

**Pentagon – Wedge 3
Julie Rankin
Construction Management**



**Technical Assignment 2
Cost and Methods Analysis**

Contents

Detailed Project Schedule – Description-1-

Site Plan – Demolition Phase – Description-6-

Site Plan – Demolition Phase AutoCAD drawings-7-

Assemblies Estimate – Interior Metal Stud Walls-8-

Detailed Structural Systems Estimate-10-

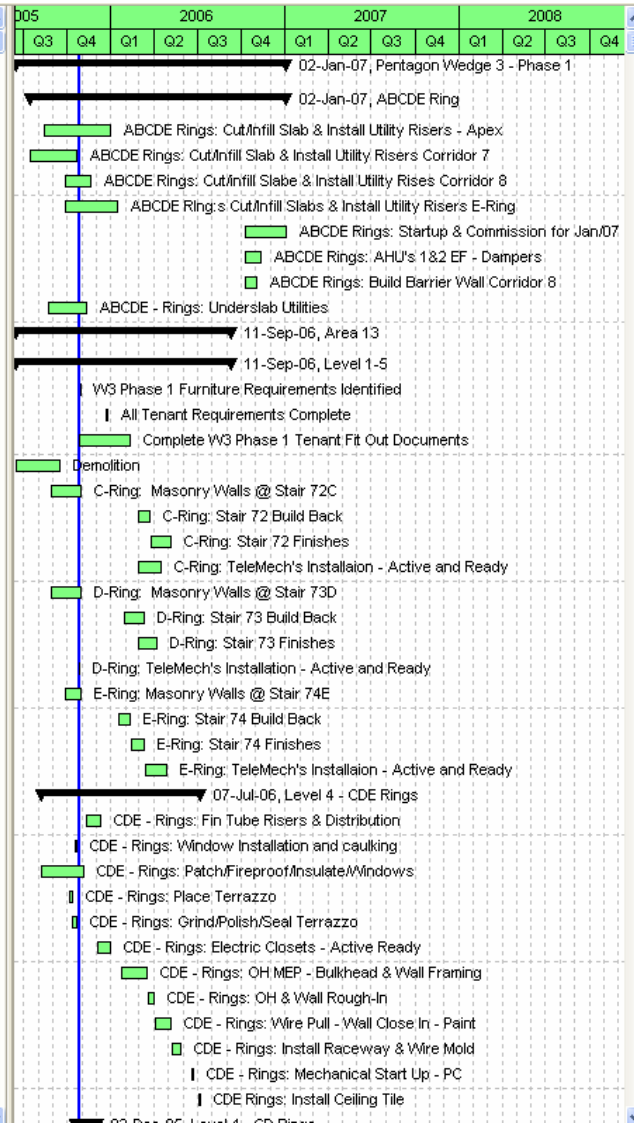
General Conditions Estimate-11-

Detailed Project Schedule

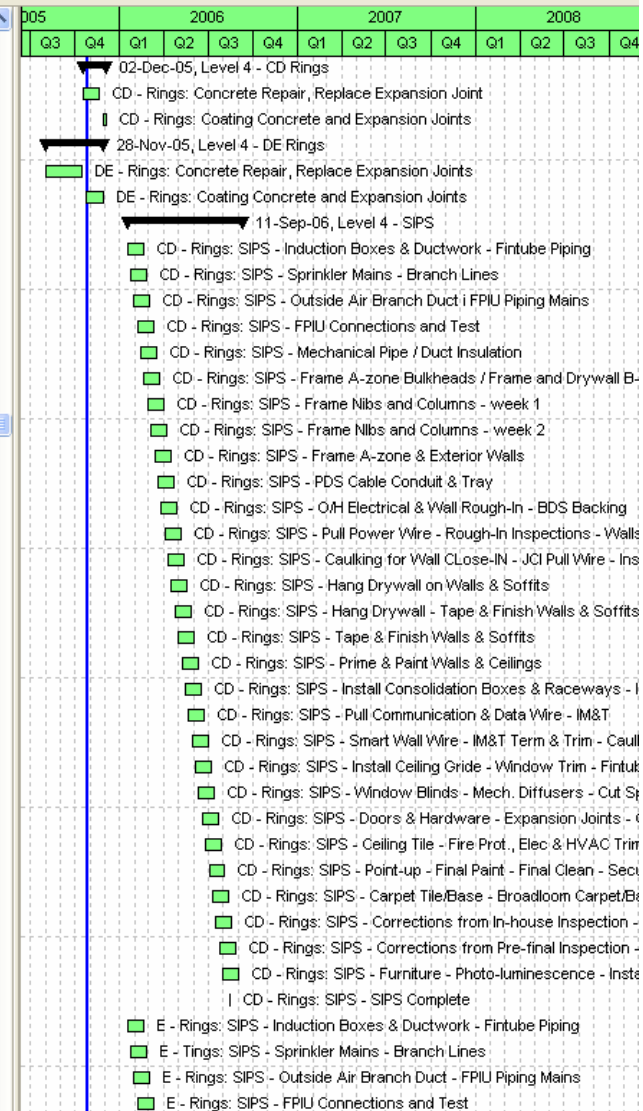
This detailed project schedule was developed using Primavera software. It shows the major steps of work for all of Wedge 3, phase one. The schedule begins with the demolition phase, shows structural cutting and concrete infill and patching, the major systems' installation, and also the SIPS schedule.

The SIPS schedule was used for the interior fit-out process, and is extremely visible on the following schedule, because each step of the SIPS process follows one week behind the previous, and each activity has the same duration.

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish
Pentagon Wedge 3 - Phase 1		392	392	0%	15-Jun-05	02-Jan-07
ABCDE Ring		371	371	0%	15-Jul-05	02-Jan-07
A01000	ABCDE Rings: Cut/Infill Slab & Install Utility Risers - Apex	96	96	54.17%	15-Aug-05	30-Dec-05
A01100	ABCDE Rings: Cut/Infill Slab & Install Utility Risers Corridor 7	70	70	100%	15-Jul-05	21-Oct-05
A01150	ABCDE Rings: Cut/Infill Slab & Install Utility Risers Corridor 8	40	40	57.5%	26-Sep-05	18-Nov-05
A01160	ABCDE Ring:s Cut/Infill Slabs & Install Utility Risers E-Ring	76	76	30.26%	26-Sep-05	13-Jan-06
A01220	ABCDE Rings: Startup & Commission for Jan/07	58	58	0%	09-Oct-06	02-Jan-07
A01230	ABCDE Rings: AHU's 1&2 EF - Dampers	25	25	0%	09-Oct-06	10-Nov-06
A01240	ABCDE Rings: Build Barrier Wall Corridor 8	20	20	0%	09-Oct-06	03-Nov-06
A1035	ABCDE - Rings: Under slab Utilities	59	59	79.66%	22-Aug-05	11-Nov-05
Area 13		315	315	0%	15-Jun-05	11-Sep-06
Level 1-5		315	315	0%	15-Jun-05	11-Sep-06
A1000	W3 Phase 1 Furniture Requirements Identified	1	1	0%	28-Oct-05*	28-Oct-05
A1010	All Tenant Requirements Complete	1	1	0%	23-Dec-05*	23-Dec-05
A1020	Complete W3 Phase 1 Tenant Fit Out Documents	73	73	0%	27-Oct-05	10-Feb-06
A1030	Demolition	66	66	100%	15-Jun-05	16-Sep-05
A1040	C-Ring: Masonry Walls @ Stair 72C	44	44	95.45%	29-Aug-05	28-Oct-05
A1050	C-Ring: Stair 72 Build Back	20	20	0%	27-Feb-06*	24-Mar-06
A1060	C-Ring: Stair 72 Finishes	30	30	0%	27-Mar-06*	05-May-06
A1070	C-Ring: TeleMech's Installaion - Active and Ready	35	35	0%	27-Feb-06*	14-Apr-06
A1080	D-Ring: Masonry Walls @ Stair 73D	44	44	95.45%	29-Aug-05	28-Oct-05
A1090	D-Ring: Stair 73 Build Back	30	30	0%	30-Jan-06*	10-Mar-06
A1100	D-Ring: Stair 73 Finishes	30	30	0%	27-Feb-06*	07-Apr-06
A1110	D-Ring: TeleMech's Installation - Active and Ready	1	1	0%	27-Oct-05	27-Oct-05
A1120	E-Ring: Masonry Walls @ Stair 74E	25	25	92%	26-Sep-05	28-Oct-05
A1130	E-Ring: Stair 74 Build Back	20	20	0%	16-Jan-06*	10-Feb-06
A1140	E-Ring: Stair 74 Finishes	20	20	0%	13-Feb-06*	10-Mar-06
A1150	E-Ring: TeleMech's Installaion - Active and Ready	35	35	0%	13-Mar-06*	28-Apr-06
Level 4 - CDE Rings		233	233	0%	08-Aug-05	07-Jul-06
A1200	CDE - Rings: Fin Tube Risers & Distribution	18	18	0%	11-Nov-05*	08-Dec-05
A1210	CDE - Rings: Window Installation and caulking	5	5	100%	17-Oct-05	21-Oct-05
B1000	CDE - Rings: Patch/Fireproof/Insulate/Windows	64	64	89.06%	08-Aug-05	04-Nov-05
B1010	CDE - Rings: Place Terrazzo	6	6	100%	05-Oct-05	12-Oct-05
B1020	CDE - Rings: Grind/Polish/Seal Terrazzo	6	6	100%	13-Oct-05	20-Oct-05
B1030	CDE - Rings: Electric Closets - Active Ready	19	19	0%	05-Dec-05*	30-Dec-05
B1640	CDE - Rings: OH MEP - Bulkhead & Wall Framing	40	40	0%	23-Jan-06	17-Mar-06
B1650	CDE - Rings: OH & Wall Rough-In	10	10	0%	20-Mar-06	31-Mar-06
B1660	CDE - Rings: Wire Pull - Wall Close In - Paint	25	25	0%	03-Apr-06	05-May-06
B1670	CDE - Rings: Install Raceway & Wire Mold	15	15	0%	08-May-06	26-May-06
B1680	CDE - Rings: Mechanical Start Up - PC	5	5	0%	19-Jun-06	23-Jun-06
B1690	CDE Rings: Install Ceiling Tile	4	4	0%	03-Jul-06	07-Jul-06

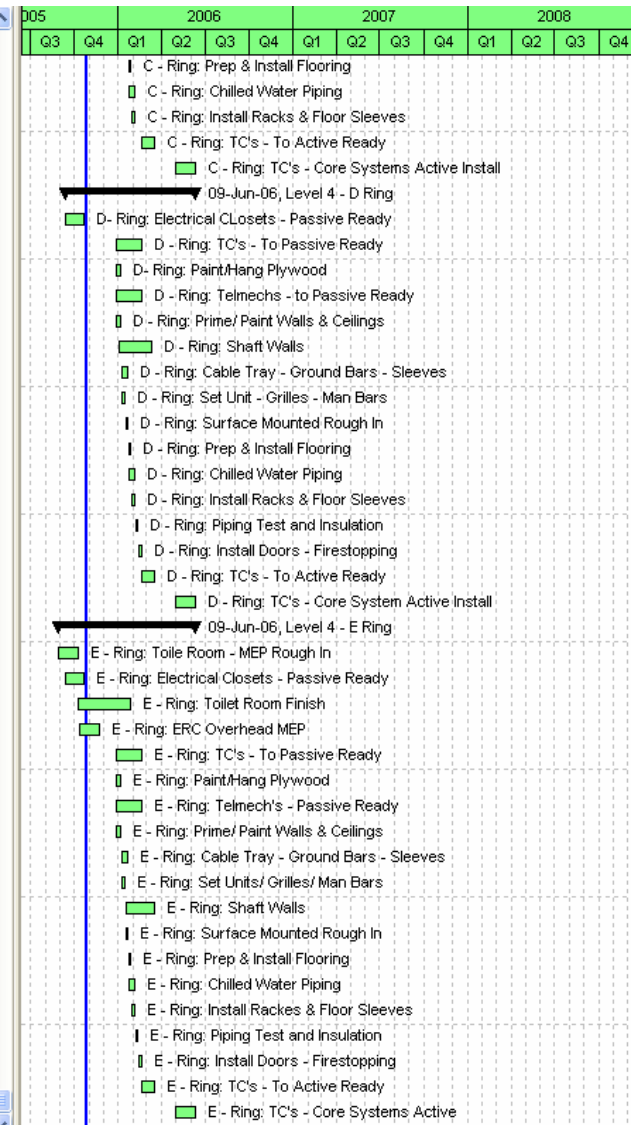


Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish
Level 4 - CD Rings						
A1160	CD - Rings: Concrete Repair, Replace Expansion Joint	33	33	0%	17-Oct-05	02-Dec-05
A1170	CD - Rings: Coating Concrete and Expansion Joints	5	5	0%	28-Nov-05*	02-Dec-05
Level 4 - DE Rings						
A1180	DE - Rings: Concrete Repair, Replace Expansion Joints	83	83	0%	01-Aug-05	28-Nov-05
A1190	DE - Rings: Coating Concrete and Expansion Joints	54	54	100%	01-Aug-05	14-Oct-05
Level 4 - SIPS						
B1040	CD - Rings: SIPS - Induction Boxes & Ductwork - Fintube Piping	24	24	0%	16-Jan-06*	17-Feb-06
B1050	CD - Rings: SIPS - Sprinkler Mains - Branch Lines	25	25	0%	23-Jan-06*	24-Feb-06
B1060	CD - Rings: SIPS - Outside Air Branch Duct i FPIU Piping Mains	25	25	0%	30-Jan-06*	03-Mar-06
B1070	CD - Rings: SIPS - FPIU Connections and Test	25	25	0%	06-Feb-06*	10-Mar-06
B1080	CD - Rings: SIPS - Mechanical Pipe / Duct Insulation	25	25	0%	13-Feb-06*	17-Mar-06
B1090	CD - Rings: SIPS - Frame A-zone Bulkheads / Frame and Dry...	25	25	0%	20-Feb-06*	24-Mar-06
B1100	CD - Rings: SIPS - Frame Nibs and Columns - week 1	25	25	0%	27-Feb-06*	31-Mar-06
B1110	CD - Rings: SIPS - Frame Nibs and Columns - week 2	25	25	0%	06-Mar-06*	07-Apr-06
B1120	CD - Rings: SIPS - Frame A-zone & Exterior Walls	25	25	0%	13-Mar-06	14-Apr-06
B1130	CD - Rings: SIPS - PDS Cable Conduit & Tray	25	25	0%	20-Mar-06	21-Apr-06
B1140	CD - Rings: SIPS - O/H Electrical & Wall Rough-In - BDS Backing	25	25	0%	27-Mar-06	28-Apr-06
B1150	CD - Rings: SIPS - Pull Power Wire - Rough-In Inspections - W...	25	25	0%	03-Apr-06	05-May-06
B1160	CD - Rings: SIPS - Caulking for Wall Close-IN - JCI Pull Wire - I...	25	25	0%	10-Apr-06	12-May-06
B1170	CD - Rings: SIPS - Hang Drywall on Walls & Soffits	25	25	0%	17-Apr-06	19-May-06
B1180	CD - Rings: SIPS - Hang Drywall - Tape & Finish Walls & Soffit...	25	25	0%	24-Apr-06	26-May-06
B1190	CD - Rings: SIPS - Tape & Finish Walls & Soffits	24	24	0%	01-May-06	02-Jun-06
B1200	CD - Rings: SIPS - Prime & Paint Walls & Ceilings	24	24	0%	08-May-06	09-Jun-06
B1210	CD - Rings: SIPS - Install Consolidation Boxes & Raceways - I...	24	24	0%	15-May-06	16-Jun-06
B1220	CD - Rings: SIPS - Pull Communication & Data Wire - IM&T	24	24	0%	22-May-06	23-Jun-06
B1230	CD - Rings: SIPS - Smart Wall Wire - IM&T Term & Trim - Caulki...	24	24	0%	30-May-06	30-Jun-06
B1240	CD - Rings: SIPS - Install Ceiling Grille - Window Trim - Fintube ...	24	24	0%	05-Jun-06	07-Jul-06
B1250	CD - Rings: SIPS - Window Blinds - Mech. Diffusers - Cut Spr...	24	24	0%	12-Jun-06	14-Jul-06
B1260	CD - Rings: SIPS - Doors & Hardware - Expansion Joints - O/H...	24	24	0%	19-Jun-06	21-Jul-06
B1270	CD - Rings: SIPS - Ceiling Tile - Fire Prot., Elec & HVAC Trim	24	24	0%	26-Jun-06	28-Jul-06
B1280	CD - Rings: SIPS - Point-up - Final Paint - Final Clean - Security...	24	24	0%	03-Jul-06	04-Aug-06
B1290	CD - Rings: SIPS - Carpet Tile/Base - Broadloom Carpet/Base - ...	25	25	0%	10-Jul-06	11-Aug-06
B1300	CD - Rings: SIPS - Corrections from In-house Inspection - Pre-...	25	25	0%	17-Jul-06	18-Aug-06
B1310	CD - Rings: SIPS - Corrections from Pre-final Inspection - HP F...	25	25	0%	24-Jul-06	25-Aug-06
B1320	CD - Rings: SIPS - Furniture - Photo-luminescence - Install Des...	25	25	0%	31-Jul-06	01-Sep-06
B1330	CD - Rings: SIPS - SIPS Complete	1	1	0%	14-Aug-06	14-Aug-06
B1340	E - Rings: SIPS - Induction Boxes & Ductwork - Fintube Piping	25	25	0%	16-Jan-06	17-Feb-06
B1350	E - Rings: SIPS - Sprinkler Mains - Branch Lines	25	25	0%	23-Jan-06	24-Feb-06
B1360	E - Rings: SIPS - Outside Air Branch Duct - FPIU Piping Mains	25	25	0%	30-Jan-06	03-Mar-06
B1370	E - Rings: SIPS - FPIU Connections and Test	25	25	0%	06-Feb-06	10-Mar-06



Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Gantt Chart															
							2005		2006				2007				2008					
							Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
B1380	E - Rings: SIPS - Mechanical Pipe - Duct Insulation	25	25	0%	13-Feb-06	17-Mar-06																
B1390	E - Ring: SIPS - Frame A-zone Bulkheads / Frame and Drywall...	25	25	0%	20-Feb-06	24-Mar-06																
B1400	E - Ring: SIPS - Frame Nibs and Columns - week 1	25	25	0%	27-Feb-06	31-Mar-06																
B1410	E - Ring: SIPS - Frame Nibs and Columns - week 2	25	25	0%	06-Mar-06	07-Apr-06																
B1420	E - Ring: SIPS - Frame A-zone Bulkheads - Frame/Drywall B-z...	25	25	0%	13-Mar-06	14-Apr-06																
B1430	E - Ring: SIPS - PDS Cable Conduit & Tray	25	25	0%	20-Mar-06	21-Apr-06																
B1440	E - Ring: SIPS - O/H Electrical & Wall Rough-In - BDS Backing	25	25	0%	27-Mar-06	28-Apr-06																
B1450	E - Ring: SIPS - Pull Power Wire - Rough-In Inspections - Walls...	25	25	0%	03-Apr-06	05-May-06																
B1460	E - Ring: SIPS - Caulking for Wall Close-IN - JCI Pull Wire - Insul...	25	25	0%	10-Apr-06	12-May-06																
B1470	E - Ring: SIPS - Hang Drywall on Walls & Soffits	25	25	0%	17-Apr-06	19-May-06																
B1480	E - Ring: SIPS - Hang Drywall - Tape & Finish Walls & Soffits - ...	25	25	0%	24-Apr-06	26-May-06																
B1490	E - Ring: SIPS - Tape & Finish Walls & Soffits	24	24	0%	01-May-06	02-Jun-06																
B1500	E - Ring: SIPS - Prime & Paint Walls & Ceilings	24	24	0%	08-May-06	09-Jun-06																
B1510	E - Ring: SIPS - Install Consolidation Boxes & Raceways - Inst...	24	24	0%	15-May-06	16-Jun-06																
B1520	E - Ring: SIPS - Pull Communication & Data Wire - IM&T	24	24	0%	22-May-06	23-Jun-06																
B1530	E - Ring: SIPS - Smart Wall Wire - IM&T Term & Trim - Caulking ...	24	24	0%	30-May-06	30-Jun-06																
B1540	E - Ring: SIPS - Install Ceiling Grille - Window Trim - Fintube Co...	24	24	0%	05-Jun-06	07-Jul-06																
B1550	E - Ring: SIPS - Window Blinds - Mech. Diffusers - Cut Sprinkle...	24	24	0%	12-Jun-06	14-Jul-06																
B1560	E - Ring: SIPS - Doors & Hardware - Expansion Joints - O/H Cl...	24	24	0%	19-Jun-06	21-Jul-06																
B1570	E - Ring: SIPS - Ceiling Tile - Fire Prot., Elec & HVAC Trim	24	24	0%	26-Jun-06	28-Jul-06																
B1580	E - Ring: SIPS - Point-up - Final Paint - Final Clean - Security De...	24	24	0%	03-Jul-06	04-Aug-06																
B1590	E - Ring: SIPS - Carpet Tile/Base - Broadloom Carpet/Base - Fi...	25	25	0%	10-Jul-06	11-Aug-06																
B1600	E - Ring: SIPS - Corrections from In-house Inspection - Pre-fin...	25	25	0%	17-Jul-06	18-Aug-06																
B1610	E - Ring: SIPS - Corrections from Pre-final Inspection - HP Fina...	25	25	0%	24-Jul-06	25-Aug-06																
B1620	E - Ring: SIPS - Furniture - Photo-luminescence - Install Desk T...	25	25	0%	31-Jul-06	01-Sep-06																
B1630	E - Ring: SIPS - SIPS Complete	1	1	0%	11-Sep-06	11-Sep-06																
Level 4 - C Ring		190	190	0%	12-Sep-05	09-Jun-06																
C1000	C - Ring: Electrical Closets - Passive Ready	30	30	100%	12-Sep-05	21-Oct-05																
C1010	C - Ring: TC's to Passive Ready	38	38	0%	27-Dec-05	17-Feb-06																
C1020	C - Ring: Paint/Hang Plywood	38	38	0%	27-Dec-05	17-Feb-06																
C1030	C - Ring: Prime/Paint Walls & Ceilings	8	8	0%	27-Dec-05	06-Jan-06																
C1040	C - Ring: Shaft Walls	39	39	0%	03-Jan-06	24-Feb-06																
C1050	C - Ring: Cable Tray - Ground Bars - Sleeves	10	10	0%	09-Jan-06	20-Jan-06																
C1060	C - Ring: Set units/ Grilles/Man Bars	5	5	0%	09-Jan-06	13-Jan-06																
C1070	C - Ring: Surface Mounted Rough In	5	5	0%	16-Jan-06	20-Jan-06																

Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish
C1090	C - Ring: Prep & Install Flooring	5	5	0%	23-Jan-06	27-Jan-06
C1090	C - Ring: Chilled Water Piping	10	10	0%	23-Jan-06	03-Feb-06
C1100	C - Ring: Install Racks & Floor Sleeves	5	5	0%	30-Jan-06	03-Feb-06
C1110	C - Ring: TC's - To Active Ready	20	20	0%	20-Feb-06	17-Mar-06
C1120	C - Ring: TC's - Core Systems Active Install	29	29	0%	01-May-06	09-Jun-06
Level 4 - D Ring		190	190	0%	12-Sep-05	09-Jun-06
C1130	D - Ring: Electrical Closets - Passive Ready	30	30	100%	12-Sep-05	21-Oct-05
C1140	D - Ring: TC's - To Passive Ready	38	38	0%	27-Dec-05	17-Feb-06
C1150	D - Ring: Paint/Hang Plywood	8	8	0%	27-Dec-05	06-Jan-06
C1160	D - Ring: Telmechs - to Passive Ready	38	38	0%	27-Dec-05	17-Feb-06
C1170	D - Ring: Prime/ Paint Walls & Ceilings	8	8	0%	27-Dec-05	06-Jan-06
C1180	D - Ring: Shaft Walls	49	49	0%	03-Jan-06	10-Mar-06
C1190	D - Ring: Cable Tray - Ground Bars - Sleeves	10	10	0%	09-Jan-06	20-Jan-06
C1200	D - Ring: Set Unit - Grilles - Man Bars	5	5	0%	09-Jan-06	13-Jan-06
C1210	D - Ring: Surface Mounted Rough In	5	5	0%	16-Jan-06	20-Jan-06
C1220	D - Ring: Prep & Install Flooring	5	5	0%	23-Jan-06	27-Jan-06
C1230	D - Ring: Chilled Water Piping	10	10	0%	23-Jan-06	03-Feb-06
C1240	D - Ring: Install Racks & Floor Sleeves	5	5	0%	30-Jan-06	03-Feb-06
C1250	D - Ring: Piping Test and Insulation	5	5	0%	06-Feb-06	10-Feb-06
C1260	D - Ring: Install Doors - Firestopping	5	5	0%	13-Feb-06	17-Feb-06
C1270	D - Ring: TC's - To Active Ready	20	20	0%	20-Feb-06	17-Mar-06
C1280	D - Ring: TC's - Core System Active Install	29	29	0%	01-May-06	09-Jun-06
Level 4 - E Ring		199	199	0%	29-Aug-05	09-Jun-06
C1290	E - Ring: Toile Room - MEP Rough In	29	29	100%	29-Aug-05	07-Oct-05
C1300	E - Ring: Electrical Closets - Passive Ready	30	30	100%	12-Sep-05	21-Oct-05
C1310	E - Ring: Toilet Room Finish	76	76	17.11%	10-Oct-05	27-Jan-06
C1320	E - Ring: ERC Overhead MEP	30	30	33.33%	13-Oct-05	23-Nov-05
C1330	E - Ring: TC's - To Passive Ready	38	38	0%	27-Dec-05	17-Feb-06
C1340	E - Ring: Paint/Hang Plywood	8	8	0%	27-Dec-05	06-Jan-06
C1350	E - Ring: Telmech's - Passive Ready	38	38	0%	27-Dec-05	17-Feb-06
C1360	E - Ring: Prime/ Paint Walls & Ceilings	8	8	0%	27-Dec-05	06-Jan-06
C1370	E - Ring: Cable Tray - Ground Bars - Sleeves	10	10	0%	09-Jan-06	20-Jan-06
C1380	E - Ring: Set Units/ Grilles/ Man Bars	5	5	0%	09-Jan-06	13-Jan-06
C1390	E - Ring: Shaft Walls	45	45	0%	16-Jan-06	17-Mar-06
C1400	E - Ring: Surface Mounted Rough In	5	5	0%	16-Jan-06	20-Jan-06
C1410	E - Ring: Prep & Install Flooring	5	5	0%	23-Jan-06	27-Jan-06
C1420	E - Ring: Chilled Water Piping	10	10	0%	23-Jan-06	03-Feb-06
C1430	E - Ring: Install Racks & Floor Sleeves	5	5	0%	30-Jan-06	03-Feb-06
C1440	E - Ring: Piping Test and Insulation	5	5	0%	06-Feb-06	10-Feb-06
C1450	E - Ring: Install Doors - Firestopping	5	5	0%	13-Feb-06	17-Feb-06
C1460	E - Ring: TC's - To Active Ready	20	20	0%	20-Feb-06	17-Mar-06
C1470	E - Ring: TC's - Core Systems Active	29	29	0%	01-May-06	09-Jun-06



Site Plan – Demolition Phase



Fig. 1 – Site congestion on the mall entrance.

Included on the Demolition site plan is the access roads for trucks, as well as the location of some trucks. As visible in figure 1, much of the site is utilized for storage of various machines, including lifts and bobcats. The site plan will also detail some material storage areas. Finally, the temporary ramp over the mall terrace entrance steps and the permanent ramp that was poured over the moat will be shown, both of which are intended to removed waste material from site.



Fig. 3 – A bobcat pushes waste out of the trash chute.

The Wedge 3 Demolition phase requires a lot of on site coordination. Though the site is relatively large outside, the site is extremely congested during demolition phases, because there are dozens of trucks removing waste daily. The site is also full of bobcats and dumpsters to move and store demoed materials. Also, during this phase, the slab penetrations and infills are underway, therefore, there will be present on site concrete trucks and buggies.

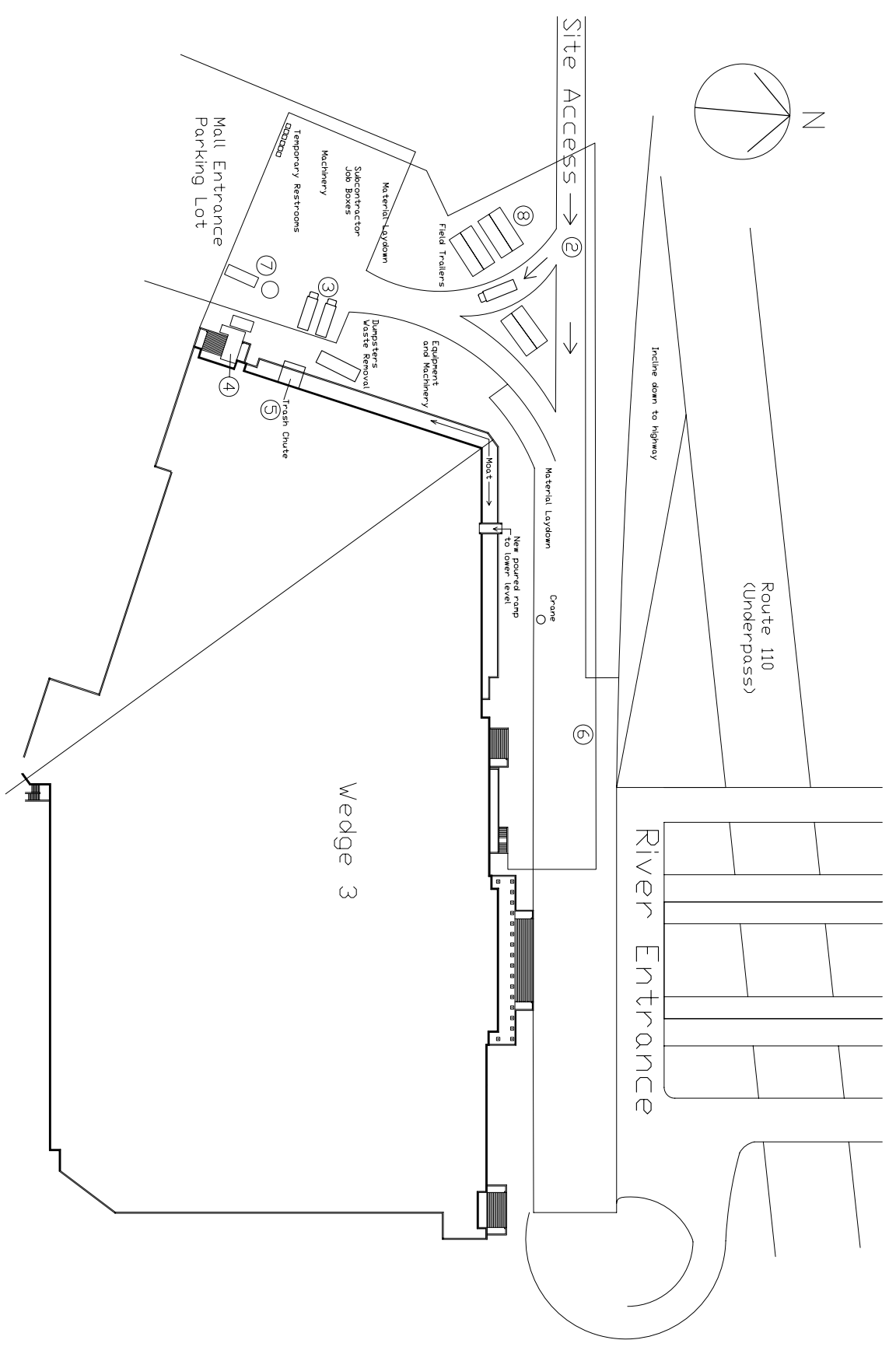
Fig. 2 – Concrete truck and boom pump on site.



Waste is also removed by way of the trash chute, which is also detailed on the site plan.

General Notes

1. Site conditions during Demolition
2. Labeled Access Road open only to construction vehicles; not tenants
3. Trucks remove waste from Site - dozens / day
4. Temporary ramp for bobcats to deliver scrap to dumpsters and trucks
5. Trash chute located here for Phase I demolition only
6. Temporary Fence
7. Concrete batch mixer and pump truck - pump concrete through windows
8. Field Trailers include only trailers within temporary fencing. Office, design and DC trailers are located at the South Terrace.



No.	Revision/Issue	Date

From Name and Address

Site Plan - Demolition

Project Name and Address

Pentagon Renovation -
Wedge 3
The Pentagon
Arlington, VA

Project Sheet

Date

Scale $\frac{1}{8}'' = 1'-0''$

Site Plan Demolition 1

Assemblies Estimate

Wedge 3 interior walls are built on metal studs, with gypsum board framing. However, there are several wall types used, they are not all typical. Therefore, a detailed estimate of the interior metal stud walls was performed to better understand the magnitude and scope of the system. The estimate includes the interior walls for Wedge 3 – phase 1, which are areas 10, 12 and 14. The following estimate was developed using R.S. Means data for Assemblies.

Assemblies Estimate in CSI Uniformat

CSI UNIFORMAT	Item Description	S.F. of Partion	Mat. (\$)	Ins. (\$)	Total /sf. (\$)	Total cost / item (\$)
Metal Framing						
5400 400.5120	2-12" in metal stud, no GWB	3120.00	6.60	5.10	11.70	36504.00
5400 400.6190	12' high, 16 ga x 6"wide, 12"O.C.	4530.00	25.00	15.65	40.65	184144.50
Building Insulation						
07210 950.0140	6" Cavity Insulation, 23" wide	18510.00	0.35	0.17	0.52	9625.20
Gypsum Board						
09250 700.0390	1/2" GWB Laminate - one side	14160.00	0.28	0.71	0.99	14018.40
9260 100.9400	2 layer 5/8" GWB, both sides	4530.00	2.03	2.03	4.06	18391.80
Acoustical Treatment						
9800 500.1000	2-1/2" Sound Atten Blanket	18525.00	0.29	0.30	0.59	10929.75
9800 500.1500	3-1/2" Sound Attenuation Blanket	23400.00	0.40	0.30	0.70	16380.00
Drywall Partitions						
10100 126.5300	Specific wall type	4665.00	0.83	1.90	2.73	12735.45
10100 126.5450	Specific wall type	41460.00	0.93	2.30	3.23	133915.80
10100 126.5500	Specific wall type	14505.00	0.64	1.44	2.08	30170.40
10100 126.5900	Specific wall type	1290.00	0.83	1.90	2.73	3521.70
10100 126.6100	Specific wall type	13080.00	1.32	2.38	3.70	48396.00
10100 128.0140	1 extra 2-1/2" metal stud	1290.00	0.73	0.85	1.58	2038.20
10100 128.0280	16 gage, 6" metal stud	18510.00	1.33	1.03	2.36	43683.60
10100 128.0646	Resilient Furring - 1 side	12060.00	0.15	1.14	1.29	15557.40
10100 128.0880	3-1/2" Fiberglass Insulation	33015.00	0.44	0.28	0.72	23770.80
10100 128.0920	1" Rigid Insulation	18510.00	0.40	0.45	0.85	15733.50
10100 128.0980	Textured Finish w/ mesh rein	18510.00	0.40	0.50	0.54	9995.40
10100 126.6250		450.00	1.14	2.76	3.90	1755.00

Assemblies Estimate by Typical Wall Types

Wall Type	Additions	L.F. of Partition	S.F. of Partion	Mat (\$)	Install (\$)	Total cost /sf (\$)	Total cost / item (\$)
P0.1		382.00	5730.00	0.93	2.30	3.23	18507.90
	3-1/2" Sound Atten. Blanket	382.00	5730.00	0.40	0.30	0.70	4011.00
P0.3		838.00	69135.00	0.64	1.44	2.08	143800.80
	3-1/2" Fiberglass Insulation	838.00	69135.00	0.44	0.28	0.72	49777.20
P0.7		48.00	3960.00	0.83	1.90	2.73	10810.80
	1 extra 2-1/2" metal stud	48.00	3960.00	0.73	0.85	1.58	6256.80
	2-1/2" Sound Atten Blanket	48.00	3960.00	0.29	0.30	0.59	2336.40
P0.13		1234.00	101805.00	0.93	2.30	3.23	328830.15
	3-1/2" Fiberglass Insulation	1234.00	101805.00	0.44	0.28	0.72	73299.60
	16 gage, 6" metal stud	1234.00	101805.00	1.33	1.03	2.36	240259.80
	6" Cavity Insulation, 23" wide	1234.00	101805.00	0.35	0.17	0.52	52938.60
	1" Rigid Insulation	1234.00	101805.00	0.40	0.45	0.85	86534.25
	1/2" Cement Board	1234.00	101805.00				0.00
	Textured Finish w/ mesh rein.	1234.00	101805.00	0.40	0.50	0.54	54974.70
P0.15		311.00	25675.50	0.83	1.90	2.73	70094.12
	2-1/2" Sound Atten Blanket	311.00	25675.50	0.29	0.30	0.59	15148.55
P0.16		129.00	10642.50	0.64	1.44	2.08	22136.40
	3-1/2" Fiberglass Insulation	129.00	10642.50	0.44	0.28	0.72	7662.60
P0.17	2-12" in metal stud, no GWB	107.00	8827.50	6.60	5.10	11.70	103281.75
P0.75		38.00	3135.00	0.83	1.90	2.73	8558.55
	1 extra 2-1/2" metal stud	38.00	3135.00	0.73	0.85	1.58	4953.30
	2-1/2" Sound Atten Blanket	38.00	3135.00	0.29	0.30	0.59	1849.65
P1.1		204.00	16830.00	0.93	2.30	3.23	54360.90
	3-1/2" Sound Attenuation Blanket	204.00	16830.00	0.40	0.30	0.70	11781.00
P1.1G		944.00	77880.00	0.93	2.30	3.23	251552.40
	3-1/2" Sound Attenuation Blanket	944.00	77880.00	0.40	0.30	0.70	54516.00
	1/2" GWB Laminate - one side	944.00	77880.00	0.28	0.71	0.99	77101.20
P2.1		30.00	2475.00	1.14	2.76	3.90	9652.50
	3-1/2" Sound Attenuation Blanket	30.00	2475.00	0.40	0.30	0.70	1732.50
P2.3	2-12" in metal stud, no GWB	101.00	8332.50	6.60	5.10	11.70	97490.25
		101.00	8332.50				0.00
P2.20		804.00	66330.00	1.32	2.38	3.70	245421.00
	2-1/2" Sound Atten. Blanket	804.00	66330.00	0.29	0.30	0.59	39134.70
	Resilient Furring - 1 side	804.00	66330.00	0.15	1.14	1.29	85565.70
P2.37	12' high, 16 ga x 6" wide, 12" O.C.	302.00	24915.00	25.00	15.65	40.65	1012794.75
	2 layer 5/8" GWB, both sides	302.00	24915.00	2.03	2.03	4.06	101154.90
P2.40		34.00	2805.00	1.32	2.38	3.70	10378.50
		34.00	2805.00	1.32	2.38	3.70	10378.50
	2-1/2" Sound Atten. Blanket	34.00	2805.00	0.29	0.30	0.59	1654.95
						Total Cost=	3370692.66

Detailed Structural Systems Estimate

Though much of the structure of this project will remain the original cast-in-place concrete that was poured in 1941 to 1942, the structural and architectural drawings specify a lot of structural reinforcement, as well as changes to the existing structure.

The structural scope includes blocking up CMU walls around all stairwells. Before demolition, the stairwells were framed with red terracotta brick. Over the years it has lost structural integrity and is extremely brittle. Now an 8" CMU wall will protect the stairwells. All the stairwells are fire rated, with the walls fully caulked and fire proofed and metal doors.



Fig. 1 – A typical new concrete penetration in Wedge 3.

When the concrete was cast-in-place originally, it was done in such haste that there are inconsistencies in the slabs, which question the structural integrity, and certainly the aesthetics of the structure. Several of these areas will have old concrete cut out and new infill pours will resolve the issue.

Several locations in Wedge 3 have concrete that was evaluated by structural engineers and found to be unsound. Therefore there will be patching in places where there is extreme honeycombing in columns and beams. There are places where rebar or wire is exposed to a dangerous degree, and these areas will also be patched for structural soundness. Also, old conduit runs will be filled in with fireproofing material.

The last structural changes include areas where new concrete slabs over metal deck will be poured. Some of these will be small areas with thin slabs, while others will be much larger areas with a six and a half inch slab.

There will be several new penetrations cut in the existing concrete slabs, for both utilities and for people moving systems, namely elevators and an escalator. Many of these new penetrations will be reinforced with steel beams around the openings. Also angles and L beams will be used to reinforce areas around penetrations.

Fig. 2 – Angle reinforcement at a new penetration and CMU wall.



For this estimate, a region was chosen as a typical area and all of the structural work for this area was estimated. The area is level three, area 10, B ring, column line 8.29 through 8.23. The area has one slab infill, one slab cut, and structural steel reinforcement installation. Also a typical masonry wall and typical fire stair, namely stair 72 on the third floor C ring, were analyzed for a general structural estimate.

Assumptions and Specifications for the typical bay:

Masonry Fire Stair

- An example of the most typical fire stair is Stair 72C on the third floor.
- 62 linear feet of masonry wall with fifteen feet ceiling height
 - $(62 \text{ lf}) * (15') = 930 \text{ sf}$
- The steel reinforcing is 16" O.C. around entire perimeter of masonry
 - $(62 \text{ lf}) / (1.33') = 47 \text{ pieces}$
- For all the angles on the masonry walls

Masonry Wall

- The typical masonry wall is specified as the same type of wall as the masonry fire stair , therefore the cost per square foot of the above wall will be the same.

Demolition

- The selected typical region has one demolition cut. There is approximately 80 sf of concrete to be removed.
- The concrete is supported by existing steel joists
- Small demolitions are done in pieces, but larger demolition is done by removal in large pieces. Therefore for 80 sf of concrete:
 - $(80 \text{ sf}) * (4.5"/12") = 30 \text{ cf concrete}$
 - $(30 \text{ cf concrete}) * (150 \text{ lb/cf}) = 4,500 = 2.25 \text{ tons removal}$
- Existing steel joists will be removed with the slab
 - $(4 \text{ joists}) * (10' \text{ strip removed from each joist}) = 40 \text{ L.F. of joist demolition}$

Steel

- For the typical area chosen for analysis, there is new steel placed around the concrete slab cut:
 - (1) W 12 x 16
 - (2) L 2"x2" x 1/4" (one on each side)
 - (4) L 1-3/4" x 1-3/4" – 1/4" – 7" long (two on each side, welded to existing joist)

Slab Infill

- Structural infills are a 3-1/2" composite slab on 3" 20 gage galvanized metal decking, for a 6-1/2" slab.

- The metal reinforcing is 6x6 W2.1/W2.1 WWF.
- The concrete is pumped in most cases.

<i>Concrete Demolition</i>										
CSI Unifomat		Item	Description	Unit	Mat Cost (\$)	Labor Cost (\$/sf)	Equip Cost (\$)	Total unit cost (\$)	Total of Unit	Total Cost / item (\$)
3055	.110.0050	Demolition	Concrete Demolition, Break up into small pieces, average rein.	CY	0.00	68.00	8.85	50.90	0.00	0.00
3055	.110.0150	Demolition	Concrete Demolition, Remove whole pieces, up to 2 tons	Each	0.00	42.00	22.00	64.00	3.00	192.00
3055	.110.0160	Demolition	Concrete Demolition, Remove whole pieces, 2-5 tons	Each	0.00	50.50	26.50	77.00	0.00	0.00
							Typical Area Total Cost		192.00	
<i>Steel Demolition</i>										
CSI Unifomat		Item	Description	Unit	Mat Cost (\$)	Labor Cost (\$/sf)	Equip Cost (\$)	Total unit cost (\$)	Total of Unit	Total Cost / item (\$)
5060	.110.0240	Demolition	Structural members, remove whole or cut up, 1/4 - 2 tons	Each	0.00	42.00	22.00	64.00	4.00	256.00
							Typical Area Total Cost		256.00	

<i>Typical Poured Deck</i>										
CSI Unifomat		Item	Description	Unit	Mat Cost (\$)	Labor Cost (\$/sf)	Equip Cost (\$)	Total unit cost (\$)	Total of Unit	Total Cost (\$) / item
5310	.300.0400	Metal Deck	3"-20 gage galvanized steel	sf	6.45	0.90	0.06	7.41	24.00	177.84
3220	.200.0200	Wire Mesh	6x6 W2.1/W2.1 WWF	sf	25.50	19.60	0.00	45.10	24.00	1082.40
3300	.220.0760	Concrete	Ready mix, Light Weight, 3 ksi	cy	111.00			111.00	0.33	36.63
3310	.700.1500	Placing Concrete	Elevated Slab, 6" to 10" thick, pumped	cy		11.50	4.70	16.20	0.33	5.35
		Studs	4-1/2" Headed Studs @ 12"	each						
							Typical Area Total Cost		1302.22	

<i>Steel</i>											
CSI Unifomat		Item	Description	Unit	MatCost (\$)	Labor Cost (\$/sf)	Equip Cost (\$)	Total unit cost (\$)	Total of Unit	Total Cost / item (\$)	
5120	.640.1300	Structural Steel	W12 x 24	L.F.	21.00	2.35	1.51	24.66	17.00	419.22	
5120	.440.0470	L shape angle	L 2" x 2" x 1.4"	L.F.	1.67	10.35	0.90	12.92	16.00	206.72	
									Typical Area Total Cost		625.94

<i>Typical Fire Stair</i>										
CSI Unifomat		Item	Description	Unit	Mat Cost (\$)	Labor Cost (\$/sf)	Total unit cost (\$)	Total of Unit	Total Cost (\$) / item	
4220	.210.4600	CMU	8"x8"x16', hollow, normal weight, 2 ksi	sf	1.63	3.45	5.08	930	4724.4	
4050	.200.0060	Reinforcing	Steel bars A615, placed vertical, #5 bars @ 16" O.C.	lb	0.4	0.63	1.03	47	48.41	
4050	.650.5500	Dowels	1/2" diameter, 6" long	each	78.5				0	
5120	.440.0400	Steel Angles	6"x3-1/2" x 1'-4" bent angle with (2) 1/2" dia. E.B.	lb	0.51	2.12	2.81		0	
5120	.440.0400	Steel Angles	5"x5"x3/8" @ 3' O.C.	lb	0.51	2.12	2.81		0	
							Typical Area Total Cost			4772.81

General Conditions Estimate

The following chart details the general conditions estimate. With a total of \$41,209,750, this estimate reflects a about %11 of the total project cost, which reflects an accurate estimate of the general conditions.

General Conditions		Unit	Bare Cost	Tot (O&P)	Total/item
Professional Consultant					
01107.100.0090	Architectural Fees, minimum	Proj.		4.90%	17983000
01107.300.1300	Structural Engineering Fees, maximum	Proj.		2.50%	9175000.00
Administrative Requirements					
01310.700.0010	Clerk - average		320	500	272000
01310.700.0100	Field Engineers - minimum	Week	765	1,200	2121600
01310.700.0180	Project Manager - minimum	Week	1,425	2,225	1815600
01310.700.0220	Project Manager - maximum	Week	1,850	2,875	977500
01310.700.0240	Superintendents - minimum	Week	1,375	2,150	1900600
01310.700.0280	Superintendents - maximum	Week	1,725	2,675	363800
01310.700.0290	Timekeeper, average	Week	890	1,375	561000
Construction Facilities					
01520.500.0550	Office Trailer, furnished, no hookups, 50'x10', Rent	Month	254	280	190400
01520.500.0700	Air conditioning for trailers	Month	39.5	43.5	29580
01520.500.0800	Delivery of trailer	Mile	1.53	1.68	11424
01520.500.0100	Field office expense, equip. rental	Month	143	157	106760
01520.500.0120	Office Supplies, average	Month	85	93.5	63580
01520.500.0140	Telephone Bill, including long dist.	Month	204	224	268800
01520.500.0160	Field office lights & HVAC	Month	98	108	73440
Temporary Construction					
01530.700.0100	Protection Stair Tread 3/4" thick	/ Tread	7.39	10.2	1020
Vehicular Access & Parking					
01550.700.1000	Ramp, 3/4" plywood on joists	S.F.	3.31	4.47	1341
01550.700.2200	Sidewalks, 2"X12" planks	S.F.	1.58	2.1	420
Barriers & Enclosures					
01560.100.1000	Gaurdrail wooden, 3' high	L.F.	2.74	3.76	1504
01560.100.1300	Barricade Tape, polyethelyne, 500' roll	Each	25	27.5	4125
01560.100.0200	Temporary Fence, rented chain link, over 1000' - one year	L.F.	4.01	4.89	11736
Equipment Rental					
01590.400.0600	Cart, concrete, self propelled, 10 C.F.	Each	495		39600
01590.400.1500	Finisher, float , 48" wide	Each	120		2880
01590.400.1800	Mixer, powered, mortar and concrete 10 c.f.	EAch	915		10980
01590.400.2120	Pump, concrete, truck mounted, 5" line	Each	10,500		21000
01590.400.0160	Aerial sizzor lift, to 25' high	Each	540		64800
01590.400.2040	Forklift, 28', 4 wheel drive	Each	2,075		83000
01590.400.3300	Ladders, extension, 16' to 36' long	Each	250		200000
01590.400.3405	Lance for cutting concrete	Each	945		113400
01590.400.3440	Level, laser type, rotating beam	Each	455		36400

01590.400.3460	Builders level with tripod and rod	Each	620	24800
01590.400.6000	Masonry Saw, table mounted, 14" diameter	Each	490	9800
01590.400.6100	Circular Saw, hand held, electric	Each	66	3960
01590.400.7620	Hazardous material truck	Each	2700	21600
01590.500.0300	Concrete batch plant, portable	Each	5150	20600
01590.600.0140	Boom work platform, 40'	Each	1,650	33000
01590.600.0150	Crane, crawler mounted, 100 ton	Each	15,300	275400
Execution Requirements				
01700.500.0040	Cleaning up after job, maximum	Job	0.30%	1101000
01700.500.0050	Cleanup of floor area, per day	S.F.	23.04	460800
Facility Operation				
01800.100.0150	Commissioning - O&M, training, maximum	Project	0.75%	2752500
			Total Cost =	\$41,209,750.00