# Waynesburg Central High School


## Technical Assignment #2

**Robert O. Brennan**

**Construction Management**

**Adviser: Dr. Riley**

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# Executive Summary

Waynesburg Central High School is a project that has a very intricate phasing sequence that needs to be strictly adhered to. The multiple phases on Waynesburg Central High School create for scheduling problems, in order to efficiently schedule a project with this many phases contractors whereabouts need to be know at all times. When compiling the schedule it needs to be taken into account that contractors should not be responsible for performing tasks in multiple phases at the same time without some sort of time compensation. Durations of phases were not changed by adding detail to the summary schedule.

Multiple site plans are used to better illustrate the sequence of events that will be occurring at Waynesburg Central High School during the construction. Since there are 12 phases and many of them will be occurring simultaneously it is impossible to separate individual phases of construction. The initial site plan for spring 2008 shows the excavation and the general start up layout. Summer 2008 is in the middle of construction were some phases will be undergoing demolition while others will be in the finish stage. The final site plan for summer 2009 shows the phases that are primarily in the finish stage. For this reason site plans in appendix C are not label by a particular phase of construction rather a general time frame.

Detailed structural systems estimate was derived from a detailed take off combined with the use of RS Means. The spreadsheets for the detailed take off of the structural system are shown in appendix A. The final estimated cost of the structural system for Waynesburg Central High School came to $645,802. This would seem to be a rather low estimate for a structural system at first glance, but when the amount of structural work being performed on Waynesburg Central High School is taken into account the price seems more reasonable. The detailed structural systems estimate was a full estimate for all structural work performed on the school, the only areas that have structural work being done are the two additions. When the structural estimate is analyzed alongside the overall project cost of approximately $17 million excluding the construction manager and architect fees, as well as looking at square footages of renovation work at 154,900 square feet compared to only 24,000 square feet of additions, the cost of the structural system seems reasonable.

A general conditions estimate was derived for both the construction manager and the general contractor. The estimated cost of general conditions for the construction manager is $431,970 which is almost solely comprised of personnel costs. General conditions cost for the general contractor are slightly higher at $488,106, again being primarily comprised of personnel costs. These cost are not extremely high because of the way general conditions are divided at Waynesburg Central High School. Since it is a multiple prime contractor project each prime is responsible for their corresponding general conditions resulting in lower than normal general conditions costs for the general contractor.

# Detailed Project Schedule

The detailed project schedule for Waynesburg Central High School was derived from the original summary schedule. This schedule was expanded upon by adding information pertaining to individual contractors. In order to keep the schedule to the desired length many of the intricate details and links needed to be left out. Each phase was broken down and the major activities are shown with the corresponding duration. The two phases that encompassed the additions required the most activities because there was a more diverse range of work being performed in these areas.

From the original summary schedule to the detailed project schedule the phasing sequence remained unchanged. Waynesburg Central High School's most critical issue is the schedule; to ensure that occupation of spaces can commence on time. The detailed schedule did not change any turn over dates, rather simply provides more information to ensure that contractors proceed with work and finish in the allotted time as to not prevent other contractors from finishing. Many of the phases will be under construction simultaneously; the schedule was developed to prevent the same contractor from needing to perform work in multiple phases at the same time. The following image shows the phasing sequence for Waynesburg Central High School.


**Figure 1: Project Phasing Plan**

The actual schedule at Waynesburg Central High School was developed by the construction manager, Foreman Program and Construction Management. This schedule contained vastly more information than that which is provided in this report. Being a design-bid-build project the plans were sent out and bid on by each individual prime contractor who was then responsible, after being awarded the contract, to provide the construction manager with a list of activities and the corresponding durations. After the information was received from the contractors Foreman Program and Construction Management then compiled the information into a single master schedule. Each contractor received a copy of this master schedule and was given a chance to review and suggest any revisions that needed to be made. Portions pertaining to the phases that are about to begin are

handed out at the job conference meetings and discussed to ensure that work will commence when scheduled, but most importantly the phase will be completed on time.

Each item in the detailed schedule was taken from the actual master schedule derived by the construction manager at Waynesburg Central High School. In order to create a schedule with the desired length several of the activities had to be combined. Much of the schedule shows the major systems being installed in the building, mechanical, structural, electrical, and plumbing. Since this is a high school there are several other systems that need to be installed in the building, but with the shortened schedule some of these needed to be put in as single line items. For example the kitchen equipment in phase 3 had to be shown as a single line item, rather than dividing the work into the rough in of systems and then the final installation and testing. This also had to be done in phase 4 with the stage equipment installation. Items needed to be compressed into less in for more items then the two listed but the primary goal was to ensure that every prime contractor had their activities listed on the detailed project schedule.

On the detailed project schedule links between items are shown in the column labeled predecessors. Links are not shown in the Gantt chart because this results in an illegible flow of work. Items are primarily linked to other activities that are in the same field of work. Activities are also linked to all items that need to be finished or started before the other activity may commence work. As a result of this linking scheme there are several items that have multiple activities linked to them. The best example of this would be painting. This is basically the first step in the finishing process and as a result of this all activities that follow this have painting as a predecessor.

**Detailed Schedules attached in appendix B**

# Site Layout Planning

Waynesburg Central High School is a project that has twelve different phases and at various points in time up to six are under construction at once. This needs to be factored in when developing a site layout plan, because many areas will be at different stages of construction meaning that multiple contractors will have material being delivered to the site on the same day for different phases and require a layout area.

With multiple phases under construction at the same time it is impossible to label a phasing plan as a single phase. As a result of this the phasing plans attached in appendix C are labeled as a time of year. The phasing plan labeled spring 2008 contains the beginning of phase 1 and 2, which are both in the excavation phase. At the time of this site plan the kitchen will also be taken over, this will occur in May a few weeks before school lets out. In the spring of 2008 students will still be in school and therefore need parking spaces meaning that the lower lot behind the school will be used for student parking at this time. Construction workers will be able to park in the last row of this lower parking lot as well as a parking lot located in the adjacent field.

Summer 2008 Site Plan attached in appendix C shows the site plan as it will be during the summer of 2008. Since this project is a school and students will still be in attendance the majority of work is done over the summer. As a result of this the summer of 2008 site plan has the most phases under construction at any given time. Excavation is basically complete by this point in the construction project, allowing for a fence to be placed around the main construction area. The site plan depicts the path of the crane in purple. The crane will only be present at a few select times, primarily when the precast concrete is being installed.

The summer 2008 site plan show the path of the crane as well as the reach of the crane for the installation of precast structural concrete members. Other cranes were also brought on site one for the roofing system to set the joists and also one to set the mechanical system. The same general path will be utilized for all cranes on site to perform work on building G. A 45 ton truck mounted crane was utilized to set the structural concrete members. I was not able to attain the exact make and model of crane utilized, so I did a search and found a similar crane to determine the lifting capacities. The crane chosen was a Liebherr LTF 1045-4.1 which is depicted in figure 2. Lifting capacity tables from the manufacturer's specifications for this crane are attached in appendix D.

**Figure 2: Liebherr LFT 1045-4.1**

Crane size shown on the site plan is based off the maximum load for the precast concrete setting. Since several other cranes will be used at various times throughout the process this was an exercise to determine maximum distance for a load. Since all precast concrete members lie along the

exterior of the building the actual distance of each pick is only about 10 feet. This meant that all beams and columns were equal spans for a pick, meaning that the largest member would determine the crane size. This exercise was more so to determine the radius in which to depict on the site plan. Beam CB #4 was determined to be the largest and therefore weight the most. The weight of beam CB #4 was calculated using the normal weight of concrete which is 150 lb/ft3. This calculation is shown in the following chart.

| Precast Concrete Beams | | | | | |
|---|---|---|---|---|---|
| **No.** | **Length (ft)** | **Depth (in)** | **Width (in)** | **Weight per foot (lb)** | **Beam Weight (ton)** |
| CB #4 | 41 | 69 | 15 | 150 | 22.1 |

**Table 1: Beam CB #4 weight calculation**

Once the weight of the beam was determined the crane then had to be sized. This was done using the material found in appendix D. The chart in the specifications for the Liebherr LTF 1045-4.1 states that the crane will be able to make the pick with none of the telescoping sections extended and keeping the pick within 4 meters of the crane. This is a very limited range for a crane but this was the largest pick so it was decided that the site plan would show the average pick distance attainable by the 45 ton truck mounted crane. This distance was determined to be the same as beam CB #4 since it is precast concrete and it flanks the perimeter of the building, many of the columns have the same dimensions so column C8 was chosen to do the calculation for which is shown in Table 2. With this as a base for crane reach the crane will be able to make a pick spanning a distance of 25 meters. The exact details of what the crane may be doing and the sections that may be extended as well as the angle can be obtained from the material in appendix D.

| Precast Concrete Column | | | | | |
|---|---|---|---|---|---|
| **No.** | **Length (ft)** | **Depth (in)** | **Width (in)** | **Weight per foot (lb)** | **Beam Weight (ton)** |
| C8 | 12.25 | 26 | 12 | 150 | 2.0 |

**Table 2: Column C8 weight Calculation**

Summer 2009 site plan shows the phases that will be under construction at that time as well as the critical paths and facilities. One of the major differences between the 2008 and the 2009 summer plan is the amount of contractors that will be staffing the site on a full time basis. Much of the work will be closing out this summer meaning that contractors such as the mason and the excavator will not be present. This is why the reduced number of trailers is depicted as well as the topsoil storage pile no longer represented. Construction parking, material staging and the other critical areas do not move from one summer to the next.

These three times are the most critical part of the construction process which is why they are depicted for the site plan. The spring of 2008 is when the project is just starting to come out of the ground which is critical to the success of a project and has the potential to cause the largest delays. The summer of 2008 is when the most phases are under construction and all in various stages. Summer 2009 is basically finish phases for most of the phases under construction. This is why these times are chosen and individual phases of construction cannot be depicted.

**Site layout plans attached in appendix C**

# Detailed Structural Systems Estimate

Waynesburg Central High School was primarily a renovation project that was not upgrading the structural syatem. There were however two additions to the building that required structural work. This is what the structural estimate is based upon. Since the additions only total a square footage of 24,405 it was decided that an estimate of the entire structural system would be done. The primary structural system utalized on this project was a precast concrete system. There are however several structural steel members utalized in the interior of the building. Cast in place concrete was only utalized for the foundations and the slab on grade. An open web steel joist system was used for the roof of the additions with a metal deck spanning the joists. When doing the estimate RS Means 2009 was used to attain all numbers for the detailed structural systems estimate.

The first step in determining the cost of the structural system is performing a detailed take off of the entire system. Numbers and charts of this take off are attached in appendix A. Concrete beams were placed into a chart in which was used to determine the cost of erection, weight was not needed to be calculated because they are precast concrete simply the size and length. The same was done for the precast concrete columns. Steel members were taken off based on the individual size of each member, some however needed to be approximated to the nearest size in the RS Means catalog. Foundation take offs are the most tedious to perform because there are the most items involved in preparing this system. The strength of concrete for the footings was given to be 3000 PSI.The strength of the slab on grade was also given to be 4000 PSI. All the details of each take off can be viewed in appendix A. A summary of the detailed structural systems estimate is shown in the following table.

| Cast in Place Concrete Construction Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
| Forms in place, Columns, 16"x16" columns, 4 use | 960.0 | SFCA | $ 0.73 | $ 5.15 | | $ 5.88 | $ 5,644.66 |
| Forms in place, Columns, 24"x24" columns, 4 use | 432.0 | SFCA | $ 0.81 | $ 5.10 | | $ 5.91 | $ 2,553.03 |
| Forms in place, Columns, 36"x36" columns, 4 use | 2726.0 | SFCA | $ 0.59 | $ 4.85 | | $ 5.44 | $ 14,829.44 |
| Spread footings, job built lumber, 4 use | 1236.0 | SFCA | $ 0.70 | $ 2.93 | | $ 3.63 | $ 8,973.36 |
| 4000PSI Concrete | 301.3 | CY | $ 101.00 | | | $ 101.00 | $ 30,430.90 |
| 3000PSI Concrete | 122.7 | CY | $ 106.00 | | | $ 106.00 | $ 13,002.66 |
| Footings, continuous, shallow, direct chute | 141.7 | CY | | $ 11.35 | $ 0.37 | $ 11.72 | $ 1,660.33 |
| Footings, spread, under 1 CY, direct chute | 47.4 | CY | | $ 29.00 | $ 0.94 | $ 29.94 | $ 1,420.49 |
| Columns, square or round, 18" thick, pumped | 11.9 | CY | | $ 24.00 | $ 8.80 | $ 32.80 | $ 388.74 |
| Columns, square or round, 24" thick, pumped | 5.9 | CY | | $ 23.50 | $ 8.60 | $ 32.10 | $ 190.22 |
| Columns, square or round, 36" thick, pumped | 57.4 | CY | | $ 15.50 | $ 5.65 | $ 21.15 | $ 1,214.95 |
| Slab on grade, up to 6" thick, direct chute | 301.3 | CY | | $ 14.40 | $ 0.47 | $ 14.87 | $ 4,480.27 |
| Finishing Floors, Manual screed, bull float, manual float | 24405.0 | SF | | 0.43 | | $ 0.43 | $ 10,494.15 |
| | | | Total Cost of Cast in Place Concrete: | | | | $ 95,283.20 |

| Precast Concrete Construction Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
| Precast Beams, rectangular 20' span, 24" x 44" | 18.0 | Ea | $ 2,000.00 | $ 131.00 | $ 79.00 | $ 2,210.00 | $ 39,780.00 |
| Precast Beams, rectangular 40' span, 24" x 52" | 3.0 | Ea | $ 4,850.00 | $ 263.00 | $ 158.00 | $ 5,271.00 | $ 15,813.00 |
| Precast Beams, rectangular 20' span, 18" x 36" | 6.0 | Ea | $ 1,475.00 | $ 131.00 | $ 79.00 | $ 1,685.00 | $ 10,110.00 |
| Precast Columns, rectangular to 24' high, large columns | 568.5 | LF | $ 184.00 | $ 22.00 | $ 13.15 | $ 219.15 | $ 124,591.16 |
| | | | Total Cost of Precast Concrete: | | | | $ 190,294.16 |

| Concrete Reinforcement Construction Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
| 6x6 W2.9 x W2.9 WWF 42 lbs per CSF | 244 | CSF | $ 32.50 | $ 24.50 | | $ 57.00 | $ 13,910.85 |
| Reinforcing in Place, footings, #4 to #7 | 3.0 | Ton | $ 1,475.00 | $ 680.00 | | $ 2,155.00 | $ 6,421.95 |
| Reinforcing in Place, footings, #8 to #18 | 3.6 | Ton | $ 1,400.00 | $ 395.00 | | $ 1,795.00 | $ 6,470.08 |
| | | | Total Cost of Reinforcement Concrete: | | | | $ 26,802.88 |

| Structural Steel Construction Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
| Columns Structural, structural tubing, 6x4x5/16x12 | 18 | Ea | $ 375.00 | $ 45.00 | $ 32.00 | $ 452.00 | $ 8,192.50 |
| Columns Structural, structural tubing, 10x6x3/8x14 | 4 | Ea | $ 880.00 | $ 49.00 | $ 35.00 | $ 964.00 | $ 3,615.00 |
| Columns Structural, structural tubing, 12x8x1/2x16 | 15 | Ea | $ 1,625.00 | $ 51.00 | $ 36.50 | $ 1,712.50 | $ 25,687.50 |
| Columns Structural, W Shape, A992 Steel, 2 tier, W10 x 45 | 133 | LF | $ 74.50 | $ 2.36 | $ 1.69 | $ 78.55 | $ 10,447.15 |
| Structural steel members, W10x49 | 66 | LF | $ 81.00 | $ 4.43 | $ 3.17 | $ 88.60 | $ 5,847.60 |
| Structural steel members, W16x50 | 74 | LF | $ 82.50 | $ 3.05 | $ 2.18 | $ 87.73 | $ 6,492.02 |
| Structural steel members, W8x15 | 86 | LF | $ 25.00 | $ 4.06 | $ 2.90 | $ 31.96 | $ 2,748.56 |
| Structural steel members, W12x35 | 11 | LF | $ 58.00 | $ 3.01 | $ 2.15 | $ 63.16 | $ 694.76 |
| Structural steel members, W8x21 | 361 | LF | $ 34.50 | $ 4.06 | $ 2.90 | $ 41.46 | $ 14,967.06 |
| Structural steel members, W12x26 | 12 | LF | $ 43.00 | $ 2.77 | $ 1.98 | $ 47.75 | $ 573.00 |
| Structural steel members, W16x31 | 36 | LF | $ 51.00 | $ 2.71 | $ 1.93 | $ 55.64 | $ 2,003.04 |
| Structural steel members, W8x10 | 84 | LF | $ 16.50 | $ 4.06 | $ 2.90 | $ 23.46 | $ 1,970.64 |
| Structural steel members, W8x48 | 9 | LF | $ 79.00 | $ 4.43 | $ 3.17 | $ 86.60 | $ 779.40 |
| Structural steel members, W12x16 | 142 | LF | $ 26.50 | $ 2.77 | $ 1.98 | $ 31.25 | $ 4,437.50 |
| Structural steel members, structural tubing, 10x6x3/8x14 | 7 | Ea | $ 880.00 | $ 49.00 | $ 35.00 | $ 964.00 | $ 7,023.43 |
| Lintels, Steel Angles, 3 1/2x3, 1/4" thick, 4'6" long | 23 | Ea | $ 29.00 | $ 12.45 | | $ 41.45 | $ 939.53 |
| | | | Total Cost of Structural Steel: | | | | $ 96,418.69 |

| Structural Roofing System Construction Costs | | | | | | | |
|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
| Open Web Joists, 10CS2, 7.5 lb/lf | 1210 | LF | $ 7.85 | $ 2.94 | $ 1.67 | $ 12.46 | $ 15,076.60 |
| Open Web Joists, 22CS4, 16.5 lb/lf | 6930 | LF | $ 17.25 | $ 1.76 | $ 1.00 | $ 20.01 | $ 138,669.30 |
| Open Web Joists, 24CS4, 16.5 lb/lf | 798 | LF | $ 17.25 | $ 1.60 | $ 0.91 | $ 19.76 | $ 15,768.48 |
| Open Web Joists, 26CS4, 16.5 lb/lf | 968 | LF | $ 17.25 | $ 1.60 | $ 0.91 | $ 19.76 | $ 19,127.68 |
| Roof decking, open type, 1 1/2" d wide rib, 20 gauge, 50-500 sq. | 24405 | SF | $ 2.42 | $ 0.35 | $ 0.03 | $ 2.80 | $ 68,334.00 |
| | | | Total Cost of Structural Roofing System: | | | | $ 256,976.06 |

| | |
|---|---|
| **Total Cost of Structural System:** | **$ 665,774.99** |
| **Adjusted Total Cost of Structural System:** | **$ 645,801.74** |

**Table 3: Detailed structural systems estimate**

In order to perform the detailed structural systems estimate several assumptions needed to be made. Assumptions are as follows:

- Use location factor for Pennsylvania, Other of .97
- Cubic Yards of concrete does not factor out the volume of rebar
- Length of rebar calculated from end to end and does not factor in any overlap that would be present when actually placed
- No overlap of welded wire mesh when placed for slab on grade

This cost estimate was further analyzed in order to obtain costs per square foot for the entire structural system. This is a useful number especially should the owner decide to make further additions. Materials, labor, and equipment costs were also broken out as part of this estimate and summarized in table 4. These numbers give a good handle on the most expensive part of the system, in this case material costs far outweigh the rest.

| | Material | Labor | Equipment | Total Structural Cost |
|---|---|---|---|---|
| **Total Cost System:** | **$ 533,258.16** | **$ 102,100.22** | **$ 25,929.93** | **$ 661,288.31** |
| **Cost per Square Foot:** | **$ 21.85** | **$ 4.18** | **$ 1.06** | **$ 27.10** |

**Table 4: Structural system cost breakdown**

**Detailed structural systems estimate attached in appendix A**

# General Conditions Estimate

Waynesburg Central High School is a public project which requires the use of multiple prime contractors. As a result of this the general conditions are spread amongst all multiple contractors. Waynesburg Central High School has 12 prime contractors all of which have some sort of general conditions associated with them. Many of the general condition costs are minimal for the prime contractors, since the general contractors general conditions would be the most these were estimated in table 5. Since one of the other people on site that would be of interest and possibly used in further analysis in future exercises the construction managers general conditions were also estimated this is shown in table 6.

Some of the typical costs not represented in table 5 are because it is a part of a different prime contractors contract. One of the primary examples of this would be the temporary electric costs, this is the responsibility of the electrical contractor. There are also two trailers shown in the estimate for the general contractor, this is because the contract states that the general contractor is responsible for providing the construction manager with a furnished trailer were meeting will be held. This is the reason that there is no trailer present in the construction manager's general conditions estimate in table 6.

**General Conditions Estimate for General Contractor**

| Description | Quantity | Units | Material | Labor | Equipment | Price/Unit | Cost |
|---|---|---|---|---|---|---|---|
| **Construction Facilities** | | | | | | | |
| Trailer 32x8 with air conditioning | 22 | MO | $ 241.00 | | | $ 241.00 | $ 5,302.00 |
| Trailer 50x12 with air conditioning | 22 | MO | $ 416.00 | | | $ 416.00 | $ 9,152.00 |
| Trailer delivery (2) | 24 | Mile | | | $ 4.50 | $ 4.50 | $ 216.00 |
| Office Furnishings | 22 | MO | $ 155.00 | | | $ 155.00 | $ 3,410.00 |
| Office Supplies | 22 | MO | $ 85.00 | | | $ 85.00 | $ 1,870.00 |
| Employee Vehicle | 22 | MO | $ 1,000.00 | | | $ 1,000.00 | $ 22,000.00 |
| Telephones | 22 | MO | $ 240.00 | | | $ 240.00 | $ 5,280.00 |
| Dumpsters | 22 | MO | $ 1,200.00 | | | $ 1,200.00 | $ 26,400.00 |
| Toilets | 22 | MO | $ 600.00 | | | $ 600.00 | $ 13,200.00 |
| **Construction Aids** | | | | | | | |
| Exterior Scafold 1-5 story, steel tube | 125 | CSF | | $ 120.00 | | $ 120.00 | $ 15,000.00 |
| Building interior, steel tube | 64 | CSF | | $ 80.00 | | $ 80.00 | $ 5,120.00 |
| Steel tubular regular, 6'4"x5' rent/month | 96 | Each | $ 5.05 | | | $ 5.05 | $ 6,787.20 |
| Heavy Equipment Mobilization | 5 | Each | | $ 261.00 | $ 346.00 | $ 607.00 | $ 3,035.00 |
| **Project Staff** | | | | | | | |
| Project Manager | 98 | Week | | $ 1,925.00 | | $ 1,925.00 | $ 188,650.00 |
| Superintendent | 98 | Week | | $ 1,775.00 | | $ 1,775.00 | $ 173,950.00 |
| **Protection and Safety** | | | | | | | |
| Chain link fence, 11 ga, 5' | 850 | LF | $ 7.25 | $ 1.26 | | $ 8.51 | $ 7,233.50 |
| First aid Supplies | 1 | LS | $ 600.00 | | | $ 600.00 | $ 600.00 |
| Safety Signs | 1 | LS | $ 500.00 | | | $ 500.00 | $ 500.00 |
| Hardhats, Gloves, Goggles | 1 | LS | $ 400.00 | | | $ 400.00 | $ 400.00 |
| | | | | | **Total Cost of General Conditions:** | | **$ 488,105.70** |

**Table 5: General conditions estimate for general contractor**

| General Conditions Estimate for Construction Manager | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Description** | **Quantity** | **Units** | **Material** | **Labor** | **Equipment** | **Price/Unit** | **Cost** |
| **Construction Facilities** | | | | | | | |
| Office Supplies | 22 | MO | $ 85.00 | | | $ 85.00 | $ 1,870.00 |
| Employee Vehicle | 22 | MO | $ 1,000.00 | | | $ 1,000.00 | $ 22,000.00 |
| **Project Staff** | | | | | | | |
| Project Manager | 114 | Week | | $ 1,925.00 | | $ 1,925.00 | $ 219,450.00 |
| Project Manager, (Site Manager) | 98 | Week | | $ 1,925.00 | | $ 1,925.00 | $ 188,650.00 |
| | | | | | **Total Cost of General Conditions:** | | **$ 431,970.00** |

**Table 6: General conditions estimate for construction manager**

General conditions estimates factor in all aspects of construction and account for all the areas that do not fall into any other category. The general conditions lie heavily on the layout of the site to incorporate and decide the cost associated with the placement of various items. The plan shown on the right was one of the primary plans that show what areas are being added as well as the ones being renovated. This plan would have been used to help with some of the schematics as to where materials would have to be stored as well as what facilities would be available for use by construction workers. Toilets are an issue that would come up in the discussion of necessary facilities to be provided since it is a renovation project and there is functional plumbing. The use of existing facilities is not possible on Waynesburg Central High School because school is in session and students will be occupying these spaces. As a result the general contractor is responsible for providing the necessary facilities. This is one of the examples of how preliminary floor plans and the general condition costs are associated.

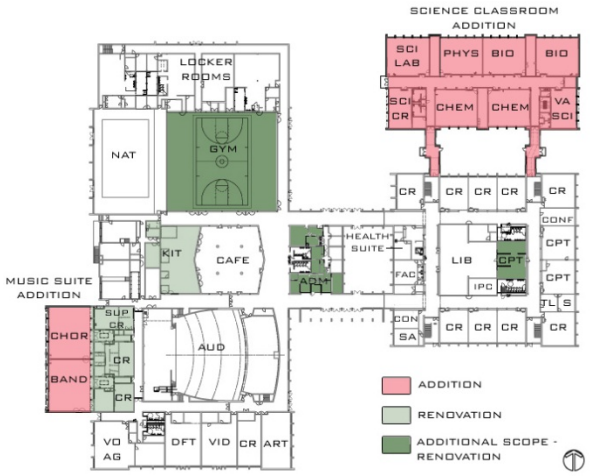



**Figure 3: Preliminary floor plan**

# Critical Industry Issues

Partnership for Achieving Construction Excellence Roundtable Meeting varied drastically from what I had imagined. The format of the discussion was very conducive in getting a variety of opinions about a topic. In general the day had a good pace to it and provided enough time to interact with industry members. The roundtable provided an excellent opportunity to find contacts in the industry that would make for good resources.

The morning exercise in which student paired off with an industry member to discuss the benefits and challenges associated with doing an industry mentorship program was very effective. I feel that this format enabled all individuals to voice their opinion. There were several advantages brought up that would be very beneficial mostly for the students participating in the program, also the industry members have the ability to ask students about subjects that may be just immerging in the industry since students are subjected to this before industry. One of the largest challenges the mentorship program may face would be since students are paired with an industry member students would think the industry member should offer them internship opportunities and potentially a full time position. This would put industry members in a position that would be less than desirable. As a result of this every attempt should be made to keep the two separate. One of the other challenges is in how to pair the students with an industry member and when to do so. The overall idea behind the program is a good one and should be implemented in the near future, yet there are several details that need to be thought through more thoroughly.

The breakout sessions that were held were useful in giving individuals the opportunity to learn some of the pressing issues related to a particular area of interest rather than everyone discussing one topic. While attending the session on LEED several important issues were discussed, primarily focused on the areas in which LEED could be improved. Another area that was discussed was the modifications made to the new LEED. Several areas that came up in the discussion of improvements seemed to have already been addressed in new LEED. One such topic was that of making LEED certification have items that are regional based. This enables different areas of the country to have specific points, which will have to be petitioned for approval the first time; but once approved they are then permanently approved in the given region and it is no longer necessary to petition. The discussion of LEED was generally good but it felt as though it was all for not, it was not made clear how this discussion would be used and if the material discussed would be presented to the LEED council. There were some good suggestions made, one of which was to require the owner to have a LEED accredited professional working for them. This is in response to the fact that much of LEED certification is based off the mechanical system and the operation of such after the completion of the project. Should owners understand the LEED certification process better it would easier to ensure that the systems would be handled appropriately after the completion. Another issue


**Figure 4: LEED certification symbol**

that is important to owners is when LEED certification is received by the owner, now the certification is not given until well after the building is occupied in most cases. For owners that are leasing or selling space it would prove to be more profitable should they receive some sort of certification sooner, possibly a temporary approval pending further review. These were some of the positive things that came out of the LEED discussion.

PACE Roundtable was a good place to get ideas that could be used for a topic of research for the spring semester. With the economy in the state that it is in there is a big concern for were the construction industry is heading. As a result of the economic situation many areas of research could potentially come out of this. Since Waynesburg Central High School is a renovation project this could lead into analyzing a comparative cost between new construction verse a renovation, since renovations are a market that seems to be immerging as a direct result of the economy. Corrinne Ambler from Barton Mallow is an individual that I spoke with and could possibly help advise with a topic related to the area of economics. The other area that could be used for a topic in the spring would be that of LEED. Waynesburg Central High School, in Central Greene School District, is not striving to attain a LEED certification of any form. With this not being done looking to see what could be done and the changes that would need to be made in the construction process to attain a LEED certification could be a topic of research. Aaron Bernett with Foreman Program and Construction Management is an individual that would be able to provide reliable advice on this topic. He is from the Pittsburgh region and has also been on several school projects that have attained LEED certification. There are probably several other areas that could be looked at for a topic of thesis these are simply a few that came as a direct result of material discussed and a few of the people spoke with.

# Appendix A

## Detailed Structural Estimate

| Floor Slab | | | | |
|---|---|---|---|---|
| Perimeter (LF) | Area (SF) | Vol. (CF) | Vol. (CY) | SFCA |
| 1025 | 24,405 | 8135 | 301.3 | 341.7 |

| Floor Slab Welded Wire Mesh | |
|---|---|
| Type | Area (CSF) |
| 6x6 W2.9 x W2.9 WWF | 244 |

| Precast Concrete Columns | | | |
|---|---|---|---|
| No. | Height (ft) | Depth (in) | Width (in) |
| C1 | 18.92 | 26 | 12 |
| C2 | 18.92 | 26 | 12 |
| C3 | 18.92 | 26 | 12 |
| C4 | 18.92 | 26 | 12 |
| C5 | 18.92 | 26 | 12 |
| C6 | 18.92 | 26 | 12 |
| C7 | 12.25 | 26 | 12 |
| C8 | 12.25 | 26 | 12 |
| C9 | 12.25 | 26 | 12 |
| C10 | 12.25 | 26 | 12 |
| C11 | 12.25 | 26 | 12 |
| C12 | 12.25 | 26 | 12 |
| C13 | 12.25 | 26 | 12 |
| C14 | 12.25 | 26 | 12 |
| C15 | 12.25 | 26 | 12 |
| C16 | 12.25 | 26 | 12 |
| C17 | 12.25 | 26 | 12 |
| C18 | 29.75 | 26 | 12 |
| C19 | 29.75 | 26 | 12 |
| C20 | 29.75 | 26 | 12 |
| C21 | 29.75 | 26 | 12 |
| C22 | 29.75 | 26 | 12 |
| C23 | 12.25 | 26 | 12 |
| C24 | 12.25 | 26 | 12 |
| C25 | 12.25 | 26 | 12 |
| C26 | 12.25 | 26 | 12 |
| C27 | 12.25 | 26 | 12 |
| C28 | 12.25 | 26 | 12 |
| C29 | 12.25 | 26 | 12 |
| C30 | 12.25 | 26 | 12 |
| C31 | 12.25 | 26 | 12 |
| C32 | 12.25 | 26 | 12 |
| C33 | 12.25 | 26 | 12 |
| C34 | 12.25 | 26 | 12 |
| C35 | 12.25 | 26 | 12 |
| C36 | 12.25 | 26 | 12 |
| Total Height (LF) | 568.52 | All Columns Large | |

| Precast Concrete Beams | | | |
|---|---|---|---|
| No. | Length (ft) | Depth (in) | Width (in) |
| CB #1 | 244 | 43 | 15 |
| CB #2 | 102 | 43 | 15 |
| CB #3 | 116 | 13 | 15 |
| CB #4 | 103 | 69 | 15 |

| Open Web Steel Joists | | | |
|---|---|---|---|
| Type | No. | Length per (ft) | Total Length (ft) |
| 10k1 | 110 | 11 | 1210 |
| 22k5 | 165 | 42 | 6930 |
| 24k10 | 19 | 42 | 798 |
| 26k8 | 22 | 44 | 968 |

| Steel Decking | |
|---|---|
| Type | Area (SF) |
| 1 1/2" wide rib, 20 gauge | 24,405 |

| Steel Columns | | |
|---|---|---|
| No. | Column Size | Length (ft) |
| F1 | HSS 8x8x1/4 | 22.50 |
| F2 | HSS 12x6x1/4 | 22.50 |
| F3 | HSS 12x6x1/4 | 22.50 |
| F4 | HSS 12x6x1/4 | 22.50 |
| F5 | HSS 12x6x1/4 | 22.50 |
| F6 | HSS 12x6x1/4 | 22.50 |
| F7 | HSS 12x6x1/4 | 22.50 |
| F8 | HSS 12x6x1/4 | 22.50 |
| F9 | HSS 12x6x1/4 | 22.50 |
| F10 | HSS 8x8x1/4 | 22.50 |
| G1 | HSS 6x6x1/4 | 14.50 |
| G2 | HSS 6x6x1/4 | 14.50 |
| G3 | HSS 6x6x1/4 | 14.50 |
| G4 | HSS 6x6x1/4 | 14.50 |
| G5 | HSS 6x6x1/4 | 14.50 |
| G6 | HSS 6x6x1/4 | 14.50 |
| G7 | HSS 6x6x1/4 | 14.50 |
| G8 | HSS 6x6x1/4 | 14.50 |
| G9 | HSS 6x6x1/4 | 14.50 |
| G10 | HSS 6x6x1/4 | 14.50 |
| G11 | HSS 6x6x1/4 | 14.50 |
| G12 | HSS 6x6x1/4 | 14.50 |
| G13 | HSS 6x6x1/4 | 14.50 |
| G14 | HSS 6x6x1/4 | 14.50 |
| G15 | HSS 6x6x1/4 | 14.50 |
| G16 | W 10 x 33 | 19.00 |
| G17 | W 10 x 33 | 19.00 |
| G18 | W 10 x 33 | 19.00 |
| G19 | W 10 x 33 | 19.00 |
| G20 | W 10 x 33 | 19.00 |
| G21 | W 10 x 33 | 19.00 |
| G22 | W 10 x 33 | 19.00 |

| Steel Columns | |
|---|---|
| Column Size | Length (ft) |
| HSS 8x8x1/4 | 45.00 |
| HSS 12x6x1/4 | 180.00 |
| HSS 6x6x1/4 | 217.50 |
| W 10 x 33 | 133.00 |

| Steel Beams | | |
|---|---|---|
| No. | Beam Size | Length (ft) |
| FB #1 | W 10x45 | 66.00 |
| FB #2 | W 16x45 | 74.00 |
| FB #3 | W 8x15 | 78.00 |
| FB #4 | W 8x21 | 25.00 |
| FB #5 | W 12x30 | 11.00 |
| FB #6 | W 8x18 | 6.00 |
| FB #7 | W 12x26 | 12.00 |
| SB #1 | W 8x21 | 32.00 |
| SB #2 | W 8x21 | 32.00 |
| SB #3 | HSS 12x2x1/4 | 40.00 |
| RB #1 | W 8x21 | 204.00 |
| RB #2 | L 3x3x1/4 | 102.00 |
| RB #3 | W 16x31 | 36.00 |
| RB #4 | W 8x10 | 10.00 |
| RB #5 | W 8x10 | 42.00 |
| RB #6 | W 8x15 | 8.00 |
| RB #7 | W 8x10 | 20.00 |
| RB #8 | W 8x40 | 9.00 |
| RB #1 | W 12x14 | 142.00 |
| RB #2 | W 8x18 | 30.00 |
| RB #3 | W 8x21 | 16.00 |
| RB #4 | W 8x18 | 16.00 |
| RB #5 | W 8x10 | 12.00 |

| Steel Beam | |
|---|---|
| Beam Size | Length (ft) |
| W 10x45 | 66 |
| W 16x45 | 74.00 |
| W 8x15 | 86.00 |
| W 12x30 | 11.00 |
| W 8x18 | 52.00 |
| W 12x26 | 12.00 |
| W 16x31 | 36.00 |
| W 8x10 | 84.00 |
| W 8x40 | 9.00 |
| W 12x14 | 142.00 |
| HSS 12x2x1/4 | 40.00 |
| L 3x3x1/4 | 102.00 |
| W 8x21 | 309.00 |

| Concrete Footings Strip | | | | | |
|---|---|---|---|---|---|
| Mark | Width (in) | Depth (in) | Bars L | Bars T | Length (ft) |
| A | 24 | 12 | 3-#4 | #4-10"C/C | 1506 |
| B | 36 | 12 | 4-#4 | #4-10"C/C | 271 |

| Concrete Footings Piers | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mark | Footing Size | Footing Rein. | Peir Size | Pier Rein. | Peir Ties | No. of Piers | Total Depth |
| F-A | 4'x4'x12" | 4-#5 EA Way | 20"x16" | 4-#8 | #3T at 12" C/C | 9 | 72 |
| F-B | 4'x4'x12" | 4-#5 EA Way | 16"x16" | 4-#8 | #3T at 12" C/C | 2 | 18 |
| F-C | 4'x4'x12" | 4-#5 EA Way | 36"x22" | 6-#8 | #3T at 12" C/C | 29 | 258 |
| F-D | 5'x5'x12" | 5-#5 EA Way | | | | 9 | 50 |
| F-E | 4'x4'x12" | 4-#5 EA Way | 16"x16" | 4-#8 | #3T at 12" C/C | 22 | 162 |
| F-F | 4'x4'x12" | 4-#5 EA Way | 36"x22" | 6-#8 | #3T at 12" C/C | 4 | 24 |

| Concrete Volume in Piers | | |
|---|---|---|
| Pier size | Volume (CY) | Contact Area (SFCA) |
| 20"x16" | 5.93 | 432.0 |
| 16"x16" | 11.85 | 960.0 |
| 36"x22" | 57.44 | 2726.0 |

| Concrete Volume in Spread Footings | | |
|---|---|---|
| Footing Size | Volume (CY) | Contact Area (SFCA) |
| 4'x4'x12" | 39.11 | 1056 |
| 5'x5'x12" | 8.33 | 180 |

| Concrete Volume in Strip Footings | | |
|---|---|---|
| Width (in) | Depth (in) | Volume (CY) |
| 24 | 12 | 111.6 |
| 36 | 12 | 30.1 |

| Steel Reinforcment | | | |
|---|---|---|---|
| Rebar Size | Length (ft) | Nominal Weight (lb/ft) | Weight (lb) |
| #3 | 396.0 | 0.376 | 148.896 |
| #4 | 7734.4 | 0.668 | 5166.57977 |
| #5 | 618.0 | 1.043 | 644.574 |
| #8 | 2700.0 | 2.67 | 7209 |

| Cast in Place Concrete Construction Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Material Cost | Labor Cost | Equipment Cost |
| Forms in place, Columns, 16"x16" columns, 4 use | 960.0 | SFCA | $ 0.73 | $ 5.15 | | $ 700.78 | $ 4,943.88 | $ - |
| Forms in place, Columns, 24"x24" columns, 4 use | 432.0 | SFCA | $ 0.81 | $ 5.10 | | $ 349.91 | $ 2,203.13 | $ - |
| Forms in place, Columns, 36"x36" columns, 4 use | 2726.0 | SFCA | $ 0.59 | $ 4.85 | | $ 1,608.34 | $ 13,221.10 | $ - |
| Spread footings, job built lumber, 4 use | 1236.0 | SFCA | $ 0.70 | $ 2.93 | | $ 865.20 | $ 3,621.48 | $ - |
| 4000PSI Concrete | 301.3 | CY | $ 101.00 | | | $ 30,430.90 | $ - | $ - |
| 3000PSI Concrete | 122.7 | CY | $ 106.00 | | | $ 13,002.66 | $ - | $ - |
| Footings, continuous, shallow, direct chute | 141.7 | CY | | $ 11.35 | $ 0.37 | $ - | $ 1,607.92 | $ 52.42 |
| Footings, spread, under 1 CY, direct chute | 47.4 | CY | | $ 29.00 | $ 0.94 | $ - | $ 1,375.89 | $ 44.60 |
| Columns, square or round, 18" thick, pumped | 11.9 | CY | | $ 24.00 | $ 8.80 | $ - | $ 284.44 | $ 104.30 |
| Columns, square or round, 24" thick, pumped | 5.9 | CY | | $ 23.50 | $ 8.60 | $ - | $ 139.26 | $ 50.96 |
| Columns, square or round, 36" thick, pumped | 57.4 | CY | | $ 15.50 | $ 5.65 | $ - | $ 890.39 | $ 324.56 |
| Slab on grade, up to 6" thick, direct chute | 301.3 | CY | | $ 14.40 | $ 0.47 | $ - | $ 4,338.66 | $ 141.61 |
| Finishing Floors, Manual screed, bull float, manual float | 24405.0 | SF | | 0.43 | | $ - | $ 10,494.15 | $ - |
| | | | Total Cost of Cast in Place Concrete: | | | $ 46,957.79 | $ 43,120.29 | $ 718.44 |

| Precast Concrete Construction Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Material Cost | Labor Cost | Equipment Cost |
| Precast Beams, rectangular 20' span, 24" x 44" | 18.0 | Ea | $ 2,000.00 | $ 131.00 | $ 79.00 | $ 36,000.00 | $ 2,358.00 | $ 1,422.00 |
| Precast Beams, rectangular 40' span, 24" x 52" | 3.0 | Ea | $ 4,850.00 | $ 263.00 | $ 158.00 | $ 14,550.00 | $ 789.00 | $ 474.00 |
| Precast Beams, rectangular 20' span, 18" x 36" | 6.0 | Ea | $ 1,475.00 | $ 131.00 | $ 79.00 | $ 8,850.00 | $ 786.00 | $ 474.00 |
| Precast Columns, rectangular to 24' high, large columns | 568.5 | LF | $ 184.00 | $ 22.00 | $ 13.15 | $ 104,607.68 | $ 12,507.44 | $ 7,476.04 |
| | | | Total Cost of Precast Concrete: | | | $ 164,007.68 | $ 16,440.44 | $ 9,846.04 |

| Concrete Reinforcement Construction Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Material Cost | Labor Cost | Equipment Cost |
| 6x6 W2.9 x W2.9 WWF 42 lbs per CSF | 244 | CSF | $ 32.50 | $ 24.50 | | $ 7,931.63 | $ 5,979.23 | $ - |
| Reinforcing in Place, footings, #4 to #7 | 3.0 | Ton | $ 1,475.00 | $ 680.00 | | $ 4,395.54 | $ 2,026.42 | $ - |
| Reinforcing in Place, footings, #8 to #18 | 3.6 | Ton | $ 1,400.00 | $ 395.00 | | $ 5,046.30 | $ 1,423.78 | $ - |
| | | | Total Cost of Reinforcement Concrete: | | | $ 17,373.46 | $ 9,429.42 | $ - |

| Structural Steel Construction Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Material Cost | Labor Cost | Equipment Cost |
| Columns Structural, structural tubing, 6x4x5/16x12 | 18 | Ea | $ 375.00 | $ 45.00 | $ 32.00 | $ 6,796.88 | $ 815.63 | $ 580.00 |
| Columns Structural, structural tubing, 10x6x3/8x14 | 4 | Ea | $ 880.00 | $ 49.00 | $ 35.00 | $ 3,300.00 | $ 183.75 | $ 131.25 |
| Columns Structural, structural tubing, 12x8x1/2x16 | 15 | Ea | $ 1,625.00 | $ 51.00 | $ 36.50 | $ 24,375.00 | $ 765.00 | $ 547.50 |
| Columns Structural, W Shape, A992 Steel, 2 tier, W10 x 45 | 133 | LF | $ 74.50 | $ 2.36 | $ 1.69 | $ 9,908.50 | $ 313.88 | $ 224.77 |
| Structural steel members, W10x49 | 66 | LF | $ 81.00 | $ 4.43 | $ 3.17 | $ 5,346.00 | $ 292.38 | $ 209.22 |
| Structural steel members, W16x50 | 74 | LF | $ 82.50 | $ 3.05 | $ 2.18 | $ 6,105.00 | $ 225.70 | $ 161.32 |
| Structural steel members, W8x15 | 86 | LF | $ 25.00 | $ 4.06 | $ 2.90 | $ 2,150.00 | $ 349.16 | $ 249.40 |
| Structural steel members, W12x35 | 11 | LF | $ 58.00 | $ 3.01 | $ 2.15 | $ 638.00 | $ 33.11 | $ 23.65 |
| Structural steel members, W8x21 | 361 | LF | $ 34.50 | $ 4.06 | $ 2.90 | $ 12,454.50 | $ 1,465.66 | $ 1,046.90 |
| Structural steel members, W12x26 | 12 | LF | $ 43.00 | $ 2.77 | $ 1.98 | $ 516.00 | $ 33.24 | $ 23.76 |
| Structural steel members, W16x31 | 36 | LF | $ 51.00 | $ 2.71 | $ 1.93 | $ 1,836.00 | $ 97.56 | $ 69.48 |
| Structural steel members, W8x10 | 84 | LF | $ 16.50 | $ 4.06 | $ 2.90 | $ 1,386.00 | $ 341.04 | $ 243.60 |
| Structural steel members, W8x48 | 9 | LF | $ 79.00 | $ 4.43 | $ 3.17 | $ 711.00 | $ 39.87 | $ 28.53 |
| Structural steel members, W12x16 | 142 | LF | $ 26.50 | $ 2.77 | $ 1.98 | $ 3,763.00 | $ 393.34 | $ 281.16 |
| Structural steel members, structural tubing, 10x6x3/8x14 | 7 | Ea | $ 880.00 | $ 49.00 | $ 35.00 | $ 6,411.43 | $ 357.00 | $ 255.00 |
| Lintels, Steel Angles, 3 1/2x3, 1/4" thick, 4'6" long | 23 | Ea | $ 29.00 | $ 12.45 | | $ 657.33 | $ 282.20 | $ - |
| | | | Total Cost of Structural Steel: | | | $ 86,354.64 | $ 5,988.52 | $ 4,075.54 |

| Structural Roofing System Construction Costs | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Description | Quantity | Units | Material | Labor | Equipment | Material Cost | Labor Cost | Equipment Cost |
| Open Web Joists, 10CS2, 7.5 lb/lf | 1210 | LF | $ 7.85 | $ 2.94 | $ 1.67 | $ 9,498.50 | $ 3,557.40 | $ 2,020.70 |
| Open Web Joists, 22CS4, 16.5 lb/lf | 6930 | LF | $ 17.25 | $ 1.76 | $ 1.00 | $ 119,542.50 | $ 12,196.80 | $ 6,930.00 |
| Open Web Joists, 24CS4, 16.5 lb/lf | 798 | LF | $ 17.25 | $ 1.60 | $ 0.91 | $ 13,765.50 | $ 1,276.80 | $ 726.18 |
| Open Web Joists, 26CS4, 16.5 lb/lf | 968 | LF | $ 17.25 | $ 1.60 | $ 0.91 | $ 16,698.00 | $ 1,548.80 | $ 880.88 |
| Roof decking, open type, 1 1/2" d wide rib, 20 gauge, 50-500 sq. | 24405 | SF | $ 2.42 | $ 0.35 | $ 0.03 | $ 59,060.10 | $ 8,541.75 | $ 732.15 |
| | | | Total Cost of Each Item: | | | $ 218,564.60 | $ 27,121.55 | $ 11,289.91 |

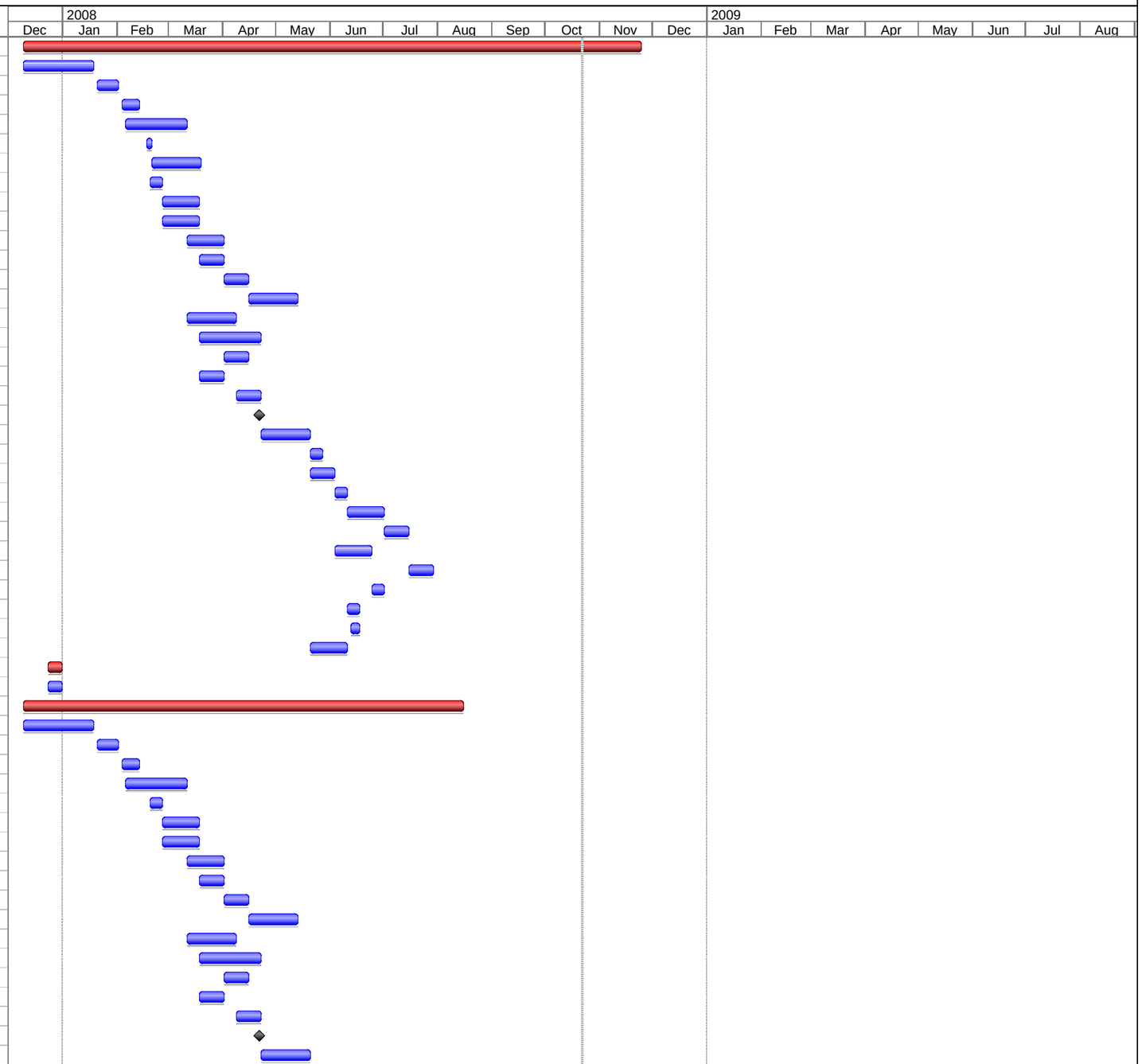
| **Total Cost System:** | **$ 533,258.16** | **$ 102,100.22** | **$ 25,929.93** |
|---|---|---|---|

# Appendix B

# Detailed Project Schedule

# Waynesburg Central High School Detailed Project Schedule

| ID | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|
| 1 | Phase 1 | 251 days | Mon 12/10/07 | Mon 11/24/08 | | |
| 2 | Site Excavation 1 | 30 days | Mon 12/10/07 | Fri 1/18/08 | 1SS | |
| 3 | FRP concrete footers 1 | 10 days | Mon 1/21/08 | Fri 2/1/08 | 2 | |
| 4 | Erect Precast Concrete 1 | 8 days | Mon 2/4/08 | Wed 2/13/08 | 3 | |
| 5 | Install CMU's 1 | 25 days | Wed 2/6/08 | Tue 3/11/08 | 4SS+2 days | |
| 6 | Set Docs Plank | 3 days | Mon 2/18/08 | Wed 2/20/08 | 5SS+8 days | |
| 7 | Boiler room assemblies 1 | 20 days | Thu 2/21/08 | Wed 3/19/08 | 6 | |
| 8 | FRP Slab on grade 1 | 5 days | Wed 2/20/08 | Tue 2/26/08 | 5SS+10 days | |
| 9 | Rough in Electrical 1 | 15 days | Wed 2/27/08 | Tue 3/18/08 | 5SS+15 days | |
| 10 | Rough in Plumbing 1 | 15 days | Wed 2/27/08 | Tue 3/18/08 | 5SS+15 days | |
| 11 | Install Roofing Structure | 15 days | Wed 3/12/08 | Tue 4/1/08 | 5 | |
| 12 | Insulate Plumbing Pipes 1 | 10 days | Wed 3/19/08 | Tue 4/1/08 | 10 | |
| 13 | Install Mechanical Equipment 1 | 10 days | Wed 4/2/08 | Tue 4/15/08 | 11 | |
| 14 | Rough in Mechanical 1 | 20 days | Wed 4/16/08 | Tue 5/13/08 | 13 | |
| 15 | Rough in Communications 1 | 20 days | Wed 3/12/08 | Tue 4/8/08 | 5 | |
| 16 | Install brick veneer 1 | 25 days | Wed 3/19/08 | Tue 4/22/08 | 5FS+5 days | |
| 17 | Install Roofing | 10 days | Wed 4/2/08 | Tue 4/15/08 | 11 | |
| 18 | Electrical Hook ups 1 | 10 days | Wed 3/19/08 | Tue 4/1/08 | 9 | |
| 19 | Install Windows 1 | 10 days | Wed 4/9/08 | Tue 4/22/08 | 16SS+15 days | |
| 20 | Enclosure 1 | 1 day | Tue 4/22/08 | Tue 4/22/08 | 19FF | |
| 21 | Painting 1 | 20 days | Wed 4/23/08 | Tue 5/20/08 | 19 | |
| 22 | Install Low Voltage Fixtures 1 | 5 days | Wed 5/21/08 | Tue 5/27/08 | 21 | |
| 23 | Install Ceiling Grid 1 | 10 days | Wed 5/21/08 | Tue 6/3/08 | 21 | |
| 24 | Install Mechanical GRD's | 5 days | Wed 6/4/08 | Tue 6/10/08 | 23 | |
| 25 | Install Casework 1 | 15 days | Wed 6/11/08 | Tue 7/1/08 | 24 | |
| 26 | Install Flooring 1 | 10 days | Wed 7/2/08 | Tue 7/15/08 | 25 | |
| 27 | Install Lighting Fixtures 1 | 15 days | Wed 6/4/08 | Tue 6/24/08 | 23 | |
| 28 | Install Plumbing Fixtures 1 | 10 days | Wed 7/16/08 | Tue 7/29/08 | 26 | |
| 29 | Install Ceiling Tiles 1 | 5 days | Wed 6/25/08 | Tue 7/1/08 | 27 | |
| 30 | Start up Mechanical System 1 | 5 days | Wed 6/11/08 | Tue 6/17/08 | 24 | |
| 31 | Test Systems 1 | 3 days | Fri 6/13/08 | Tue 6/17/08 | 30FF | |
| 32 | Exterior Site Work Finishing 1 | 15 days | Wed 5/21/08 | Wed 6/11/08 | 20,30SF | |
| 33 | Phase 1A | 6 days | Mon 12/24/07 | Mon 12/31/07 | | |
| 34 | Corridor Ceiling Demolition | 6 days | Mon 12/24/07 | Mon 12/31/07 | 33SS | |
| 35 | Phase 2 | 180 days | Mon 12/10/07 | Fri 8/15/08 | | |
| 36 | Site Excavation 2 | 30 days | Mon 12/10/07 | Fri 1/18/08 | 35SS | |
| 37 | FRP concrete footers 2 | 10 days | Mon 1/21/08 | Fri 2/1/08 | 36 | |
| 38 | Erect Precast Concrete 2 | 8 days | Mon 2/4/08 | Wed 2/13/08 | 37 | |
| 39 | Install CMU's 2 | 25 days | Wed 2/6/08 | Tue 3/11/08 | 38SS+2 days | |
| 40 | FRP Slab on grade 2 | 5 days | Wed 2/20/08 | Tue 2/26/08 | 39SS+10 days | |
| 41 | Rough in Electrical 2 | 15 days | Wed 2/27/08 | Tue 3/18/08 | 39SS+15 days | |
| 42 | Rough in Plumbing 2 | 15 days | Wed 2/27/08 | Tue 3/18/08 | 39SS+15 days | |
| 43 | Install Roofing Structure 2 | 15 days | Wed 3/12/08 | Tue 4/1/08 | 39 | |
| 44 | Insulate Plumbing Pipes 2 | 10 days | Wed 3/19/08 | Tue 4/1/08 | 42 | |
| 45 | Install Mechanical Equipment 2 | 10 days | Wed 4/2/08 | Tue 4/15/08 | 43 | |
| 46 | Rough in Mechanical 2 | 20 days | Wed 4/16/08 | Tue 5/13/08 | 45 | |
| 47 | Rough in Communications 2 | 20 days | Wed 3/12/08 | Tue 4/8/08 | 39 | |
| 48 | Install brick veneer 2 | 25 days | Wed 3/19/08 | Tue 4/22/08 | 39FS+5 days | |
| 49 | Install Roofing 2 | 10 days | Wed 4/2/08 | Tue 4/15/08 | 43 | |
| 50 | Electrical Hook ups 2 | 10 days | Wed 3/19/08 | Tue 4/1/08 | 41 | |
| 51 | Install Windows 2 | 10 days | Wed 4/9/08 | Tue 4/22/08 | 48SS+15 days | |
| 52 | Enclosure 2 | 1 day | Tue 4/22/08 | Tue 4/22/08 | 51FF | |
| 53 | Painting 2 | 20 days | Wed 4/23/08 | Tue 5/20/08 | 51 | |

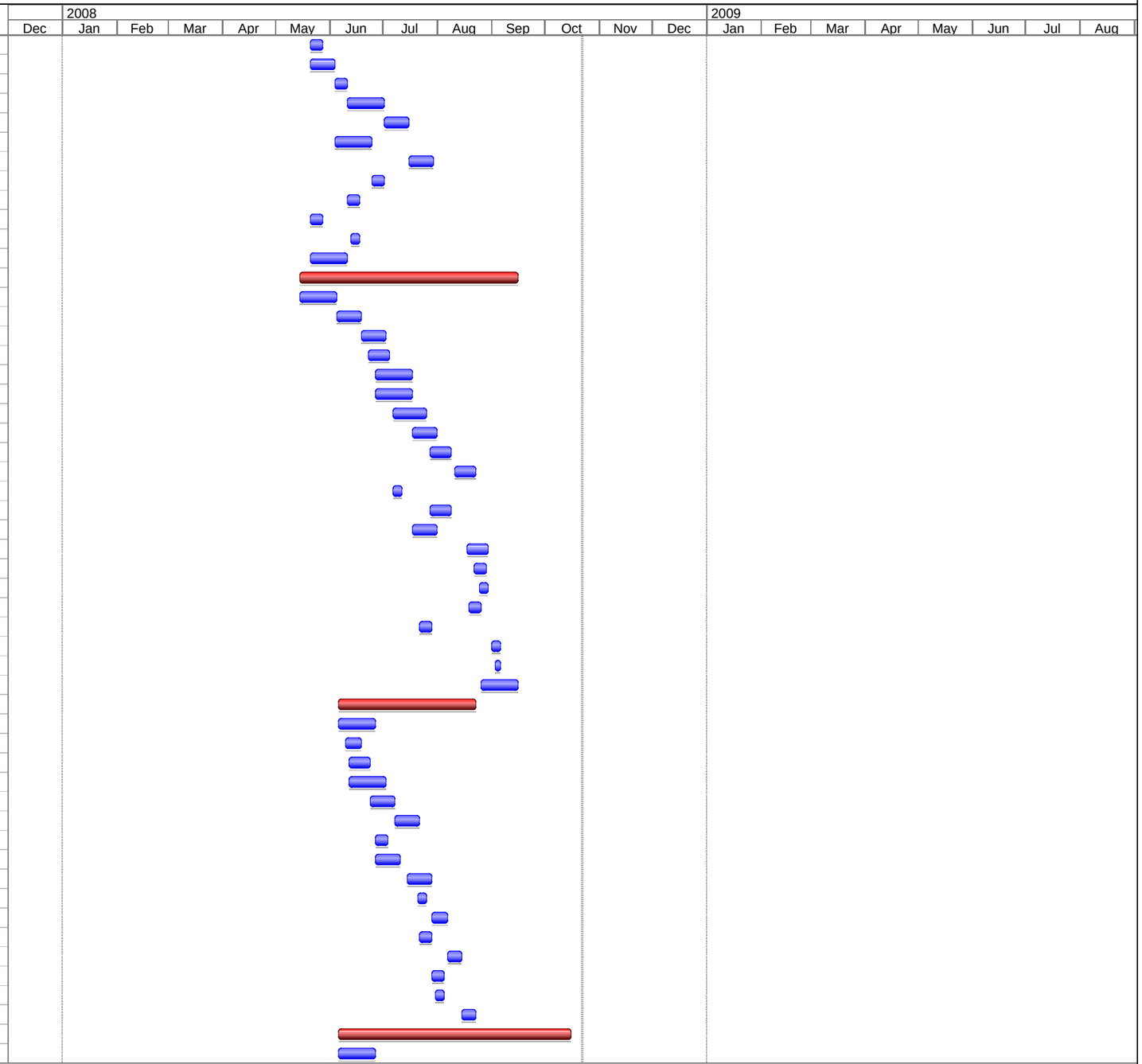



Robert O. Brennan
Project: Schedule
Date: Wed 10/22/08

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

# Waynesburg Central High School Detailed Project Schedule

| ID | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|
| 54 | Install Low Voltage Fixtures 2 | 5 days | Wed 5/21/08 | Tue 5/27/08 | 53 | |
| 55 | Install Ceiling Grid 2 | 10 days | Wed 5/21/08 | Tue 6/3/08 | 53 | |
| 56 | Install Mechanical GRD's 2 | 5 days | Wed 6/4/08 | Tue 6/10/08 | 55 | |
| 57 | Install Casework 2 | 15 days | Wed 6/11/08 | Tue 7/1/08 | 56 | |
| 58 | Install Flooring 2 | 10 days | Wed 7/2/08 | Tue 7/15/08 | 57 | |
| 59 | Install Lighting Fixtures 2 | 15 days | Wed 6/4/08 | Tue 6/24/08 | 55 | |
| 60 | Install Plumbing Fixtures 2 | 10 days | Wed 7/16/08 | Tue 7/29/08 | 58 | |
| 61 | Install Ceiling Tiles 2 | 5 days | Wed 6/25/08 | Tue 7/1/08 | 59 | |
| 62 | Start up Mechanical System 2 | 5 days | Wed 6/11/08 | Tue 6/17/08 | 56 | |
| 63 | Install Acoustical Panels | 5 days | Wed 5/21/08 | Tue 5/27/08 | 53 | |
| 64 | Test Systems 2 | 3 days | Fri 6/13/08 | Tue 6/17/08 | 62FF | |
| 65 | Exterior Site Work Finishing 2 | 15 days | Wed 5/21/08 | Wed 6/11/08 | 52,62SF | |
| 66 | Phase 3 | 88 days | Thu 5/15/08 | Mon 9/15/08 | | |
| 67 | General Demolition 3 | 15 days | Thu 5/15/08 | Wed 6/4/08 | 66SS | |
| 68 | Electrical Demolition 3 | 10 days | Thu 6/5/08 | Wed 6/18/08 | 67 | |
| 69 | Mechanical Demolition 3 | 10 days | Thu 6/19/08 | Wed 7/2/08 | 68 | |
| 70 | Plumbing Demolition 3 | 10 days | Mon 6/23/08 | Fri 7/4/08 | 69SS+2 days | |
| 71 | Rough in Electrical 3 | 15 days | Fri 6/27/08 | Thu 7/17/08 | 70SS+4 days | |
| 72 | Rough in Plumbing 3 | 15 days | Fri 6/27/08 | Thu 7/17/08 | 70SS+4 days | |
| 73 | Install Roofing Structure 3 | 15 days | Mon 7/7/08 | Fri 7/25/08 | 70 | |
| 74 | Insulate Plumbing Pipes 3 | 10 days | Fri 7/18/08 | Thu 7/31/08 | 72 | |
| 75 | Install Mechanical Equipment 3 | 10 days | Mon 7/28/08 | Fri 8/8/08 | 73 | |
| 76 | Rough in Mechanical 3 | 10 days | Mon 8/11/08 | Fri 8/22/08 | 75 | |
| 77 | Rough in Communications 3 | 5 days | Mon 7/7/08 | Fri 7/11/08 | 70 | |
| 78 | Install Roofing 3 | 10 days | Mon 7/28/08 | Fri 8/8/08 | 73 | |
| 79 | Electrical Hook ups 3 | 10 days | Fri 7/18/08 | Thu 7/31/08 | 71 | |
| 80 | Painting 3 | 10 days | Mon 8/18/08 | Fri 8/29/08 | 76SS+5 days,77 | |
| 81 | Install Low Voltage Fixtures 3 | 5 days | Fri 8/22/08 | Thu 8/28/08 | 80SS+4 days | |
| 82 | Install Mechanical GRD's 3 | 5 days | Mon 8/25/08 | Fri 8/29/08 | 80SS+5 days | |
| 83 | Install Flooring 3 | 5 days | Tue 8/19/08 | Mon 8/25/08 | 80SS+1 day | |
| 84 | Install Lighting Fixtures 3 | 5 days | Tue 7/22/08 | Mon 7/28/08 | 79SS+2 days | |
| 85 | Start up Mechanical System 3 | 5 days | Mon 9/1/08 | Fri 9/5/08 | 82 | |
| 86 | Test Systems 3 | 3 days | Wed 9/3/08 | Fri 9/5/08 | 85FF | |
| 87 | Install Kitchen Equipment 3 | 15 days | Tue 8/26/08 | Mon 9/15/08 | 83 | |
| 88 | Phase 3A | 56 days | Fri 6/6/08 | Fri 8/22/08 | | |
| 89 | General Demolition 3a | 15 days | Fri 6/6/08 | Thu 6/26/08 | 88SS | |
| 90 | Electrical Demolition 3a | 7 days | Tue 6/10/08 | Wed 6/18/08 | 89SS+2 days | |
| 91 | Mechanical Demolition 3a | 8 days | Thu 6/12/08 | Mon 6/23/08 | 90SS+2 days | |
| 92 | Rough in Electrical 3a | 15 days | Thu 6/12/08 | Wed 7/2/08 | 89SS+4 days | |
| 93 | Install Mechanical Equipment 3 | 10 days | Tue 6/24/08 | Mon 7/7/08 | 91 | |
| 94 | Rough in Mechanical 3a | 10 days | Tue 7/8/08 | Mon 7/21/08 | 93 | |
| 95 | Rough in Communications 3a | 5 days | Fri 6/27/08 | Thu 7/3/08 | 89 | |
| 96 | Install Roofing 3a | 10 days | Fri 6/27/08 | Thu 7/10/08 | 89 | |
| 97 | Painting 3a | 10 days | Tue 7/15/08 | Mon 7/28/08 | 94SS+5 days,95 | |
| 98 | Install Low Voltage Fixtures 3a | 5 days | Mon 7/21/08 | Fri 7/25/08 | 97SS+4 days | |
| 99 | Install Ceiling Grid 3a | 7 days | Tue 7/29/08 | Wed 8/6/08 | 97 | |
| 100 | Install Mechanical GRD's 3a | 5 days | Tue 7/22/08 | Mon 7/28/08 | 97SS+5 days | |
| 101 | Install Lighting Fixtures 3a | 6 days | Thu 8/7/08 | Thu 8/14/08 | 92,99 | |
| 102 | Start up Mechanical System 3a | 5 days | Tue 7/29/08 | Mon 8/4/08 | 100 | |
| 103 | Test Systems 3a | 3 days | Thu 7/31/08 | Mon 8/4/08 | 102FF | |
| 104 | Install Ceiling Tiles 3a | 6 days | Fri 8/15/08 | Fri 8/22/08 | 101 | |
| 105 | Phase 3B | 94 days | Fri 6/6/08 | Wed 10/15/08 | | |
| 106 | General Demolition 3b | 15 days | Fri 6/6/08 | Thu 6/26/08 | 105SS | |

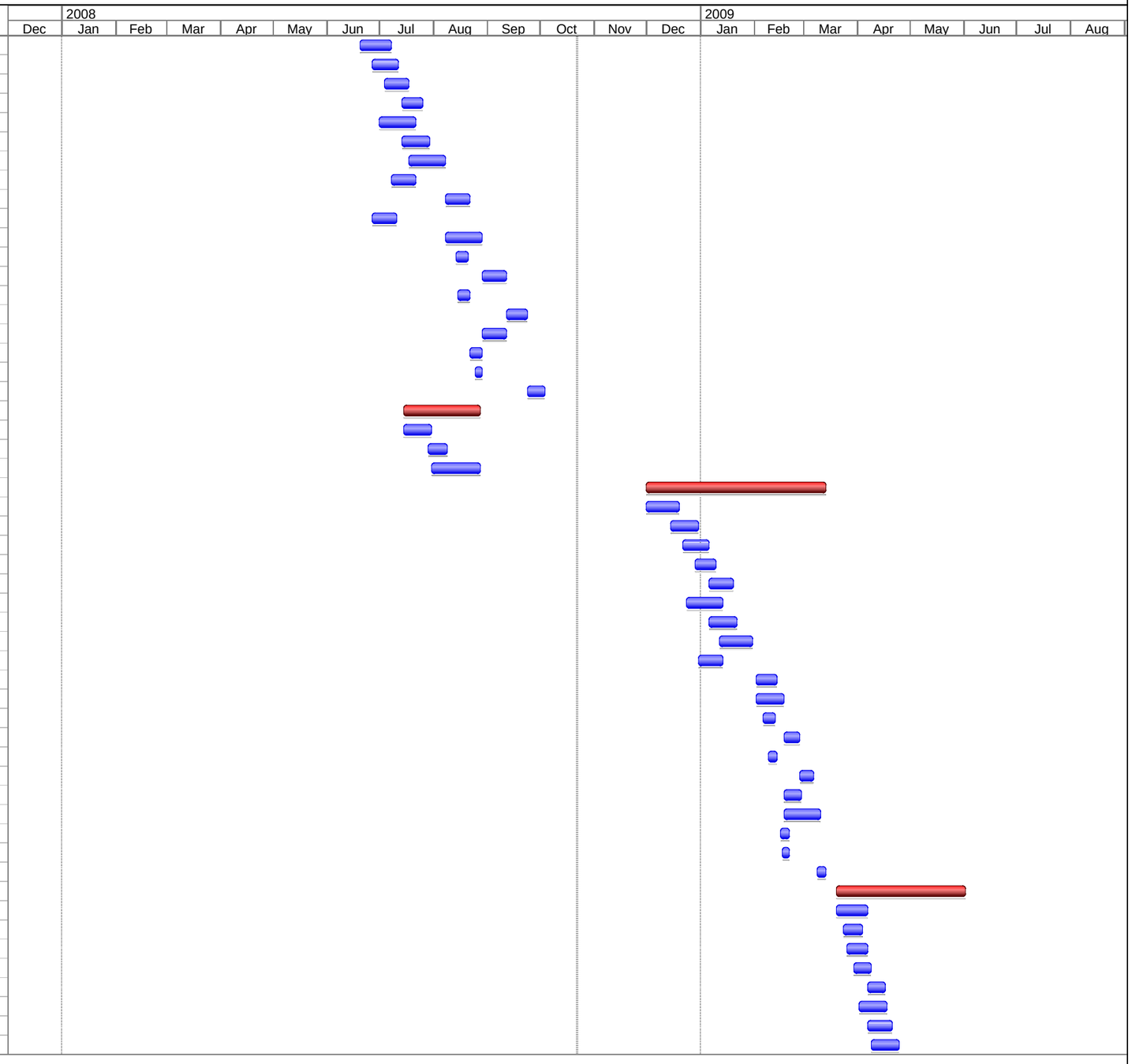



Robert O. Brennan
Project: Schedule
Date: Wed 10/22/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

# Waynesburg Central High School Detailed Project Schedule

| ID | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|
| 107 | Electrical Demolition 3b | 12 days | Fri 6/20/08 | Mon 7/7/08 | 106SS+10 days | |
| 108 | Mechanical Demolition 3b | 11 days | Fri 6/27/08 | Fri 7/11/08 | 107SS+5 days | |
| 109 | Plumbing Demolition 3b | 10 days | Fri 7/4/08 | Thu 7/17/08 | 108SS+5 days | |
| 110 | Rough in Mechanical 3b | 10 days | Mon 7/14/08 | Fri 7/25/08 | 108 | |
| 111 | Rough in Electrical 3b | 15 days | Tue 7/1/08 | Mon 7/21/08 | 107SS+7 days | |
| 112 | Install Mechanical Equipment 3 | 12 days | Mon 7/14/08 | Tue 7/29/08 | 108 | |
| 113 | Rough in Plumbing 3b | 15 days | Fri 7/18/08 | Thu 8/7/08 | 109 | |
| 114 | Rough in Communications 3b | 10 days | Tue 7/8/08 | Mon 7/21/08 | 107 | |
| 115 | Insulate Plumbing Pipes 3b | 10 days | Fri 8/8/08 | Thu 8/21/08 | 113 | |
| 116 | Install Roofing 3b | 10 days | Fri 6/27/08 | Thu 7/10/08 | 106 | |
| 117 | Painting 3b | 15 days | Fri 8/8/08 | Thu 8/28/08 | 110SS+5 days,11 | |
| 118 | Install Low Voltage Fixtures 3b | 5 days | Thu 8/14/08 | Wed 8/20/08 | 117SS+4 days | |
| 119 | Install Ceiling Grid 3b | 10 days | Fri 8/29/08 | Thu 9/11/08 | 117 | |
| 120 | Install Mechanical GRD's 3b | 5 days | Fri 8/15/08 | Thu 8/21/08 | 117SS+5 days | |
| 121 | Install Lighting Fixtures 3b | 8 days | Fri 9/12/08 | Tue 9/23/08 | 111,119 | |
| 122 | Install Plumbing Fixtures 3b | 10 days | Fri 8/29/08 | Thu 9/11/08 | 117,115 | |
| 123 | Start up Mechanical System 3b | 5 days | Fri 8/22/08 | Thu 8/28/08 | 120 | |
| 124 | Test Systems 3b | 4 days | Mon 8/25/08 | Thu 8/28/08 | 123FF | |
| 125 | Install Ceiling Tiles 3b | 8 days | Wed 9/24/08 | Fri 10/3/08 | 121 | |
| 126 | Phase 4 | 32 days | Tue 7/15/08 | Wed 8/27/08 | | |
| 127 | Stage Equipment Demolition | 12 days | Tue 7/15/08 | Wed 7/30/08 | 126SS | |
| 128 | Mechnical Revonations | 9 days | Tue 7/29/08 | Fri 8/8/08 | 127SS+10 days | |
| 129 | Install Stage Equipment | 20 days | Thu 7/31/08 | Wed 8/27/08 | 127 | |
| 130 | Phase 5 | 75 days | Mon 12/1/08 | Fri 3/13/09 | | |
| 131 | General Demolition 5 | 15 days | Mon 12/1/08 | Fri 12/19/08 | 130SS | |
| 132 | Electrical Demolition 5 | 12 days | Mon 12/15/08 | Tue 12/30/08 | 131SS+10 days | |
| 133 | Mechanical Demolition 5 | 11 days | Mon 12/22/08 | Mon 1/5/09 | 132SS+5 days | |
| 134 | Plumbing Demolition 5 | 10 days | Mon 12/29/08 | Fri 1/9/09 | 133SS+5 days | |
| 135 | Rough in Mechanical 5 | 10 days | Tue 1/6/09 | Mon 1/19/09 | 133 | |
| 136 | Rough in Electrical 5 | 15 days | Wed 12/24/08 | Tue 1/13/09 | 132SS+7 days | |
| 137 | Install Mechanical Equipment 5 | 12 days | Tue 1/6/09 | Wed 1/21/09 | 133 | |
| 138 | Rough in Plumbing 5 | 15 days | Mon 1/12/09 | Fri 1/30/09 | 134 | |
| 139 | Rough in Communications 5 | 10 days | Wed 12/31/08 | Tue 1/13/09 | 132 | |
| 140 | Insulate Plumbing Pipes 5 | 10 days | Mon 2/2/09 | Fri 2/13/09 | 138 | |
| 141 | Painting 5 | 12 days | Mon 2/2/09 | Tue 2/17/09 | 135SS+5 days,13 | |
| 142 | Install Low Voltage Fixtures 5 | 5 days | Fri 2/6/09 | Thu 2/12/09 | 141SS+4 days | |
| 143 | Install Ceiling Grid 5 | 7 days | Wed 2/18/09 | Thu 2/26/09 | 141 | |
| 144 | Install Mechanical GRD's 5 | 5 days | Mon 2/9/09 | Fri 2/13/09 | 141SS+5 days | |
| 145 | Install Lighting Fixtures 5 | 6 days | Fri 2/27/09 | Fri 3/6/09 | 136,143 | |
| 146 | Install Plumbing Fixtures 5 | 8 days | Wed 2/18/09 | Fri 2/27/09 | 140,141 | |
| 147 | Install Casework | 15 days | Wed 2/18/09 | Tue 3/10/09 | 141 | |
| 148 | Start up Mechanical System 5 | 5 days | Mon 2/16/09 | Fri 2/20/09 | 144 | |
| 149 | Test Systems 5 | 4 days | Tue 2/17/09 | Fri 2/20/09 | 148FF | |
| 150 | Install Ceiling Tiles 5 | 5 days | Mon 3/9/09 | Fri 3/13/09 | 145 | |
| 151 | Phase 6 | 52 days | Fri 3/20/09 | Mon 6/1/09 | | |
| 152 | General Demolition 6 | 12 days | Fri 3/20/09 | Mon 4/6/09 | 151SS | |
| 153 | Electrical Demolition 6 | 9 days | Tue 3/24/09 | Fri 4/3/09 | 152SS+2 days | |
| 154 | Mechanical Demolition 6 | 8 days | Thu 3/26/09 | Mon 4/6/09 | 153SS+2 days | |
| 155 | Plumbing Demolition 6 | 8 days | Mon 3/30/09 | Wed 4/8/09 | 154SS+2 days | |
| 156 | Rough in Mechanical 6 | 8 days | Tue 4/7/09 | Thu 4/16/09 | 154 | |
| 157 | Rough in Electrical 6 | 12 days | Thu 4/2/09 | Fri 4/17/09 | 153SS+7 days | |
| 158 | Install Mechanical Equipment 6 | 10 days | Tue 4/7/09 | Mon 4/20/09 | 154 | |
| 159 | Rough in Plumbing 6 | 12 days | Thu 4/9/09 | Fri 4/24/09 | 155 | |

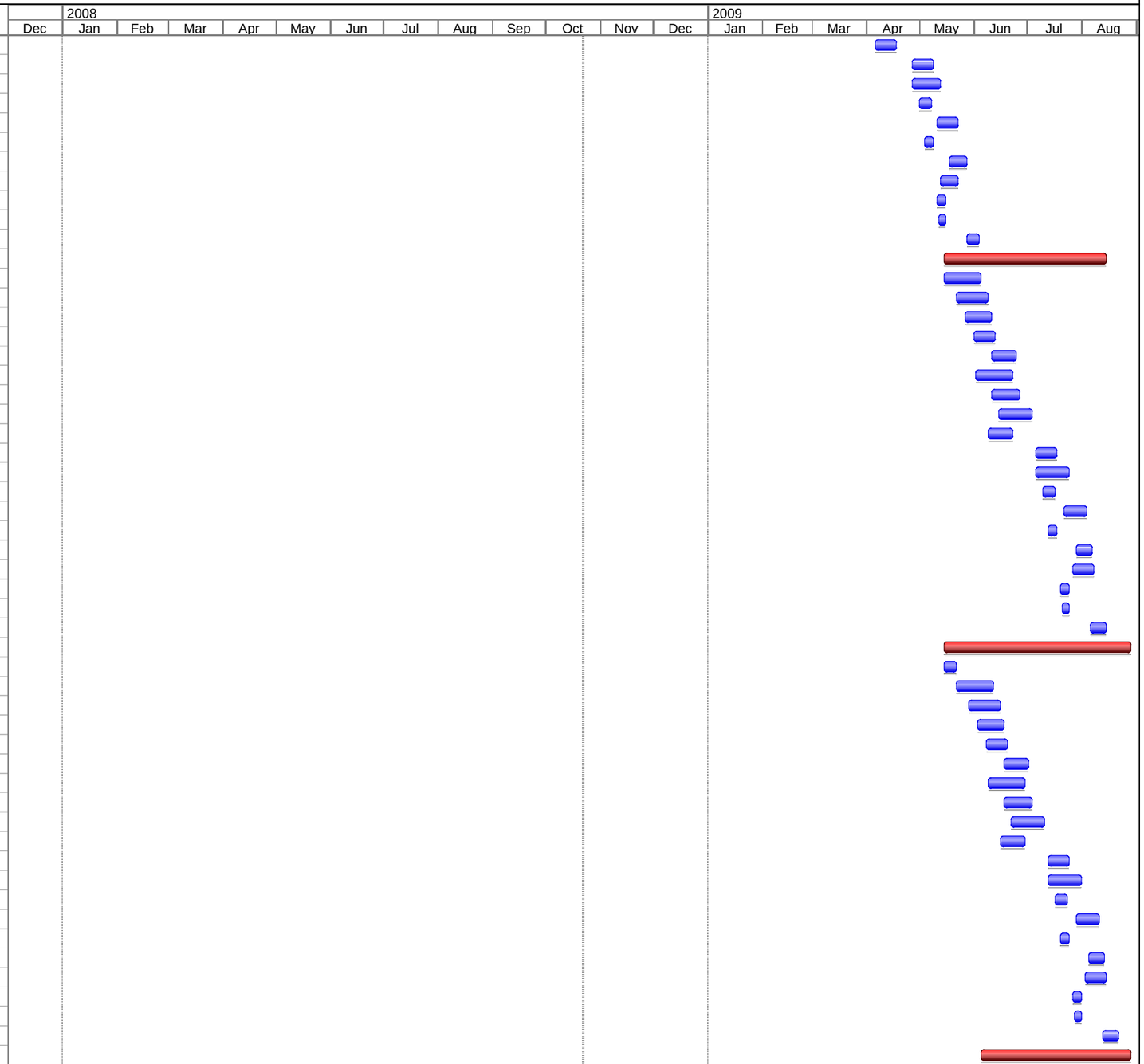



Robert O. Brennan
Project: Schedule
Date: Wed 10/22/08

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

# Waynesburg Central High School Detailed Project Schedule

| ID | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|
| 160 | Rough in Communications 6 | 10 days | Mon 4/6/09 | Fri 4/17/09 | 153 | |
| 161 | Insulate Plumbing Pipes 6 | 10 days | Mon 4/27/09 | Fri 5/8/09 | 159 | |
| 162 | Painting 6 | 12 days | Mon 4/27/09 | Tue 5/12/09 | 156SS+5 days,15 | |
| 163 | Install Low Voltage Fixtures 6 | 5 days | Fri 5/1/09 | Thu 5/7/09 | 162SS+4 days | |
| 164 | Install Ceiling Grid 6 | 10 days | Mon 5/11/09 | Fri 5/22/09 | 162SS+10 days | |
| 165 | Install Mechanical GRD's 6 | 5 days | Mon 5/4/09 | Fri 5/8/09 | 162SS+5 days | |
| 166 | Install Lighting Fixtures 6 | 8 days | Mon 5/18/09 | Wed 5/27/09 | 157,164SS+5 day | |
| 167 | Install Plumbing Fixtures 6 | 8 days | Wed 5/13/09 | Fri 5/22/09 | 161,162 | |
| 168 | Start up Mechanical System 6 | 5 days | Mon 5/11/09 | Fri 5/15/09 | 165 | |
| 169 | Test Systems 6 | 4 days | Tue 5/12/09 | Fri 5/15/09 | 168FF | |
| 170 | Install Ceiling Tiles 6 | 5 days | Thu 5/28/09 | Wed 6/3/09 | 166 | |
| 171 | Phase 6a | 66 days | Fri 5/15/09 | Fri 8/14/09 | | |
| 172 | General Demolition 6a | 15 days | Fri 5/15/09 | Thu 6/4/09 | 171SS | |
| 173 | Electrical Demolition 6a | 12 days | Fri 5/22/09 | Mon 6/8/09 | 172SS+5 days | |
| 174 | Mechanical Demolition 6a | 11 days | Wed 5/27/09 | Wed 6/10/09 | 173SS+3 days | |
| 175 | Plumbing Demolition 6a | 10 days | Mon 6/1/09 | Fri 6/12/09 | 174SS+3 days | |
| 176 | Rough in Mechanical 6a | 10 days | Thu 6/11/09 | Wed 6/24/09 | 174 | |
| 177 | Rough in Electrical 6a | 15 days | Tue 6/2/09 | Mon 6/22/09 | 173SS+7 days | |
| 178 | Install Mechanical Equipment 6 | 12 days | Thu 6/11/09 | Fri 6/26/09 | 174 | |
| 179 | Rough in Plumbing 6a | 15 days | Mon 6/15/09 | Fri 7/3/09 | 175 | |
| 180 | Rough in Communications 6a | 10 days | Tue 6/9/09 | Mon 6/22/09 | 173 | |
| 181 | Insulate Plumbing Pipes 6a | 10 days | Mon 7/6/09 | Fri 7/17/09 | 179 | |
| 182 | Painting 6a | 15 days | Mon 7/6/09 | Fri 7/24/09 | 176SS+5 days,17 | |
| 183 | Install Low Voltage Fixtures 6a | 5 days | Fri 7/10/09 | Thu 7/16/09 | 182SS+4 days | |
| 184 | Install Ceiling Grid 6a | 9 days | Wed 7/22/09 | Mon 8/3/09 | 182SS+12 days | |
| 185 | Install Mechanical GRD's 6a | 5 days | Mon 7/13/09 | Fri 7/17/09 | 182SS+5 days | |
| 186 | Install Lighting Fixtures 6a | 7 days | Wed 7/29/09 | Thu 8/6/09 | 177,184SS+5 day | |
| 187 | Install Plumbing Fixtures 6a | 10 days | Mon 7/27/09 | Fri 8/7/09 | 181,182 | |
| 188 | Start up Mechanical System 6a | 5 days | Mon 7/20/09 | Fri 7/24/09 | 185 | |
| 189 | Test Systems 6a | 4 days | Tue 7/21/09 | Fri 7/24/09 | 188FF | |
| 190 | Install Ceiling Tiles 6a | 7 days | Thu 8/6/09 | Fri 8/14/09 | 186SS+6 days | |
| 191 | Phase 7 | 76 days | Fri 5/15/09 | Fri 8/28/09 | | |
| 192 | Asbestos Removal 7 | 5 days | Fri 5/15/09 | Thu 5/21/09 | 191SS | |
| 193 | General Demolition 7 | 15 days | Fri 5/22/09 | Thu 6/11/09 | 192 | |
| 194 | Electrical Demolition 7 | 12 days | Fri 5/29/09 | Mon 6/15/09 | 193SS+5 days | |
| 195 | Mechanical Demolition 7 | 11 days | Wed 6/3/09 | Wed 6/17/09 | 194SS+3 days | |
| 196 | Plumbing Demolition 7 | 10 days | Mon 6/8/09 | Fri 6/19/09 | 195SS+3 days | |
| 197 | Rough in Mechanical 7 | 10 days | Thu 6/18/09 | Wed 7/1/09 | 195 | |
| 198 | Rough in Electrical 7 | 15 days | Tue 6/9/09 | Mon 6/29/09 | 194SS+7 days | |
| 199 | Install Mechanical Equipment 7 | 12 days | Thu 6/18/09 | Fri 7/3/09 | 195 | |
| 200 | Rough in Plumbing 7 | 15 days | Mon 6/22/09 | Fri 7/10/09 | 196 | |
| 201 | Rough in Communications 7 | 10 days | Tue 6/16/09 | Mon 6/29/09 | 194 | |
| 202 | Insulate Plumbing Pipes 7 | 10 days | Mon 7/13/09 | Fri 7/24/09 | 200 | |
| 203 | Painting 7 | 15 days | Mon 7/13/09 | Fri 7/31/09 | 197SS+5 days,20 | |
| 204 | Install Low Voltage Fixtures 7 | 5 days | Fri 7/17/09 | Thu 7/23/09 | 203SS+4 days | |
| 205 | Install Ceiling Grid 7 | 9 days | Wed 7/29/09 | Mon 8/10/09 | 203SS+12 days | |
| 206 | Install Mechanical GRD's 7 | 5 days | Mon 7/20/09 | Fri 7/24/09 | 203SS+5 days | |
| 207 | Install Lighting Fixtures 7 | 7 days | Wed 8/5/09 | Thu 8/13/09 | 198,205SS+5 day | |
| 208 | Install Plumbing Fixtures 7 | 10 days | Mon 8/3/09 | Fri 8/14/09 | 202,203 | |
| 209 | Start up Mechanical System 7 | 5 days | Mon 7/27/09 | Fri 7/31/09 | 206 | |
| 210 | Test Systems 7 | 4 days | Tue 7/28/09 | Fri 7/31/09 | 209FF | |
| 211 | Install Ceiling Tiles 7 | 7 days | Thu 8/13/09 | Fri 8/21/09 | 207SS+6 days | |
| 212 | Phase 7A | 61 days | Fri 6/5/09 | Fri 8/28/09 | | |

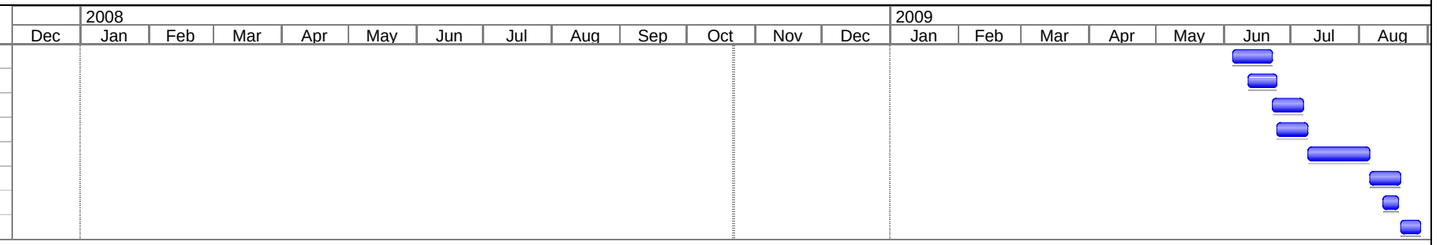



Robert O. Brennan
Project: Schedule
Date: Wed 10/22/08

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

# Waynesburg Central High School Detailed Project Schedule

| ID | Task Name | Duration | Start | Finish | Predecessors | Resource Names |
|---|---|---|---|---|---|---|
| 213 | General Demolition 7a | 12 days | Fri 6/5/09 | Mon 6/22/09 | 212SS | |
| 214 | Electrical Demolition 7a | 9 days | Fri 6/12/09 | Wed 6/24/09 | 213SS+5 days | |
| 215 | Rough in Electrical 7a | 10 days | Tue 6/23/09 | Mon 7/6/09 | 214SS+7 days | |
| 216 | Rough in Communications 7a | 10 days | Thu 6/25/09 | Wed 7/8/09 | 214 | |
| 217 | Refinish Floor | 20 days | Thu 7/9/09 | Wed 8/5/09 | 216 | |
| 218 | Painting 7a | 10 days | Thu 8/6/09 | Wed 8/19/09 | 217 | |
| 219 | Install Low Voltage Fixtures 7a | 5 days | Wed 8/12/09 | Tue 8/18/09 | 218SS+4 days | |
| 220 | Install Lighting Fixtures 7a | 7 days | Thu 8/20/09 | Fri 8/28/09 | 215,218 | |




Robert O. Brennan
Project: Schedule
Date: Wed 10/22/08

Task
Split
Progress
Milestone
Summary
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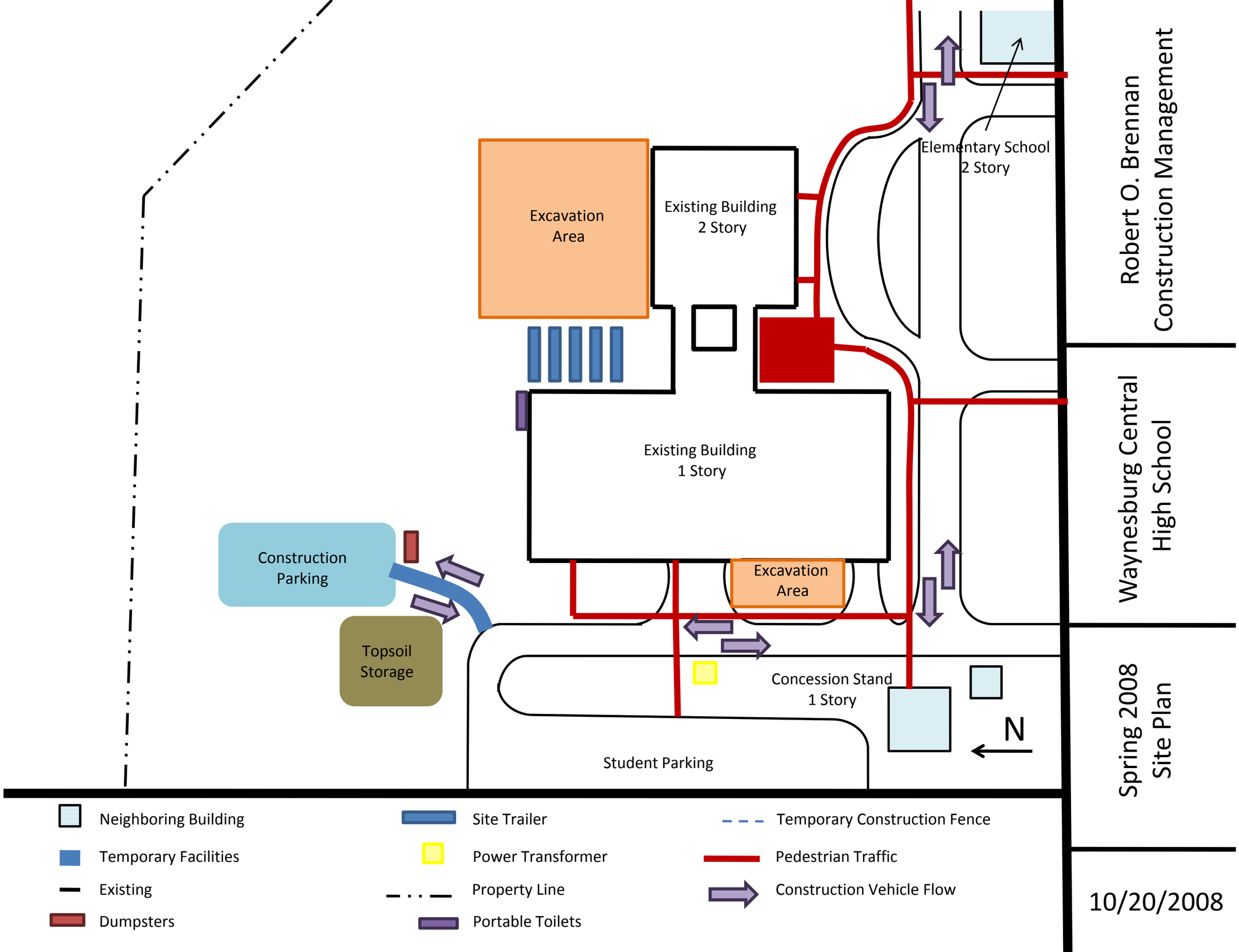
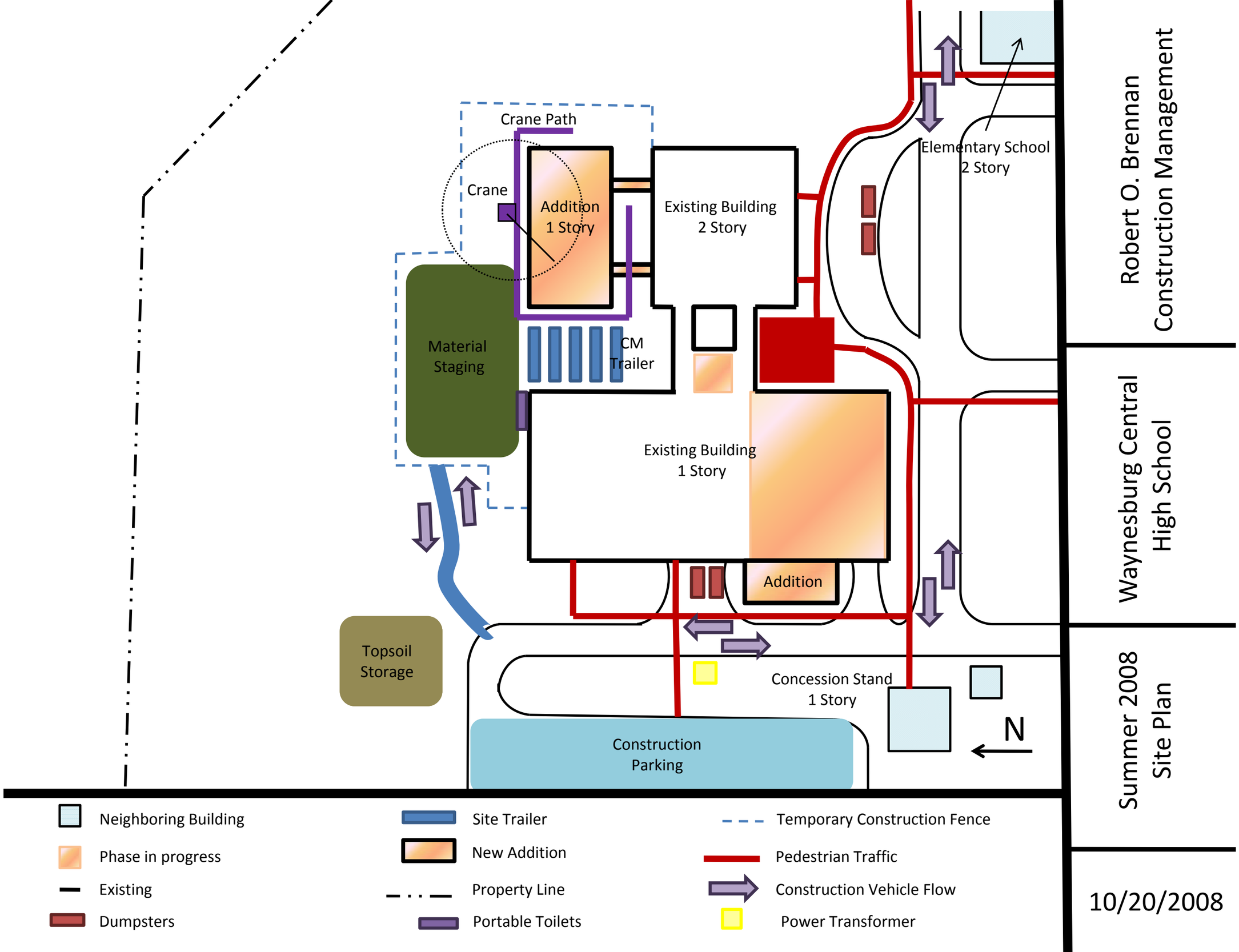
Deadline

# Appendix C

# Site Layout Plan


Excavation Area
Existing Building 2 Story
Elementary School 2 Story
Existing Building 1 Story
Construction Parking
Topsoil Storage
Excavation Area
Concession Stand 1 Story
Student Parking
N
Neighboring Building
Temporary Facilities
Existing
Dumpsters
Site Trailer
Power Transformer
Property Line
Portable Toilets
Temporary Construction Fence
Pedestrian Traffic
Construction Vehicle Flow
Robert O. Brennan Construction Management
Waynesburg Central High School
Spring 2008 Site Plan
10/20/2008


Crane Path
Crane
Addition
1 Story
Existing Building
2 Story
Material
Staging
CM
Trailer
Existing Building
1 Story
Addition
Elementary School
2 Story
Robert O. Brennan
Construction Management
Waynesburg Central
High School
Topsoil
Storage
Concession Stand
1 Story
Construction
Parking
N
Summer 2008
Site Plan
10/20/2008
Neighboring Building
Phase in progress
Existing
Dumpsters
Site Trailer
New Addition
Property Line
Portable Toilets
Temporary Construction Fence
Pedestrian Traffic
Construction Vehicle Flow
Power Transformer

Addition
1 Story

Existing Building
2 Story

Material
Staging

CM
Trailer

Existing Building
1 Story

Elementary School
2 Story

Concession Stand
1 Story

Construction
Parking

N

Robert O. Brennan
Construction Management

Waynesburg Central
High School

Summer 2009
Site Plan

10/20/2008

Neighboring Building
Phase in progress
Existing
Dumpsters
Site Trailer
Power Transformer
Property Line
Portable Toilets
Temporary Construction Fence
Pedestrian Traffic
Construction Vehicle Flow

# Appendix D

# Crane Specifications

## Lifting capacities on telescopic boom

**Forces de levage à la flèche télescopique • Portate del braccio telescopico**
**Tablas de carga con pluma telescópica • Грузоподъемность на телескопической стреле**



DIN
ISO

| m | 10,5 m | 15,4 m | 20,3 m | 25,2 m | 30,1 m | 32,6 m | 35 m | m |
|---|---|---|---|---|---|---|---|---|
| 2,5 | 45 | | | | | | | 2,5 |
| 3 | 35 | 19,2 | 16,9 | | | | | 3 |
| 3,5 | 32 | 19,5 | 17,2 | | | | | 3,5 |
| 4 | 29,1 | 19,9 | 17,5 | 14,7 | | | | 4 |
| 4,5 | 26,5 | 20,4 | 17,8 | 15 | | | | 4,5 |
| 5 | 24,2 | 20,9 | 18,2 | 15,4 | 11,4 | | | 5 |
| 6 | 20,3 | 20,5 | 19 | 14,1 | 10,7 | 9,2 | | 6 |
| 7 | 17,3 | 17,5 | 17,6 | 12,9 | 9,9 | 8,8 | 7,3 | 7 |
| 8 | 14,7 | 14,9 | 15 | 11,9 | 9,2 | 8,3 | 7 | 8 |
| 9 | | 12,8 | 13 | 10,9 | 8,4 | 7,8 | 6,7 | 9 |
| 10 | | 11,2 | 11,3 | 10,1 | 7,9 | 7,3 | 6,3 | 10 |
| 11 | | 9,9 | 10 | 9,4 | 7,4 | 6,9 | 5,9 | 11 |
| 12 | | 8,8 | 8,8 | 8,7 | 6,9 | 6,6 | 5,6 | 12 |
| 13 | | | 8 | 8 | 6,5 | 6,2 | 5,4 | 13 |
| 14 | | | 7,2 | 7,2 | 6,1 | 5,9 | 5,2 | 14 |
| 15 | | | 6,4 | 6,6 | 5,7 | 5,6 | 4,9 | 15 |
| 16 | | | 5,9 | 5,9 | 5,4 | 5,2 | 4,7 | 16 |
| 17 | | | 5,4 | 5,4 | 5,2 | 4,9 | 4,5 | 17 |
| 18 | | | | 4,9 | 4,9 | 4,7 | 4,4 | 18 |
| 19 | | | | 4,5 | 4,6 | 4,5 | 4,2 | 19 |
| 20 | | | | 4,2 | 4,2 | 4,2 | 4 | 20 |
| 21 | | | | 3,8 | 3,9 | 3,9 | 3,9 | 21 |
| 22 | | | | 3,6 | 3,6 | 3,6 | 3,6 | 22 |
| 23 | | | | | 3,3 | 3,3 | 3,4 | 23 |
| 24 | | | | | 3,1 | 3,1 | 3,1 | 24 |
| 25 | | | | | 2,9 | 2,9 | 2,9 | 25 |
| 26 | | | | | 2,7 | 2,7 | 2,7 | 26 |
| 27 | | | | | 2,5 | 2,5 | 2,5 | 27 |
| 28 | | | | | | 2,3 | 2,3 | 28 |
| 29 | | | | | | 2,2 | 2,2 | 29 |
| 30 | | | | | | 2 | 2 | 30 |
| 31 | | | | | | | 1,9 | 31 |
| 32 | | | | | | | 1,8 | 32 |

TAB 1650001

## Lifting capacities on telescopic boom

**Forces de levage à la flèche télescopique • Portate del braccio telescopico**
**Tablas de carga con pluma telescópica • Грузоподъемность на телескопической стреле**


DIN ISO

| m | 10,5 m | 15,4 m | 20,3 m | 25,2 m | 30,1 m | 32,6 m | 35 m | m |
|---|---|---|---|---|---|---|---|---|
| 3 | 35 | 19,2 | 16,9 | | | | | 3 |
| 3,5 | 31,5 | 19,5 | 17,2 | | | | | 3,5 |
| 4 | 28,6 | 19,9 | 17,5 | 14,7 | | | | 4 |
| 4,5 | 25,9 | 20,4 | 17,8 | 15 | | | | 4,5 |
| 5 | 23,3 | 20,9 | 18,2 | 15,4 | 11,4 | | | 5 |
| 6 | 19,2 | 19,4 | 19 | 14,1 | 10,7 | 9,2 | | 6 |
| 7 | 15,7 | 16 | 16,1 | 12,9 | 9,9 | 8,8 | 7,3 | 7 |
| 8 | 13,3 | 13,5 | 13,4 | 11,9 | 9,2 | 8,3 | 7 | 8 |
| 9 | | 11,5 | 11,4 | 10,8 | 8,4 | 7,8 | 6,7 | 9 |
| 10 | | 10 | 9,9 | 9,4 | 7,9 | 7,3 | 6,3 | 10 |
| 11 | | 8,5 | 8,6 | 8,3 | 7,4 | 6,9 | 5,9 | 11 |
| 12 | | 7,3 | 7,5 | 7,3 | 6,9 | 6,6 | 5,6 | 12 |
| 13 | | | 6,5 | 6,6 | 6,3 | 6,2 | 5,4 | 13 |
| 14 | | | 5,8 | 5,9 | 5,7 | 5,6 | 5,2 | 14 |
| 15 | | | 5,1 | 5,2 | 5,2 | 5,1 | 4,9 | 15 |
| 16 | | | 4,6 | 4,7 | 4,7 | 4,6 | 4,6 | 16 |
| 17 | | | 4,2 | 4,2 | 4,3 | 4,2 | 4,2 | 17 |
| 18 | | | | 3,8 | 3,9 | 3,9 | 3,8 | 18 |
| 19 | | | | 3,5 | 3,5 | 3,6 | 3,5 | 19 |
| 20 | | | | 3,2 | 3,2 | 3,2 | 3,2 | 20 |
| 21 | | | | 2,9 | 2,9 | 3 | 3 | 21 |
| 22 | | | | 2,7 | 2,7 | 2,7 | 2,7 | 22 |
| 23 | | | | | 2,5 | 2,5 | 2,5 | 23 |
| 24 | | | | | 2,3 | 2,3 | 2,3 | 24 |
| 25 | | | | | 2,1 | 2,1 | 2,1 | 25 |
| 26 | | | | | 1,9 | 1,9 | 1,9 | 26 |
| 27 | | | | | 1,7 | 1,7 | 1,7 | 27 |
| 28 | | | | | | 1,6 | 1,6 | 28 |
| 29 | | | | | | 1,5 | 1,5 | 29 |
| 30 | | | | | | 1,3 | 1,3 | 30 |
| 31 | | | | | | | 1,2 | 31 |
| 32 | | | | | | | 1,1 | 32 |

TAB 1650003

## Lifting heights
**Hauteurs de levage • Altezze di sollevamento**
**Alturas de elevación • Высота подъема**