.83	\$ 19.92	\$ 10,398
40LHSP2			116	lf	\$ 17.55	\$ 1.54	\$ 0.83	\$ 19.92	\$ 2,311
40LHSP3			116	lf	\$ 30.00	\$ 1.54	\$ 0.83	\$ 32.37	\$ 3,755
40LHSP4			116	lf	\$ 30.00	\$ 1.54	\$ 0.83	\$ 32.37	\$ 3,755
Total									\$ 437,044
Total Including Location Factor (89.8)									\$ 392,466

Appendix E

General Conditions Estimate

		QTY.	Unit Price	Unit	Total
Personnel	Project Manager	0.33	7400	\$/mo	\$ 56,166
	General Superintendent	1.00	1700	\$/mo	\$ 39,100
	Superintendent/Project Engineer	0.25	1550	\$/mo	\$ 8,913
	Senior Project Engineer	0.60	1300	\$/mo	\$ 17,940
	Project Engineer	0.90	1125	\$/mo	\$ 23,288
	Relocation	1.00	1500	ea	\$ 1,500
Office Supplies	General Supplies	23	95	\$/mo	\$ 2,185
	Telephone	23	210	\$/mo	\$ 4,830
	Internet Service	23	60	\$/mo	\$ 1,380
	Equipment Rental	23	95	\$/mo	\$ 2,185
	Computers	4	2000	ea	\$ 8,000
	Cell Phones/Nextels	5	400	\$/mo	\$ 2,000
	Cameras	1	5000	ea	\$ 5,000
	Reproduction and Postage	23	1000	\$/mo	\$ 23,000
Temporary Buildings	Trailer	23	330	\$/mo	\$ 7,590
	Office Lights/HVAC	23	110	\$/mo	\$ 2,530
	Sewar Hookup/Removal	1	10000	ea	\$ 10,000
Temporary Utilities	Heat	680	13.50	csf flr	\$ 9,180
	Lighting	680	13.33	csf flr	\$ 9,064
	Power	680	47.00	csf flr	\$ 31,960
	Chainlink fencing	3039	8.61	\$/lf	\$ 26,166
	Toilets/Porty Jons	23	165.00	\$/mo	\$ 3,795
	Roads	6316	7.27	\$/sy	\$ 45,917
Trash Disposal	Dumpsters	92	690	\$/wk	\$ 63,480
	Dumping Charges	92	95	\$/wk	\$ 8,740
Security		3680	25	\$/hr	\$ 92,000
Safety	Fire Extinguishers	1	5000	ea	\$ 5,000
	First Aid Kit	1	2500	ea	\$ 2,500
Signage		100	17.9	\$/sf	\$ 1,790
Equipment	Crane	20	5515	\$/wk	\$ 110,300
	Scaffolding	268	110	\$/sf	\$ 29,480
Surveying		12	328.6	\$/acre	\$ 3,943
Permits		1	0.50%	job	\$ 70,210
Winter Protection	Weather Protection Enclosures	1	40000	ea	\$ 40,000
Aerial Photos		1	1645	ea	\$ 1,645
Testing		1	33100	ea	\$ 33,100
Cleaning	After job completion	1	0.3	job	\$ 42,126
	Floor area per day	68	26.07	msf	\$ 1,773
	Protect Finished Work (Stairs)	80	7.79	\$/tread	\$ 623
Fee (4.0%)					\$ 33,936
Total				\$	882,335