Landis Run Intermediate School

Lancaster, PA

Technical Report Two

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Executive Summary

The project schedule is phased by building area starting in A and ending in D. Although the critical path is hard to identify due to contractors trailing contractors, concurrent work in many areas, and fluctuating manpower due to schedule demands the main critical path is comprised mostly of the structural activities. It appears to have been relatively efficiently planned out for such a large building area and not many significant improvements to the scheduling sequence can be made.

Using load bearing masonry as the structure for the building was a wise choice due to its heavy use in the area. A detailed estimate was performed which provided a square foot cost of $27.81 for the structural system. Changing the structural system to concrete, steel or a composite system would most likely only serve to increase the cost of the structure.

Due to the project utilizing a multiple prime delivery system the general conditions are split across many different contractors. In addition, the site's simplicity negates the need for many general conditions items. Therefore, the general conditions only accounts for 4% of the overall GC contract value which is low. Subsequently, any revision to site utilization plan or project staffing plan seems unnecessary due to the already low cost of the general conditions.

The project is pursuing a LEED silver rating by identifying 44 credits which will total 52 points. Overall, the credits being pursued are appropriate and will produce significant and tangible reductions in the building's demand on the environment as well as costs to the owner during the life span of the building. However, a significant opportunity may have been missed by not installing solar panels on the building's roof. With such a large, hidden area for installation and an unobstructed skyline a reason for not installing the panels, besides initial cost, was not found. Although the amount of additional points this added feature would have given the project has yet to be identified, it still seems worth it, even if it won't push the project to gold, due to the significant reductions in energy costs it could provide to the building.

BIM was used somewhat in the planning phase, heavily in the design phase, not at all in the construction phase, and is in the process of being planned for how it will be used in the operations phase. Overall, the BIM use on the project seems appropriate for its size, complexity, location, building type, and end user.

Detailed Project Schedule

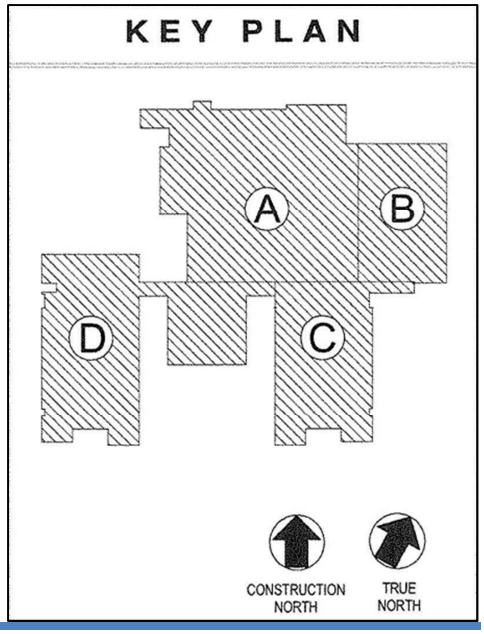
As discussed in technical report one, the project deadline is the major driver of the project due to the fact that the Manheim Township School District (MTSD) has nowhere else to place the 5th and 6th grade students who are scheduled to occupy the building. A detailed schedule comprised of 284 activities shows the main activities for the construction of Landis Run Intermediate (LRI). This schedule is derived and consolidated from a schedule of more than 700 activities that is actually being used on the project and can be found in Appendix A. It should be noted that site work was left out due to the fact that besides excavating the footings there was very little site work that had to do with the building itself. Rather most of the site work had to do with the grading of the surrounding area, storm water systems for the parking lots, etc. In order to keep the detailed schedule as concise as possible dry-in, mechanical equipment start up, balancing & commissioning, final cleaning, punch lists, inspections, and substantial complete were left out. Table 1.1 page is a matrix schedule of these common activities by building area. The building areas are shown in Figure 1.1. The matrix shows the sequencing for the above mentioned activities and how they relate to one another. For example, it shows that most of the activities work from the 2nd floor down in the two classroom wings. In addition, it shows that many of the activities in areas A & B are performed simultaneously.

A clear progression from area to area can be seen in the detailed schedule since the flow of work starts in area A and ends in area D. Although the project is split into four construction areas as shown in Figure 1.1, for many activities areas A & B are treated as one area such as the final activities in Table 1.1.

Critical Path

The critical path on LRI is somewhat fluid since many of the trades trail each other, work around each other in the same area, and work concurrently in multiple building areas to stay on track for the deadline. However, upon further examination of the schedule it can be seen that the structure is a predecessor for many of the interior trades and finishes. In other words, it appears that the structure comprises most of the critical path of the project. Therefore, I've included a summary structural schedule at the end of this section which should be considered the majority of the critical path for the schedule. The structure is the majority of the critical path because those activities are full prerequisites for other activities. For instance, the K joists can't be set until the masonry walls are up to bearing height and the rough in overhead activities can't start until the joists are set and the deck is installed. However, once an activity is completed many trades will enter an area at the same time and work around each other to ensure the project stays on schedule.

Figure 1.1: Construction Areas



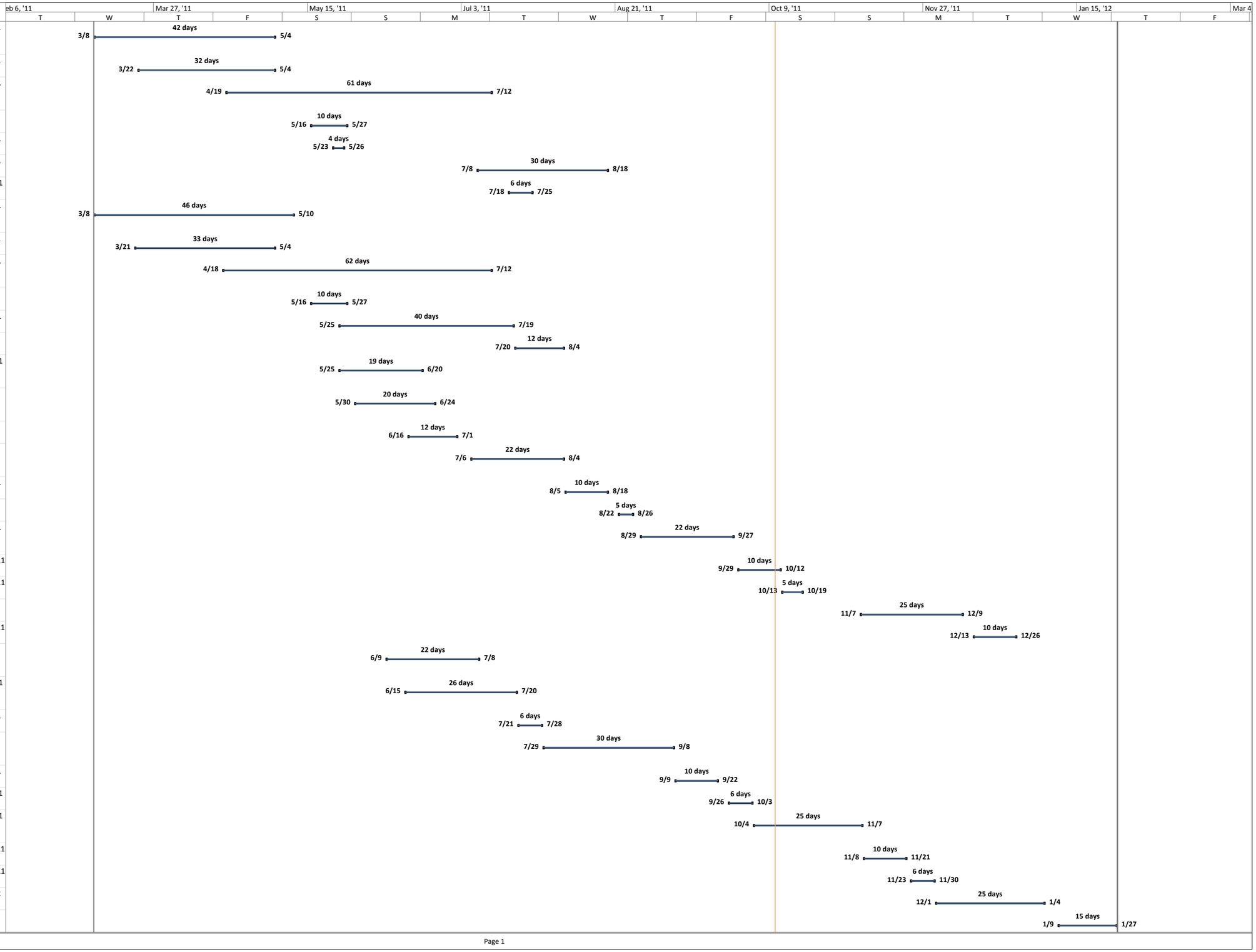
Sequencing

The first activity for the building areas are the installation of the footings. Once the footings are poured the concrete bearing walls are brought up to SOG elevation and any underground MEP rough-ins are installed. The slab is then prepped and poured up to the walls which negate the need for forming. Once the slab is poured the walls are brought up to bearing height. MEP wall rough-ins will continue as door frames are installed and all the walls are completed. Base plates will be installed in the walls along with steel angles and then the joists and decking will be installed. As this occurs other carpentry items such as window blocking and moisture protection will be installed if needed. As the joists are being installed the MEP primes will start overhead rough-ins and installation of mechanical equipment including hangers, conduits, piping, etc. In the classroom wings the concrete will start being poured once the decking and angles are installed. In areas A & B the installation of the decking will allow the roof blocking, roof curbs for mechanical equipment, and roofing to start being installed. After the miscellaneous blocking has been installed the installation of the spray foam insulation and the brick veneer will start. The installation of windows will follow those two activities. Once the building has been dried in wiring and equipment tie in will occur. At the same time insulation of ducts and pipes will occur. Once all the MEP systems have completed rough in the interior finishes will begin. This includes activities such as metal stud framing, drywall, acoustical ceiling tile, paint, etc. As these trades progress the MEP systems will be finished with covers, diffusers, fixtures, and the like. As those activities are progressing other interior items will start being installed. This includes items like bathroom partitions, millwork, casework, and specialty equipment. It is easy to see why the critical path is basically the structure. Because not many interior trades completely hold up another. Once the structure is completed the large floor area allows trades to trail each other and work around each other.

As stated above, much of the time one trade will trail another to maximize time, work in different areas concurrently, and fluctuate manpower as available work varies. However, in a particular building area the interior trades will rotate around the floor due to the large floor area to stay out of each other's way. The direction in which the interior trades rotate has been different for each building area so far. It is decided by deliveries, communication with the other primes, and advice by foreman. The decision on how to rotate the interior trades is ultimately decided by the GC's superintendent. Because there are many primes the GC's superintendent often coordinates everyone to ensure efficiency and fairness.

Table 1.1: Finish Activities Matrix	A	B	C Ground	C 1st
Dry-In	10/06/11	9/22/11	2/14/12	2/14/12
Above Ceiling Inspections	2/17/12	2/17/12	6/07/12	5/16/12
Mechanical Equipment Start-up	4/20/12-5/03/12	5/04/12-5/17/12	6/22/12-6/26/12	5/31/12-6/04/12
Fire Alarm/Security Startups/Commissioning	5/18/12-5/24/12	5/18/12-5/24/12	6/29/12-7/06/12	5/31/12-6/06/12
Final Cleaning	7/12/12-7/25/12	7/11/12-7/24/12	7/25/12-8/03/12	7/13/12-7/24/12
Balancing & Commissioning	6/26/12-7/20/12	7/18/12-7/31/12	7/25/12-8/07/12	7/02/12-7/16/12
Punchlist & Inspection	7/23/12-8/03/12	7/23/12-8/03/12	8/08/12-8/21/12	7/25/12-8/07/12
Substantial Complete	8/03/12	8/03/12	8/21/12	8/21/12
	C 2nd	**D Ground**	**D 1st**	**D 2nd**
Dry-In	2/14/12	2/29/12	2/29/12	2/29/12
Above Ceiling Inspections	4/05/12	6/11/12	5/15/12	4/24/12
Mechanical Equipment Start-up	4/16/12-4/18/12	6/26/12-6/29/12	5/22/12-5/31/12	5/09/12-5/11/12
Fire Alarm/Security Startups/Commissioning	4/27/12-5/03/12	7/09/12-7/13/12	6/22/12-6/28/12	5/11/12-5/17/12
Final Cleaning	5/30/12-6/08/12	8/10/12-8/21/12	7/25/12-8/03/12	6/13/12-6/22/12
Balancing & Commissioning	5/18/12-5/31/12	7/31/12-8/20/12	7/06/12-7/30/12	5/25/12-6/07/12
Punchlist & Inspection	6/05/12-6/18/12	8/15/12-8/28/12	7/31/12-8/13/12	6/25/12-7/09/12
Substantial Complete	8/21/12	8/28/12	8/28/12	8/28/12

ID	Area	Task Name	Duration	Start	Finish
1	Area A	Layout, Excavate, & Place Footing	42 days	Tue 3/8/11	Wed 5/4/11
2	Area A	Masonry Wall to SOG Elevation	32 days	Tue 3/22/11	Wed 5/4/11
3	Area A	Masonry Walls to Bearing Height	61 days	Tue 4/19/11	Tue 7/12/11
4	Area A	Install Floor Joists & Deck	10 days	Mon 5/16/11	Fri 5/27/11
5	Area A	FRP Slab Except Caf. & Gym	4 days	Mon 5/23/11	Thu 5/26/11
6	Area A	Install Roof Joists & Deck	30 days	Fri 7/8/11	Thu 8/18/11
7	Area A	FRP Caf. & Gym SOG	6 days	Mon 7/18/11	Mon 7/25/11
8	Area B	Layout, Excavate, & Place Footing	46 days	Tue 3/8/11	Tue 5/10/11
9	Area B	Masonry Wall to SOG Elevation	33 days	Mon 3/21/11	Wed 5/4/11
10	Area B	Masonry Walls to Bearing Height	62 days	Mon 4/18/11	Tue 7/12/11
11	Area B	Install Floor Joists & Deck	10 days	Mon 5/16/11	Fri 5/27/11
12	Area B	Prep & Place Slab on Grade	40 days	Wed 5/25/11	Tue 7/19/11
13	Area B	Install Roof Joists & Deck	12 days	Wed 7/20/11	Thu 8/4/11
14	Area C Ground	Layout, Excavate, & Place Footing	19 days	Wed 5/25/11	Mon 6/20/11
15	Area C Ground	Masonry Foundation Walls to SOG	20 days	Mon 5/30/11	Fri 6/24/11
16	Area C Ground	Prep & Place Slab on Grade	12 days	Thu 6/16/11	Fri 7/1/11
17	Area C Ground	Masonry Bearing Walls to 1st Floor	22 days	Wed 7/6/11	Thu 8/4/11
18	Area C 1st Floor	Install Joists & Deck	10 days	Fri 8/5/11	Thu 8/18/11
19	Area C 1st Floor	Prep & Place Slab on Deck	5 days	Mon 8/22/11	Fri 8/26/11
20	Area C 1st Floor	Masonry Bearing Walls to 2nd Floor	22 days	Mon 8/29/11	Tue 9/27/11
21	Area C 2nd Floor	Install Joists & Deck	10 days	Thu 9/29/11	Wed 10/12/11
22	Area C 2nd Floor	Prep & Place Slab on Deck	5 days	Thu 10/13/11	Wed 10/19/11
23	Area C 2nd Floor	Masonry Bearing Walls to Roof	25 days	Mon 11/7/11	Fri 12/9/11
24	Area C 2nd Floor	Install Roof Joists & Roof Deck	10 days	Tue 12/13/11	Mon 12/26/11
25	Area D Ground	Layout, Excavate, & Place Footing	22 days	Thu 6/9/11	Fri 7/8/11
26	Area D Ground	Masonry Foundation Walls to SOG	26 days	Wed 6/15/11	Wed 7/20/11
27	Area D Ground	FRP SOG	6 days	Thu 7/21/11	Thu 7/28/11
28	Area D Ground	Masonry Bearing Walls to 1st Floor	30 days	Fri 7/29/11	Thu 9/8/11
29	Area D 1st Floor	Install Joists & Deck	10 days	Fri 9/9/11	Thu 9/22/11
30	Area D 1st Floor	Prep & Place Slab on Deck	6 days	Mon 9/26/11	Mon 10/3/11
31	Area D 1st Floor	Masonry Bearing Walls to 2nd Floor	25 days	Tue 10/4/11	Mon 11/7/11
32	Area D 2nd Floor	Install Joists & Deck	10 days	Tue 11/8/11	Mon 11/21/11
33	Area D 2nd Floor	Prep & Place Slab on Deck	6 days	Wed 11/23/11	Wed 11/30/11
34	Area D 2nd Floor	Masonry Bearing Walls to Roof	25 days	Thu 12/1/11	Wed 1/4/12
35	Area D 2nd Floor	Install Roof Joists & Roof Deck	15 days	Mon 1/9/12	Fri 1/27/12



Detailed Structural Systems Estimate

Estimate Process

Using R.S. Means and the construction documents, a detailed estimate was performed for the ground floor of building area C. R.S. Means values that were used were the exact type, strength, and installation type that was actually used on LRI. Any value that was absent for a specification in the contract documents was interpolated from other values in R.S. Means. For instance, if a wall strength was specified as 3500 psi and R.S. Means only provided values for 3000 psi and 4000 psi, the value for 3500 psi was found by interpolation. These values were multiplied by the appropriate figures provided by the contract documents. Any values that were not directly provided by the contract documents were calculated by the author based on provided figures and/or takeoffs of the drawings.

Assumptions

Miscellaneous items such as small tools, rebar ties, etc. were assumed to have a negligible cost impact on the estimate. It was assumed that R.S. Means installation costs reflect union wages which are used on LRI. It was also assumed that the cost of excavation is included in the concrete footings cost. In addition, it was assumed that the concrete masonry units included the cost of mortar as well as scaffolding. It was also assumed that the scaffolding included is stick masonry which is what is being used on LRI. The concrete figures used from R.S. Means for the SOG included a trowel finish but not formwork since there was no formwork needed on the project.

Estimate Items

Items included in the estimate are concrete masonry units, reinforcing, grout, cast in place concrete, fiber reinforcing, steel angles for metal deck support, metal deck, and steel joists. These elements provide the main components of the structural system. All of the walls in the module are grouted, horizontally reinforced on alternating courses, and vertically reinforced with #4 or #5 rebar as shown in the estimate breakdown. The concrete slab on grade is reinforced with synthetic fiber. The slab was trowel finished and poured up to the CMU walls which negated the need for formwork. Open web joists sit on bearing plates in the CMU walls to support the composite deck. Steel angles are bolted to the walls in order to support the edges of the deck and provide a stopper to prevent concrete from dripping through voids at the edge of the deck. Specified strengths of materials are shown in the estimate breakdown.

Typical Module

The ground floor of area C was chosen as a logical module on which to perform the estimate since the floor plans are virtually identical throughout both three story classroom wings (areas C & D). In addition, the two wings make up 70.5% of the square footage of the building. Therefore, the module selected provides the best representative square foot

Table 2.1: Structural Estimate Summary

Structural Estimate Summary			
	Square Feet	Estimated Cost per SF	Estimated Total Cost
Ground Floor of Area C	28,046	$27.81	$779,858.15
Classroom Wings	148,180	$27.81	$4,120,351.59
Landis Run Intermediate	210,000	$27.81	$5,839,342.92

cost for the entire building.

Once the structural cost for the ground floor of unit C was obtained, it was divided by the square footage of the ground floor of area C to produce a cost per SF for the floor. That cost per square foot, shown in Table 2.1, was then multiplied by the square footage of the two classroom wings and the overall square footage of the building to obtain rough estimates for the structural system on LRI.

Estimate Accuracy

As stated in technical report one, the structural system for the entirety of LRI cost about $5.7 million. The detailed estimate performed came in at 2.4% over that value. Although the result of the estimate is fairly accurate there are many factors that could have created this discrepancy. For instance, R.S. Means does not take into account subcontractor-vendor relationships. Often, contractors who have a good relationship with a vendor will receive discount pricing on material. Furthermore, contractors who have good relationships with sub-contractors will receive cheaper estimates than those who don't. So in reality, prices paid for materials and services could have been cheaper than what was provided by R.S. Means even after adjusting for location. Also, area A & B have a lot more open space due to the cafeteria, gymnasium, large music and orchestra rooms, and wider hallways. This means that those areas have a lower interior wall density than areas A & B. In other words, the cost per square foot of areas A & B is likely less than that of the classroom wings which also could have contributed to the slight inflation of the estimate. In addition, the waste factors included in the estimate were decided by the author and are not necessarily the waste factors included in the estimate of the respective trades. The waste factors included could have been less and could significantly reduce the estimate. Lastly, as stated before load bearing masonry is the predominant construction method in the area. Thus, many of the trades are efficient at performing this type of construction which could further lower prices.

Figure 2.2: Detailed Structural Estimate of the Ground Floor of Area C

Detailed Structural Estimate					
	Total Cost	Per Unit	Quantity	Unit	Waste Factor	Total
Cast-In-Place Foundation						
CIP 3000 PSI Concrete w/ Reinforcing	$259.00	CY	72	CY	10.00%	$20,512.80
Concrete Pump Truck	$30.00	CY	72	CY	10.00%	$2,376.00
Slab on Grade						
CIP 3500 PSI Concrete	$2.64	SF	28046	SF	5.00%	$77,743.51
Fiber Reinforcing	$5.55	lb	520	lb	0.00%	$2,886.00
Concrete Pump Truck	$34.00	CY	346	CY	5.00%	$12,352.20
Decking						
Galvanized 1.5VL20 Composite Deck	$2.46	SF	28046	SF	10.00%	$75,892.48
Steel Angles	$10.88	LF	3316	LF	5.00%	$37,881.98
Steel Joists						
28k10	$13.85	LF	2142	LF	0.00%	$29,666.70
12k1	$9.75	LF	966.5	LF	0.00%	$9,423.38
20k3	$8.57	LF	120	LF	0.00%	$1,028.40
22k5	$9.95	LF	264	LF	0.00%	$2,626.80
22k6	$11.15	LF	132	LF	0.00%	$1,471.80
Masonry						
Exterior Walls						
16" Thick 2000 PSI Reinforced IVANY Block	$21.27	SF	4800	SF	5.00%	$107,200.80
Grout	$4.16	SF	4800	SF	5.00%	$20,966.40
#4 @ 8" O.C.	$1.98	lb	4810	lb	7.50%	$10,238.09
16" Thick Reinforced CMU	$19.93	SF	3470	SF	5.00%	$72,614.96
Grout	$8.32	SF	3470	SF	5.00%	$30,313.92
#5 Rebar @ 32" O.C.	$1.30	lb	1358	lb	7.50%	$1,897.81
Interior						
8" Thick 1500 PSI Reinforced CMU	$9.25	SF	17670	SF	5.00%	$171,619.88
Grout	$8.32	SF	17670	SF	5.00%	$154,365.12
#5 Rebar @ 48" O.C.	$1.30	lb	4608	lb	7.50%	$6,439.68
Total						$849,518.69
Location Factor						91.8
Adjusted Total						$779,858.15

General Conditions Estimate

The general conditions cost for the general contractor on LRI is estimated at $557,700.00 for the duration of the project. Figure 3.1 is a breakdown of this estimate and can be found on the following page. As discussed in technical report one, LRI is on a relatively open site. Although it is surrounded on three sides by houses there is a substantial distance between the building and the houses. In addition, there is a thick buffer of trees in between the two. There is ample room on site to accommodate all equipment and deliveries as well as no heavy pedestrian or vehicular traffic except for the staff and builders on site. In addition, many of the general conditions costs are covered by other primes. Therefore, if the estimate looks somewhat simple it is because there are less general conditions items than what it typically needed on a more congested site or a site that is run by one contractor. Some examples of such items include overhead protection, diversion of pedestrian or vehicular traffic, additional parking or storage, and additional safety features. This explains why the general conditions cost is only 4% of the GC's contract value as oppose to the 10% that is common on most jobs.

Estimate Assumptions

This estimate does not include any general conditions items paid for by other primes or the owner. In addition, the estimate does not include any items that were purchased in a subcontract. All of the monthly costs were calculated by using a project duration of 20 months. The costs used were provided by Warfel Construction Company. Any costs provided as a lump sum figure were divided by 20 in order to obtain a monthly cost. In addition, any figures that were provided as a monthly cost were multiplied by 20 in order to obtain the total cost.

Excluded Items

As shown in Figure 3.1 the general conditions costs incurred by the GC are common costs on most jobsites. However, as mentioned in the above paragraph items that are paid for by the owner or other primes as well as items that were purchased in a sub-contract are not included in the following estimate.

The general conditions items not included in the estimate due to one of the previously discussed reasons include the tire wash station, the monthly electric bill, the crane, water tanks, and any permits and zoning costs. The tire wash station on the access road to the site was purchased in the site contractor's scope of work. Although Warfel was responsible for the temporary electric hook-up for the site, the owner pays the electric bill since the utility is tapped from the high school on the northern part of the campus. The crane, while only on site part time, was purchased in the steel contractor's scope of work. The water tanks used mainly to provide water for the masonry mixing stations are the responsibility of the plumbing contractor, J.R. Reynolds, as described in the project specifications. The permits and zoning costs were paid for by the owner prior to the start of construction. As stated in technical report one there was no land costs due to the fact that the owner already owned the land.

Since all project documentation including correspondence, RFI's, submittals, contracts, and change orders for LRI are sent and received electronically, the office supplies category in the GC estimate is relatively low compared with other jobs. Electronic

correspondence is greener and cheaper than paper correspondence because it negates the need for paper, stamps, and the time it takes for the documents to be delivered. Therefore, the only true costs in that category are the internet and miscellaneous office items, printer paper and ink should any documents need to be printed as a hard copy.

In addition, it should be noted that computers themselves as well as temporary heat are not included in the estimate. Computers are purchased in bulk and are considered office overhead by Warfel and therefore are not part of the general conditions. Temporary heat will be purchased in the subcontract of any trade that requires it to complete their work.

Lastly, it should be noted that although the project executive is involved with LRI his time is not charged to the job due to financial reasons I am not qualified to discuss.

Figure 3.1: General Conditions Estimate

	Quantity	Unit Cost per Month	Total Monthly Cost	Total Cost
Cell Phones	4	$50	$200	$4,000
Dumpsters	2	$850	$1,700	$34,000
Insurance	N/A	$550	$550	$11,000
Office Supplies/Internet	N/A	$70	$70	$1,400
Office Trailer	1	$550	$550	$11,000
Progressive Cleaning	N/A	$85	$85	$1,700
Site Fencing	N/A	$700	$700	$14,000
Small Tools	N/A	$550	$550	$11,000
Temp. Electric Hook-up	N/A	$70	$70	$1,400
Temporary Restroom Facilities	2	$117.50	$235	$4,700
Warfel Truck	1	$1,050	$1,050	$21,000
Foreman	1	$4,000	$4,000	$80,000
Superintendent	1	$9,000	$9,000	$180,000
Project Administrator	1	$625	$625	$12,500
Project Engineer	1	$4,250	$4,250	$85,000
Project Manager	1	$4,250	$4,250	$85,000
Project Executive	1	N/A	N/A	N/A
Total			**$27,885.00**	**$557,700.00**

LEED Evaluation

Landis Run Intermediate School is striving to obtain a LEED Silver Rating under the LEED 2009 for Schools rating system. The project has identified 44 credits that will be achieved in order to obtain a total point value of 52. In order to achieve LEED Silver status a project must obtain between 50 and 59 points. Table 4.1 shows the breakdown of points and credits across the six general categories in the LEED for Schools rating system. A detailed LEED 2009 for Schools scorecard can be found in appendix B. Figure 5.2 is a LEED 2009 for schools scorecard can be seen at the end of this section.

Table 4.1: LEED Summary

LEED Category	Number of Credits	Number of Points
Sustainable Sites	10	10
Water Efficiency	5	5
Energy & Atmosphere	4	11
Materials & Resources	8	8
Indoor Environmental Quality	14	15
Innovation & Design Process	3	3
Total	44	52

Overall, the project is pursuing credits which can be done efficiently without adding a too large of an initial cost and that will significantly reduce the building's impact on the environment. Credits that weren't chosen were not applicable to the project requirements, added to large of an initial cost, or would not serve to significantly reduce the impact of the building on the environment. On a public project where the budget is scrutinized the above reasoning makes sense because it's imperative that the taxpayer's money is spent as efficiently as possible. Therefore, I think these credits were chosen wisely overall and will serve to create an environmentally friendly building while keeping the initial cost comparable to that of a non-green building of similar size and type.

Sustainable Sites

LRI is striving for 10 different credits in the sustainable sites category which will combine for a total of 10 points. The credits which are being pursued in this category include multiple alternative transportation credits, multiple storm water design credits, site selection, heat island effect reduction, light pollution reduction, site master plan, and joint use of facilities. It makes sense that these were the credits chosen because they will all directly reduce the school's impact on the environment and its surrounding neighbors.

Many credits in this category simply could not be pursed due to project restraints. For example, obtaining the community connectivity credit or the brownfield redevelopment credit would have required the owner choose a different site which was note an option due to the readily available land which was already owned by MTSD. It wouldn't have made sense to purchase more land in order to obtain two credits while there was already suitable land on which the owner could build. The credits in the category were wisely chosen and gave the owner the most value in terms for reducing the buildings impact on the environment while limiting added costs.

Water Efficiency

The two main credits being pursued for the water efficiency category are water efficient landscaping and water use reduction. With the number of kids that will utilize the building the owner had a great opportunity to really reduce the water demand of this building and is doing so with water efficient fixtures in order to reduce demand by 40%. In addition, with a site of this size landscaping irrigation can really create a great demand. In using native or adaptive plant species and not using potable water it greatly lessens the demand the school creates. In pursuing these two credits the owner has made a huge dent in what the building would have otherwise required in terms of water usage.

Process water use reduction really wouldn't have made sense to achieve due to the relatively small amount of process water demand. Innovative wastewater technologies would have significantly increased the cost for the plumbing systems and would have probably run into some public opposition due to the public's caution of new technologies. Especially so if it could potentially put the health of their children at risk no matter how proven the technology is.

Energy & Atmosphere

LRI is pursuing all Energy & Atmosphere credits with the exception of on-site renewable energy and green power. On-site renewable energy may have added a substantial initial cost to purchase, install, and commission. However, due to the intended long term use of the building and the significant roof area the installation of solar panels probably would have had a suitable payback period and decreased the costs of electricity in the long run. This could have been a valuable addition to the building program since the cost of electricity has been steadily rising in recent years. Also, since the project is currently under budget for MTSD it seems likely that the district could have absorbed the initial cost of the installation.

Green power is a constant additional cost for the owner, Manheim Township School District. While it is commendable to buy green power, it probably would not have been the best idea for the district. The district has to answer to all the taxpayers who fund the district. Paying extra for electricity would probably not have gone over too well with the taxpayers especially in the current economic environment.

Materials & Resources

The project pursued all applicable credits in this category. Since the school is 100% new construction there was no initial materials to reuse therefore negating credits 1 and 3. Every other credit in this category has been pursued to its fullest extent. It makes sense that these credits were pursued due to the availability and substantial variety of regional materials and certified wood in central Pennsylvania. The timeline for the project, although certainly at a quick pace with a hard deadline, certainly allowed for the relatively short time it takes to recycle and divert construction waste from the landfill. In addition, the small cost premium for certified wood is certainly the responsible thing to do and is worth it to ensure that forests are still populated with healthy trees in the future. The use of recycled content and rapidly renewable resource are relatively effortless credits to obtain. Furthermore, the use of rapidly renewable resources, such as bamboo which is used in LRI, can add character to the building. In general, the credits chosen for this

category were relatively easy to pursue and have or will have a significant positive impact on the environment which is well worth it.

Indoor Environmental Quality

The credits being pursued in the IAQ category reflect the owner's commitment to providing an environment that is safe and conducive to learning. All of the credits selected reduce potential health risks for the building's occupants, such as the low-emitting materials credits, and increase bodily comfort, such as the day lighting and views credit as well as the thermal comfort credit. These credits were invaluable additions to the LEED score card because the owner's main purpose is the education of students and all the credits in this category will enhance that learning in one way or another as well as protect the health of all the building occupants.

Innovation & Design Process

Using the school as a teaching tool is a great way to educate the public about green topics and technologies. Since the building is a school it makes sense that it should be used to teach not just its students but everyone in the school district and beyond of an ever increasingly important topic. The integrated pest management credit also makes sense because it is such a relatively small initial cost but could protect the building for years or decades to come. Doing so will therefore reduce demand for building repairs down the road and therefore reduce the environmental demand of the building. Again, the initial cost of this credit really makes it a "no brainer".

Regional Priority Credits

It should be noted that two of the credits being pursued on this project are regional priority credits, namely SSc4.1 (Alternative Transportation-Public Transportation Access) and SSc6.2 (Storm Water Design – Quality Control) under LEED for Schools 2009. However they are not included in the list of credit goals in the project specifications. Accordingly, I have not added them into the LEED scorecard for this report as there may be reasons that I am not aware for not including the regional priority credits. One such reason may be that the building was designed under an earlier LEED version and then converted to LEED 2009 when that version debuted. It should also be noted that even with the addition of these two regional priority credits the project would remain LEED Silver at 54 points.

Figure 5.2: LEED Scorecard

LEED 2009 for Schools New Construction and Major Renovations

Project Checklist

Landis Run Intermediate School

Sustainable Sites — Possible Points: 24

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
Y			Prereq 2	Environmental Site Assessment	
x			Credit 1	Site Selection	1
			Credit 2	Development Density and Community Connectivity	4
			Credit 3	Brownfield Redevelopment	1
x			Credit 4.1	Alternative Transportation—Public Transportation Access	4
x			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	2
x			Credit 4.4	Alternative Transportation—Parking Capacity	2
			Credit 5.1	Site Development—Protect or Restore Habitat	1
			Credit 5.2	Site Development—Maximize Open Space	1
x			Credit 6.1	Stormwater Design—Quantity Control	1
x			Credit 6.2	Stormwater Design—Quality Control	1
			Credit 7.1	Heat Island Effect—Non-roof	1
x			Credit 7.2	Heat Island Effect—Roof	1
x			Credit 8	Light Pollution Reduction	1
x			Credit 9	Site Master Plan	1
x			Credit 10	Joint Use of Facilities	1

Water Efficiency — Possible Points: 11

Y			Prereq 1	Water Use Reduction—20% Reduction	
x			Credit 1	Water Efficient Landscaping	2 to 4
			Credit 2	Innovative Wastewater Technologies	2
x			Credit 3	Water Use Reduction	2 to 4
			Credit 3	Process Water Use Reduction	1

Energy and Atmosphere — Possible Points: 33

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
x			Credit 1	Optimize Energy Performance	1 to 19
			Credit 2	On-Site Renewable Energy	1 to 7
x			Credit 3	Enhanced Commissioning	2
x			Credit 4	Enhanced Refrigerant Management	1
x			Credit 5	Measurement and Verification	2
			Credit 6	Green Power	2

Materials and Resources — Possible Points: 13

Y			Prereq 1	Storage and Collection of Recyclables	
			Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 2
			Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
x			Credit 2	Construction Waste Management	1 to 2

Materials and Resources, Continued

Y	?	N			
			Credit 3	Materials Reuse	1 to 2
x			Credit 4	Recycled Content	1 to 2
x			Credit 5	Regional Materials	1 to 2
x			Credit 6	Rapidly Renewable Materials	1
x			Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 19

Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Minimum Acoustical Performance	
x			Credit 1	Outdoor Air Delivery Monitoring	1
			Credit 2	Increased Ventilation	1
x			Credit 3.1	Construction IAQ Management Plan—During Construction	1
x			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
x			Credit 4	Low-Emitting Materials	1 to 4
x			Credit 5	Indoor Chemical and Pollutant Source Control	1
x			Credit 6.1	Controllability of Systems—Lighting	1
x			Credit 6.2	Controllability of Systems—Thermal Comfort	1
x			Credit 7.1	Thermal Comfort—Design	1
x			Credit 7.2	Thermal Comfort—Verification	1
x			Credit 8.1	Daylight and Views—Daylight	1 to 3
			Credit 8.2	Daylight and Views—Views	1
			Credit 9	Enhanced Acoustical Performance	1
x			Credit 10	Mold Prevention	1

Innovation and Design Process — Possible Points: 6

x			Credit 1.1	Innovation in Design: Integrated Pest Management	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
x			Credit 2	LEED Accredited Professional	1
x			Credit 3	The School as a Teaching Tool	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

BIM Use Evaluation

According to an interview with a representative from the architectural firm that designed the building, LRI was one of the first projects that Crabtree, Rohrbaugh & Associates used BIM heavily for the entire design phase of the project. The goals of BIM implementation on the project are listed in Figure 5.1 and a process map is shown in Figure 5.3.

Planning & Design Phase

CAD was used to analyze the site spatially and determine how the building would interact with the rest of the site during the planning stage. The building was designed entirely through the use of BIM in the design phase. Autodesk's Revit was the primary program used for BIM. The structure was designed and analyzed completely in Revit. Once the structure was designed it was flattened to 2D drawings in AutoCad and given to the structural contractor. The contractor then used these drawings as a starting point for their shop drawings. For the majority of the design all the contractor had to do was add details before submitting the shop drawings. A lighting analysis was performed for internal lights, external lights and day lighting. An energy analysis was also performed in terms of a building envelope analysis and mechanical system analysis. The design team implemented 3D clash detection for the MEP systems. The MEP systems were then flattened into 2D drawings using AutoCad and distributed to the MEP primes as a starting point for their coordination drawings. The MEP primes were not directly given the model since they were not equipped at the time to accept the model. Although not directly explicit through the interview it is assumed due to the high level of information embedded within the model that it was used to perform a preliminary cost estimate of the building.

Overall, BIM was implemented in order to make communication and design more efficient between the architects and engineers. This goal seems to have been accomplished so far due to the low amount of coordination issues during construction and the relatively low amount of addendums.

Construction Phase

BIM played virtually no role in the construction phase of LRI. This seems to be consistent with the rest of the industry due to the fact that so far in the industry during the construction phase BIM only makes economic sense to implement on very large, complex projects. It probably would have cost contractor's money to use BIM in any sort of meaningful way on LRI during the construction phase of the project. In addition, it simply would have been unnecessary since the building type is one that local contractors are very familiar with and the building itself is not overly complex.

Operation Phase

Although not 100% planned yet, the building model is intended to serve as a way for the owner to schedule maintenance, record information about assets and maintenance (i.e. what light fixtures accept what lamps), and to maintain an as built model to reference for future additions or modifications to the building. However, the information needed to perform these services has not yet been entered into the model and is a work in progress between the owner and the architects.

Evaluation

In my opinion, BIM was used to an appropriate extent on LRI. It was moderately used in the planning stage which makes sense due to the fact that the site and its surroundings are not complex. It was heavily used in the design phase to design, analyze, review, and revise the building design including its systems. These uses seem to be appropriate due to the high level of performance and efficiency required of the building in order to achieve its LEED pursuits. BIM was not utilized at all in the construction phase of the project which makes sense. Currently, it is very expensive to implement BIM in the field to track equipment or show construction details to subcontractors. It only makes sense to do so with hundreds of pieces of equipment or enormous and complex projects. While LRI is large I don't think it's enormous and it is certainly not overly complex. It wouldn't have paid off to implement BIM to any useful extent during the construction phase of LRI. Although not totally figured out, BIM is planned to be used in the operation phase of the project because it is relatively cheap to implement in the operations phase. On a large project like LRI this will pay off for the owner many times over. It is planned that maintenance scheduling, equipment information, as built data, and other information will be embedded into the building model to allow for efficient operation of the building. Although this is cutting edge for both the architects who designed the building and typical owners in the area I think it will be a successful use of BIM and will certainly be of great use to the owner in the future.

Overall, I find that BIM was used efficiently. It seems it was only used for processes that would provide a clear benefit and made sense to implement while other uses which would have cost additional money and were unnecessary were avoided.

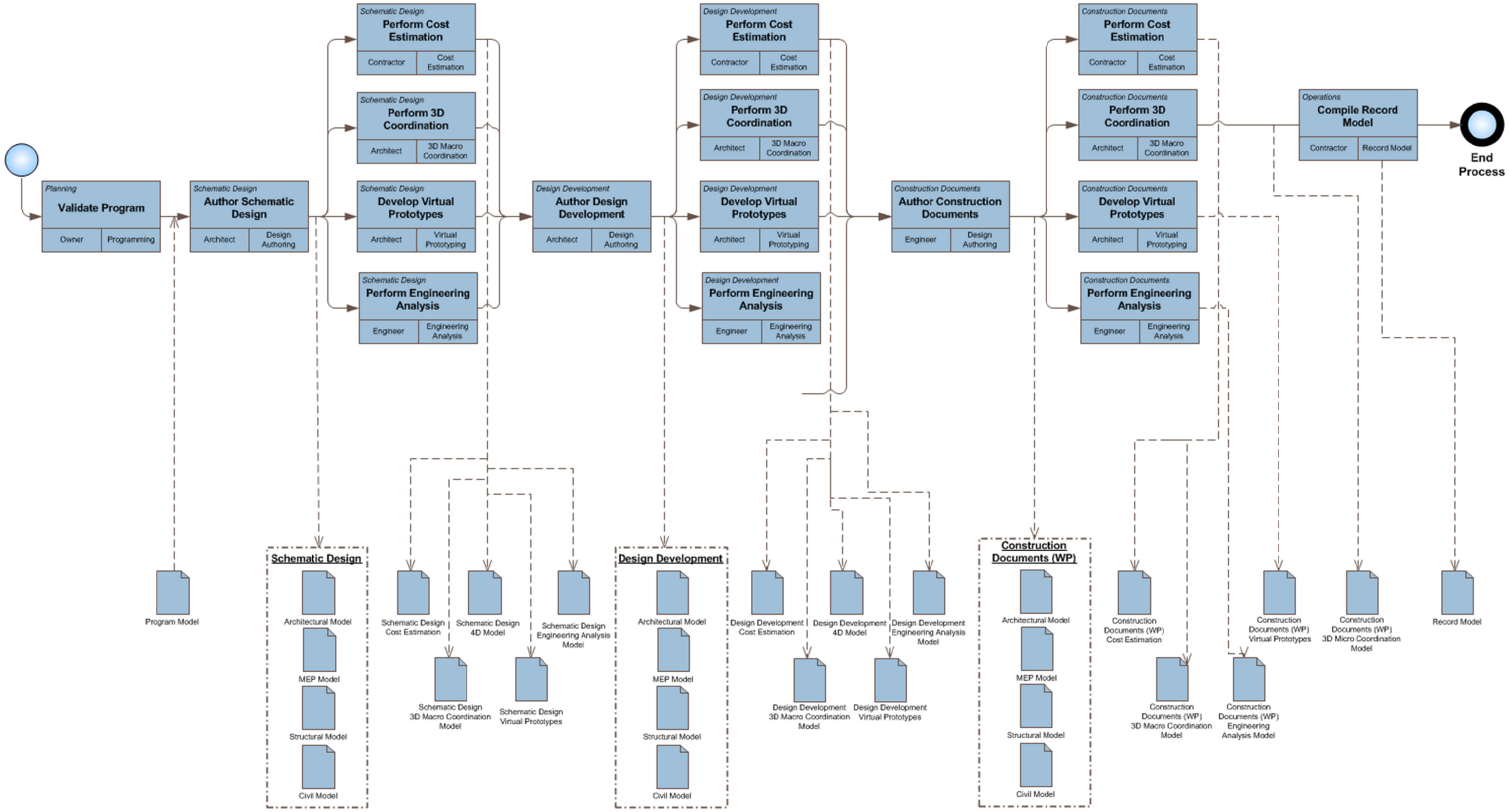
Figure 5.1: BIM Goals for Landis Run Intermediate School

PRIORITY (HIGH/ MED/ LOW)	GOAL DESCRIPTION	POTENTIAL BIM USES
High	Maximize efficiency of design process	Design Authoring
High	Provide a model that the owner can use to efficiently maintain the building	Building Maintenance Scheduling, Space Management and Tracking, Asset Management, and Record Modeling
Med	Conflict resolution of MEP systems	3D Coordination
Med	Check Feasibility of LEED Credits	Energy Analysis
Med	Analysis of design to ensure project program is met	Systems Analysis
Low	Provide a template for contractor's to reference for fabrication and construction	Design Reviews

Figure 5.2: BIM Uses by Phase for Landis Run Intermediate School

X	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
	PROGRAMMING	X	DESIGN AUTHORING		SITE UTILIZATION PLANNING	X	BUILDING MAINTENANCE SCHEDULING
X	SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		BUILDING SYSTEM ANALYSIS
		X	3D COORDINATION		3D COORDINATION	X	ASSET MANAGEMENT
		X	STRUCTURAL ANALYSIS		DIGITAL FABRICATION		SPACE MANAGEMENT / TRACKING
		X	LIGHTING ANALYSIS		3D CONTROL AND PLANNING		DISASTER PLANNING
		X	ENERGY ANALYSIS		RECORD MODELING	X	RECORD MODELING
			MECHANICAL ANALYSIS				
			OTHER ENG. ANALYSIS				
			SUSTAINABLITY (LEED) EVALUATION				
			CODE VALIDATION				
	PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)		PHASE PLANNING (4D MODELING)
	COST ESTIMATION	X	COST ESTIMATION		COST ESTIMATION		COST ESTIMATION
	EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING

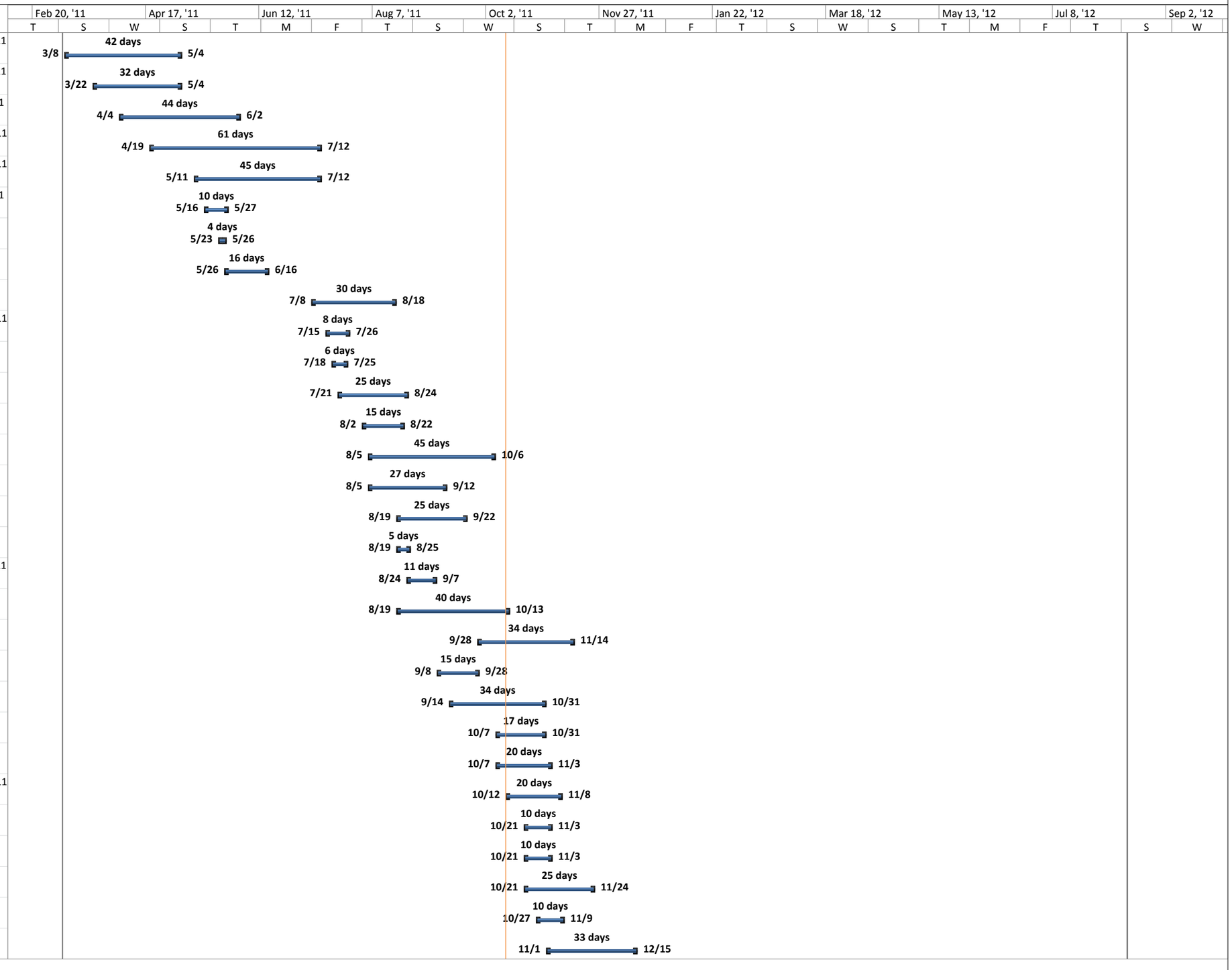
Figure 5.3: BIM Process Map for Landis Run Intermediate School



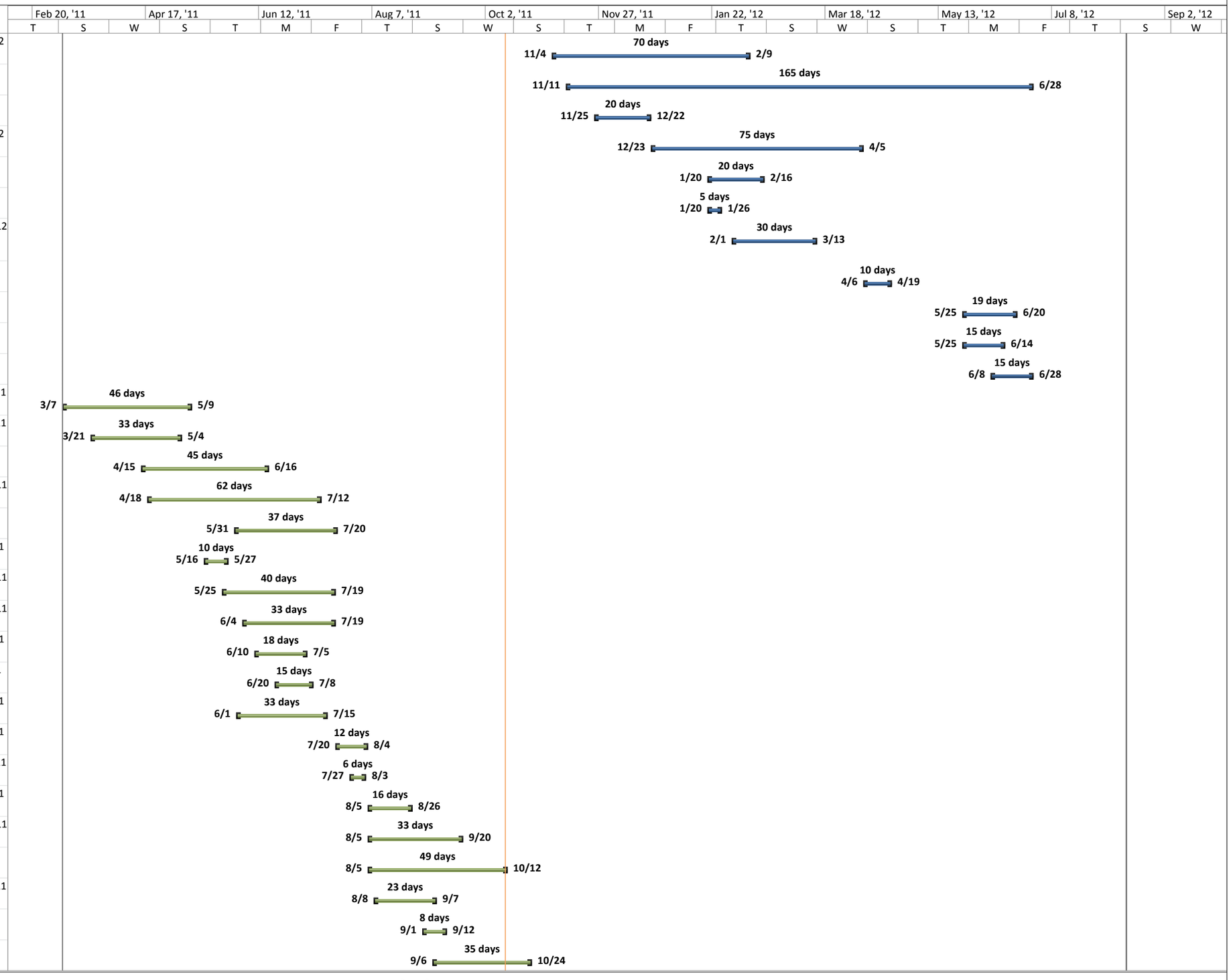
Landis Run Intermediate School

Detailed Project Schedule

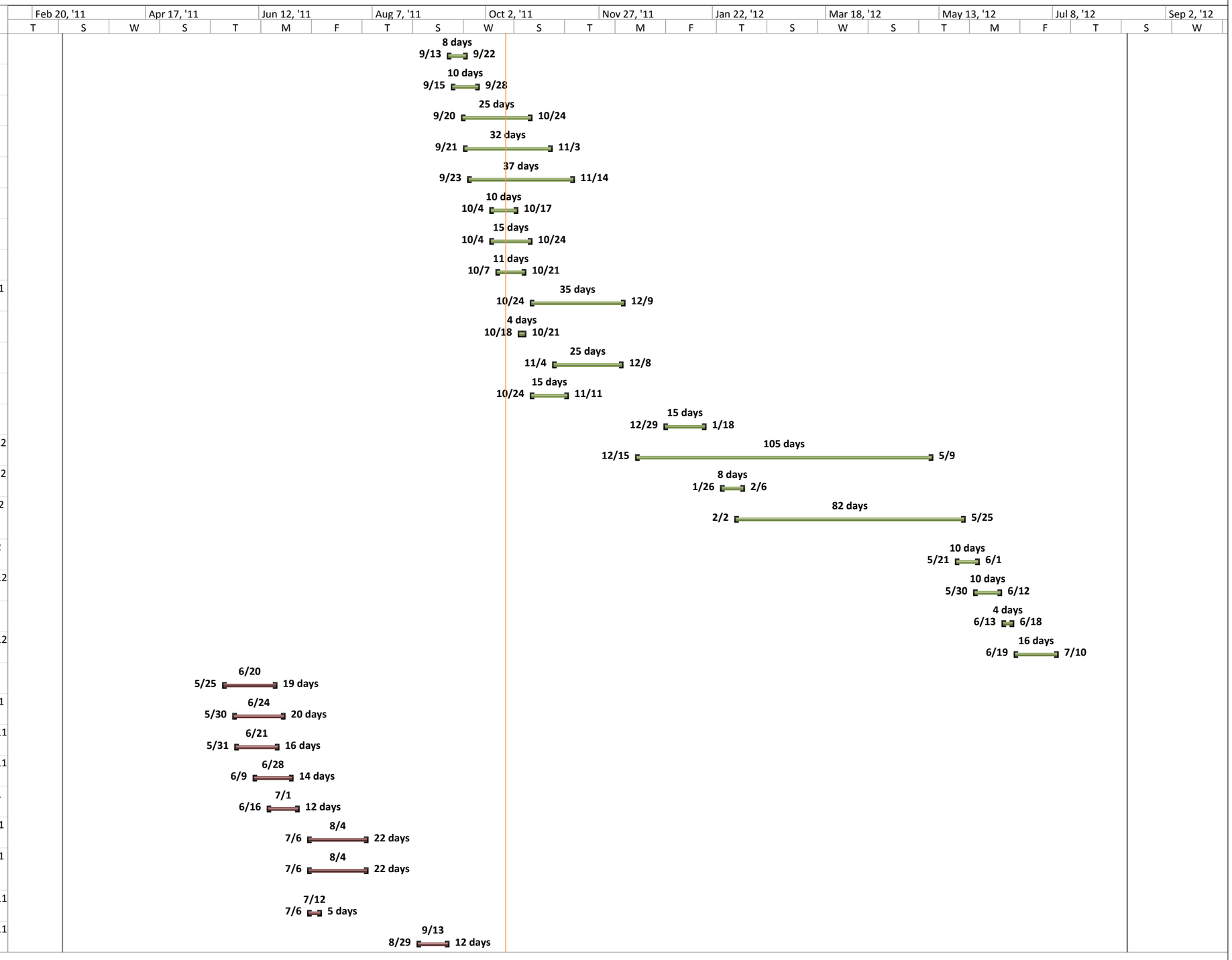
ID	Area	Activity	Duration	Start	Finish
1	Area A	Layout, Excavate, & Place Footing	42 days	Tue 3/8/11	Wed 5/4/11
2	Area A	Masonry Wall to SOG Elevation	32 days	Tue 3/22/11	Wed 5/4/11
3	Area A	Plumbing & Electrical Rough-In	44 days	Mon 4/4/11	Thu 6/2/11
4	Area A	Masonry Walls to Bearing Height	61 days	Tue 4/19/11	Tue 7/12/11
5	Area A	Elec, Low Voltage. & Plumbing In Wall Rough-In	45 days	Wed 5/11/11	Tue 7/12/11
6	Area A	Install Floor Joists & Deck	10 days	Mon 5/16/11	Fri 5/27/11
7	Area A	FRP Slab Except Caf. & Gym	4 days	Mon 5/23/11	Thu 5/26/11
8	Area A	Install Door Frames	16 days	Thu 5/26/11	Thu 6/16/11
9	Area A	Install Roof Joists & Deck	30 days	Fri 7/8/11	Thu 8/18/11
10	Area A	Spray Foam Insulation	8 days	Fri 7/15/11	Tue 7/26/11
11	Area A	FRP Caf. & Gym SOG	6 days	Mon 7/18/11	Mon 7/25/11
12	Area A	HVAC, Plumb., Elec. Gym Overhead Rough-In	25 days	Thu 7/21/11	Wed 8/24/11
13	Area A	Metal Stud Wall Framing	15 days	Tue 8/2/11	Mon 8/22/11
14	Area A	Roofing & Roof Drains	45 days	Fri 8/5/11	Thu 10/6/11
15	Area A	HVAC Ducts, Pipes, Hangers, Mains, Branches & Test	27 days	Fri 8/5/11	Mon 9/12/11
16	Area A	Sprinkler RI & Branch Piping	25 days	Fri 8/19/11	Thu 9/22/11
17	Area A	Gas Piping	5 days	Fri 8/19/11	Thu 8/25/11
18	Area A	Brick Veneer	11 days	Wed 8/24/11	Wed 9/7/11
19	Area A	AHU Installation	40 days	Fri 8/19/11	Thu 10/13/11
20	Area A	AHU Tie-In	34 days	Wed 9/28/11	Mon 11/14/11
21	Area A	Install Windows/Curtainwall	15 days	Thu 9/8/11	Wed 9/28/11
22	Area A	Elec. & Dom. Water RI and Branch Piping	34 days	Wed 9/14/11	Mon 10/31/11
23	Area A	Install Mech. Equipment & Piping	17 days	Fri 10/7/11	Mon 10/31/11
24	Area A	Apply Block Filler & Paint	20 days	Fri 10/7/11	Thu 11/3/11
25	Area A	Insulate Ductwork & Piping	20 days	Wed 10/12/11	Tue 11/8/11
26	Area A	Install Kitchen Equipment	10 days	Fri 10/21/11	Thu 11/3/11
27	Area A	Install Cabe Tray	10 days	Fri 10/21/11	Thu 11/3/11
28	Area A	Install & Finish Drywall, Bulkheads, Soffits & Panels	25 days	Fri 10/21/11	Thu 11/24/11
29	Area A	Equipment Tie-Ins, Ductwork & Piping	10 days	Thu 10/27/11	Wed 11/9/11
30	Area A	Elec., HVAC, Fire Alarm & Security Wiring	33 days	Tue 11/1/11	Thu 12/15/11



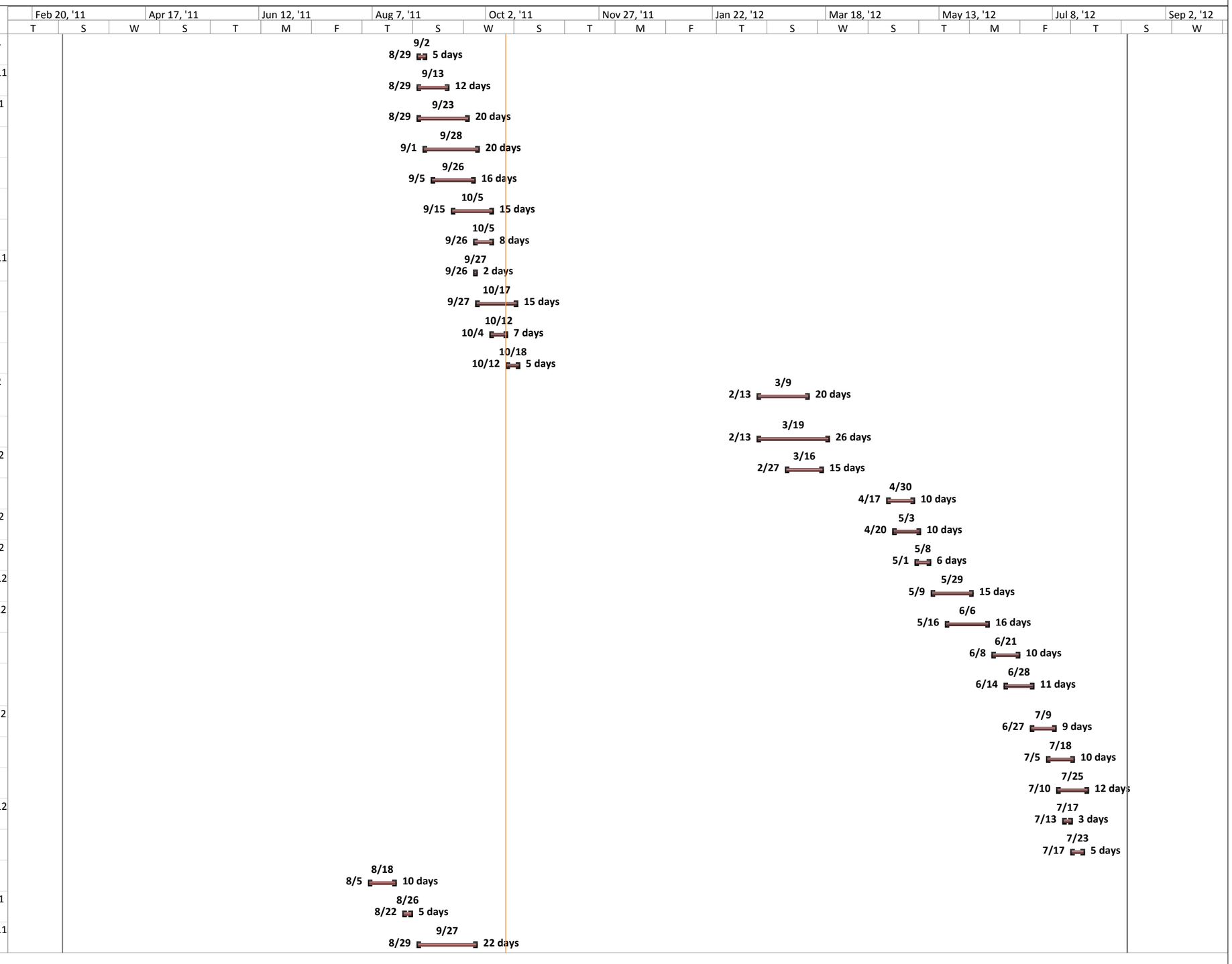
ID	Area	Activity	Duration	Start	Finish
31	Area A	Install Light Fixtures & Devices	70 days	Fri 11/4/11	Thu 2/9/12
32	Area A	Gym Specialties & Equipment	165 days	Fri 11/11/11	Thu 6/28/12
33	Area A	Flooring	20 days	Fri 11/25/11	Thu 12/22/11
34	Area A	Ceiling Grid & Tile	75 days	Fri 12/23/11	Thu 4/5/12
35	Area A	Install Sprinkler Drop Heads	20 days	Fri 1/20/12	Thu 2/16/12
36	Area A	Lockers & Hallway Specialties	5 days	Fri 1/20/12	Thu 1/26/12
37	Area A	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	30 days	Wed 2/1/12	Tue 3/13/12
38	Area A	Casework	10 days	Fri 4/6/12	Thu 4/19/12
39	Area A	Plumbing Fixtures & Toilet Specialties	19 days	Fri 5/25/12	Wed 6/20/12
40	Area A	Millwork	15 days	Fri 5/25/12	Thu 6/14/12
41	Area A	Install Doors & Accessories	15 days	Fri 6/8/12	Thu 6/28/12
42	Area B	Layout, Excavate, & Place Footing	46 days	Mon 3/7/11	Mon 5/9/11
43	Area B	Masonry Wall to SOG Elevation	33 days	Mon 3/21/11	Wed 5/4/11
44	Area B	Plumbing & Electrical Rough-In	45 days	Fri 4/15/11	Thu 6/16/11
45	Area B	Masonry Walls to Bearing Height	62 days	Mon 4/18/11	Tue 7/12/11
46	Area B	Elec, Low Voltage. & Plumbing In Wall Rough-In	37 days	Tue 5/31/11	Wed 7/20/11
47	Area B	Install Floor Joists & Deck	10 days	Mon 5/16/11	Fri 5/27/11
48	Area B	FRP Slab	40 days	Wed 5/25/11	Tue 7/19/11
49	Area B	Install Door Frames	33 days	Sat 6/4/11	Tue 7/19/11
50	Area B	Install Composite Sheet Waterproofing	18 days	Fri 6/10/11	Tue 7/5/11
51	Area B	Backfill Basement Walls	15 days	Mon 6/20/11	Fri 7/8/11
52	Area B	Complete All UG MEP Rough In	33 days	Wed 6/1/11	Fri 7/15/11
53	Area B	Install Roof Joists & Deck	12 days	Wed 7/20/11	Thu 8/4/11
54	Area B	Spray Foam Insulation	6 days	Wed 7/27/11	Wed 8/3/11
55	Area B	Install Plumbing Equipment	16 days	Fri 8/5/11	Fri 8/26/11
56	Area B	Install Elec. Panels, Transformers, and Conduit	33 days	Fri 8/5/11	Tue 9/20/11
57	Area B	Metal Stud Framing & Drywall	49 days	Fri 8/5/11	Wed 10/12/11
58	Area B	Roofing & Roof Drains	23 days	Mon 8/8/11	Wed 9/7/11
59	Area B	Brick Veneer	8 days	Thu 9/1/11	Mon 9/12/11
60	Area B	HVAC Ducts, Pipes, Hangers, Mains, Branches & Test	35 days	Tue 9/6/11	Mon 10/24/11



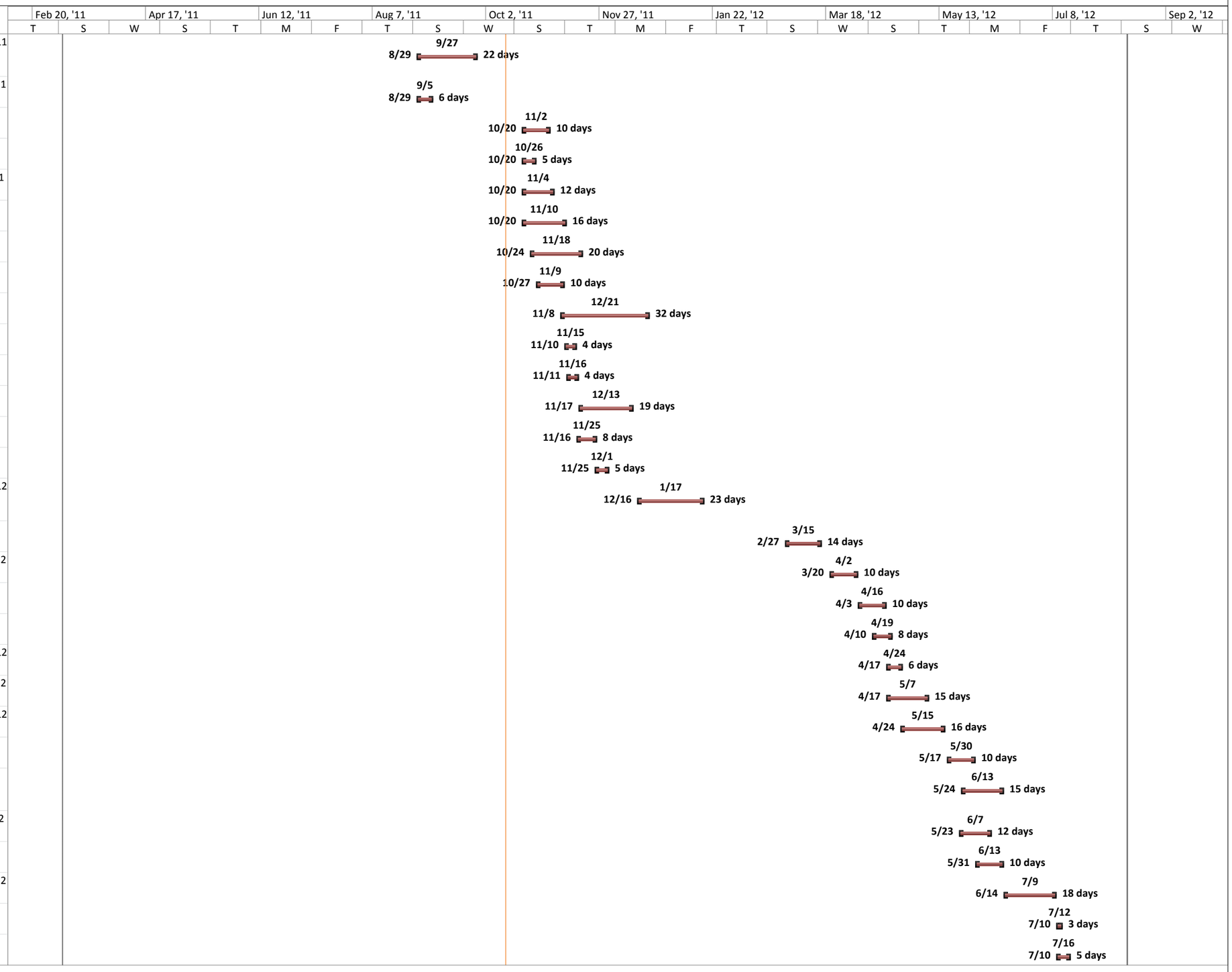
ID	Area	Activity	Duration	Start	Finish
61	Area B	Install Windows/Curtainwall	8 days	Tue 9/13/11	Thu 9/22/11
62	Area B	Apply Block Filler & Paint	10 days	Thu 9/15/11	Wed 9/28/11
63	Area B	Dom. Water RI and Branch Piping	25 days	Tue 9/20/11	Mon 10/24/11
64	Area B	Terminate Panels, Transformers, and Primary.	32 days	Wed 9/21/11	Thu 11/3/11
65	Area B	Insulate Ductwork & Piping	37 days	Fri 9/23/11	Mon 11/14/11
66	Area B	Sprinkler RI & Branch Piping	10 days	Tue 10/4/11	Mon 10/17/11
67	Area B	Gas Piping	15 days	Tue 10/4/11	Mon 10/24/11
68	Area B	AHU Installation	11 days	Fri 10/7/11	Fri 10/21/11
69	Area B	AHU Tie-In	35 days	Mon 10/24/11	Fri 12/9/11
70	Area B	Install Cable Tray	4 days	Tue 10/18/11	Fri 10/21/11
71	Area B	Install Mech. Equipment & Piping	25 days	Fri 11/4/11	Thu 12/8/11
72	Area B	Elec., HVAC, Fire Alarm & Security Wiring	15 days	Mon 10/24/11	Fri 11/11/11
73	Area B	Install Light Fixtures & Devices	15 days	Thu 12/29/11	Wed 1/18/12
74	Area B	Ceiling Grid & Tile	105 days	Thu 12/15/11	Wed 5/9/12
75	Area B	Install Sprinkler Drop Heads	8 days	Thu 1/26/12	Mon 2/6/12
76	Area B	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	82 days	Thu 2/2/12	Fri 5/25/12
77	Area B	Casework	10 days	Mon 5/21/12	Fri 6/1/12
78	Area B	Flooring	10 days	Wed 5/30/12	Tue 6/12/12
79	Area B	Plumbing Fixtures & Toilet Specialties	4 days	Wed 6/13/12	Mon 6/18/12
80	Area B	Install Doors & Accessories	16 days	Tue 6/19/12	Tue 7/10/12
81	Area C Ground	Layout, Excavate, & Place Footing	19 days	Wed 5/25/11	Mon 6/20/11
82	Area C Ground	Masonry Foundation Walls to SOG	20 days	Mon 5/30/11	Fri 6/24/11
83	Area C Ground	UG MEP Rough-Ins	16 days	Tue 5/31/11	Tue 6/21/11
84	Area C Ground	Prep & Backfill Foundation Walls	14 days	Thu 6/9/11	Tue 6/28/11
85	Area C Ground	FRP SOG	12 days	Thu 6/16/11	Fri 7/1/11
86	Area C Ground	Masonry Bearing Walls to 1st Floor	22 days	Wed 7/6/11	Thu 8/4/11
87	Area C Ground	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	22 days	Wed 7/6/11	Thu 8/4/11
88	Area C Ground	Install Door Frames	5 days	Wed 7/6/11	Tue 7/12/11
89	Area C Ground	Apply Block Filler & Paint	12 days	Mon 8/29/11	Tue 9/13/11



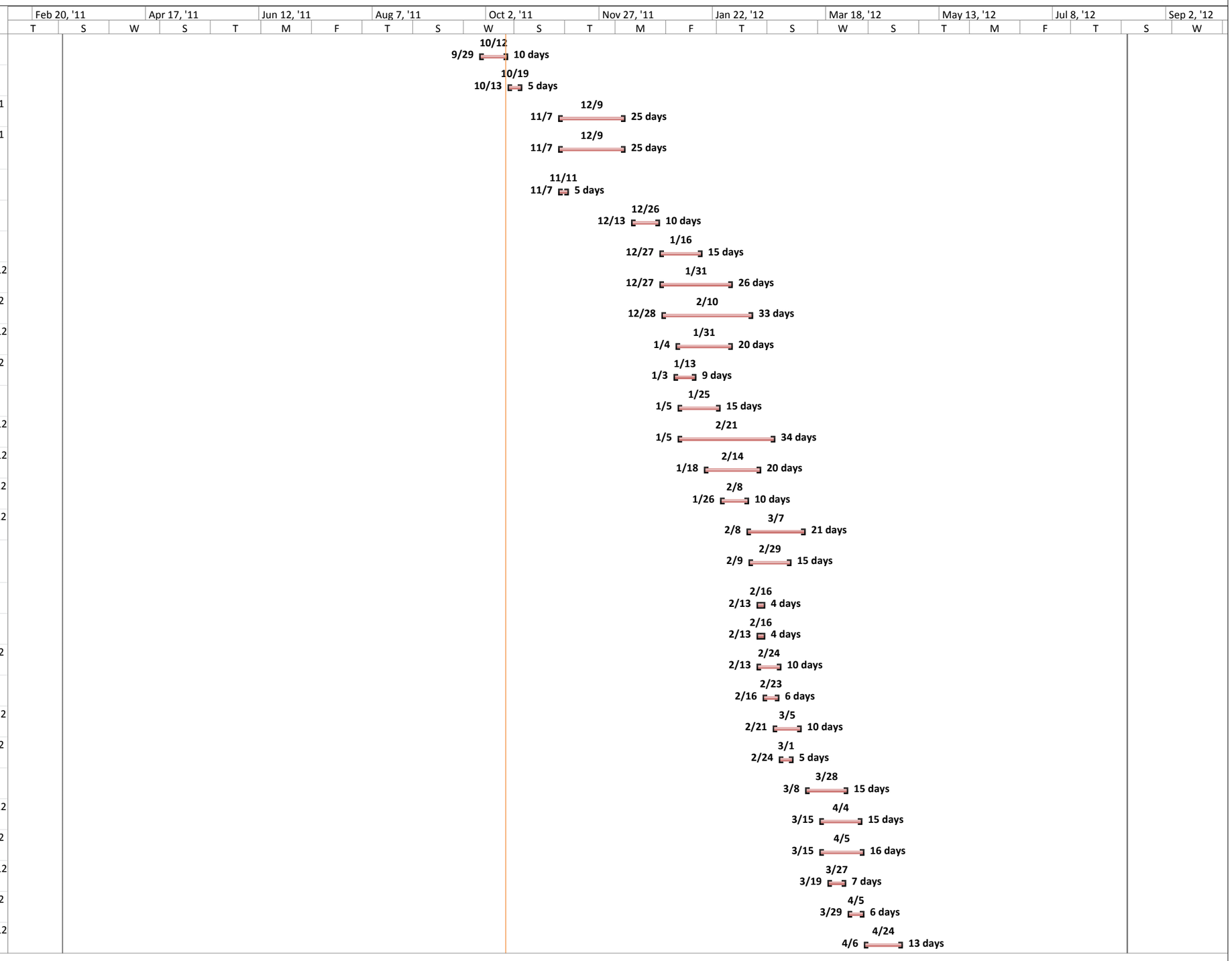
ID	Area	Activity	Duration	Start	Finish
90	Area C Ground	Metal Stud Framing & Drywall	5 days	Mon 8/29/11	Fri 9/2/11
91	Area C Ground	Install Stairs to 1st Floor	12 days	Mon 8/29/11	Tue 9/13/11
92	Area C Ground	HVAC Ducts, Pipes, Hangers, Mains, Branches	20 days	Mon 8/29/11	Fri 9/23/11
93	Area C Ground	Overhead Electrical Rough-In	20 days	Thu 9/1/11	Wed 9/28/11
94	Area C Ground	Sprinkler Rough-In and Branch Piping	16 days	Mon 9/5/11	Mon 9/26/11
95	Area C Ground	Dom. Water RI and Branch Piping	15 days	Thu 9/15/11	Wed 10/5/11
96	Area C Ground	Install Mech. Equipment	8 days	Mon 9/26/11	Wed 10/5/11
97	Area C Ground	Chase Duct for AHU's	2 days	Mon 9/26/11	Tue 9/27/11
98	Area C Ground	Install LV Cable Tray & Pull Wire	15 days	Tue 9/27/11	Mon 10/17/11
99	Area C Ground	Equipment Tie-Ins, Ductwork & Piping	7 days	Tue 10/4/11	Wed 10/12/11
100	Area C Ground	Wire HVAC Equipment	5 days	Wed 10/12/11	Tue 10/18/11
101	Area C Ground	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	20 days	Mon 2/13/12	Fri 3/9/12
102	Area C Ground	Insulate Ductwork & Piping	26 days	Mon 2/13/12	Mon 3/19/12
103	Area C Ground	Install Elevator	15 days	Mon 2/27/12	Fri 3/16/12
104	Area C Ground	Install Ceiling Grid	10 days	Tue 4/17/12	Mon 4/30/12
105	Area C Ground	Install Sprinkler Drop Heads	10 days	Fri 4/20/12	Thu 5/3/12
106	Area C Ground	Install Resinous Flooring	6 days	Tue 5/1/12	Tue 5/8/12
107	Area C Ground	Install Light Fixtures & Devices	15 days	Wed 5/9/12	Tue 5/29/12
108	Area C Ground	Install Duct Drops	16 days	Wed 5/16/12	Wed 6/6/12
109	Area C Ground	Ceiling Tile	10 days	Fri 6/8/12	Thu 6/21/12
110	Area C Ground	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	11 days	Thu 6/14/12	Thu 6/28/12
111	Area C Ground	Casework & Lockers	9 days	Wed 6/27/12	Mon 7/9/12
112	Area C Ground	Flooring	10 days	Thu 7/5/12	Wed 7/18/12
113	Area C Ground	Plumbing Fixtures & Toilet Specialties	12 days	Tue 7/10/12	Wed 7/25/12
114	Area C Ground	Doors & Hardware	3 days	Fri 7/13/12	Tue 7/17/12
115	Area C Ground	Classroom Specialties	5 days	Tue 7/17/12	Mon 7/23/12
116	Area C 1st Floor	Install Joists & Deck	10 days	Fri 8/5/11	Thu 8/18/11
117	Area C 1st Floor	Prep & Place Slab on Deck	5 days	Mon 8/22/11	Fri 8/26/11
118	Area C 1st Floor	Masonry Bearing Walls to 2nd Floor	22 days	Mon 8/29/11	Tue 9/27/11



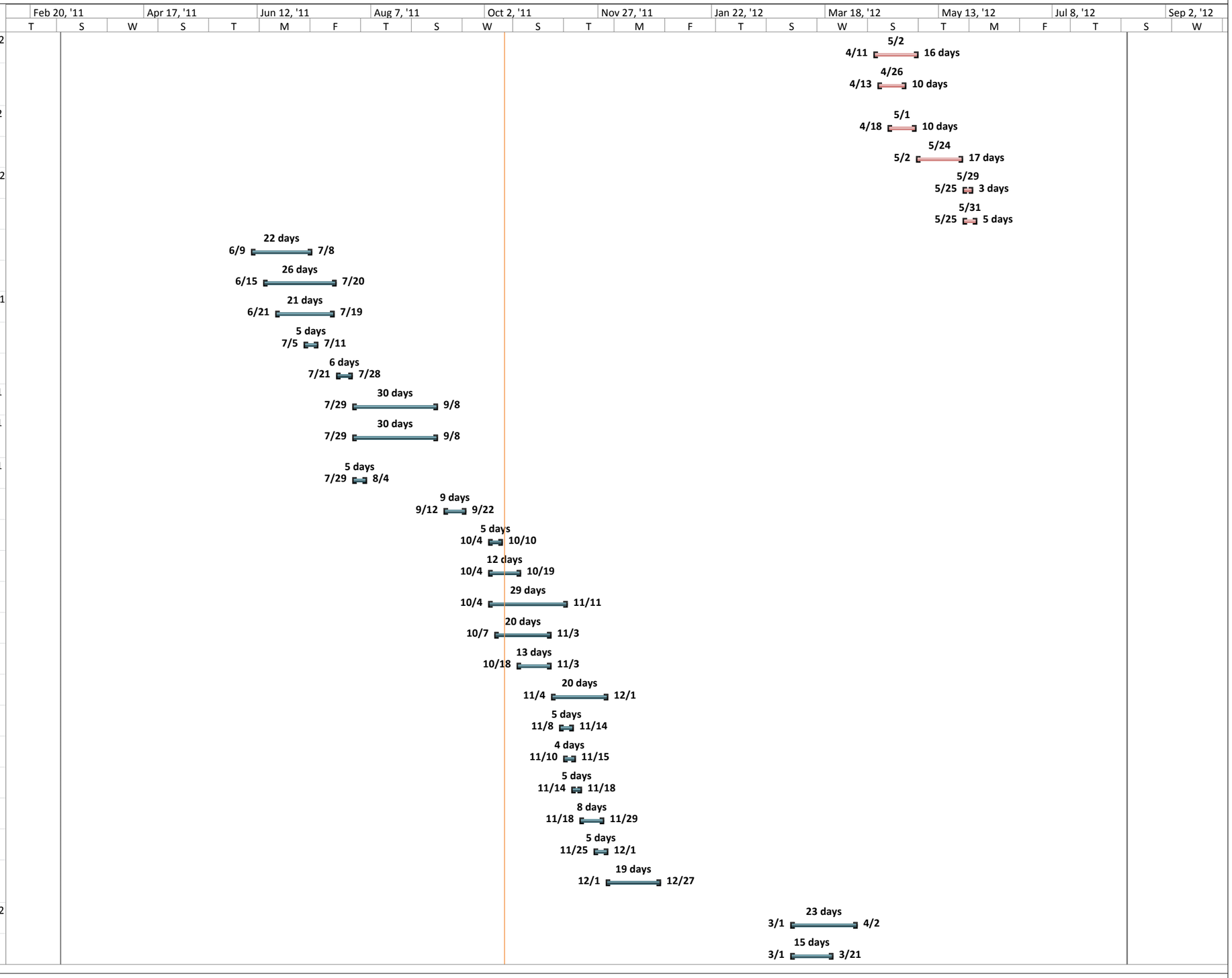
ID	Area	Activity	Duration	Start	Finish
119	Area C 1st Floor	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	22 days	Mon 8/29/11	Tue 9/27/11
120	Area C 1st Floor	Install Door Frames	6 days	Mon 8/29/11	Mon 9/5/11
121	Area C 1st Floor	Apply Block Filler & Paint	10 days	Thu 10/20/11	Wed 11/2/11
122	Area C 1st Floor	Metal Stud Framing & Drywall	5 days	Thu 10/20/11	Wed 10/26/11
123	Area C 1st Floor	Install Stairs to 2nd Floor	12 days	Thu 10/20/11	Fri 11/4/11
124	Area C 1st Floor	HVAC Ducts, Pipes, Hangers, Mains, Branches	16 days	Thu 10/20/11	Thu 11/10/11
125	Area C 1st Floor	Overhead Electrical Rough-In	20 days	Mon 10/24/11	Fri 11/18/11
126	Area C 1st Floor	Sprinkler Rough-In and Branch Piping	10 days	Thu 10/27/11	Wed 11/9/11
127	Area C 1st Floor	Dom. Water RI and Branch Piping	32 days	Tue 11/8/11	Wed 12/21/11
128	Area C 1st Floor	Install Mech. Equipment	4 days	Thu 11/10/11	Tue 11/15/11
129	Area C 1st Floor	Chase Duct for AHU's	4 days	Fri 11/11/11	Wed 11/16/11
130	Area C 1st Floor	Install LV Cable Tray & Pull Wire	19 days	Thu 11/17/11	Tue 12/13/11
131	Area C 1st Floor	Equipment Tie-Ins, Ductwork & Piping	8 days	Wed 11/16/11	Fri 11/25/11
132	Area C 1st Floor	Wire HVAC Equipment	5 days	Fri 11/25/11	Thu 12/1/11
133	Area C 1st Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	23 days	Fri 12/16/11	Tue 1/17/12
134	Area C 1st Floor	Insulate Ductwork & Piping	14 days	Mon 2/27/12	Thu 3/15/12
135	Area C 1st Floor	Install Drywall	10 days	Tue 3/20/12	Mon 4/2/12
136	Area C 1st Floor	Install Ceiling Grid	10 days	Tue 4/3/12	Mon 4/16/12
137	Area C 1st Floor	Install Sprinkler Drop Heads	8 days	Tue 4/10/12	Thu 4/19/12
138	Area C 1st Floor	Install Resinous Flooring	6 days	Tue 4/17/12	Tue 4/24/12
139	Area C 1st Floor	Install Light Fixtures & Devices	15 days	Tue 4/17/12	Mon 5/7/12
140	Area C 1st Floor	Install Duct Drops	16 days	Tue 4/24/12	Tue 5/15/12
141	Area C 1st Floor	Ceiling Tile	10 days	Thu 5/17/12	Wed 5/30/12
142	Area C 1st Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	15 days	Thu 5/24/12	Wed 6/13/12
143	Area C 1st Floor	Casework & Lockers	12 days	Wed 5/23/12	Thu 6/7/12
144	Area C 1st Floor	Flooring	10 days	Thu 5/31/12	Wed 6/13/12
145	Area C 1st Floor	Plumbing Fixtures & Toilet Specialties	18 days	Thu 6/14/12	Mon 7/9/12
146	Area C 1st Floor	Doors & Hardware	3 days	Tue 7/10/12	Thu 7/12/12
147	Area C 1st Floor	Classroom Specialties	5 days	Tue 7/10/12	Mon 7/16/12



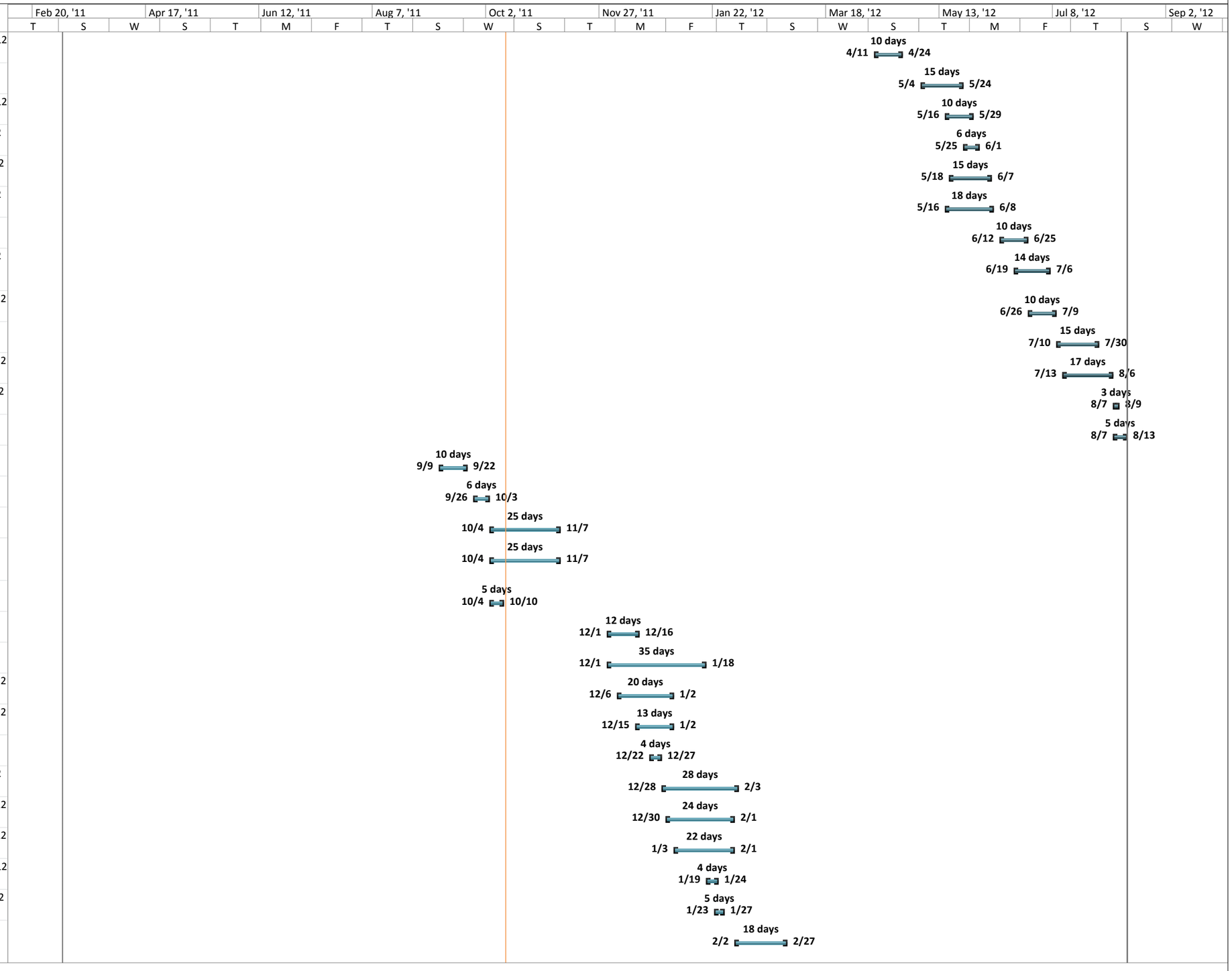
ID	Area	Activity	Duration	Start	Finish
148	Area C 2nd Floor	Install Joists & Deck	10 days	Thu 9/29/11	Wed 10/12/11
149	Area C 2nd Floor	Prep & Place Slab on Deck	5 days	Thu 10/13/11	Wed 10/19/11
150	Area C 2nd Floor	Masonry Bearing Walls to Roof	25 days	Mon 11/7/11	Fri 12/9/11
151	Area C 2nd Floor	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	25 days	Mon 11/7/11	Fri 12/9/11
152	Area C 2nd Floor	Install Door Frames	5 days	Mon 11/7/11	Fri 11/11/11
153	Area C 2nd Floor	Install Roof Joists & Roof Deck	10 days	Tue 12/13/11	Mon 12/26/11
154	Area C 2nd Floor	Spray Foam Insulation Ground to Roof	15 days	Tue 12/27/11	Mon 1/16/12
155	Area C 2nd Floor	HVAC Ducts, Pipes, Hangers, Mains, Branches	26 days	Tue 12/27/11	Tue 1/31/12
156	Area C 2nd Floor	Roofing & Roof Drains	33 days	Wed 12/28/11	Fri 2/10/12
157	Area C 2nd Floor	Brick Veneer Ground to Roof	20 days	Wed 1/4/12	Tue 1/31/12
158	Area C 2nd Floor	Sprinkler Rough-In and Branch Piping	9 days	Tue 1/3/12	Fri 1/13/12
159	Area C 2nd Floor	Overhead Electrical Rough-In	15 days	Thu 1/5/12	Wed 1/25/12
160	Area C 2nd Floor	Dom. Water RI and Branch Piping	34 days	Thu 1/5/12	Tue 2/21/12
161	Area C 2nd Floor	Install Windows/Curtainwall Ground to Roof	20 days	Wed 1/18/12	Tue 2/14/12
162	Area C 2nd Floor	Install LV Cable Tray & Pull Wire	10 days	Thu 1/26/12	Wed 2/8/12
163	Area C 2nd Floor	Insulate Ductwork & Piping	21 days	Wed 2/8/12	Wed 3/7/12
164	Area C 2nd Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	15 days	Thu 2/9/12	Wed 2/29/12
165	Area C 2nd Floor	Install Mech. Equipment	4 days	Mon 2/13/12	Thu 2/16/12
166	Area C 2nd Floor	Set Roof Top Units & Misc. Equip.	4 days	Mon 2/13/12	Thu 2/16/12
167	Area C 2nd Floor	Apply Block Filler & Paint	10 days	Mon 2/13/12	Fri 2/24/12
168	Area C 2nd Floor	Equipment Tie-Ins, Ductwork & Piping	6 days	Thu 2/16/12	Thu 2/23/12
169	Area C 2nd Floor	Install Drywall	10 days	Tue 2/21/12	Mon 3/5/12
170	Area C 2nd Floor	Wire HVAC Equipment	5 days	Fri 2/24/12	Thu 3/1/12
171	Area C 2nd Floor	Install Ceiling Grid	15 days	Thu 3/8/12	Wed 3/28/12
172	Area C 2nd Floor	Install Light Fixtures & Devices	15 days	Thu 3/15/12	Wed 4/4/12
173	Area C 2nd Floor	Install Duct Drops	16 days	Thu 3/15/12	Thu 4/5/12
174	Area C 2nd Floor	Install Sprinkler Drop Heads	7 days	Mon 3/19/12	Tue 3/27/12
175	Area C 2nd Floor	Install Resinous Flooring	6 days	Thu 3/29/12	Thu 4/5/12
176	Area C 2nd Floor	Ceiling Tile	13 days	Fri 4/6/12	Tue 4/24/12



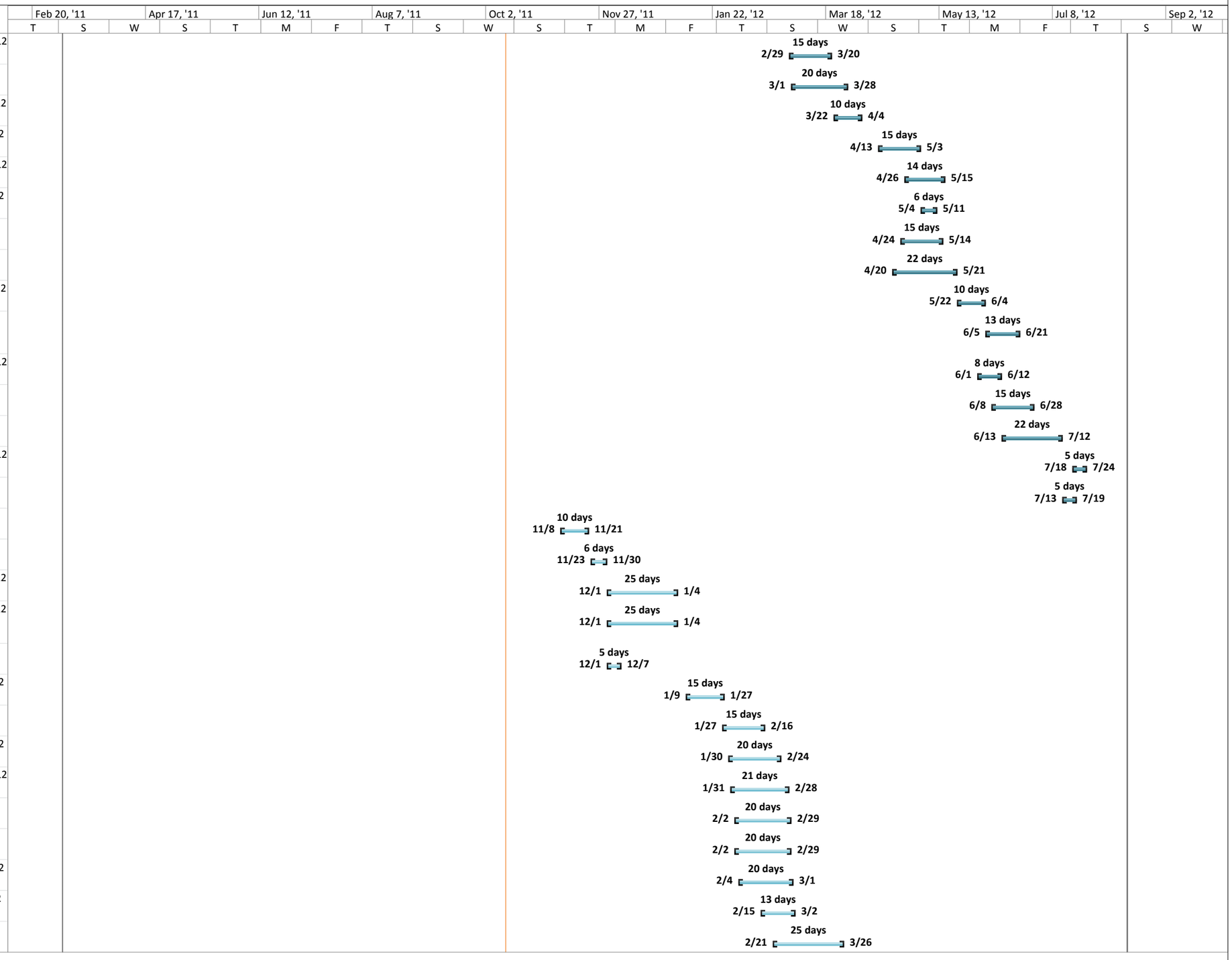
ID	Area	Activity	Duration	Start	Finish
177	Area C 2nd Floor	Casework & Lockers	16 days	Wed 4/11/12	Wed 5/2/12
178	Area C 2nd Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	10 days	Fri 4/13/12	Thu 4/26/12
179	Area C 2nd Floor	Flooring	10 days	Wed 4/18/12	Tue 5/1/12
180	Area C 2nd Floor	Plumbing Fixtures & Toilet Specialties	17 days	Wed 5/2/12	Thu 5/24/12
181	Area C 2nd Floor	Doors & Hardware	3 days	Fri 5/25/12	Tue 5/29/12
182	Area C 2nd Floor	Classroom Specialties	5 days	Fri 5/25/12	Thu 5/31/12
183	Area D Ground	Layout, Excavate, & Place Footing	22 days	Thu 6/9/11	Fri 7/8/11
184	Area D Ground	Masonry Foundation Walls to SOG	26 days	Wed 6/15/11	Wed 7/20/11
185	Area D Ground	UG MEP Rough-Ins	21 days	Tue 6/21/11	Tue 7/19/11
186	Area D Ground	Prep & Backfill Foundation Walls	5 days	Tue 7/5/11	Mon 7/11/11
187	Area D Ground	FRP SOG	6 days	Thu 7/21/11	Thu 7/28/11
188	Area D Ground	Masonry Bearing Walls to 1st Floor	30 days	Fri 7/29/11	Thu 9/8/11
189	Area D Ground	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	30 days	Fri 7/29/11	Thu 9/8/11
190	Area D Ground	Install Door Frames	5 days	Fri 7/29/11	Thu 8/4/11
191	Area D Ground	Apply Block Filler & Paint	9 days	Mon 9/12/11	Thu 9/22/11
192	Area D Ground	Metal Stud Framing & Drywall	5 days	Tue 10/4/11	Mon 10/10/11
193	Area D Ground	Install Stairs to 1st Floor	12 days	Tue 10/4/11	Wed 10/19/11
194	Area D Ground	HVAC Ducts, Pipes, Hangers, Mains, Branches	29 days	Tue 10/4/11	Fri 11/11/11
195	Area D Ground	Overhead Electrical Rough-In	20 days	Fri 10/7/11	Thu 11/3/11
196	Area D Ground	Sprinkler Rough-In and Branch Piping	13 days	Tue 10/18/11	Thu 11/3/11
197	Area D Ground	Dom. Water RI and Branch Piping	20 days	Fri 11/4/11	Thu 12/1/11
198	Area D Ground	Install LV Cable Tray & Pull Wire	5 days	Tue 11/8/11	Mon 11/14/11
199	Area D Ground	Chase Duct for AHU's	4 days	Thu 11/10/11	Tue 11/15/11
200	Area D Ground	Install Mech. Equipment	5 days	Mon 11/14/11	Fri 11/18/11
201	Area D Ground	Equipment Tie-Ins, Ductwork & Piping	8 days	Fri 11/18/11	Tue 11/29/11
202	Area D Ground	Wire HVAC Equipment	5 days	Fri 11/25/11	Thu 12/1/11
203	Area D Ground	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	19 days	Thu 12/1/11	Tue 12/27/11
204	Area D Ground	Insulate Ductwork & Piping	23 days	Thu 3/1/12	Mon 4/2/12
205	Area D Ground	Install Elevator	15 days	Thu 3/1/12	Wed 3/21/12



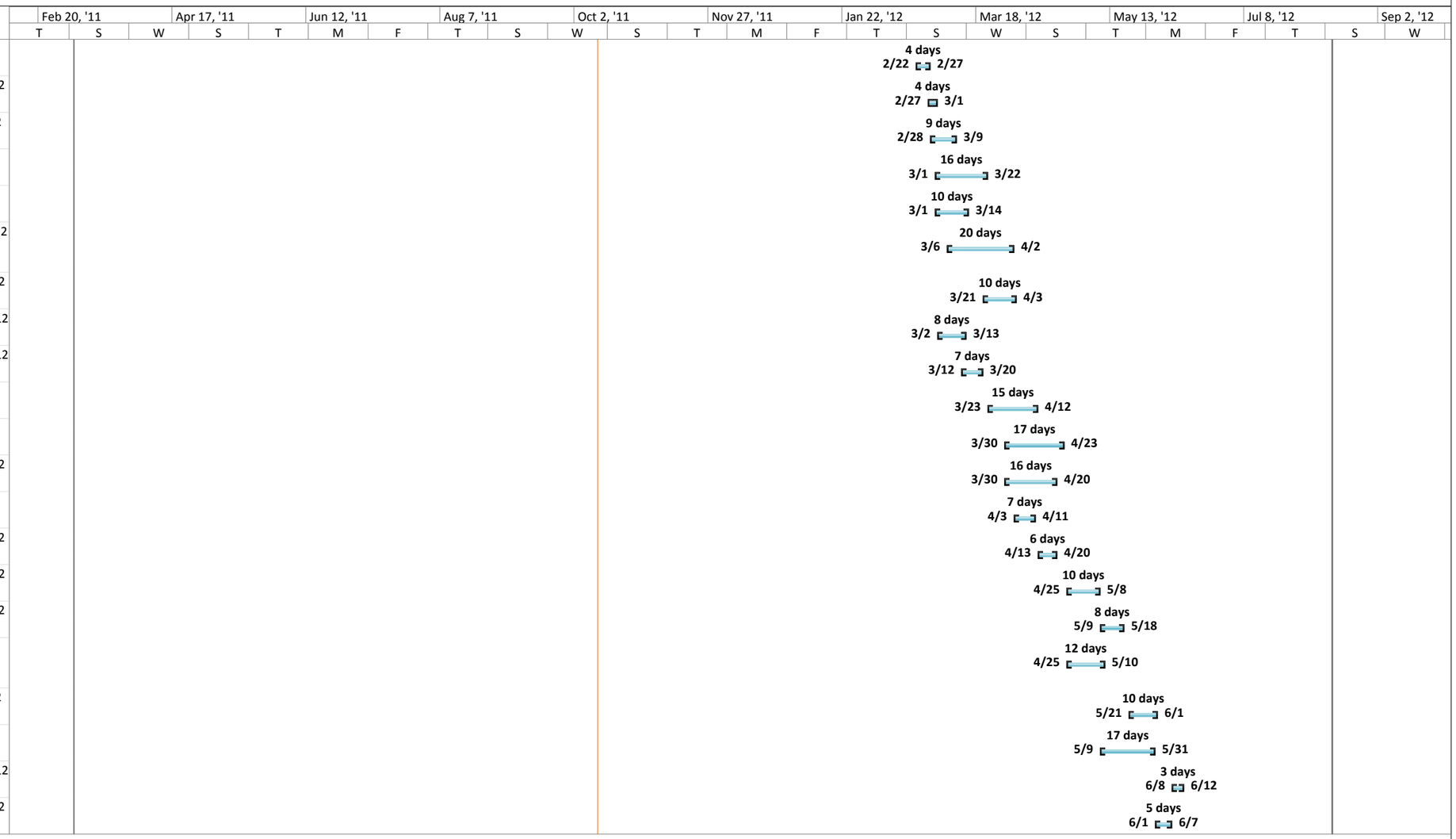
ID	Area	Activity	Duration	Start	Finish
206	Area D Ground	Metal Stud Framing & Drywall	10 days	Wed 4/11/12	Tue 4/24/12
207	Area D Ground	Install Ceiling Grid	15 days	Fri 5/4/12	Thu 5/24/12
208	Area D Ground	Install Sprinkler Drop Heads	10 days	Wed 5/16/12	Tue 5/29/12
209	Area D Ground	Install Resinous Flooring	6 days	Fri 5/25/12	Fri 6/1/12
210	Area D Ground	Install Light Fixtures & Devices	15 days	Fri 5/18/12	Thu 6/7/12
211	Area D Ground	Install Duct Drops	18 days	Wed 5/16/12	Fri 6/8/12
212	Area D Ground	Ceiling Tile	10 days	Tue 6/12/12	Mon 6/25/12
213	Area D Ground	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	14 days	Tue 6/19/12	Fri 7/6/12
214	Area D Ground	Casework & Lockers	10 days	Tue 6/26/12	Mon 7/9/12
215	Area D Ground	Flooring	15 days	Tue 7/10/12	Mon 7/30/12
216	Area D Ground	Plumbing Fixtures & Toilet Specialties	17 days	Fri 7/13/12	Mon 8/6/12
217	Area D Ground	Doors & Hardware	3 days	Tue 8/7/12	Thu 8/9/12
218	Area D Ground	Classroom Specialties	5 days	Tue 8/7/12	Mon 8/13/12
219	Area D 1st Floor	Install Joists & Deck	10 days	Fri 9/9/11	Thu 9/22/11
220	Area D 1st Floor	Prep & Place Slab on Deck	6 days	Mon 9/26/11	Mon 10/3/11
221	Area D 1st Floor	Masonry Bearing Walls to 2nd Floor	25 days	Tue 10/4/11	Mon 11/7/11
222	Area D 1st Floor	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	25 days	Tue 10/4/11	Mon 11/7/11
223	Area D 1st Floor	Install Door Frames	5 days	Tue 10/4/11	Mon 10/10/11
224	Area D 1st Floor	Install Stairs to 2nd Floor	12 days	Thu 12/1/11	Fri 12/16/11
225	Area D 1st Floor	HVAC Ducts, Pipes, Hangers, Mains, Branches	35 days	Thu 12/1/11	Wed 1/18/12
226	Area D 1st Floor	Overhead Electrical Rough-In	20 days	Tue 12/6/11	Mon 1/2/12
227	Area D 1st Floor	Sprinkler Rough-In and Branch Piping	13 days	Thu 12/15/11	Mon 1/2/12
228	Area D 1st Floor	Install Mech. Equipment	4 days	Thu 12/22/11	Tue 12/27/11
229	Area D 1st Floor	Equipment Tie-Ins, Ductwork & Piping	28 days	Wed 12/28/11	Fri 2/3/12
230	Area D 1st Floor	Install LV Cable Tray & Pull Wire	24 days	Fri 12/30/11	Wed 2/1/12
231	Area D 1st Floor	Dom. Water RI and Branch Piping	22 days	Tue 1/3/12	Wed 2/1/12
232	Area D 1st Floor	Chase Duct for AHU's	4 days	Thu 1/19/12	Tue 1/24/12
233	Area D 1st Floor	Wire HVAC Equipment	5 days	Mon 1/23/12	Fri 1/27/12
234	Area D 1st Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	18 days	Thu 2/2/12	Mon 2/27/12



ID	Area	Activity	Duration	Start	Finish
235	Area D 1st Floor	Blockfill & Painting	15 days	Wed 2/29/12	Tue 3/20/12
236	Area D 1st Floor	Insulate Ductwork & Piping	20 days	Thu 3/1/12	Wed 3/28/12
237	Area D 1st Floor	Install Drywall	10 days	Thu 3/22/12	Wed 4/4/12
238	Area D 1st Floor	Install Ceiling Grid	15 days	Fri 4/13/12	Thu 5/3/12
239	Area D 1st Floor	Install Sprinkler Drop Heads	14 days	Thu 4/26/12	Tue 5/15/12
240	Area D 1st Floor	Install Resinous Flooring	6 days	Fri 5/4/12	Fri 5/11/12
241	Area D 1st Floor	Install Light Fixtures & Devices	15 days	Tue 4/24/12	Mon 5/14/12
242	Area D 1st Floor	Install Duct Drops	22 days	Fri 4/20/12	Mon 5/21/12
243	Area D 1st Floor	Ceiling Tile	10 days	Tue 5/22/12	Mon 6/4/12
244	Area D 1st Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	13 days	Tue 6/5/12	Thu 6/21/12
245	Area D 1st Floor	Casework & Lockers	8 days	Fri 6/1/12	Tue 6/12/12
246	Area D 1st Floor	Flooring	15 days	Fri 6/8/12	Thu 6/28/12
247	Area D 1st Floor	Plumbing Fixtures & Toilet Specialties	22 days	Wed 6/13/12	Thu 7/12/12
248	Area D 1st Floor	Doors & Hardware	5 days	Wed 7/18/12	Tue 7/24/12
249	Area D 1st Floor	Classroom Specialties	5 days	Fri 7/13/12	Thu 7/19/12
250	Area D 2nd Floor	Install Joists & Deck	10 days	Tue 11/8/11	Mon 11/21/11
251	Area D 2nd Floor	Prep & Place Slab on Deck	6 days	Wed 11/23/11	Wed 11/30/11
252	Area D 2nd Floor	Masonry Bearing Walls to Roof	25 days	Thu 12/1/11	Wed 1/4/12
253	Area D 2nd Floor	Plumbing, Electrical, & Low Voltage in Wall Rough-Ins & Chases	25 days	Thu 12/1/11	Wed 1/4/12
254	Area D 2nd Floor	Install Door Frames	5 days	Thu 12/1/11	Wed 12/7/11
255	Area D 2nd Floor	Install Roof Joists & Roof Deck	15 days	Mon 1/9/12	Fri 1/27/12
256	Area D 2nd Floor	Spray Foam Insulation Ground to Roof	15 days	Fri 1/27/12	Thu 2/16/12
257	Area D 2nd Floor	HVAC Ducts, Pipes, Hangers, Mains, Branches	20 days	Mon 1/30/12	Fri 2/24/12
258	Area D 2nd Floor	Roofing & Roof Drains	21 days	Tue 1/31/12	Tue 2/28/12
259	Area D 2nd Floor	Overhead Electrical Rough-In	20 days	Thu 2/2/12	Wed 2/29/12
260	Area D 2nd Floor	Install Windows/Curtainwall Ground to Roof	20 days	Thu 2/2/12	Wed 2/29/12
261	Area D 2nd Floor	Brick Veneer Ground to Roof	20 days	Sat 2/4/12	Thu 3/1/12
262	Area D 2nd Floor	Sprinkler Rough-In and Branch Piping	13 days	Wed 2/15/12	Fri 3/2/12
263	Area D 2nd Floor	Dom. Water RI and Branch Piping	25 days	Tue 2/21/12	Mon 3/26/12



ID	Area	Activity	Duration	Start	Finish
264	Area D 2nd Floor	Set Roof Top Units & Misc. Equip.	4 days	Wed 2/22/12	Mon 2/27/12
265	Area D 2nd Floor	Install Mech. Equipment	4 days	Mon 2/27/12	Thu 3/1/12
266	Area D 2nd Floor	Install LV Cable Tray & Pull Wire	9 days	Tue 2/28/12	Fri 3/9/12
267	Area D 2nd Floor	Insulate Ductwork & Piping	16 days	Thu 3/1/12	Thu 3/22/12
268	Area D 2nd Floor	Metal Studs & Drywall	10 days	Thu 3/1/12	Wed 3/14/12
269	Area D 2nd Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Cabling	20 days	Tue 3/6/12	Mon 4/2/12
270	Area D 2nd Floor	Apply Block Filler & Paint	10 days	Wed 3/21/12	Tue 4/3/12
271	Area D 2nd Floor	Equipment Tie-Ins, Ductwork & Piping	8 days	Fri 3/2/12	Tue 3/13/12
272	Area D 2nd Floor	Wire HVAC Equipment	7 days	Mon 3/12/12	Tue 3/20/12
273	Area D 2nd Floor	Install Ceiling Grid	15 days	Fri 3/23/12	Thu 4/12/12
274	Area D 2nd Floor	Install Light Fixtures & Devices	17 days	Fri 3/30/12	Mon 4/23/12
275	Area D 2nd Floor	Install Duct Drops	16 days	Fri 3/30/12	Fri 4/20/12
276	Area D 2nd Floor	Install Sprinkler Drop Heads	7 days	Tue 4/3/12	Wed 4/11/12
277	Area D 2nd Floor	Install Resinous Flooring	6 days	Fri 4/13/12	Fri 4/20/12
278	Area D 2nd Floor	Ceiling Tile	10 days	Wed 4/25/12	Tue 5/8/12
279	Area D 2nd Floor	Casework & Lockers	8 days	Wed 5/9/12	Fri 5/18/12
280	Area D 2nd Floor	Fire Alarm, Security, Data, Sound, Clock, Classroom Media Finishes	12 days	Wed 4/25/12	Thu 5/10/12
281	Area D 2nd Floor	Flooring	10 days	Mon 5/21/12	Fri 6/1/12
282	Area D 2nd Floor	Plumbing Fixtures & Toilet Specialties	17 days	Wed 5/9/12	Thu 5/31/12
283	Area D 2nd Floor	Doors & Hardware	3 days	Fri 6/8/12	Tue 6/12/12
284	Area D 2nd Floor	Classroom Specialties	5 days	Fri 6/1/12	Thu 6/7/12



Appendix B

LEED 2009 for Schools New Construction and Major Renovations

Project Checklist — Landis Run Intermediate School

Sustainable Sites — Possible Points: 20

Y	?	N				
	1	0				
Y			C	Prereq 1	Construction Activity Pollution Prevention	
Y			d	Prereq 2	Environmental Site Assessment	
x			d	Credit 1	Site Selection	1
		x	d	Credit 2	Development Density and Community Connectivity	4
		x	d	Credit 3	Brownfield Redevelopment	1
x			d	Credit 4.1	Alternative Transportation—Public Transportation Access	1
x			d	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		x	d	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	2
x			d	Credit 4.4	Alternative Transportation—Parking Capacity	1
			C	Credit 5.1	Site Development—Protect or Restore Habitat	1
			d	Credit 5.2	Site Development—Maximize Open Space	1
x			d	Credit 6.1	Stormwater Design—Quantity Control	1
x			d	Credit 6.2	Stormwater Design—Quality Control	1
			C	Credit 7.1	Heat Island Effect—Non-roof	1
x			d	Credit 7.2	Heat Island Effect—Roof	1
x			d	Credit 8	Light Pollution Reduction	1
x			d	Credit 9	Site Master Plan	1
x			d	Credit 10	Joint Use of Facilities	1

Water Efficiency — Possible Points: 11

Y	?	N				
		5				
Y			d	Prereq 1	Water Use Reduction—20% Reduction	
x			d	Credit 1	Water Efficient Landscaping	2 to 4
					x 50% Reduction	1
					x No Potable Water Use or Irrigation	1
		x	d	Credit 2	Innovative Wastewater Technologies	2
x			d	Credit 3	Water Use Reduction	2 to 4
					x 30% Reduction	1
					x 35% Reduction	1
					x 40% Reduction	1
		x	d	Credit 3	Process Water Use Reduction	1

Y	?	N				
	1	1		**Energy and Atmosphere**	Possible Points:	**33**
Y			c	Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			d	Prereq 2	Minimum Energy Performance	
Y			d	Prereq 3	Fundamental Refrigerant Management	
x			d	Credit 1	Optimize Energy Performance	1 to 19
					Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
					Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
					Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
					Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
					Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
					Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
					Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
					Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
					Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
					Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
					Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				x	Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
					Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
					Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
					Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
					Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
					Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
					Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
					Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
		x	d	Credit 2	On-Site Renewable Energy	1 to 7
					1% Renewable Energy	1
					3% Renewable Energy	2
					5% Renewable Energy	3
					7% Renewable Energy	4
					9% Renewable Energy	5
					11% Renewable Energy	6
					13% Renewable Energy	7
x			c	Credit 3	Enhanced Commissioning	2
x			d	Credit 4	Enhanced Refrigerant Management	1
x			c	Credit 5	Measurement and Verification	2
		x	c	Credit 6	Green Power	2

Y	?	N				
		8			**Materials and Resources**	Possible Points: **13**
Y			d	Prereq 1	Storage and Collection of Recyclables	
		x	c	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 2
					Reuse 75%	1
					Reuse 95%	2
		x	c	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
x			c	Credit 2	Construction Waste Management	1 to 2
					x 50% Recycled or Salvaged	1
					x 75% Recycled or Salvaged	2
		x	c	Credit 3	Materials Reuse	1 to 2
					5% Reuse	1
					10% Reuse	2
x			c	Credit 4	Recycled Content	1 to 2
					x 10% of Content	1
					x 20% of Content	2
x			c	Credit 5	Regional Materials	1 to 2
					x 10% of Materials	1
					x 20% of Materials	2
x			c	Credit 6	Rapidly Renewable Materials	1
x			c	Credit 7	Certified Wood	1

	1	5			Indoor Environmental Quality	Possible Points:	19
Y	?	N					
Y			d	Prereq 1	Minimum Indoor Air Quality Performance		
Y			d	Prereq 2	Environmental Tobacco Smoke (ETS) Control		
Y			d	Prereq 3	Minimum Acoustical Performance		
x			d	Credit 1	Outdoor Air Delivery Monitoring	1	
		x	d	Credit 2	Increased Ventilation	1	
x			c	Credit 3.1	Construction IAQ Management Plan—During Construction	1	
x			c	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1	
x			c	Credit 4	Low-Emitting Materials	1 to 4	
					x 4.1 - Adhesives & Sealants	1	
					x 4.2 - Paints & Coatings	1	
					x 4.3 - Flooring Systems	1	
					x 4.4 - Composite Wood & Agrifiber Products	1	
					4.5 - Furniture & Furnishings	1	
					4.6 - Ceiling & Wall Systems	1	
x			d	Credit 5	Indoor Chemical and Pollutant Source Control	1	
x			d	Credit 6.1	Controllability of Systems—Lighting	1	
x			d	Credit 6.2	Controllability of Systems—Thermal Comfort	1	
x			d	Credit 7.1	Thermal Comfort—Design	1	
x			d	Credit 7.2	Thermal Comfort—Verification	1	
x			d	Credit 8.1	Daylight and Views—Daylight	1 to 3	
					75% of classrooms	1	
					x 90% of classrooms	2	
					x 75% of other spaces	2 to 3	
		x	d	Credit 8.2	Daylight and Views—Views	1	
		x	d	Credit 9	Enhanced Acoustical Performance	1	
x			d	Credit 10	Mold Prevention	1	

		3	**Innovation and Design Process**		Possible Points:	**6**
Y	?	N				
x			d/C	Credit 1.1	Innovation in Design: Integrated Pest Management	1
		x	d/C	Credit 1.2	Innovation in Design: Specific Title	1
		x	d/C	Credit 1.3	Innovation in Design: Specific Title	1
		x	d/C	Credit 1.4	Innovation in Design: Specific Title	1
x			d/C	Credit 2	LEED Accredited Professional	1
x			d/C	Credit 3	The School as a Teaching Tool	1
		0	**Regional Priority Credits**		Possible Points:	**4**
Y	?	N				
		x	d/C	Credit 1.1	Regional Priority: Specific Credit	1
		x	d/C	Credit 1.2	Regional Priority: Specific Credit	1
		x	d/C	Credit 1.3	Regional Priority: Specific Credit	1
		x	d/C	Credit 1.4	Regional Priority: Specific Credit	1
0	5	2	**Total**		Possible Points:	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110