

Tech Report 2



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Anumba
The Duffy School
Florence, NJ
10/17/2014

Executive Summary

The purpose of this technical report is to discuss the major aspects of The Marcella L. Duffy School Renovation and Addition in Florence, NJ. The major areas of this report are a detailed project schedule, site layout plans, a general conditions estimate, a detailed structural system estimate, MEP assembly's estimates, and a LEED evaluation of the building.

The project schedule was done using Microsoft Project. The schedule breaks the building into the scope of work performed throughout the phases of the project. The schedule has around two hundred and fifteen line items that range from the initial site clearing and grubbing, to the installation of the apartment appliances, all the way to the final inspection of each floor. The schedule starts on March 17th, 2014 and goes until March 31st, 2015.

The general conditions estimate performed represents the operational costs of the jobsite for the general contractor Gary F. Gardner Construction. The estimate was broken down into six different sections which includes supervision/project management, field engineering, administrative, safety, cleanup, and miscellaneous. The estimate found that supervision/project management would cost the most at over \$270,000 and safety cost the least at less than \$1,000.

A detailed quantity takeoff of the structural system was performed to reach a final estimate. All estimate costs were taken from RS Means Online. The Duffy School is a wood frame structure with a concrete slab on grade foundation. The entire estimate was done by performing quantity takeoffs of the concrete formwork, concrete rebar, the actual concrete, and the lumber. The lumber is estimated to cost the most while the concrete reinforcing will be the least expensive.

Other aspects of this report are the site layout plans, the MEP estimates, and the LEED evaluation. The site layout plans go through each phase of construction for the project. The MEP assemblies estimate go over the plumbing system, HVAC system, and the lighting/electrical system. The electrical system was estimated to cost the most while the plumbing system will be the least expensive. The LEED evaluation section goes over two different checklists, The Future Green Program Checklist and the LEED Certification Checklist.

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Project Schedule

Overview

The project schedule for The Duffy School Addition and Renovation was done using Microsoft Project and the actual full schedule can be found in Appendix A at the end of this report. This schedule breaks the building into the scope of work performed throughout the different phases of the project. The schedule has around two hundred and fifteen line items that range from the initial site clearing and grubbing, to the installation of the apartment appliances, all the way to the final inspection of each floor.

The Duffy School Addition and Renovation project schedule begins on April 21st, 2014 with a completion date of March 31st, 2015. The initial stage of securing the site and mobilization started in Mid-March of 2014 and take place until mid-April. Demolition and abatement is then scheduled to take place on April 24th and last for over forty five days. The building addition and renovation then gets split into four different section. The new addition of the eighteen apartment unit's starts on June 25th, 2014 and lasts until February 2nd, 2015. The new addition common space, which includes the corridor and stair tower, starts on October 21st, 2014 and is to be completed by February 2nd, 2015. The existing building apartment units are set to start on September 29th, 2014 and will be completed March 31st, 2015. The last section is the existing building common space, which includes the entertainment facility, craft room, library, fitness center, and community room. This part of the building is set to start on October 22nd, 2014 and be completed on March 31st, 2015.

A detailed schedule overview can be seen below, in table 1, where the main stages of the Duffy School Addition and Renovation can be seen.

Project Schedule Overview			
Phase	Start Date	Finish Date	Duration (Days)
Mobilization	17-Mar-14	25-Apr-14	30
Demolition	24-Apr-14	24-June-14	43
New Addition	25-June-14	20-Feb-15	173
New Addition-Common	21-Oct-14	20-Feb-15	89
Existing Building	29-Sept-14	31-Mar-15	132
Existing Building-Common	22-Oct-14	31-Mar-15	115

Table 1- Project Schedule Overview

Mobilization

The mobilization process for this project was started in mid-March with the securing of the site with a site fence that runs the perimeter of the school site. After the site was secured, Gary F. Gardner Construction was allowed to mobilize on the site. This included getting the mobile office trailer on site and bringing the necessary equipment that will be needed to complete the project. The mobilization phase is the shortest of all phases with a duration of only thirty days.

Demolition and Abatement

The next step after mobilization was to clear the site and to get rid of the structures that already existed on the land. These structures include a small house on the south east of the site and an addition to the school that was added in the early 1990's. These two structures will be completely demolished by the end of May. The next part of the demolition stage is the demolition and abatement of the existing school building. This is the longest task in this phase and takes right around forty days.

New Building (Apartments)

The new building will be added onto the east side of the existing Duffy School. The addition has three levels (ground, first, and second floor). The addition will add eighteen new apartment units. The first step is to frame the building which starts in the end of June and goes until mid-October 2014. After the building was framed the MEP was roughed in which allowed the installation of drywall, doors, windows and exterior finishes. These stages start in the middle of September and take a little under two months to complete. The final stage is to finish the units with paint, hard flooring, carpet, and all the appliances. This stage takes the longest time and once it is completed, the new building is considered complete.

New Building (Common Space)

The new building common space will be comprised of everything in the addition that is not one of the eighteen apartment units. This included the corridors on each floor and stairwell. The common space gets started with MEP rough in starting on the 21st of October and being completed around a month later on November 11th. The MEP rough in starts on the second floor of the building and works its way down to the first floor then finally the ground floor. Each rough in takes the same amount of time being ten days. Once the MEP is finished the drywall, trim, doors, and paint can be completed. These go in the same order starting from the top floor working down. Once the carpet and tile are installed, the final punchlist can be completed which signifies the completion of the new building on February 20th, 2015.

Existing Building (Apartments)

The existing building apartments' stage starts with the framing of each unit. There are a total of thirty five units. These units take twenty four days to complete and again follow the same order as the new building, with the framing starting on the second floor and working down to the ground floor. The next steps are the same as the new building with MEP rough in and the installation of drywall, doors, etc. A main difference now occurs with the placement of the historical windows, trim, and tin ceilings. These pieces were saved or restored from the original building during the demolition stage. Replacing these historical details takes around forty days due to the carefulness and precision that is required. Once the historical pieces are replaced the appliances and finishes can be installed in the apartment units.

Existing Building (Common Space)

The common spaces in the existing building are a lot bigger than the common space in the addition. In addition to the corridors and stairwells there is also an entertainment facility, craft room, library, fitness center, and community room. The steps for this phase are the same as the existing building, due to the fact that there are some historical features that need to be installed in the common spaces as well. The historical trim and tin ceiling tile take less time to install in the common space than in the apartments. A difference from the rest of the structure is the installation of the trash chute which takes five days. Once the existing building common space is completed in the end of March 2015, the entire project can be inspected and be 100% completed on March 31st, 2015.

Site Layout Plans

Demolition Phase

The Duffy School Addition and Renovation sits on the site of the original Duffy School. The school will stay in place, with an addition being added on the east side. The first phase of construction is the demolition of a small house that sits on the south east of the site and the excavation of the new addition. As seen below the demo phase uses one backhoe to tear down the small house and to dig through the existing parking lot, for the foundation of the new addition.

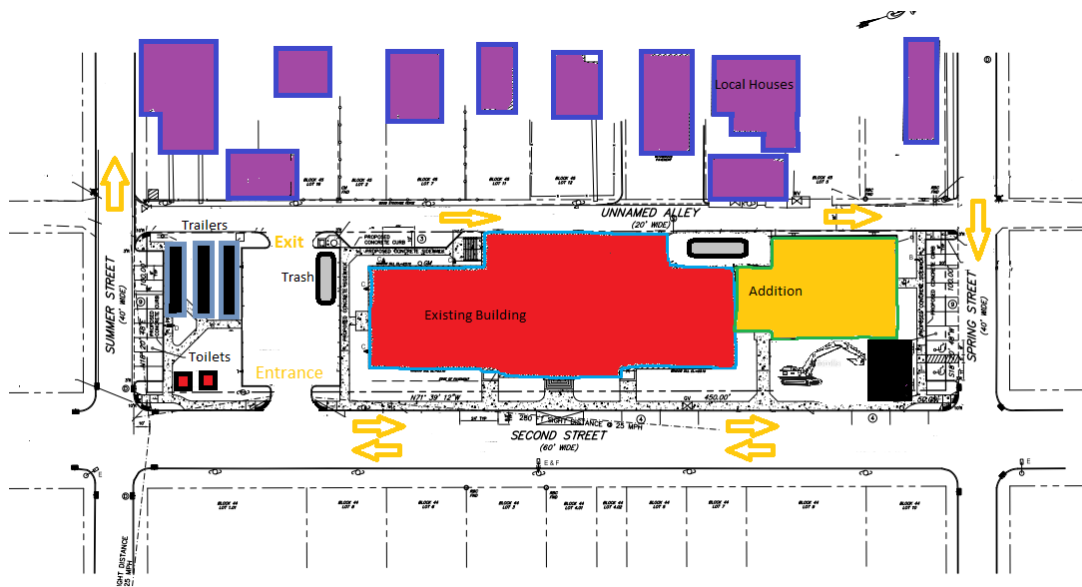


Figure 1- Demolition Phase

Building Frame Stage

The next phase of construction is the building framing for the addition and existing building. For this phase, two hydraulic fork lifts were brought to site for the moving and placement of materials. The material storage is located on the south east part of the site, in close proximity to where the small house once sat. The building frame phase can be seen below in Figure 2.

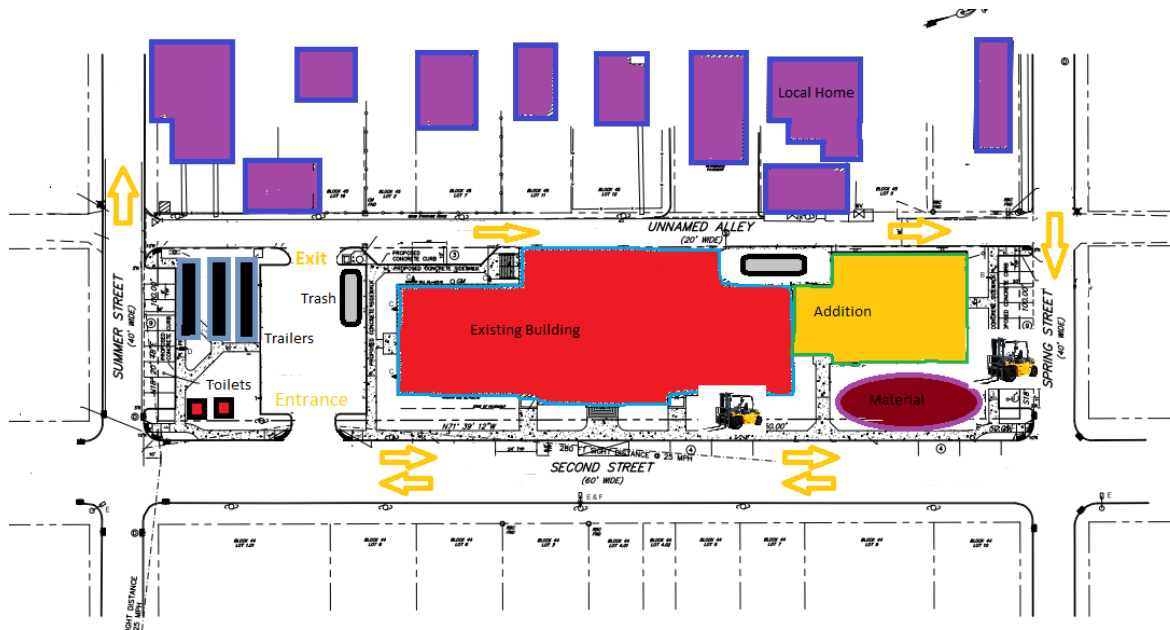


Figure 2- Building Frame Phase

Interior Finish Phase

The final phase of The Duffy School is the interior finish. Once the exterior of the building gets framed and the masonry is put up the last step is to finish the inside. This includes everything from painting, installing carpet, installing appliance, replacing historical trim, etc. For this phase all the material is now stored in the school and the forklifts are not needed anymore. As seen in Figure 3 below the material storage area and all large equipment have been removed.

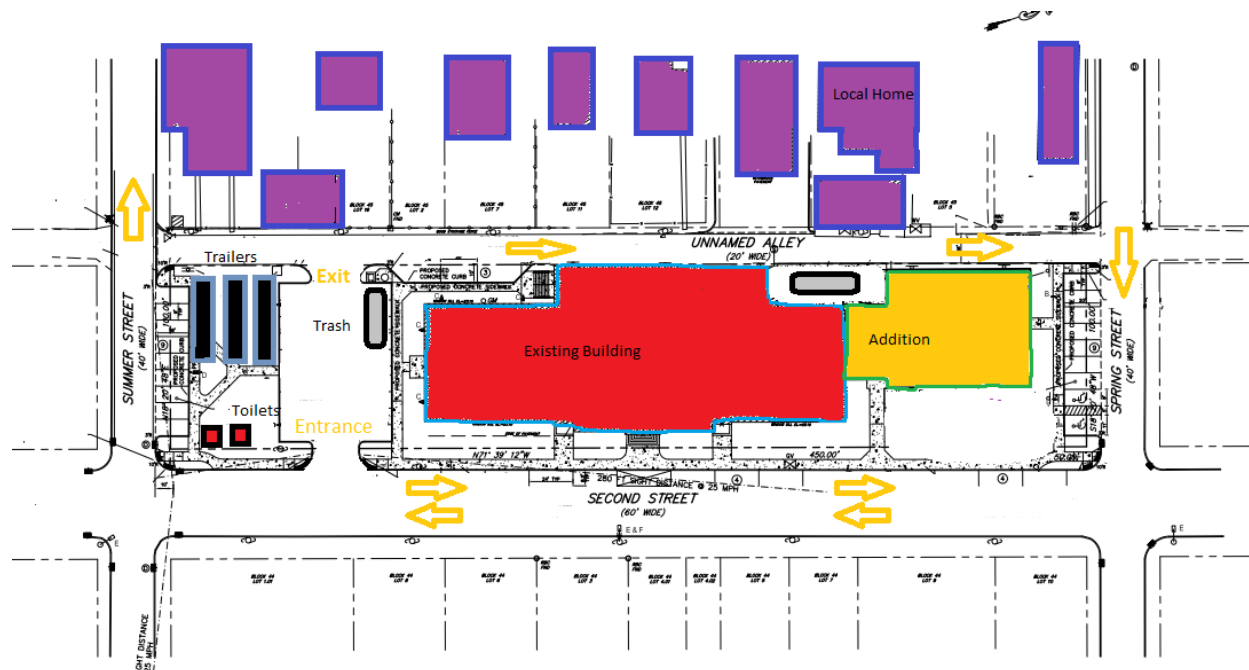


Figure 3- Interior Finish Phase

General Conditions Estimate

The general conditions estimate performed for the Duffy School Addition and Renovation represents the operational costs of the jobsite for the general contractor Gary F. Gardner Construction. The general conditions estimate can be found in Appendix C. The estimate was broken down into six different sections which includes supervision/project management, field engineering, administrative, safety, cleanup, and miscellaneous.

General Conditions Summary		
Section	Cost per Month	Total Cost (\$)
Project Management	\$22,758	\$273,104
Field Engineering	\$1,471	\$17,658
Administrative	\$5,953	\$71,435
Safety	\$56	\$670
Cleanup	\$4,838	\$58,059
Miscellaneous	\$362	\$4,339
Total	\$35,440	\$425,265

Table 2-General Conditions Summary

Table 2 above shows the general conditions estimate summary for the six main sections as noted above. The total cost of the project general conditions is \$425,265.00 which is 4.6% of the negotiated lump sum contract value for the project at \$9,290,265. With the general conditions estimate taking place over a 12 month period I divided the total by each month and found that general conditions cost around \$35,440 a month. The prices were found by using a combination of 2013 RS Means Construction Cost Data and actual known costs from previous projects. The most expensive out of the six sections was for project management. This section was 6% of the total cost, followed by administrative at 17%, cleanup at 14%, field engineering 4%, miscellaneous 1% and finally safety at less than 1%. The cost breakdown can be seen below in Figure 1.

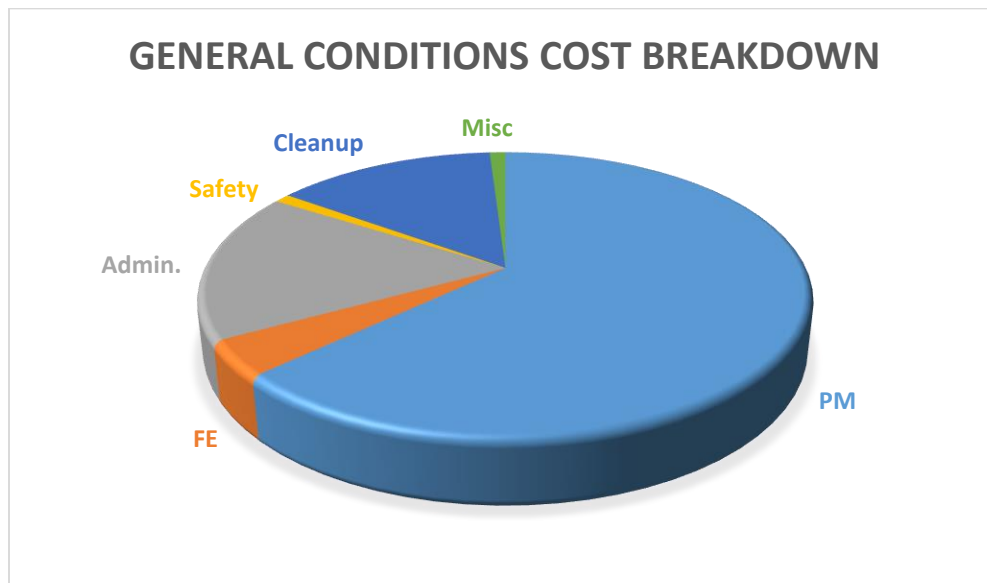


Figure 4-General Conditions Cost Breakdown

Detailed Structural Systems Estimate

A detailed quantity takeoff of the structural system was performed to reach a final estimate for the Duffy School project. All estimate costs were taken from RS Means Online and the actual estimate can be found in Appendix D. The Duffy School is wood frame structure with a concrete slab on grade foundation. There are also column footings for the wood beams. The entire estimate was done by performing quantity takeoffs of the concrete formwork, concrete rebar, the actual concrete, and the lumber. The lumber was broken down into five different sizes and the rebar was also broken down into two different sizes. The detailed structural estimate can be seen below.

Detailed Structural Schedule							
Item	Quantity	Unit	Material\$/Unit	Material Total	Labor\$/Unit	Labor Total	Total Cost
Formwork							
Footings	325	SFCA	\$2.97	\$965.25	\$9.50	\$3,087.50	\$4,052.75
Slab on Grade	1,480	SFCA	\$2.97	\$4,395.60	\$9.50	\$14,060.00	\$18,455.60
Reinforcing							
#4	2.89	TON	\$1,000.00	\$2,890.00	\$550.00	\$1,589.50	\$4,479.50
#5	2.45	TON	\$1,000.00	\$2,450.00	\$550.00	\$1,347.50	\$3,797.50
Concrete							
Footings	125	CY	\$110.00	\$13,750.00	\$73.00	\$9,125.00	\$22,875.00
Slab on Grade	950	CY	\$110.00	\$104,500.00	\$26.07	\$24,766.50	\$129,266.50
Lumber							
2x6	9,550	LF	\$1.23	\$11,746.50	\$1.55	\$14,802.50	\$26,549.00
2x8	1,553	LF	\$1.36	\$2,112.08	\$1.69	\$2,624.57	\$4,736.65
2x10	3,520	LF	\$2.10	\$7,392.00	\$1.88	\$6,617.60	\$14,009.60
Floor Truss	11,250	LF	\$27.19	\$305,887.50	\$4.25	\$47,812.50	\$353,700.00
Roof Truss	5,625	LF	\$35.14	\$197,662.50	\$4.11	\$23,118.75	\$220,781.25
Total Cost				\$653,751.43		\$148,951.92	\$802,703.35

Table 3- Detailed Structural Schedule

Formwork

For the formwork quantity takeoff, square foot contact area of concrete was calculated. The square foot contact area for the slab on grade formwork was 1,480. This was found by taking the perimeter of the slab on grade and multiplying it by the depth of the slab, which is four feet. The formwork for the footings could be reused so the total needed was only 325 SFCA. The material cost of formwork is right under three dollars a square foot which brought the total material price of footings to \$5,360. The labor rate to put up and take down the formwork was \$9.50 and was found using RS Means. The total labor for the formwork \$17,147. The total cost to buy the formwork material and install it came out to be \$22,507

Reinforcing

For the reinforcing quantity takeoff, tons of rebar was calculated. In the Duffy School there are two different types of rebar used, #4 and #5. The tons of rebar were found by first measuring the total length of each number rebar. It was found that there is around 3,860 linear feet of #4 rebar and around 5,110 linear feet of #5 rebar. Once the total linear feet of each number rebar was found, the weight of

that rebar in pounds was calculated. This got calculated by multiplying the total linear feet by the weight of the rebar in pounds per foot. #4 rebar is estimated to weigh around .668 lbs/ft., while #5 rebar weighs 1.043 lbs/ft. After the rebar length was put in pounds, an easy conversation was used to convert the pounds into the desired unit of tons.

Concrete

For the concrete quantity takeoff, cubic yards of concrete was calculated. The Duffy School does not have a large amount of concrete, concrete is just used for the slab on grade and for the footings. The slab on grade got poured on just the east side of the existing building where the new addition will be. To calculate the cubic yards for the slab on grade, the perimeter was first measured. It was found to be around 80' by 80'. Once the perimeter was found the cubic yards were calculated by converting the length and width into yards and multiplying it by the depth of the slab (in yards). The depth of the slab is 1.33 yards. The total cubic yards found for the slab on grade is 950. The material price per unit and the labor price per unit were found using RS Means Online. With those numbers the total price to place the concrete slab on grade was found to be \$129,265.

The footings were calculated the same way. The perimeter of the footings were found and multiplied by the depth. The total cubic yards for one footing was then multiplied by the total number of footings in the building which was found to be 28. The total price to place the concrete footings was found to be \$22,875.

Lumber

For the lumber quantity takeoff, the total linear feet was calculated. The lumber was broken down into five different pieces, 2x6, 2x8, 2x10, etc. The main load bearing walls in the Duffy School are comprised of 2x6 dimensional lumber. To find the total linear feet of 2x6, the building was broken down into bays. Each bay is similar with ten pieces of 2x6 over a distance of thirteen feet. It was found that there are 18 bays per floor, with three floors. Each floor uses approximately ten feet of 2x6 lumber. The total length of 2x6 lumber used in the bays was found to be 5,400 linear feet. 2x6's were also used as the headers, top plates, and bottom plates. The total perimeter of the wood structure was found and that number was used to calculate the total distance of 2x6 needed for the top and bottom plate. Each header length was calculated individually and added together to find the total length needed. A typical bay can be seen below in Figure 5.

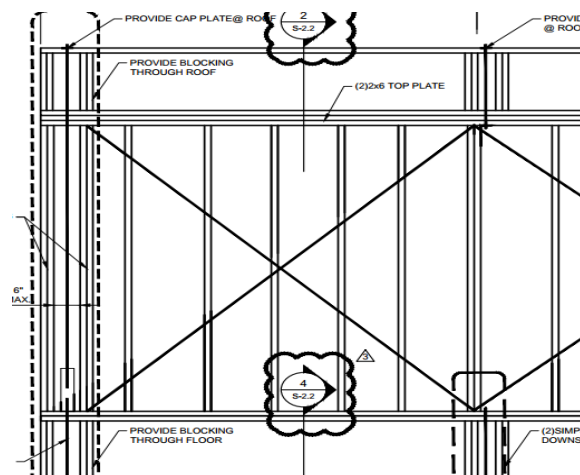


Figure 5- Typical Bay

The floor truss was calculated in a similar way. The total length of the floor truss was first found. Using online prices I found the average cost per foot of a typical floor truss. This number was multiplied by the total linear feet of floor truss. There are two sets of floor trusses, from ground to the first floor and from the first floor to the second floor. The total linear feet of floor truss was found to be 11,250 and was estimated to cost \$353,700. A typical floor truss can be seen below in Figure 6.

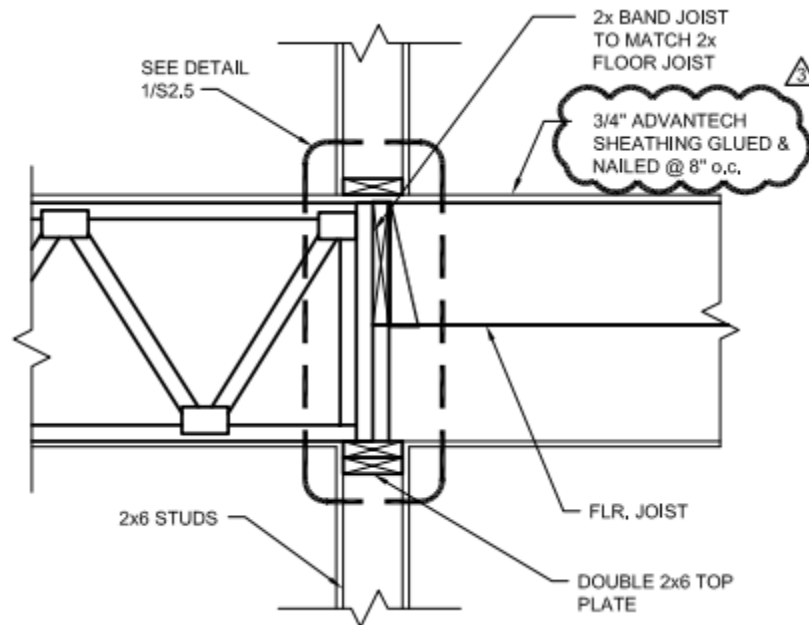


Figure 6- Typical Floor Truss

MEP Assemblies Estimate

The complete assemblies estimate can be found in Appendix E for the mechanical, electrical, and plumbing systems in The Duffy School Addition and Renovation. RS Means Online Assemblies Estimate was used for the takeoff values with the location being Vineland, NJ (within 10 miles). The HVAC system assemblies estimate came to \$478,770 while the actual estimate came out to \$727,944. The assemblies estimate was just about 34% of the actual cost. The plumbing equipment was original estimated at \$578,135 and the assemblies estimate came out to be \$745,750. The assemblies estimate was 22% more than the actual costs. Lastly, the electrical system actual cost was \$872,318 and the assemblies estimate came out to \$156,815. This had the biggest difference of just over 82%. A complete breakdown of this information can be seen below in Table 4.

System	Estimate cost	Actual Cost	Difference
Mechanical	\$478,770	\$727,944	34%
Plumbing	\$745,750	\$578,135	22%
Electrical	\$156,815	\$872,318	82%

Table 4-Assemblies Estimate Breakdown

While looking at the table above, it can be seen that there are large difference between the actual costs of the different systems and the assemblies estimate costs that were calculated. The major difference in the costs comes from the fact that in the assemblies estimate labor was no accounted for. The assemblies estimate just took into account the cost of each material. The amount of laborers it takes to complete each system is not known by me, so labor costs were excluded. If labor was added in to the mechanical and electrical system, the cost would go up greatly. Another factor in the mechanical system that made the costs different was the cost of demolition. The entire HVAC system that was originally in the Duffy School was completely removed and redone. The cost of this demolition was not known to me so it was also excluded. The main factor that caused the plumbing system to be so high was the fact that I chose the most expensive pieces of equipment. I do not have the exact model of toilet or tub provided to me so on RS Means I decided to go with the most expensive. This can be seen in Appendix E with the tub/shower system costing almost \$6,000 which is high for this type of project.

LEED Evaluation

In New Jersey in order to receive Federal Low Income Housing Tax Credit (LIHTC), the building owner has to decide which form of “Green Points” they wish to acquire for the project. There are three main ways to gain the required Green Points: Solar Hot Water or Water Retainage and Reuse System, Green Future Program, or LEED Certification. For the Duffy School Addition and Renovation, the owner decided not to go with LEED Certification but instead to use the Green Future Program.

The Green Future Program consists of a list of basic green building items that cover energy efficiency, renewable resources, siting & land use, water conservation, building durability, indoor air quality, and operations and maintenance. Beyond energy savings and generation, the Green Future Program works to create pleasant and healthy interiors for the residents. The full Green Future Program Checklist can be found in Appendix F. For these points to be acquired all items on the checklist must be completed. To complete some of the items, photographic evidence must be presented in the final report as well as a copy of the drawing or the drawing number and exact location of the item.

Some of the categories that needed to be completed for the Green Future Program are:

Site and Planning

This category includes the preservation plan, historical preservation plan, and pedestrian paths and bike trails. The preservation plan requirement is to minimize disturbed areas and preserve viable existing trees and vegetation. The benefit of this requirement is existing trees can provide shade, reduce cooling loads and provide comfortable outdoor spaces in summer. The historical preservation plan requirement is to submit documentation indicating the historic status of the building. The benefit of this requirement is because preserving the existing structure and historic character of a building has inherent ‘green’ qualities. This Green Future option seeks to not waste the energy in pre-existing and constructed materials.

Indoor Air Quality

This category includes automatic bathroom ventilation and direct vent of kitchen. The automatic bathroom ventilation requirement is to install fans that directly vent to the outside in bathrooms with automatic timer control. This is to eliminate the fan noise to help ensure ventilation utilization because nobody will turn it off since it is not too noisy. The automatic controls will increase ventilation and minimize potential odors, moisture, and smoke. The direct vent of kitchen requirement is all kitchen exhausts shall be directly vented to the outside. The benefits of this is because not all people use operable windows in the kitchen to ventilate smells, due to varying exterior temperatures and the use of HVAC. This direct vent will get rid of odors so there will be no residual smells in the units.

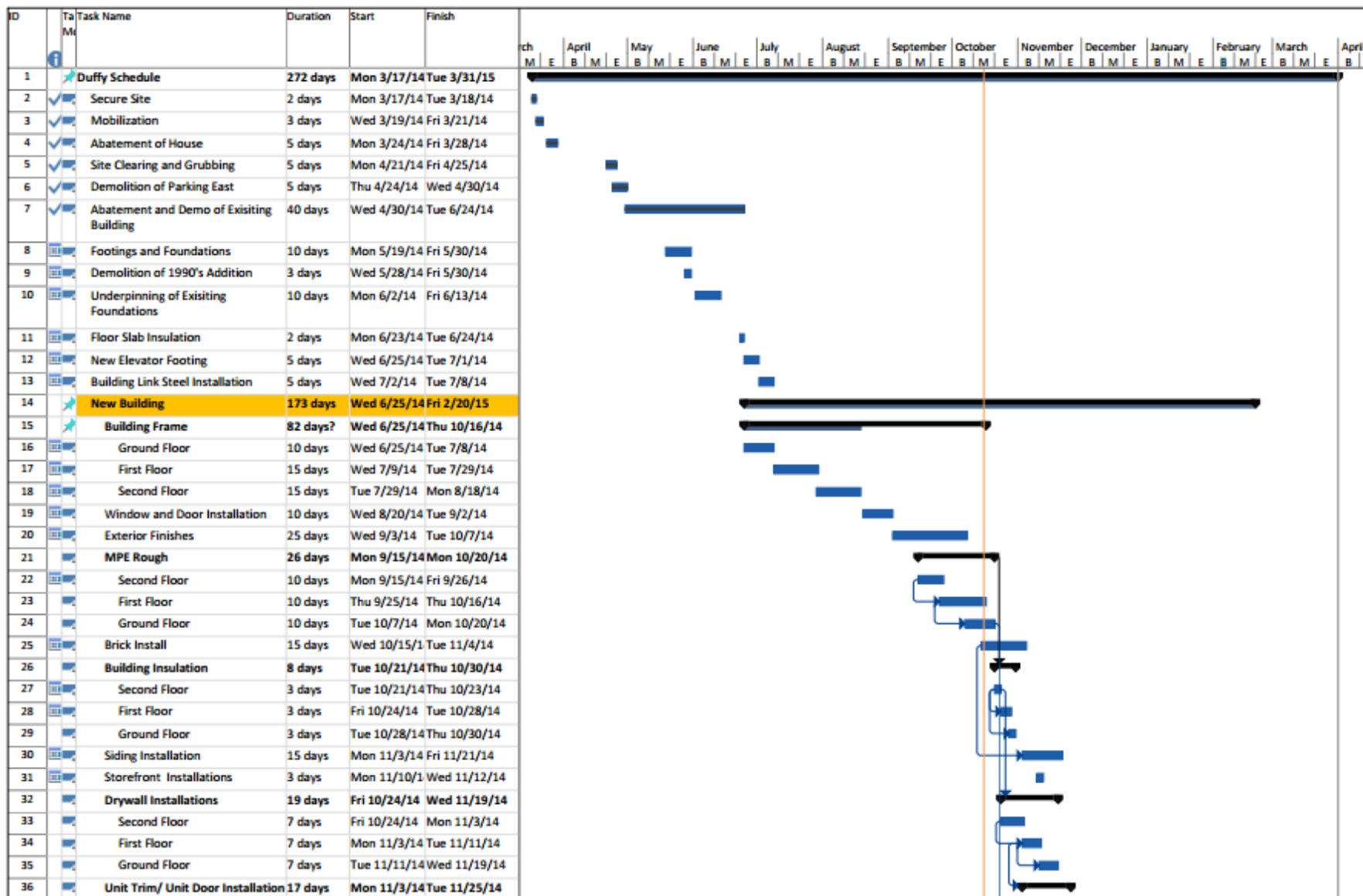
Energy Efficiency

This category includes energy star appliances. The energy star appliance requires that refrigerators, clothes washers, and dishwashers must be ENERGY STAR rated and all washing machines must be front loading. The benefit of energy start appliances are they require only about half as much energy as non-energy rated appliances. The energy rated dishwasher and clothes washing machines also save water and energy.

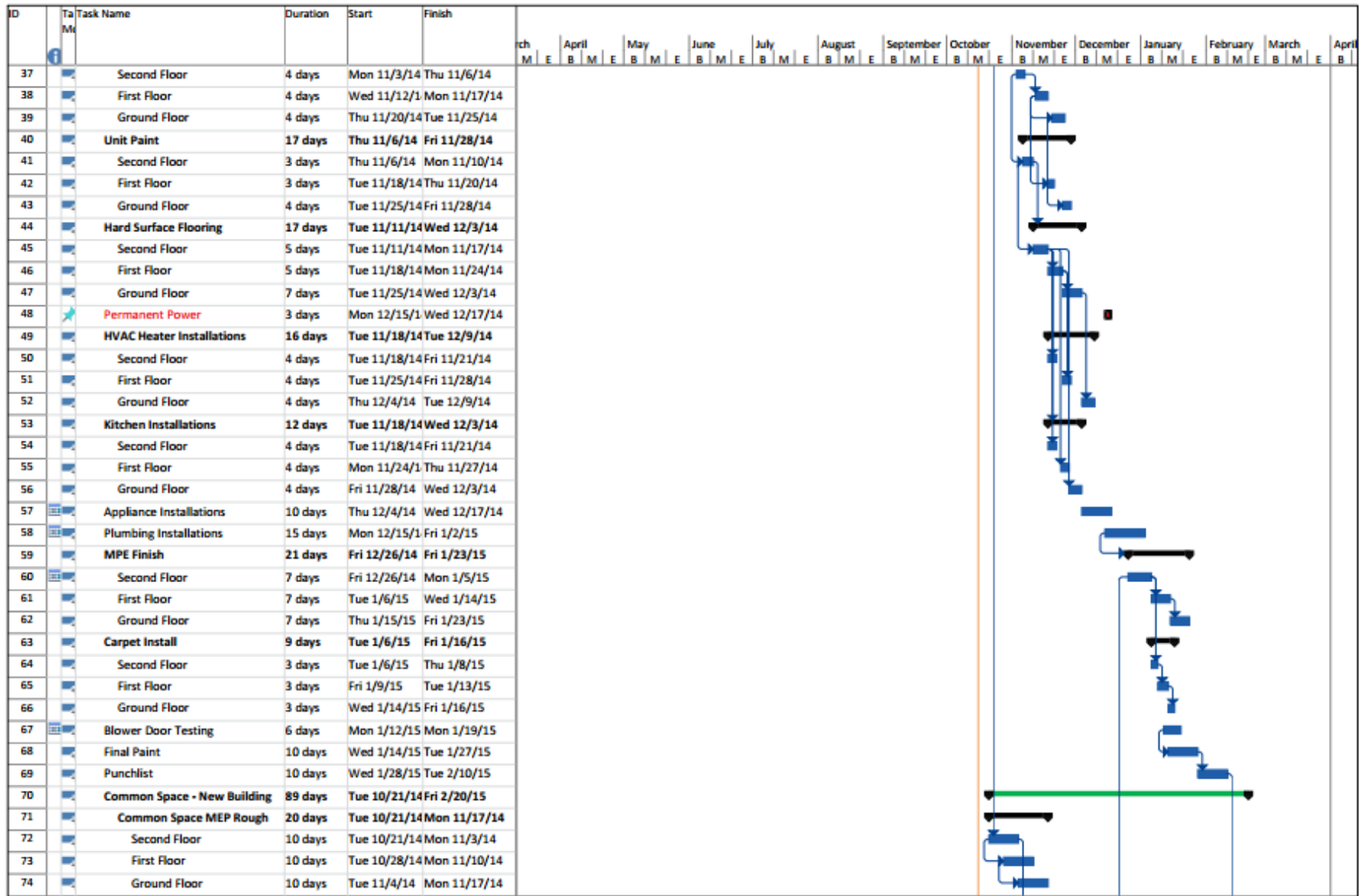
LEED

The owner did not decide to go with LEED Certification for this project. However, by comparing the Green Future Checklist with LEED v4 for New Construction and Major Renovation, the LEED certification that this project could have received was calculated. The Duffy School could have potentially earned 58 points which would make the project LEED Silver. The Green Future Checklist and LEED program are very similar with the main difference being points are awarded in the LEED program while every item must be fully completed in the Green Future Program.

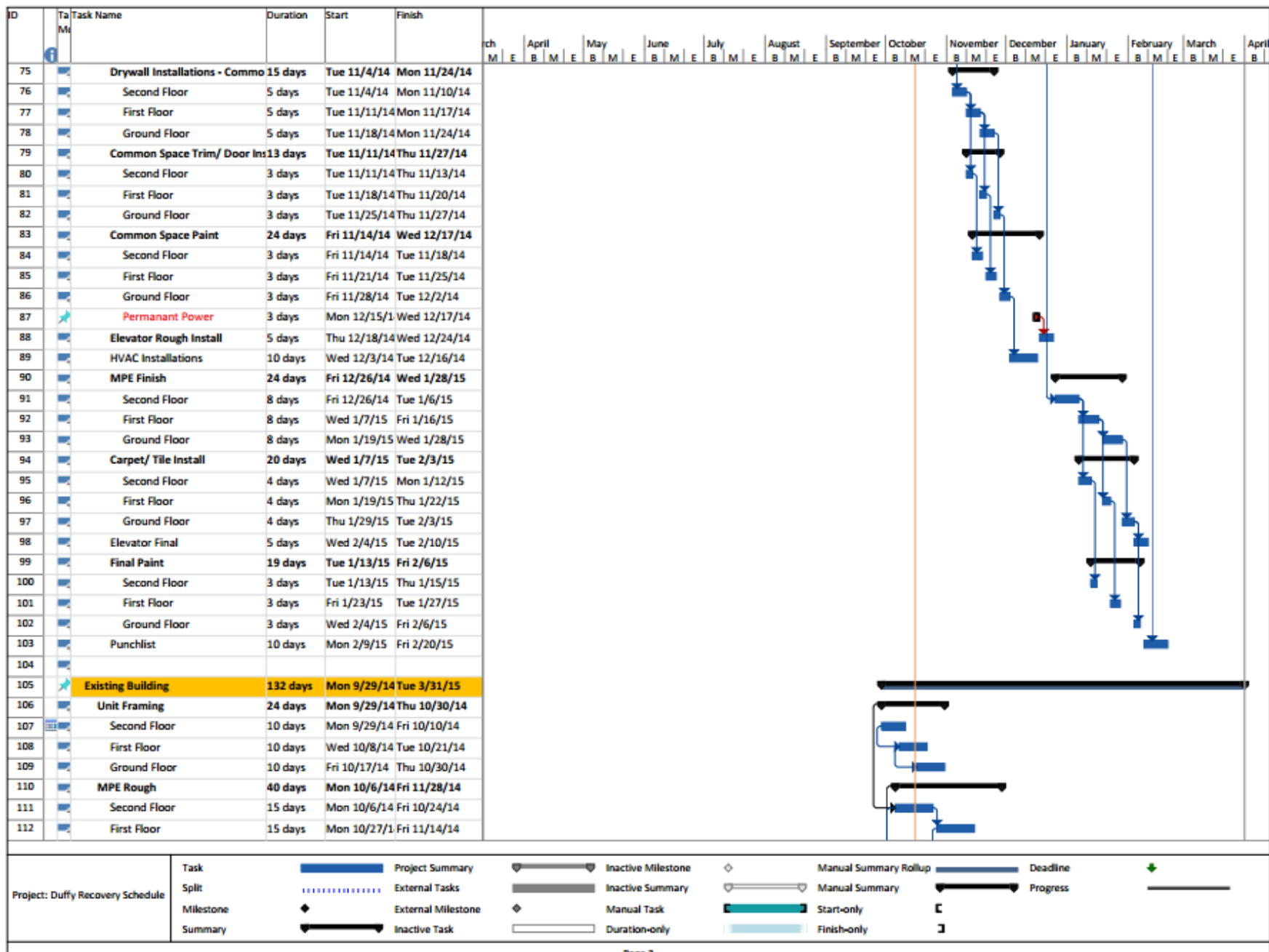
Appendix A- Detailed Project Schedule



Project: Duffy Recovery Schedule	Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
	Split	External Tasks	Inactive Summary	Manual Summary	Progress	
	Milestone	External Milestone	Manual Task	Start-only	Finish-only	
	Summary	Inactive Task	Duration-only	Finish-only		

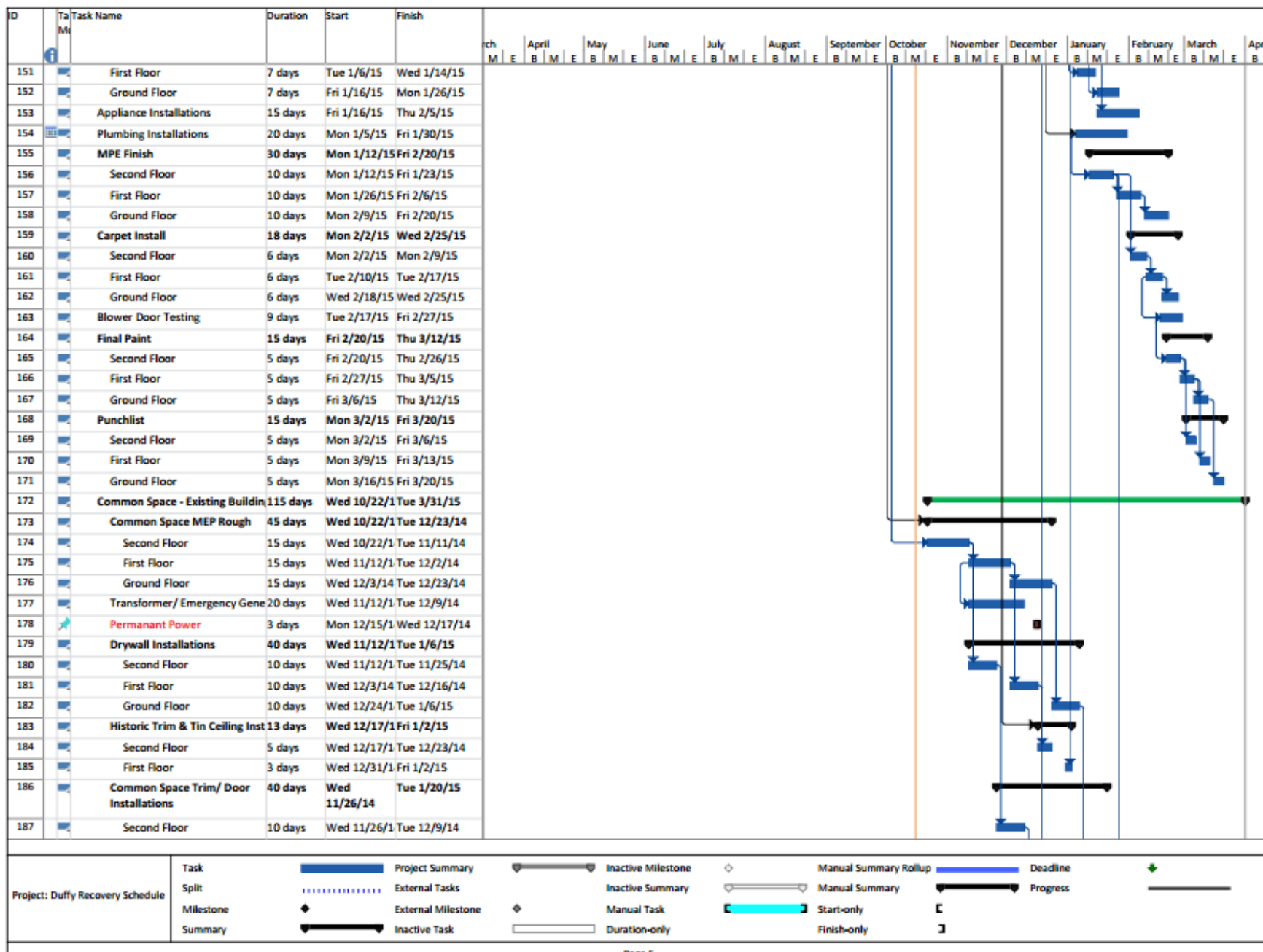


Project: Duffy Recovery Schedule	Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
	Split		External Tasks		Inactive Summary		Manual Summary		Progress	
	Milestone		External Milestone		Manual Task		Start-only			
	Summary		Inactive Task		Duration-only		Finish-only			

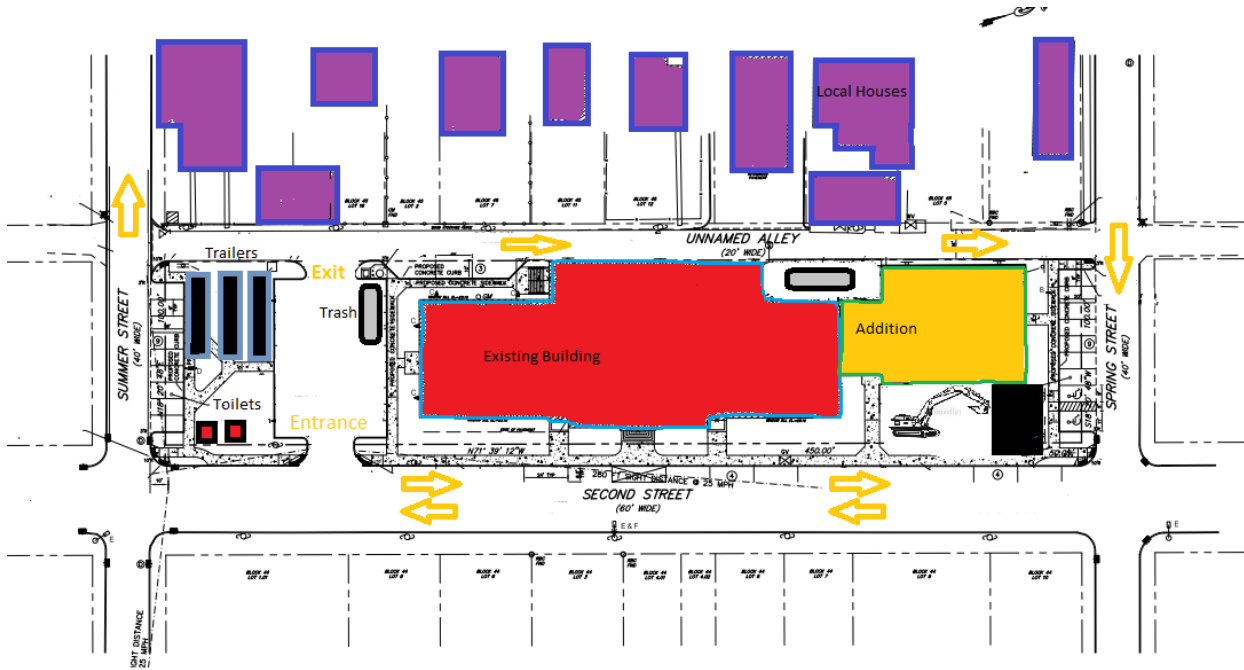


ID	Task Name	Duration	Start	Finish	Month	Day
113	Ground Floor	40 days	Mon 10/6/14	Fri 11/28/14	October	6
114	Wall Foam Insulation	25 days	Mon 11/3/14	Fri 12/5/14	November	3
115	Second Floor	5 days	Mon 11/3/14	Fri 11/7/14	November	3
116	First Floor	5 days	Mon 11/17/14	Fri 11/21/14	November	17
117	Ground Floor	5 days	Mon 12/1/14	Fri 12/5/14	December	1
118	Energy/ Inspections	22 days	Mon 11/10/14	Tue 12/9/14	November	10
119	Second Floor	2 days	Mon 11/10/14	Tue 11/11/14	November	10
120	First Floor	2 days	Mon 11/24/14	Tue 11/25/14	November	24
121	Ground Floor	2 days	Mon 12/8/14	Tue 12/9/14	December	8
122	Drywall Installations	30 days	Wed 11/12/14	Tue 12/23/14	November	12
123	Second Floor	10 days	Wed 11/12/14	Tue 11/25/14	November	12
124	First Floor	10 days	Wed 11/26/14	Tue 12/9/14	November	26
125	Ground Floor	10 days	Wed 12/10/14	Tue 12/23/14	December	10
126	Unit Trim/ Unit Door Installation	30 days	Wed 11/26/14	Tue 1/6/15	November	26
127	Second Floor	10 days	Wed 11/26/14	Tue 12/9/14	November	26
128	First Floor	10 days	Wed 12/10/14	Tue 12/23/14	December	10
129	Ground Floor	10 days	Wed 12/24/14	Tue 1/6/15	December	24
130	Historic Window Installations	20 days	Mon 12/1/14	Fri 12/26/14	December	1
131	South Elevation	10 days	Mon 12/1/14	Fri 12/12/14	December	1
132	North Elevation	10 days	Mon 12/15/14	Fri 12/26/14	December	15
133	Historic Trim/ Tin Ceilings	20 days	Wed 12/3/14	Tue 12/30/14	December	3
134	Second Floor	10 days	Wed 12/3/14	Tue 12/16/14	December	3
135	First Floor	10 days	Wed 12/17/14	Tue 12/30/14	December	17
136	Permanant Power	3 days	Mon 12/15/14	Wed 12/17/14	December	15
137	Unit Paint	21 days	Wed 12/17/14	Wed 1/14/15	December	17
138	Second Floor	7 days	Wed 12/17/14	Thu 12/25/14	December	17
139	First Floor	7 days	Fri 12/26/14	Mon 1/5/15	December	26
140	Ground Floor	7 days	Tue 1/6/15	Wed 1/14/15	January	6
141	Hard Surface Flooring	24 days	Mon 12/22/14	Thu 1/22/15	December	22
142	Second Floor	8 days	Mon 12/22/14	Wed 12/31/14	December	22
143	First Floor	8 days	Thu 1/1/15	Mon 1/12/15	January	1
144	Ground Floor	8 days	Tue 1/13/15	Thu 1/22/15	January	13
145	Kitchen Installations	24 days	Thu 12/25/14	Tue 1/27/15	December	25
146	Second Floor	8 days	Thu 12/25/14	Mon 1/5/15	December	25
147	First Floor	8 days	Tue 1/6/15	Thu 1/15/15	January	6
148	Ground Floor	8 days	Fri 1/16/15	Tue 1/27/15	January	16
149	HVAC Heater Installations	23 days	Thu 12/25/14	Mon 1/26/15	December	25
150	Second Floor	7 days	Thu 12/25/14	Fri 1/2/15	December	25

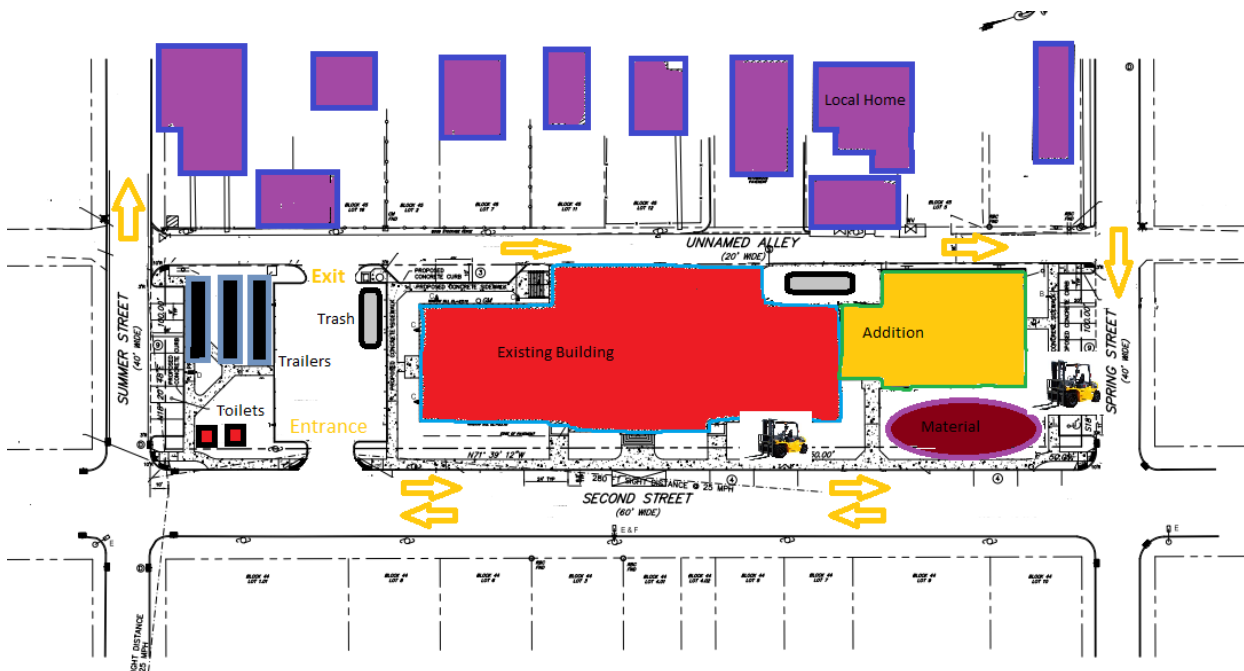
Project: Duffy Recovery Schedule	Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	+
	Split	External Tasks	Inactive Summary	Manual Summary	Progress	-
	Milestone	External Milestone	Manual Task	Start-only	C	
	Summary	Inactive Task	Duration-only	Finish-only	J	



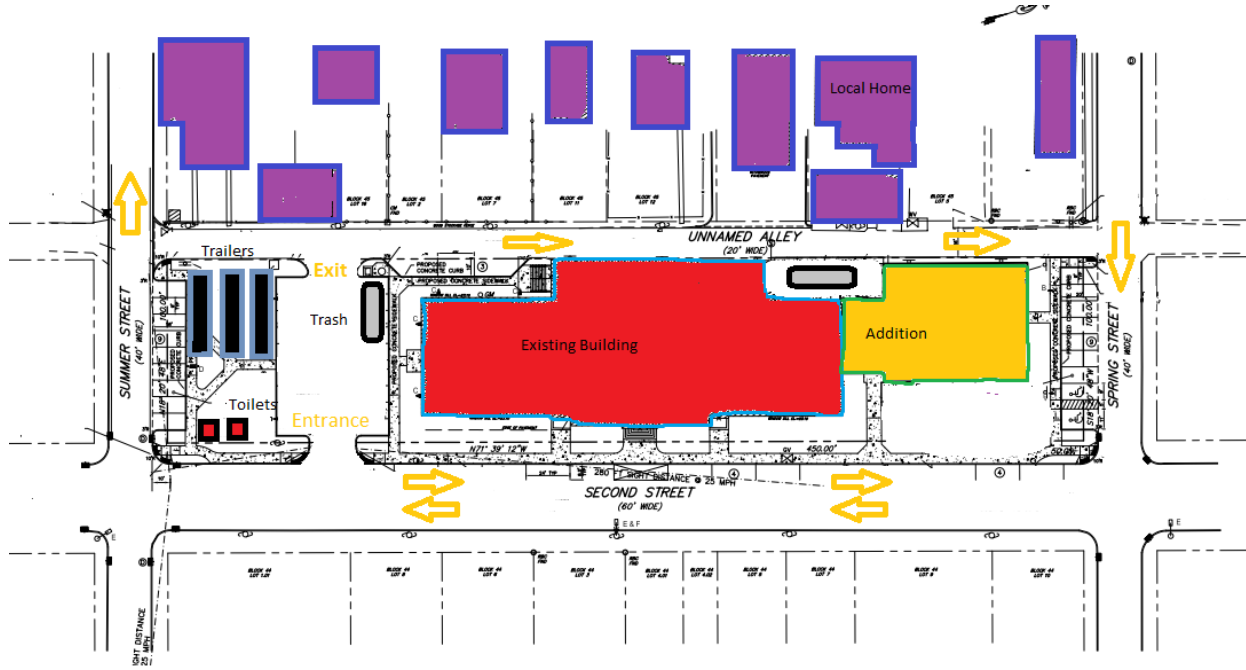
Appendix B- Site Layout Plans



Demo Phase



Building Frame Phase



Interior Finish Phase

Appendix C- General Conditions Estimate

PROJECT: *The Duffy School*

Months 12
 SF 61,115
 Units 53

CODE	Work Description	Cost Per Unit	Quantity	UOM	Total Estimate
Supervision/Project Management					
01.21.00	Project Manager Labor	\$2,415.00	26	Wk	\$62,790.00
01.21.00	1-Project Laborer	\$993.00	52	Wk	\$51,636.00
01.21.00	1-Project Laborer	\$993.00	26	Wk	\$25,818.00
01.21.00	Superintendent Labor	\$1,250.00	52	Wk	\$65,000.00
01.21.00	Asst. Superintendent Labor	\$880.00	52	Wk	\$45,760.00
01.21.00	Administration Clerical Labor	\$425.00	52	Wk	\$22,100.00
	Subtotal				\$273,104.00
Field Engineering					
01.32.23	Survey	\$850	1	EA	\$850.00
01.43.39	Mockups	\$800.00	1	LS	\$800.00
01.45.23	Testing & Allowances (Soils)	\$1,200	12	LS	\$14,400
01.45.29	Concrete Testing (per test per Bldg.)	\$402.00	4	LS	\$1,608.00
	Subtotal				\$17,658.00
Administrative					
01.32.33	Photographic Documentation	\$25.00	12	MO	\$300.00
01.51.13	Trailer Electric service install	\$965.00	1	LS	\$965.00
01.51.13	Trailer Electric Monthly Cost	\$550.00	12	MO	\$6,600.00
01.51.13	Temp. Power Installation (per bldg.)	\$200.00	2	LS	\$400.00
01.51.13	Temp. Power Usage (per bldg.)	\$300.00	12	MO	\$3,600.00
01.51.23	Temp. Heat - Equipment (4 high hats)	\$120.00	2	Bldg.	\$480.00
01.51.29	Temporary Heat Fuel	\$3,575.00	2	Bldg.	\$7,150.00
01.51.33	Trailer Telephone Monthly Costs	\$400.00	12	MO	\$4,800.00
01.51.36	Drinking Water & cups	\$50.00	12	MO	\$600.00
01.51.36	Temp. Water Installation	\$600.00	1	LS	\$600.00
01.51.36	Temp. Water Usage	\$30.00	12	MO	\$360.00
01.52.13	Site Trailer Set up & Tear down	\$780.00	1	LS	\$780.00
01.52.13	Trailer Field Office Rental	\$500.00	12	MO	\$6,000.00
01.52.13	Storage Containers/Trailers (per container)	\$250.00	12	MO	\$3,000.00
01.52.19	Temp. Toilets (cost per based upon 5 toilets)	\$500.00	12	MO	\$6,000.00
01.54.19	Rental Equipment Fork lift	\$3,600.00	6	EA	\$21,600.00
01.56.26	Temporary Fencing (6mo-1yr rental w/RR)	\$4.50	1,600	LF	\$7,200.00
01.58.13	Temp. Project Signage	\$1,000.00	1	LS	\$1,000.00

	Subtotal				\$71,435.00
Safety					
01.51.16	Fire Protection (fire extinguishers)	\$65.00	8	EA	\$520.00
01.52.16	First Aid/ Safety Supplies	\$150.00	1	LS	\$150.00
	Subtotal				\$670.00
Cleanup					
01.74.13	Final Clean Buildings	\$0.35	61,115	SF	\$21,390.25
01.74.19	Dumpsters	\$600.00	61,115	SF	\$36,669.00
	Subtotal				\$58,059.25
Miscellaneous					
01.78.53	Drawing Reproduction	\$0.07	61,115	SF	\$4,339.17
	Subtotal				\$4,339.17
	General Requirements Total				\$425,265.42

Appendix D- Structural Systems Estimate

Detailed Structural Schedule							
Item	Quantity	Unit	Material\$/Unit	Material Total	Labor\$/Unit	Labor Total	Total Cost
Formwork							
Footings	325	SFCA	\$2.97	\$965.25	\$9.50	\$3,087.50	\$4,052.75
Slab on Grade	1,480	SFCA	\$2.97	\$4,395.60	\$9.50	\$14,060.00	\$18,455.60
Reinforcing							
#4	2.89	TON	\$1,000.00	\$2,890.00	\$550.00	\$1,589.50	\$4,479.50
#5	2.45	TON	\$1,000.00	\$2,450.00	\$550.00	\$1,347.50	\$3,797.50
Concrete							
Footings	125	CY	\$110.00	\$13,750.00	\$73.00	\$9,125.00	\$22,875.00
Slab on Grade	950	CY	\$110.00	\$104,500.00	\$26.07	\$24,766.50	\$129,266.50
Lumber							
2x6	9,550	LF	\$1.23	\$11,746.50	\$1.55	\$14,802.50	\$26,549.00
2x8	1,553	LF	\$1.36	\$2,112.08	\$1.69	\$2,624.57	\$4,736.65
2x10	3,520	LF	\$2.10	\$7,392.00	\$1.88	\$6,617.60	\$14,009.60
Floor Truss	11,250	LF	\$27.19	\$305,887.50	\$4.25	\$47,812.50	\$353,700.00
Roof Truss	5,625	LF	\$35.14	\$197,662.50	\$4.11	\$23,118.75	\$220,781.25
Total Cost				\$653,751.43		\$148,951.92	\$802,703.35

Lumber		
Type	Quantity	Unit
2x6		
Columns	6,775	LF
Top Plate	1,850	LF
Bottom Plate	925	LF
2x8	1,553	LF
2x10	3,520	LF
Floor Truss	11,250	LF
Roof Truss	5,625	LF

Slab On Grade			
L	W	D	CY
80'	80'	4'	950

Reinforcing			
Item	LF	LBS	Tons
#4	3,860	5,780	2.89
#5	5,110	4,900	2.45

Appendix E- MEP Assemblies Estimate

Assemblies Estimate of MEP

Equipment	Quantity	Unit	Material\$/Unit	Total Cost
Mechanical Equipment				
Roof Top Units	5	Ea.	\$8,000.00	\$40,000.00
Unit Balancing	5	Ea.	\$300.00	\$1,500.00
Air Handling Unit Space Heaters	20	Ea.	\$350.00	\$7,000.00
Neutralizer Kits	53	Ea.	\$85.00	\$4,505.00
Mini-Splits	1	Ea.	\$2,550.00	\$2,550.00
Addition Apartment Heating-Terminal Unit Heaters	18	Ea.	\$7,620.00	\$137,160.00
Existing Apartments Heating-Terminal Unit Heaters	35	Ea.	\$8,173.00	\$286,055.00
Plumbing Equipment				
Water Closet-Handicapped, Wall Mounted, Flush Valve	53	Ea.	\$2,553.00	\$135,309.00
Countertop Sink-22 Gauge Type 304	54	Ea.	\$2,392.00	\$129,168.00
Lavatory-Handicapped	55	Ea.	\$2,855.00	\$157,025.00
Tub/Shower System	53	Ea.	\$5,695.00	\$301,835.00
Electric Water Cooler	1	Ea.	\$7,207.00	\$7,207.00
Drinking Fountain	7	Ea.	\$1,998.00	\$13,986.00
Sewage Ejector	1	Ea.	\$1,220.00	\$1,220.00
Electrical Equipment				
Panelboards-4 Wire, 120/280 V, 800A	1	Ea.	\$8,226.00	\$8,226.00
Panelboards-4 Wire, 120/280 V, 400A	2	Ea.	\$7,700.00	\$15,400.00
Panelboards-4 Wire, 120/280 V, 250A	1	Ea.	\$6,100.00	\$6,100.00
Panelboards-4 Wire, 120/280 V, 225A	1	Ea.	\$5,475.00	\$5,475.00
Panelboards-4 Wire, 120/280 V, 150A	1	Ea.	\$4,275.00	\$4,275.00
Panelboards-4 Wire, 120/280 V, 125A	1	Ea.	\$3,550.00	\$3,550.00
Panelboards-4 Wire, 120/280 V, 100A	1	Ea.	\$2,250.00	\$2,250.00
4 Wire, 277/480 V, 800 A	1	Ea.	\$37,800.00	\$37,800.00
Receptacles	1105	Ea.	\$1.13	\$1,248.65
Wall Switch's	650	Ea.	\$0.47	\$305.50
Data & Voice Systems	116	Ea.	\$536.00	\$62,176.00
60 kW Outdoor Emergency diesel Generator	1	Ea.	\$381.00	\$381.00
Utility Transformer	1	Ea.	\$7,850.00	\$7,850.00
11 Fluorescent Fixtures per 600 SF	102	Ea.	\$17.43	\$1,777.86

Appendix F-LEED Evaluation

New Jersey Green Future Construction Submittal Checklist

Siting & Land Use
PASSIVE SOLAR, VENTILATION & SHADING DESIGN
Photo of conduit runs for solar electric on roof
Photo of elevations with exterior shading devices
PRESERVATION PLAN
Site plan with tree preservation plan and note
Tree preservation details
Include tree demarking produces in Specs
HISTORIC PRESERVATION
Documentation verifying that a development is qualified for special consideration as a Historic Building
Documentation on 'character defining features'
FOLLOW STATE PLAN & SMART GROWTH PRINCIPLES
Plans and written description of Smart Growth Principles employed
PEDESTRIAN PATHS & BIKE TRAILS
Submit plans and specifications
Submit photographs of, at least, connections between living and parking spaces
SECURE AND SAFE BIKE RACKS
Submit plans and specifications
During construction: Submit photographs of bike lock signage and bike lock areas
SAFE SHELTER FOR COMMUTERS
Submit plans and specifications indicating transit stop and commuter shelter
During construction: Submit photographs of commuter shelter
ACCESS TO NEIGHBORHOOD OR PROJECT PARK
Site and neighborhood plans
ACCESS TO PUBLIC TRANSPORTATION WITH ¼ MILE
Submit plans and specifications noting public transit option(s)
Indoor Air Quality
DUCTS & HVAC PROTECTED FROM DUST
Contract language indicating duct and equipment protection requirement and method
Signed statement by GC indicating acknowledgement of requirement
During construction: Submit 3 dated photos of protected ductwork and equipment
LOW VOC INTERIOR PAINTS & FINISHES
Complete list of all paints and sealants with VOC content in g/l for each item
During construction: Submit photographs of paint cans, with label and VOC content visible
LOW VOC ADHESIVES & SEALANTS
Complete list of all paints and sealants with VOC content in g/l for each item
During construction: Submit photographs of paint cans, with label and VOC content visible
DURABLE, HEALTHY FLOORING
Floor plan highlighting flooring type in each area of building

Cut sheets for all flooring installed
COMBUSTION DEVICES
Venting detail in plans and specifications
Combustion equipment cut sheets, with model numbers highlighted
Clothes dryer exhaust: Clothes dryers must be vented directly to the outside
AUTOMATIC BATHROOM VENTILATION
Spec Sheet and note on mechanical plans.
During construction: Submit photographs of equipment installed, with label clearly visible.
DIRECT VENT OF KITCHEN
Venting details in plans and specifications
Equipment cut sheets, with model numbers
During construction: Submit photographs of kitchen exhaust direct venting
OPERABLE WINDOWS
Cut sheets of windows selected
During construction: Submit photographs of open windows
ACCESS TO DAYLIGHTING & VIEW FROM EACH BEDROOM
Unit plans
Whole-building plans that indicate nearby buildings and visual obstructions.
Building Durability & Moisture Control
EXTERIOR WALL DRAINAGE PLANE
Section drawing showing detail
Specification indicating method and products
During construction: Submit photographs of installation
WINDOW FLASHING DETAILS
Section drawing showing window flashing detail
Specification indicating flashing method and products
During construction: Submit photographs of window opening and window flashing
GUTTER DOWNSPOUTS DISCHARGE 3' FROM FOUNDATION
Specifications & Drawing detail
During construction: Submit photographs of gutter discharge and where the water will drain.
INSTALL 30-YR FOR PITCHED & 20-YR FOR FLAT ROOF
During construction: Specification and Copy of Roof Warranty
Energy Efficiency
ALL UNITS ENERGY STAR CERTIFIED
All ENERGY STAR documentation during and upon completion of construction
ENERGY STAR APPLIANCES
Refrigerator, clothes washer and dishwasher specs with model number and ENERGY STAR rating
During construction: Submit photographs of appliances installed, with ENERGY STAR label showing
ENERGY STAR LIGHTING FIXTURES
Plans and Specifications will clearly state that all lighting fixtures and lamps will be ENERGY STAR labeled
During construction: Submit photographs of a good sampling of ENERGY STAR fixtures and the lamps installed.

WINDOWS WITH LOW-E COATING

Spec Sheet

DUCTWORK IN CONDITIONED SPACE

Mechanical plans for building, which must show duct location

During construction: Submit photographs of ductwork in various places and mastic sealing

OCCUPANCY & DAYLIGHTING CONTROLS

Include locations of all occupancy sensors and daylighting controls in plans

Submit cut sheets for products

During construction: Submit photographs of occupancy sensors

EASY TO USE PROGRAMMABLE THERMOSTATS

Cut sheet with exact model highlighted

Sample programming instructions

During construction: Submit photographs of models installed

Resource Efficiency**RECYCLE / SALVAGE CONSTRUCTION DEBRIS**

Copy of on-site recycling and waste management plan.

During construction: Dated photograph of dumpsters labeled for separation

RECYCLING CENTERS IN COMMON AREAS

Plans highlighting recycling areas

Cut sheet for bins

During construction: Submit photographs of common recycling area.

RECYCLING PLAN FOR EACH UNIT

Plans highlighting recycling areas

Cut sheet or other information for bins

During construction: Submit invoice for recycling bins

Water Conservation**LOW-FLOW FIXTURES**

Cut sheet for fixtures

During construction: Submit photographs of plumber(s) installing aerators

HIGH-EFFICIENCY TOILETS

Cut sheet for toilets

Indicate model type in plans and specifications

WATER EFFICIENT LANDSCAPING

Landscaping plan with list of plants (including native habitat), including type of turf.

During construction: Submit photographs of landscaping, showing extent of turf areas and plant bedding

HIGH-EFFICIENT IRRIGATION

Written explanation

Include in specifications

Site Plan indicating placement, type, and details

Operations & Maintenance**PROPERTY MANAGEMENT O&M MANUAL & TRAINING**

Overall maintenance schedule for owner, indicating maintenance item and frequency
Copy of Owner's and installation manuals for all equipment in unit
General green building information about energy efficient
A description of all property management-relative features required within the Green Future Program
TENANT O&M MANUAL & TRAINING
Copy of manual, including an overall description of controls
INTEGRATED PEST MANAGEMENT
Sign and submit an IPM plan
Reference IPM plan in project specifications
Also, include plan in final Operations & Maintenance Manual



LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: The Duffy School

Date: 10/17/2014

Y ? N

6	5	21	Location and Transportation		32
		16	Credit	LEED for Neighborhood Development Location	16
		1	Credit	Sensitive Land Protection	1
		2	Credit	High Priority Site	2
		5	Credit	Surrounding Density and Diverse Uses	5
		5	Credit	Access to Quality Transit	5
		1	Credit	Bicycle Facilities	1
		1	Credit	Reduced Parking Footprint	1
		1	Credit	Green Vehicles	1

8	2	0	Sustainable Sites		10
			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Site Development - Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
		2	Credit	Heat Island Reduction	2
		1	Credit	Light Pollution Reduction	1

3	8	0	Water Efficiency		11
			Prereq	Outdoor Water Use Reduction	Required
			Prereq	Indoor Water Use Reduction	Required
			Prereq	Building-Level Water Metering	Required
		2	Credit	Outdoor Water Use Reduction	2
		6	Credit	Indoor Water Use Reduction	6
		2	Credit	Cooling Tower Water Use	2
		1	Credit	Water Metering	1

30	3	0	Energy and Atmosphere		33
			Prereq	Fundamental Commissioning and Verification	Required
			Prereq	Minimum Energy Performance	Required
			Prereq	Building-Level Energy Metering	Required
			Prereq	Fundamental Refrigerant Management	Required
		6	Credit	Enhanced Commissioning	6
		18	Credit	Optimize Energy Performance	18
		1	Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
		3	Credit	Renewable Energy Production	3
		1	Credit	Enhanced Refrigerant Management	1
		2	Credit	Green Power and Carbon Offsets	2

8	0	5	Materials and Resources		13
			Prereq	Storage and Collection of Recyclables	Required
			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
		2	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
		2	Credit	Construction and Demolition Waste Management	2

11	2	3	Indoor Environmental Quality		16
			Prereq	Minimum Indoor Air Quality Performance	Required
			Prereq	Environmental Tobacco Smoke Control	Required
		2	Credit	Enhanced Indoor Air Quality Strategies	2
		3	Credit	Low-Emitting Materials	3
		1	Credit	Construction Indoor Air Quality Management Plan	1
		2	Credit	Indoor Air Quality Assessment	2
		1	Credit	Thermal Comfort	1
		2	Credit	Interior Lighting	2
		3	Credit	Daylight	3
		1	Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

0	6	0	Innovation		6
			Credit	Innovation	5
		1	Credit	LEED Accredited Professional	1

0	4	0	Regional Priority		4
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

58 25 29 TOTALS Possible Points: **125**
 Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

