United States

Department of the Interior

Cafeteria Modernization

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Construction Management

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Department of the Interior Cafeteria Modernization

1849 C Street NW, Washington D.C.

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Technical Report II

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Executive Summary

Technical Assignment 2 is a detailed report that will analyze the cost and schedule for the Department of Interior Cafeteria Modernization Project. This report will provide a 190 activity detailed project schedule, site layout for the demolition phase, detailed estimate for structural work, and broken down general conditions estimate.

The construction schedule is the first portion of the cafeteria project that is analyzed. The Administrative Notice to Proceed was given on March 3, 2009. The general contractors proposal schedule called for substantial completion on February 26, 2010.. For many reasons, which will be analyzed later, the actual substantial completion was not declared until July 28, 2010. For the purposes of this activity, the proposed schedule was used. In completing this schedule, various phases and trades were separated to provide an understanding of exactly how to project was built. In conclusion, many opportunities for speeding up the schedule are available. One example, the roof demolition sequence, is broken down further in this report.

The second aspect analyzed in this report is cost. The two major features of cost studied are structural and general conditions. The cafeteria project budget is made up of a mere 3% of structural cost. This being said, there are still opportunities for savings in the structural design. The subtotal for concrete work and steel work are $139,170 and $54,538 respectively. Further analysis of the ceiling and floor structure is also provided in this report The second aspect of cost are the general conditions. General conditions cost amounted to $1,844,837. This section was broken down into staffing, construction material and equipment, and miscellaneous. These subtotals were $634,600, $108,737, and $1,101,500. Almost a third of the general conditions cost came from the general contractor's commission on subcontractors ($571,700). By looking at these estimates, plenty of opportunities for cost savings seem plausible.

Schedule Narrative

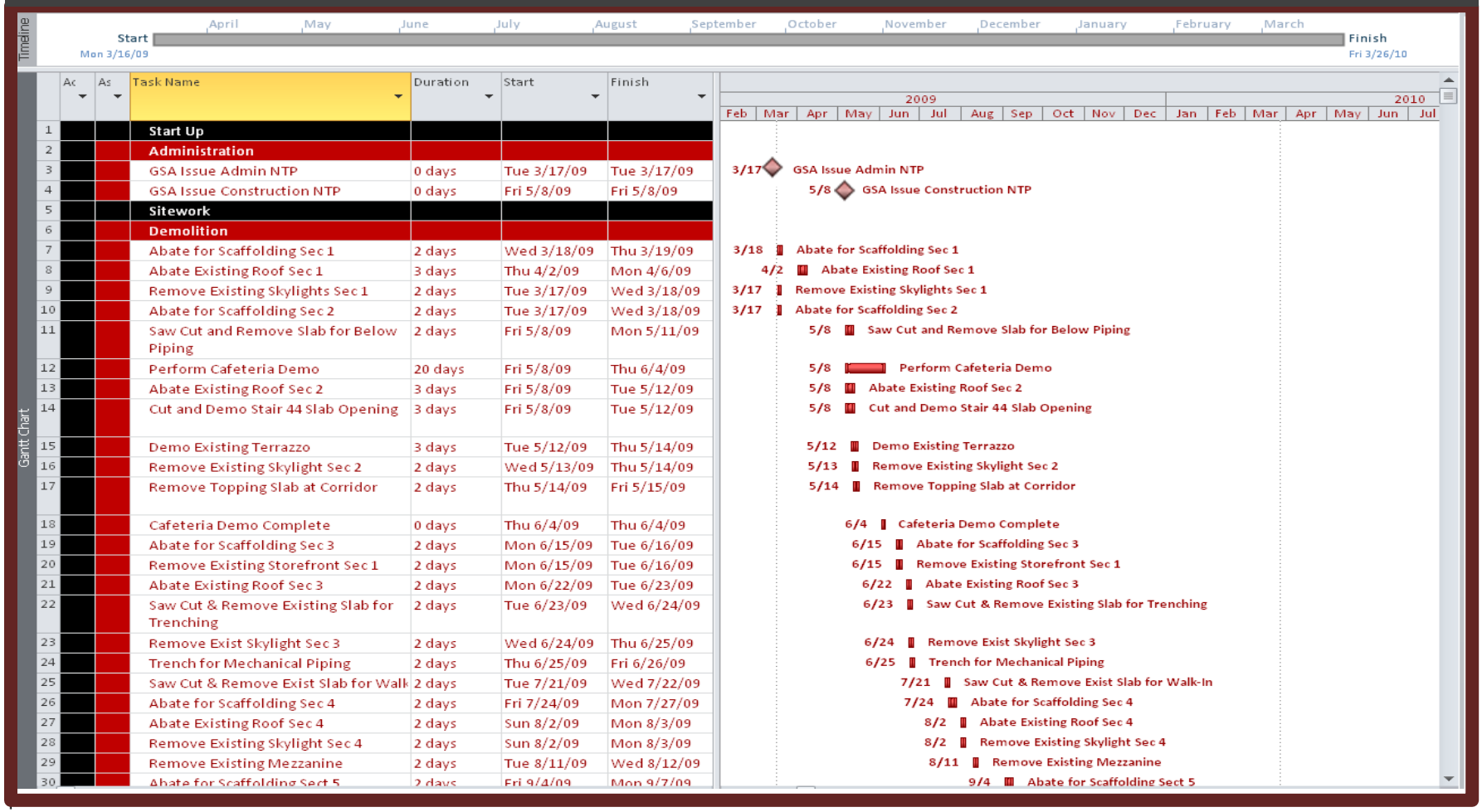
The following is a detailed project schedule for the construction of the Department of Interior Cafeteria Modernization Project. This particular schedule is based off of the original general contractor's proposal. This proposal called for project completion on March 26, 2010. The schedule is mostly broken down into construction phases. Each construction phase is then broken down further by trades. The following is the schedule outline:

- Start Up
- Sitework
  - Demolition
- Enclosure and Superstructure
  - Skylights
  - Roof
  - Concrete
  - Steel
- MEP
  - Mechanical and Plumbing
  - Electrical and Fire Alarm
  - Sprinklers
- Finishes
  - Carpet and Tile
  - GWB & ACT
  - Paint
  - Terrazzo
- Close Out

The original schedule in the General Contractor's proposal broke each construction process into 5 separate activities. The first activity consisted of the submittal process which generally allowed for a month's time. The second activity dealt with the fabrication, delivery, and storage and generally had a two week window. The next step was to install the actual item. At last, the final two activities consisted of commissioning/testing and owner acceptance. For the purpose of this schedule, only the fabrication, delivery, and storage, and the installation activities were shown. This schedule focused on the actual construction instead of the project management components.

The Department of the Interior Cafeteria Modernization Project

Project Schedule Summary



	Ac	As	Task Name	Duration	Start	Finish
1			**Start Up**			
2			**Administration**			
3			GSA Issue Admin NTP	0 days	Tue 3/17/09	Tue 3/17/09
4			GSA Issue Construction NTP	0 days	Fri 5/8/09	Fri 5/8/09
5			**Sitework**			
6			**Demolition**			
7			Abate for Scaffolding Sec 1	2 days	Wed 3/18/09	Thu 3/19/09
8			Abate Existing Roof Sec 1	3 days	Thu 4/2/09	Mon 4/6/09
9			Remove Existing Skylights Sec 1	2 days	Tue 3/17/09	Wed 3/18/09
10			Abate for Scaffolding Sec 2	2 days	Tue 3/17/09	Wed 3/18/09
11			Saw Cut and Remove Slab for Below Piping	2 days	Fri 5/8/09	Mon 5/11/09
12			Perform Cafeteria Demo	20 days	Fri 5/8/09	Thu 6/4/09
13			Abate Existing Roof Sec 2	3 days	Fri 5/8/09	Tue 5/12/09
14			Cut and Demo Stair 44 Slab Opening	3 days	Fri 5/8/09	Tue 5/12/09
15			Demo Existing Terrazzo	3 days	Tue 5/12/09	Thu 5/14/09
16			Remove Existing Skylight Sec 2	2 days	Wed 5/13/09	Thu 5/14/09
17			Remove Topping Slab at Corridor	2 days	Thu 5/14/09	Fri 5/15/09
18			Cafeteria Demo Complete	0 days	Thu 6/4/09	Thu 6/4/09
19			Abate for Scaffolding Sec 3	2 days	Mon 6/15/09	Tue 6/16/09
20			Remove Existing Storefront Sec 1	2 days	Mon 6/15/09	Tue 6/16/09
21			Abate Existing Roof Sec 3	2 days	Mon 6/22/09	Tue 6/23/09
22			Saw Cut & Remove Existing Slab for Trenching	2 days	Tue 6/23/09	Wed 6/24/09
23			Remove Exist Skylight Sec 3	2 days	Wed 6/24/09	Thu 6/25/09
24			Trench for Mechanical Piping	2 days	Thu 6/25/09	Fri 6/26/09
25			Saw Cut & Remove Exist Slab for Walk	2 days	Tue 7/21/09	Wed 7/22/09
26			Abate for Scaffolding Sec 4	2 days	Fri 7/24/09	Mon 7/27/09
27			Abate Existing Roof Sec 4	2 days	Sun 8/2/09	Mon 8/3/09
28			Remove Existing Skylight Sec 4	2 days	Sun 8/2/09	Mon 8/3/09
29			Remove Existing Mezzanine	2 days	Tue 8/11/09	Wed 8/12/09
30			Abate for Scaffolding Sect 5	2 days	Fri 9/4/09	Mon 9/7/09

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The Department of the Interior Cafeteria Modernization Project

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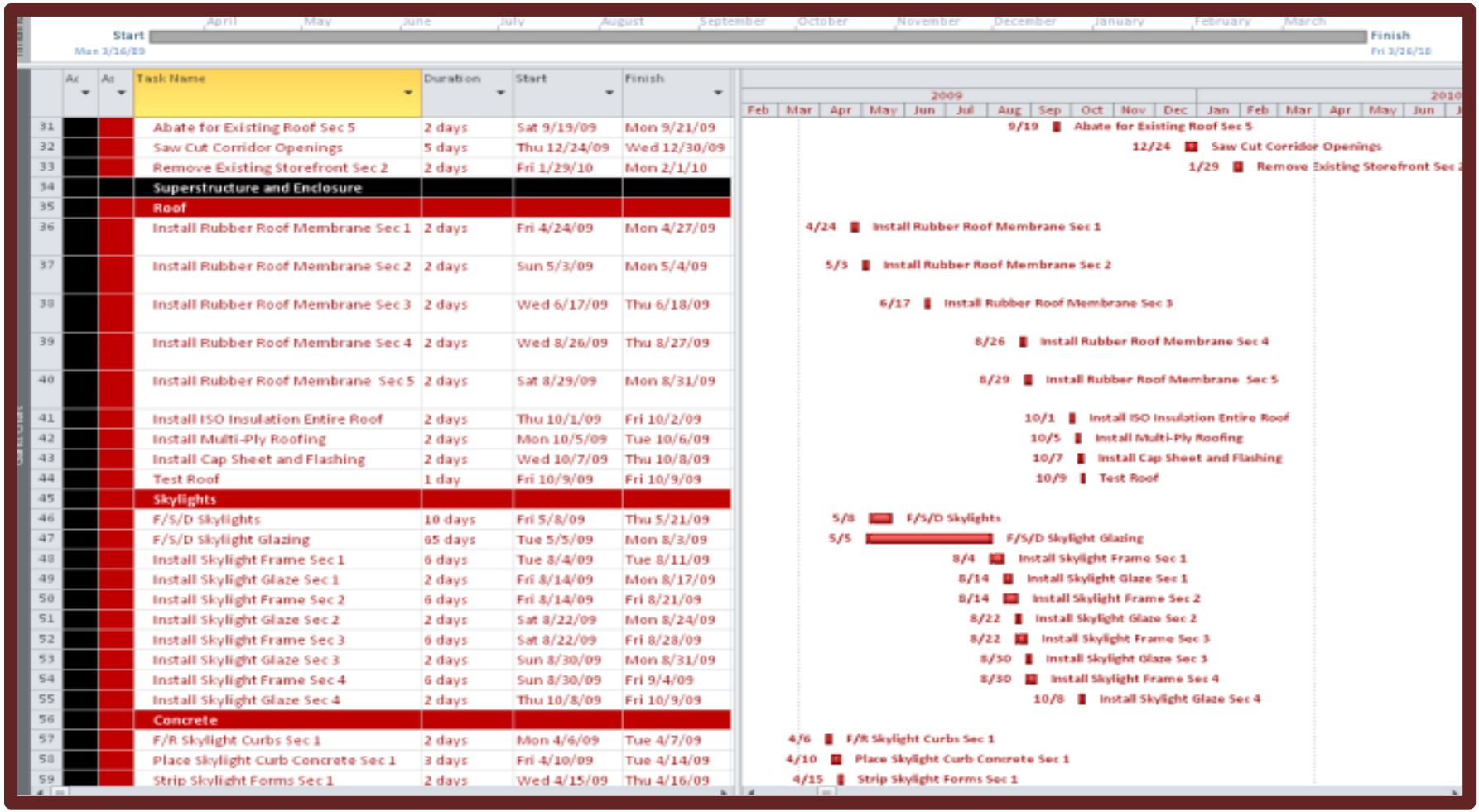

	Ac	As	Task Name	Duration	Start	Finish
31			Abate for Existing Roof Sec 5	2 days	Sat 9/19/09	Mon 9/21/09
32			Saw Cut Corridor Openings	5 days	Thu 12/24/09	Wed 12/30/09
33			Remove Existing Storefront Sec 2	2 days	Fri 1/29/10	Mon 2/1/10
34			**Superstructure and Enclosure**			
35			**Roof**			
36			Install Rubber Roof Membrane Sec 1	2 days	Fri 4/24/09	Mon 4/27/09
37			Install Rubber Roof Membrane Sec 2	2 days	Sun 5/3/09	Mon 5/4/09
38			Install Rubber Roof Membrane Sec 3	2 days	Wed 6/17/09	Thu 6/18/09
39			Install Rubber Roof Membrane Sec 4	2 days	Wed 8/26/09	Thu 8/27/09
40			Install Rubber Roof Membrane Sec 5	2 days	Sat 8/29/09	Mon 8/31/09
41			Install ISO Insulation Entire Roof	2 days	Thu 10/1/09	Fri 10/2/09
42			Install Multi-Ply Roofing	2 days	Mon 10/5/09	Tue 10/6/09
43			Install Cap Sheet and Flashing	2 days	Wed 10/7/09	Thu 10/8/09
44			Test Roof	1 day	Fri 10/9/09	Fri 10/9/09
45			**Skylights**			
46			F/S/D Skylights	10 days	Fri 5/8/09	Thu 5/21/09
47			F/S/D Skylight Glazing	65 days	Tue 5/5/09	Mon 8/3/09
48			Install Skylight Frame Sec 1	6 days	Tue 8/4/09	Tue 8/11/09
49			Install Skylight Glaze Sec 1	2 days	Fri 8/14/09	Mon 8/17/09
50			Install Skylight Frame Sec 2	6 days	Fri 8/14/09	Fri 8/21/09
51			Install Skylight Glaze Sec 2	2 days	Sat 8/22/09	Mon 8/24/09
52			Install Skylight Frame Sec 3	6 days	Sat 8/22/09	Fri 8/28/09
53			Install Skylight Glaze Sec 3	2 days	Sun 8/30/09	Mon 8/31/09
54			Install Skylight Frame Sec 4	6 days	Sun 8/30/09	Fri 9/4/09
55			Install Skylight Glaze Sec 4	2 days	Thu 10/8/09	Fri 10/9/09
56			**Concrete**			
57			F/R Skylight Curbs Sec 1	2 days	Mon 4/6/09	Tue 4/7/09
58			Place Skylight Curb Concrete Sec 1	3 days	Fri 4/10/09	Tue 4/14/09
59			Strip Skylight Forms Sec 1	2 days	Wed 4/15/09	Thu 4/16/09

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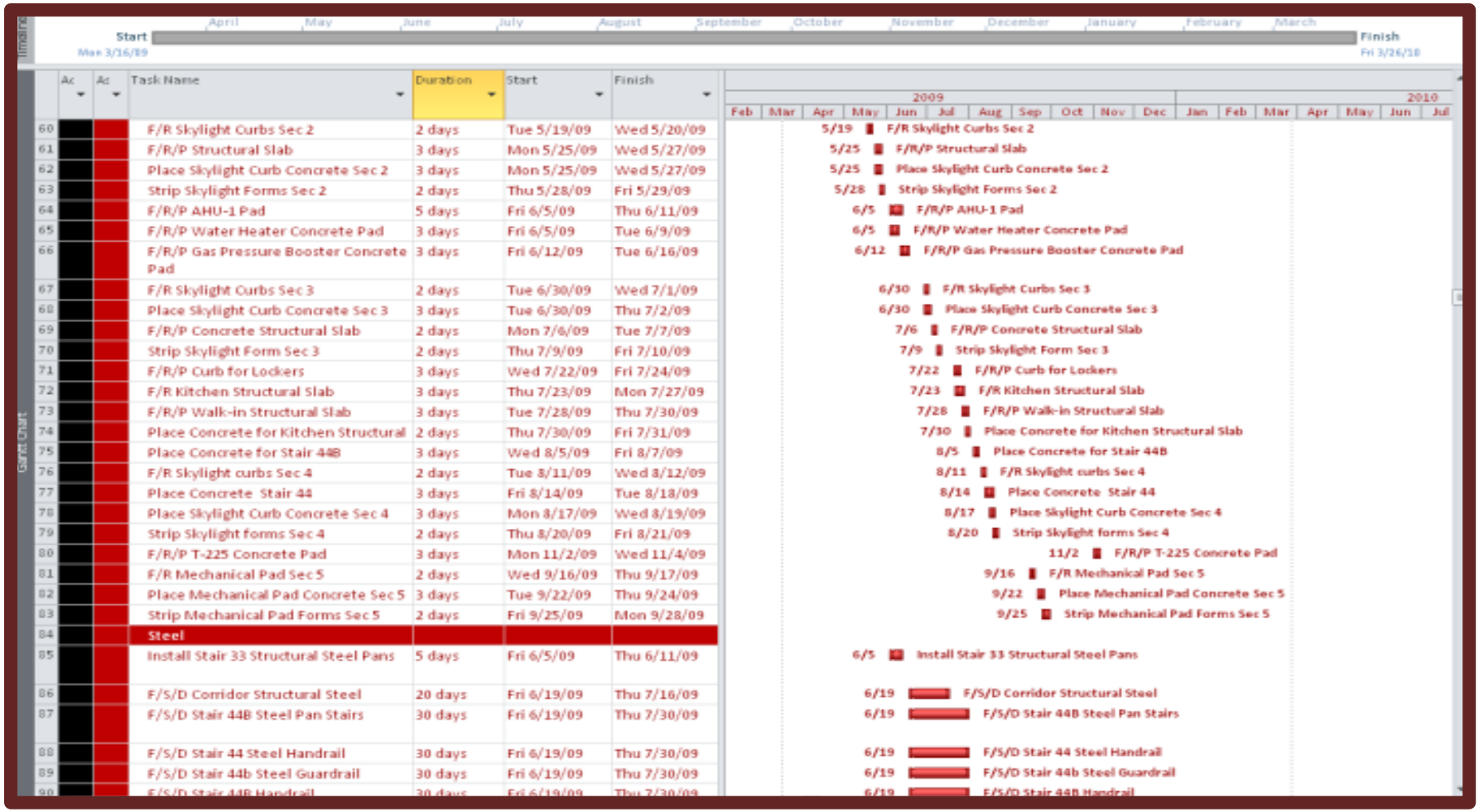

	Ac	Ac	Task Name	Duration	Start	Finish
60			F/R Skylight Curbs Sec 2	2 days	Tue 5/19/09	Wed 5/20/09
61			F/R/P Structural Slab	3 days	Mon 5/25/09	Wed 5/27/09
62			Place Skylight Curb Concrete Sec 2	3 days	Mon 5/25/09	Wed 5/27/09
63			Strip Skylight Forms Sec 2	2 days	Thu 5/28/09	Fri 5/29/09
64			F/R/P AHU-1 Pad	5 days	Fri 6/5/09	Thu 6/11/09
65			F/R/P Water Heater Concrete Pad	3 days	Fri 6/5/09	Tue 6/9/09
66			F/R/P Gas Pressure Booster Concrete Pad	3 days	Fri 6/12/09	Tue 6/16/09
67			F/R Skylight Curbs Sec 3	2 days	Tue 6/30/09	Wed 7/1/09
68			Place Skylight Curb Concrete Sec 3	3 days	Tue 6/30/09	Thu 7/2/09
69			F/R/P Concrete Structural Slab	2 days	Mon 7/6/09	Tue 7/7/09
70			Strip Skylight Form Sec 3	2 days	Thu 7/9/09	Fri 7/10/09
71			F/R/P Curb for Lockers	3 days	Wed 7/22/09	Fri 7/24/09
72			F/R Kitchen Structural Slab	3 days	Thu 7/23/09	Mon 7/27/09
73			F/R/P Walk-in Structural Slab	3 days	Tue 7/28/09	Thu 7/30/09
74			Place Concrete for Kitchen Structural	2 days	Thu 7/30/09	Fri 7/31/09
75			Place Concrete for Stair 44B	3 days	Wed 8/5/09	Fri 8/7/09
76			F/R Skylight curbs Sec 4	2 days	Tue 8/11/09	Wed 8/12/09
77			Place Concrete Stair 44	3 days	Fri 8/14/09	Tue 8/18/09
78			Place Skylight Curb Concrete Sec 4	3 days	Mon 8/17/09	Wed 8/19/09
79			Strip Skylight forms Sec 4	2 days	Thu 8/20/09	Fri 8/21/09
80			F/R/P T-225 Concrete Pad	3 days	Mon 11/2/09	Wed 11/4/09
81			F/R Mechanical Pad Sec 5	2 days	Wed 9/16/09	Thu 9/17/09
82			Place Mechanical Pad Concrete Sec 5	3 days	Tue 9/22/09	Thu 9/24/09
83			Strip Mechanical Pad Forms Sec 5	2 days	Fri 9/25/09	Mon 9/28/09
84			Steel			
85			Install Stair 33 Structural Steel Pans	5 days	Fri 6/5/09	Thu 6/11/09
86			F/S/D Corridor Structural Steel	20 days	Fri 6/19/09	Thu 7/16/09
87			F/S/D Stair 44B Steel Pan Stairs	30 days	Fri 6/19/09	Thu 7/30/09
88			F/S/D Stair 44 Steel Handrail	30 days	Fri 6/19/09	Thu 7/30/09
89			F/S/D Stair 44b Steel Guardrail	30 days	Fri 6/19/09	Thu 7/30/09
90			F/S/D Stair 44B Handrail	30 days	Fri 6/19/09	Thu 7/30/09

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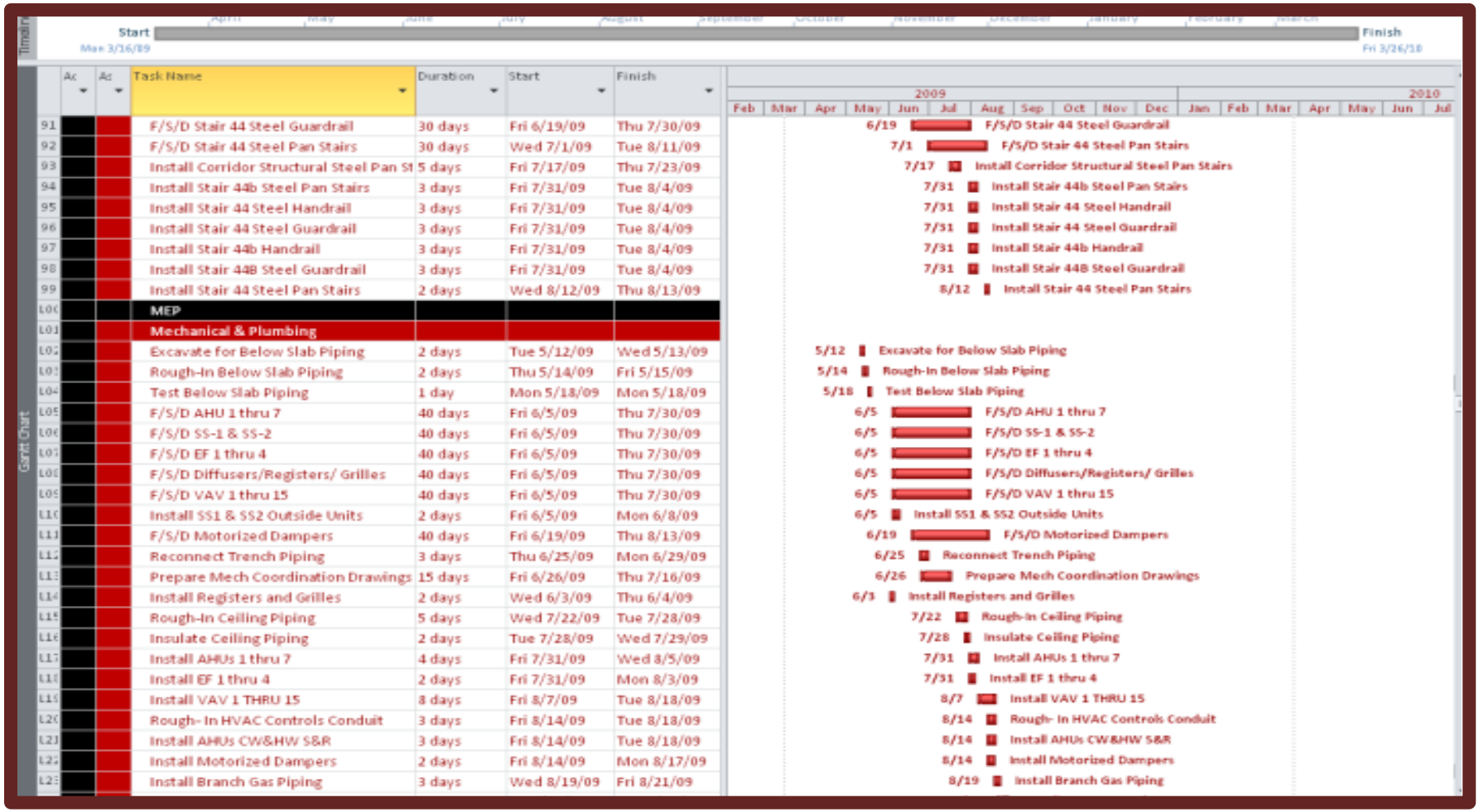

	Task Name	Duration	Start	Finish
91	F/S/D Stair 44 Steel Guardrail	30 days	Fri 6/19/09	Thu 7/30/09
92	F/S/D Stair 44 Steel Pan Stairs	30 days	Wed 7/1/09	Tue 8/11/09
93	Install Corridor Structural Steel Pan St	5 days	Fri 7/17/09	Thu 7/23/09
94	Install Stair 44b Steel Pan Stairs	3 days	Fri 7/31/09	Tue 8/4/09
95	Install Stair 44 Steel Handrail	3 days	Fri 7/31/09	Tue 8/4/09
96	Install Stair 44 Steel Guardrail	3 days	Fri 7/31/09	Tue 8/4/09
97	Install Stair 44b Handrail	3 days	Fri 7/31/09	Tue 8/4/09
98	Install Stair 44B Steel Guardrail	3 days	Fri 7/31/09	Tue 8/4/09
99	Install Stair 44 Steel Pan Stairs	2 days	Wed 8/12/09	Thu 8/13/09
L00	MEP			
L01	Mechanical & Plumbing			
L02	Excavate for Below Slab Piping	2 days	Tue 5/12/09	Wed 5/13/09
L03	Rough-In Below Slab Piping	2 days	Thu 5/14/09	Fri 5/15/09
L04	Test Below Slab Piping	1 day	Mon 5/18/09	Mon 5/18/09
L05	F/S/D AHU 1 thru 7	40 days	Fri 6/5/09	Thu 7/30/09
L06	F/S/D SS-1 & SS-2	40 days	Fri 6/5/09	Thu 7/30/09
L07	F/S/D EF 1 thru 4	40 days	Fri 6/5/09	Thu 7/30/09
L08	F/S/D Diffusers/Registers/ Grilles	40 days	Fri 6/5/09	Thu 7/30/09
L09	F/S/D VAV 1 thru 15	40 days	Fri 6/5/09	Thu 7/30/09
L10	Install SS1 & SS2 Outside Units	2 days	Fri 6/5/09	Mon 6/8/09
L11	F/S/D Motorized Dampers	40 days	Fri 6/19/09	Thu 8/13/09
L12	Reconnect Trench Piping	3 days	Thu 6/25/09	Mon 6/29/09
L13	Prepare Mech Coordination Drawings	15 days	Fri 6/26/09	Thu 7/16/09
L14	Install Registers and Grilles	2 days	Wed 6/3/09	Thu 6/4/09
L15	Rough-In Ceiling Piping	5 days	Wed 7/22/09	Tue 7/28/09
L16	Insulate Ceiling Piping	2 days	Tue 7/28/09	Wed 7/29/09
L17	Install AHUs 1 thru 7	4 days	Fri 7/31/09	Wed 8/5/09
L18	Install EF 1 thru 4	2 days	Fri 7/31/09	Mon 8/3/09
L19	Install VAV 1 THRU 15	8 days	Fri 8/7/09	Tue 8/18/09
L20	Rough- In HVAC Controls Conduit	3 days	Fri 8/14/09	Tue 8/18/09
L21	Install AHUs CW&HW S&R	3 days	Fri 8/14/09	Tue 8/18/09
L22	Install Motorized Dampers	2 days	Fri 8/14/09	Mon 8/17/09
L23	Install Branch Gas Piping	3 days	Wed 8/19/09	Fri 8/21/09

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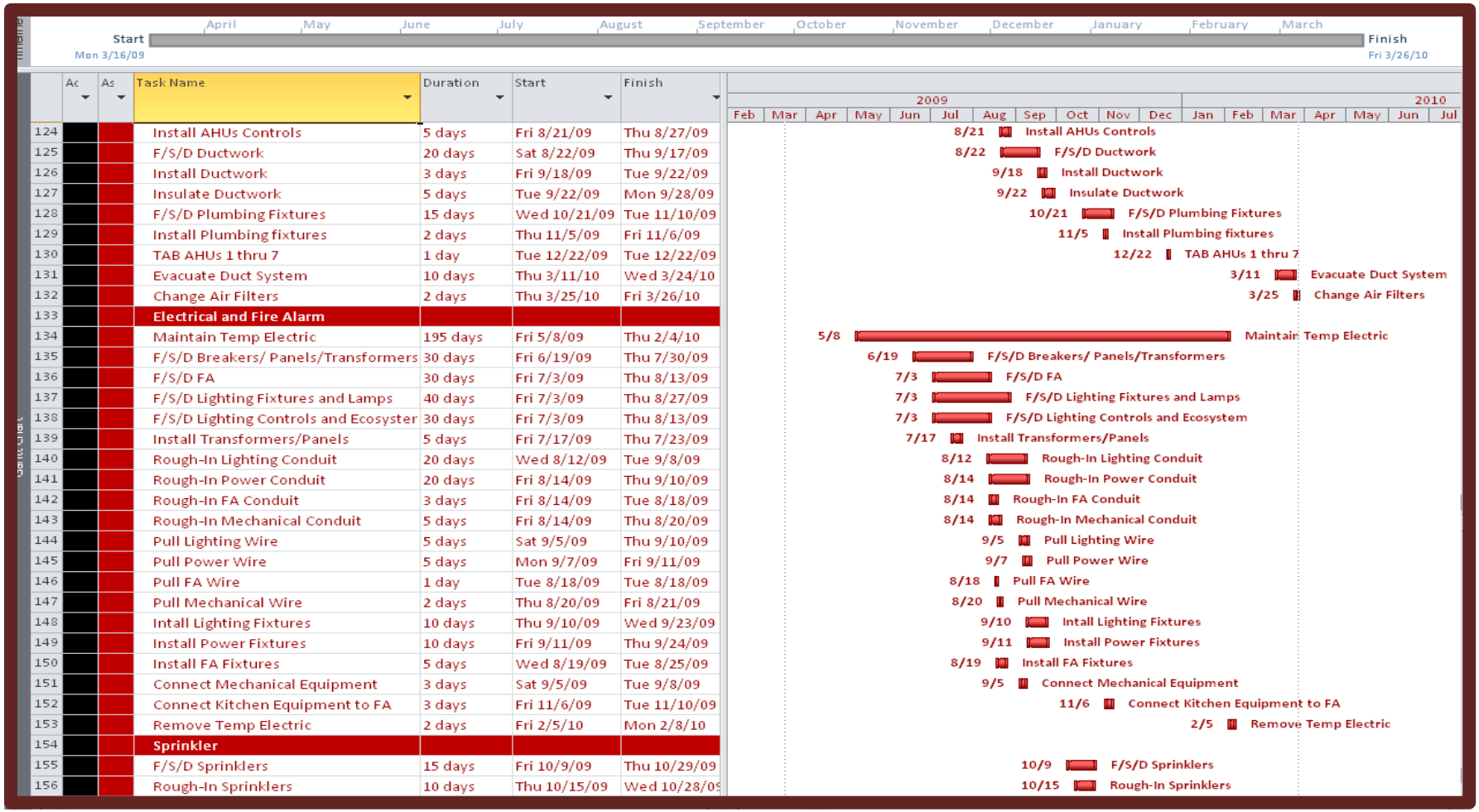

	Ac	As	Task Name	Duration	Start	Finish
124			Install AHUs Controls	5 days	Fri 8/21/09	Thu 8/27/09
125			F/S/D Ductwork	20 days	Sat 8/22/09	Thu 9/17/09
126			Install Ductwork	3 days	Fri 9/18/09	Tue 9/22/09
127			Insulate Ductwork	5 days	Tue 9/22/09	Mon 9/28/09
128			F/S/D Plumbing Fixtures	15 days	Wed 10/21/09	Tue 11/10/09
129			Install Plumbing fixtures	2 days	Thu 11/5/09	Fri 11/6/09
130			TAB AHUs 1 thru 7	1 day	Tue 12/22/09	Tue 12/22/09
131			Evacuate Duct System	10 days	Thu 3/11/10	Wed 3/24/10
132			Change Air Filters	2 days	Thu 3/25/10	Fri 3/26/10
133			**Electrical and Fire Alarm**			
134			Maintain Temp Electric	195 days	Fri 5/8/09	Thu 2/4/10
135			F/S/D Breakers/ Panels/Transformers	30 days	Fri 6/19/09	Thu 7/30/09
136			F/S/D FA	30 days	Fri 7/3/09	Thu 8/13/09
137			F/S/D Lighting Fixtures and Lamps	40 days	Fri 7/3/09	Thu 8/27/09
138			F/S/D Lighting Controls and Ecosyster	30 days	Fri 7/3/09	Thu 8/13/09
139			Install Transformers/Panels	5 days	Fri 7/17/09	Thu 7/23/09
140			Rough-In Lighting Conduit	20 days	Wed 8/12/09	Tue 9/8/09
141			Rough-In Power Conduit	20 days	Fri 8/14/09	Thu 9/10/09
142			Rough-In FA Conduit	3 days	Fri 8/14/09	Tue 8/18/09
143			Rough-In Mechanical Conduit	5 days	Fri 8/14/09	Thu 8/20/09
144			Pull Lighting Wire	5 days	Sat 9/5/09	Thu 9/10/09
145			Pull Power Wire	5 days	Mon 9/7/09	Fri 9/11/09
146			Pull FA Wire	1 day	Tue 8/18/09	Tue 8/18/09
147			Pull Mechanical Wire	2 days	Thu 8/20/09	Fri 8/21/09
148			Intall Lighting Fixtures	10 days	Thu 9/10/09	Wed 9/23/09
149			Install Power Fixtures	10 days	Fri 9/11/09	Thu 9/24/09
150			Install FA Fixtures	5 days	Wed 8/19/09	Tue 8/25/09
151			Connect Mechanical Equipment	3 days	Sat 9/5/09	Tue 9/8/09
152			Connect Kitchen Equipment to FA	3 days	Fri 11/6/09	Tue 11/10/09
153			Remove Temp Electric	2 days	Fri 2/5/10	Mon 2/8/10
154			**Sprinkler**			
155			F/S/D Sprinklers	15 days	Fri 10/9/09	Thu 10/29/09
156			Rough-In Sprinklers	10 days	Thu 10/15/09	Wed 10/28/09

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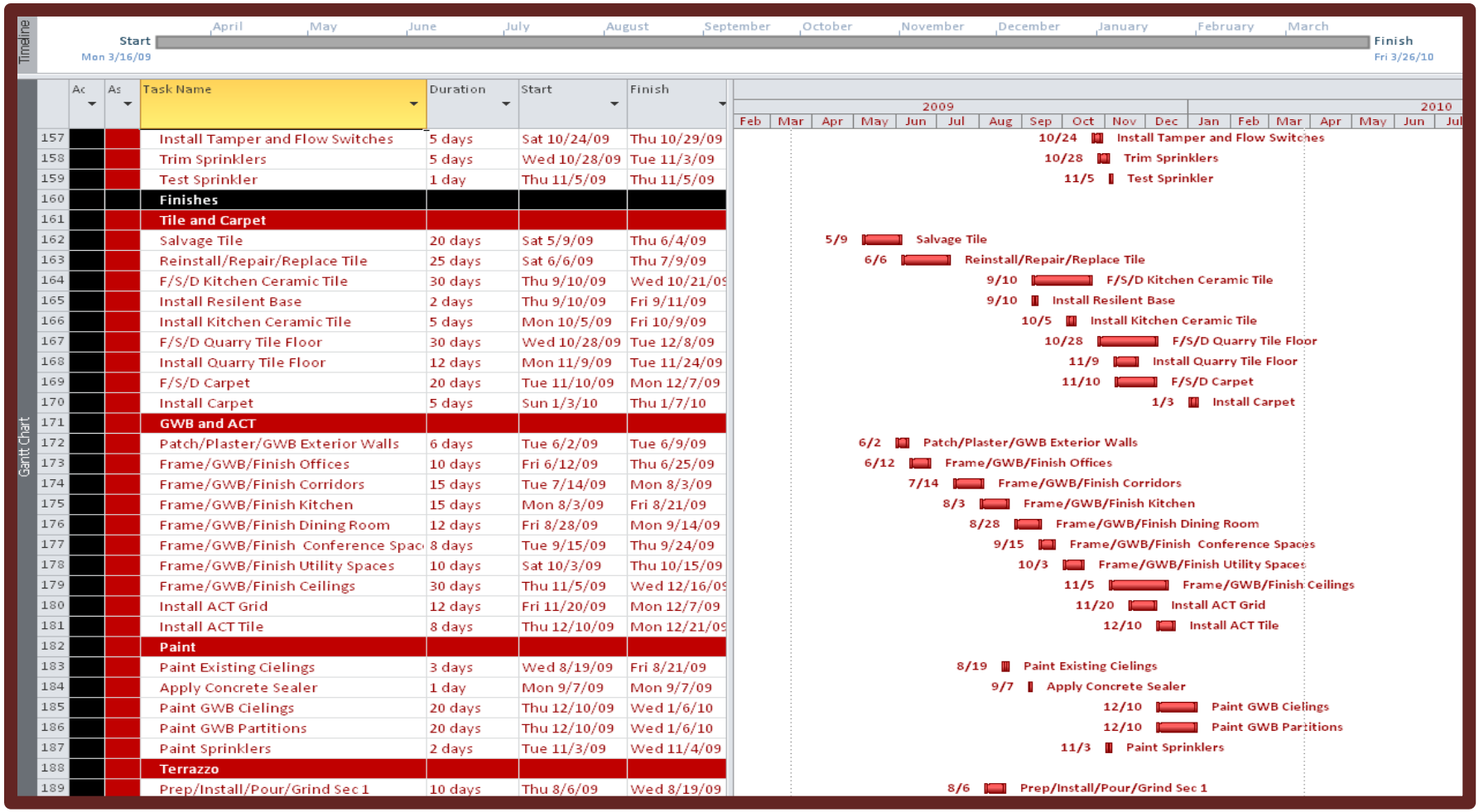

	Ac	As	Task Name	Duration	Start	Finish
157			Install Tamper and Flow Switches	5 days	Sat 10/24/09	Thu 10/29/09
158			Trim Sprinklers	5 days	Wed 10/28/09	Tue 11/3/09
159			Test Sprinkler	1 day	Thu 11/5/09	Thu 11/5/09
160			**Finishes**			
161			**Tile and Carpet**			
162			Salvage Tile	20 days	Sat 5/9/09	Thu 6/4/09
163			Reinstall/Repair/Replace Tile	25 days	Sat 6/6/09	Thu 7/9/09
164			F/S/D Kitchen Ceramic Tile	30 days	Thu 9/10/09	Wed 10/21/09
165			Install Resilent Base	2 days	Thu 9/10/09	Fri 9/11/09
166			Install Kitchen Ceramic Tile	5 days	Mon 10/5/09	Fri 10/9/09
167			F/S/D Quarry Tile Floor	30 days	Wed 10/28/09	Tue 12/8/09
168			Install Quarry Tile Floor	12 days	Mon 11/9/09	Tue 11/24/09
169			F/S/D Carpet	20 days	Tue 11/10/09	Mon 12/7/09
170			Install Carpet	5 days	Sun 1/3/10	Thu 1/7/10
171			**GWB and ACT**			
172			Patch/Plaster/GWB Exterior Walls	6 days	Tue 6/2/09	Tue 6/9/09
173			Frame/GWB/Finish Offices	10 days	Fri 6/12/09	Thu 6/25/09
174			Frame/GWB/Finish Corridors	15 days	Tue 7/14/09	Mon 8/3/09
175			Frame/GWB/Finish Kitchen	15 days	Mon 8/3/09	Fri 8/21/09
176			Frame/GWB/Finish Dining Room	12 days	Fri 8/28/09	Mon 9/14/09
177			Frame/GWB/Finish Conference Spac	8 days	Tue 9/15/09	Thu 9/24/09
178			Frame/GWB/Finish Utility Spaces	10 days	Sat 10/3/09	Thu 10/15/09
179			Frame/GWB/Finish Ceilings	30 days	Thu 11/5/09	Wed 12/16/09
180			Install ACT Grid	12 days	Fri 11/20/09	Mon 12/7/09
181			Install ACT Tile	8 days	Thu 12/10/09	Mon 12/21/09
182			**Paint**			
183			Paint Existing Cielings	3 days	Wed 8/19/09	Fri 8/21/09
184			Apply Concrete Sealer	1 day	Mon 9/7/09	Mon 9/7/09
185			Paint GWB Cielings	20 days	Thu 12/10/09	Wed 1/6/10
186			Paint GWB Partitions	20 days	Thu 12/10/09	Wed 1/6/10
187			Paint Sprinklers	2 days	Tue 11/3/09	Wed 11/4/09
188			**Terrazzo**			
189			Prep/Install/Pour/Grind Sec 1	10 days	Thu 8/6/09	Wed 8/19/09

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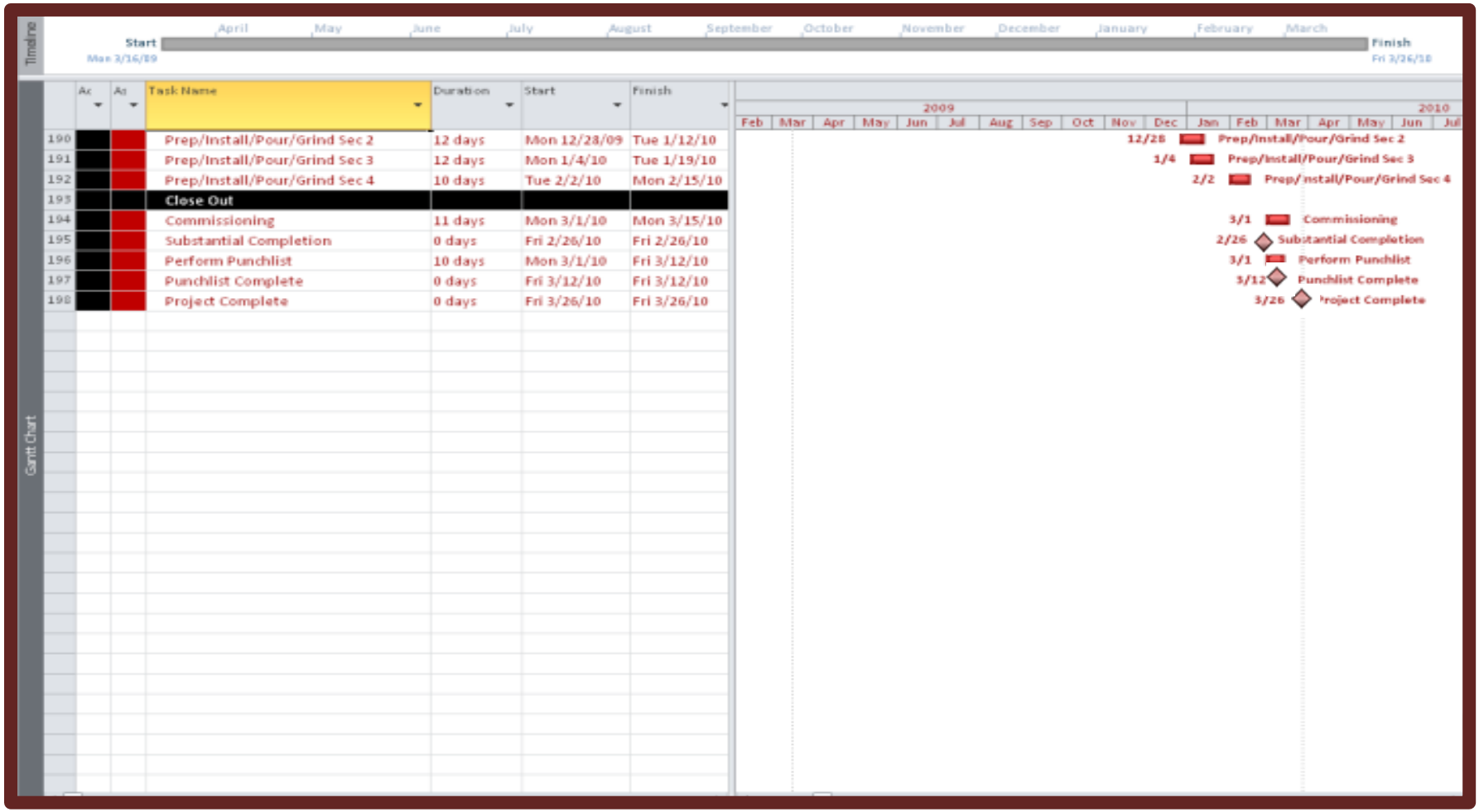

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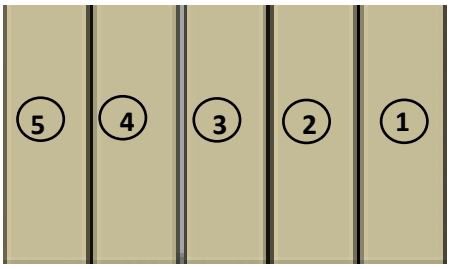
DURATION

Demolition Site Layout Narrative

Existing Roof

Demolition is the first major construction activity in the modernization of the cafeteria. Phasing is critical during this part of the schedule. In the cafeteria, almost all demolition processes require abatement. A good example of phasing during demolition can be seen in studying the skylight and roof removal. The roof is broken down into 5 different phases starting from East to West. Each phase consist of 3 demolition task:



1)Abate for Scaffolding

2)Abate for Existing Roof

3)Remove Existing Skylight

Layout and Storage space is scarce on the roof and thus organization is key. Generally, storage and waste were not kept on the roof if at all possible. All materials were taken down through the roof exit to the dumpster outside the building. Demolition time for each phase was a total 7 day. The contractor would not begin the next phase until all the construction activities such as scaffolding assembly, curb pours, skylight installation, and new roofing were completed.

One possible cost and time saving to this site layout may be to reduce the number of phases. By performing more work at one time, rather than bring labors and equipment back 5 separate times to the roof could be a more effective alternative. The only obvious down side of this proposal, could be the cost of using more scaffolding.

Phase	Abate Scaffolding	Existing Roof Abatement	Remove Existing Skylight
1	3/19/09	4/2/09	4/17/09
2	3/17/09	5/8/09	5/13/09
3	6/15/09	6/22/09	6/24/09
4	7/24/09	8/2/09	8/2/09
5	9/4/09	9/19/09	9/21/09

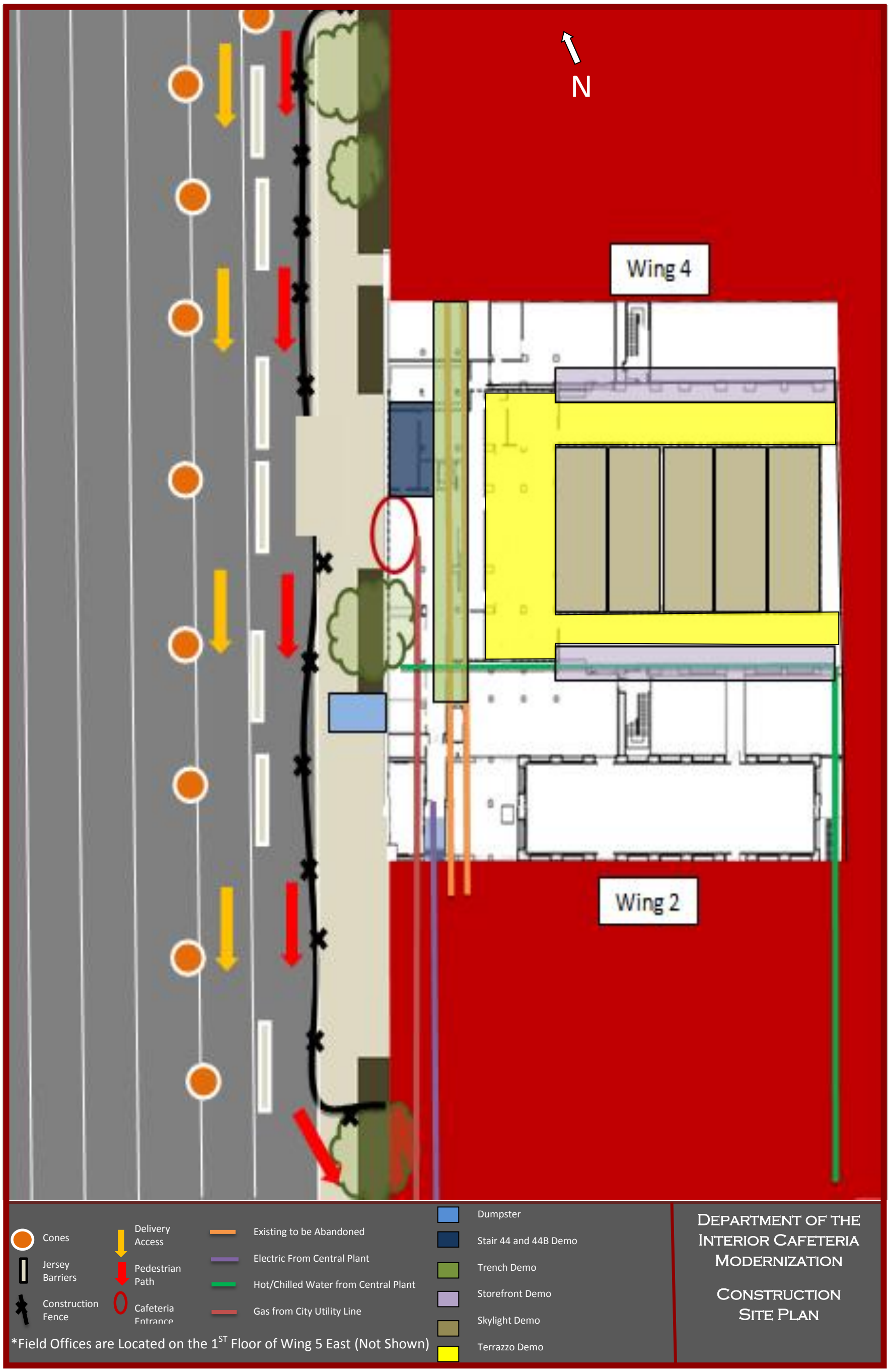
Existing Roof

Abated Roof

Removed Skylight

Installed Roof

Demolition Site Plan

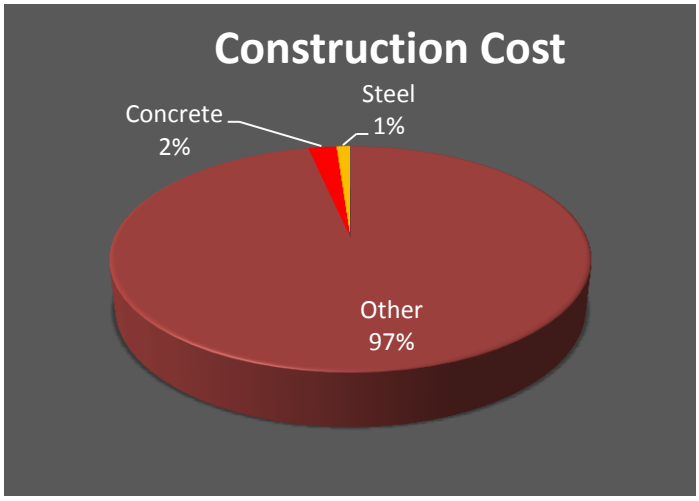


Detailed Structural System Estimate

The Cafeteria Modernization Project does not contain major structural work. This estimate will provide a detailed of scope of structural work, as well as estimates for the work to be put in place. The exact scope of work is taken from the original subcontractor proposal. All quantities are taken off of construction drawings. Cost and unit rates are taken from R.S. Means as well as subcontractor proposal documents. Labor and equipment cost are built into the unit cost for the concrete estimate. The steel estimate separates labor, equipment, and material cost to provide a more effective break down of units. Neither estimate takes into account overhead, profit, bonding, or taxes.

The existing structure of the cafeteria, which is not included in this estimate, consists of a steel frame encased in concrete. Typical column bays span 10 feet with the largest exception being the dining room area. The ceiling and flooring system consist of concrete on metal decking. Due to lack of As-Builts, core samples were taken in various locations by the structural engineer, Thornton Tomasetti. Although topping thickness varied, the design calculations assumed 3" normal weight concrete topping throughout. The dining room ceiling consists of 8 precast girders that span 45 feet. The original system was deemed structurally adequate to support the new skylights, the concrete curbs they rest on, and the new air handling unit without any additional reinforcement.

For this section's purpose, a Square Foot Estimate is not a good indicator of structural cost. Renovations generally can consist of both ends of the spectrum as far as the amount of structural work necessary. For the modernization project, structural cost only made up 3% of the total cost of construction.



Scope of Work

Contractor: Brothers Concrete Construction Inc.

Scope:

- Topping Slab Replacement in Kitchen Area
- Grout Base Plates a New Door Openings
- Topping Slab Replacement in New Stair
- Grout Base Plates at New Stair
- Pan Stair Infill at #44 and #44B
- Excavation of Depressed Slab
- Replacement of Slab on Grade and Depressed Slab
- Infill Slab over Styrofoam at Depressed Slab
- Infill Slab on Metal Deck at Skylight
- Replacement of Slab on Grade and Depressed Slab
- Curb at Mechanical Penetrations in Infill Slab on Metal Deck at Skylight
- MEP Pads at AHU's #1 and #2
- MEP Pads at Transformer

Line Item	Unit Cost	Unit	Quanity	Cost
Concrete Formwork	$12.00	SFCA	125	$1,500.00
Cast-In-Place Concrete	$200.00	CY	435	$87,000.00
Concrete Fill at Removed Quarry Tile	$4.50	SF	9,150	$41,175.00
Ardex Skim Coat in Rooms B356 &B356A	$2.25	SF	2,300	$5,175.00
Ardex Skim Coat from Columns JJ-MM & 2-22	$2.25	SF	1,920	$4,320.00
		Concrete	**Subtotal**	$139,170.00

Contractor: Superior Iron Works, Inc.

Scope:

- Furnish and Erect Skylight Infill Framing and Decking at Four Locations
- Furnish and Erect Steel Stair #44 and Rails
- Furnish and Erect Steel Stair #44B and Rails
- Furnish and Erect New Door Opening Support Steek
- Finish of One Shop Coat Primer unless noted Otherwise

Line Item	Unit	Quanity	Material Rate ($/lb)	Material Cost
Skylight Infills	lb	692	$3.42	$2,366.64
Stair #44 & Rails	lb	4626	$3.66	$16,931.16
Stair #44B and Rails	lb	948	$4.70	$4,455.60
New Door Support Steel	lb	1264	$3.42	$4,322.88
			Subtotal:	$28,076.28

Line Item	Unit	Quanity	Labor Rate ($/MH)	Labor Cost
Skylight Infills	MH	96	$59.87	$5,747.52
Stair #44 & Rails	MH	116	$59.87	$6,944.92
Stair #44B and Rails	MH	32	$59.87	$1,915.84
New Door Support Steel	MH	60	$59.87	$3,592.20
			Subtotal:	$18,200.48

Line Item	Unit	Quanity	Labor Rate ($/MH)	Labor Cost
Skylight Infills	MH	96	$59.87	$5,747.52
Stair #44 & Rails	MH	116	$59.87	$6,944.92
Stair #44B and Rails	MH	32	$59.87	$1,915.84
New Door Support Steel	MH	60	$59.87	$3,592.20
			Subtotal:	$18,200.48

Steel Subtotal: $54,537.96

General Condition Estimate Summary

The general conditions estimate for the Cafeteria project required a lot of attention to detail. Since the cafeteria modernization is taking place in the middle of the greater Department of Interior Modernization Project, many general conditions cost may be either duplicated or omitted. Field offices are one particular general condition cost that is left out of the cafeteria estimate. The offices already exist for the general contractor, construction manager, and various subcontractors on the ground floor of Wing 5. These offices have been used throughout the DOI Modernization project, and thus know new facilities are necessary. In addition, all temporary utilities already exist in the field offices have thus been paid for in the original contract. When reviewing a general contractor's general conditions estimate, it is critical for the owner to have an experienced construction management agency to catch duplicated cost.

TOTAL GENERAL CONDITIONS COST: **$1,844,837.00**

*Cost will be adjusted in coordination with proposed schedule changes

Staffing

Line Item	Unit Cost	Unit	Quantity	Cost
*Executive Project Manager	120.00	Hrs	500	$60,000
*Project Management	85.00	Hrs	1500	$127,500
*Assistant Project Management	45.00	Hrs	1500	$67,500
*Superintendence	85.00	Hrs	2000	$170,000
*MEP Coordinator	85.00	Hrs	500	$42,500
LEED Consultant	5000	LS	1	$5,000
*CPM Scheduling	800	Mo	12	$9,600
*Project Administrator	45.00	Hrs	1500	$67,500
*Quality Control Manager	85.00	Hrs	1000	$85,000
			Total:	**$634,600.00**

Construction Materials and Equipment

Line Item	Unit Cost	Unit	Quantity	Cost
*Dumpster	5486	Mo	12	$65,832
*Construction Fence	600	Mo	12	$7200
Entrance Mats	450	LS	1	$450
Negative Air Machines	1500	Ea	6	$9,000
Historic Column Tile Protection	180	Ea	40	$7,200
Historic Wall Tile Protection	30	LF	300	$9,000
Mural Protection	600	Ea	3	$1,800
Crane Services	8,255	Ea	1	$8,255
			Subtotal:	**$108,737**

Miscellaneous

		Subcontractor Work Total	$5,717,000
		Grunley Work Total	$820,000
		Subtotal	**$6,537,000**

Line Item	% of Subtotal	Cost
Clean Up	2.00	$130,740
Safety/ Protection	1.00	$65,370
Conveyance	0.50	$32,685
O&P on Grunley Work	21.00	$172,227
Commission on Subs	10.00	$571,700
Insurance	0.42	$27,455
Subcontractor and GC Bond	1.55	$101,323
	Subtotal:	**$1,101,500**

The PACE Roundtable was a successful gathering of both industry professionals and eager students. As with all fields, there are various industry issues that are at paving the future. Two issues that I found particularly interesting were High Performance Buildings and the Smart Grid. In attending these sessions I hoped to learn more about the topic, provide my input on the topic, and finally relate the topic to my thesis building.

Educating the Future Workforce for Delivering High Performance Building

Summary

The first part of this information session involved the collaboration of everyone in the room for deciding on who is responsible for delivering high performance buildings. Everyone in the room had different insight based on their past experiences as far as who they thought was responsible. Overall, a list of everyone from the owner, to the general public, to the facilities crew was called out. The rest of the meeting proceeded by calling out one part of the project team at a time and discussing the short comings, issues, and improvements necessary for making High Performance Buildings better.

The first member of the project team discussed was the owner. The first short coming mentioned arouse in the discussion for chasing LEED points as opposed providing a sustainable building. Often times, owners are ill-informed on what defines a High Performance Building. They are often willing to pay the extra money to receive that LEED plaque as opposed to making sure their building is as energy efficient and green as possible. This is a key industry issue, and it needs to be addressed. The lack of knowledge on the owner's side led into the discussion of the education of the building's facilities crew.

Many stories from industry professionals were provided telling of complex high performance building systems that were completely mismanaged by uneducated facilities crews. No matter how well designed and constructed a high performance building may be, it will be just as inefficient as a poorly designed building if it is not properly managed by facilities. Everyone in the room was in agreement that more needs to be done to bring facility crews up to snuff as far as maintaining high performance buildings.

A few other project participants were discussed in brief throughout the break out session. An interesting point was brought up in the discussion of

mechanical system designers who oversize equipment for both their own profit and for liability in design issues. Industry professionals from the mechanical contractor, general contractor, and designer roles were able to discuss each of their point of views on the topic.

Thesis Relevance

The education of the future workforce in producing High Performance Buildings directly applies to the modernization of the Department of Interior Project. The General Service Administration is one of the most experienced owners in the construction industry. They have records of hundreds of buildings in which they have owned and understand building energy use very well. The weak link in the project team lies in the facilities crew. Their lack of knowledge in advanced building systems became obvious upon retro commissioning of the first and second wings on the Department of Interior Building.

Since the first and second wings were constructed years ago without LEED consideration, GSA decided to achieve LEED certification in each wing by using retro-commissioning. The commissioning agent would constantly run in situations in which the facilities crew used quick fixes to solve problems which were crippling the system's original sustainable design. Lessons learned from that retro-commissioning were used in training the facilities staff for the cafeteria. A two week period of training meetings were held between the design, commissioning, facilities, owner, and construction management teams during project closeout for the cafeteria to ensure a smooth transition from design, to construction, to operations.

The cafeteria also provides a unique opportunity in that all members of the project team will be readily available on site if any issues in the building's system should arise. After the cafeteria is complete, the same project team will be used in the completion of the last two wings. Having the entire project team available for the facilities crew to go to for help and assistance is key in keeping a high performance building performing highly.

Key Contacts

Tyler Swartzwelder - Gilbane Building Company - Assistant Project Manager

The Smart Grid: Energy Impacts in the Building Industry

Summary

The smart grid seminar was a lot different than the one mentioned above. This was not to be unexpected, many of the people in the room had heard of the "smart grid" but few had any idea of what it actually entailed. The same type of discussion could have been had referring to BIM or Sustainability 10 years ago in a PACE seminar, because the topic is very new. Ten years from this PACE seminar, industry professionals will have plenty of work experience and example of how the smart grid has played into their projects.

The general consensus of the industry professionals and students in the room was a hunger for knowledge on what a smart grid actually is, and how it can be used to further advance the construction industry. Dr. Riley led the explanation of a Smart Grid and its relation to energy usage in buildings. Just in the thirty minutes everyone in the room were thinking of ideas of building energy usage could be tied to the smart grid such as, energy storage, or scheduling energy intensive activities at different times of the day. These simple discussions are key to developing the "Smart Grid" concept into the building industry. The best big ideas are born out of the little ideas discussed in meetings such as these.

Thesis Relevance

I attended the "Smart Grid" seminar out of pure interest and not necessarily to apply it to my thesis project. Upon further review, it seems that many of the smart grid philosophies could actually pertain to the Department of Interior Modernization. The General Service Administration owns a large amount of buildings and thus consumes a large amount of electricity. Any opportunities for energy saving would produce significant cost savings for them due to their scale of energy use.

The cafeteria project in particular already uses many of smart grid philosophies. During the hours when energy is in the highest demand and cost the most the cafeteria is not open and uses the minimum amount of power. More opportunities for smart grid principles are possible by doing most cooking and dish washing during low demand times of the day. Simple decisions like these can save the General Service Administration large amount of money in utility bills.

Key Contacts

Dr. Riley- PSU Architectural Engineering Department- Center for Sustainability