

Thesis Report Architectural Engineering Construction Management

Dave Fox

Wrangle Hill Elementary School Faculty Advisor: Dr. Riley Spring 2008

# WRANGLE HILL ELEMENTARY SCHOOL

### <u>Project Overview</u>

Wrangle Hill Elementary School New Castle, DE Elementary School, housing Kindergarten through Fifth grade Size 157,085 Square Feet

## **Architectural Features**

- One story with a mechanical mezzanine located above each wing, only accessible from the roof.
- Grand entrance with signature bell tower
- Skylights located in many places throughout hallways, cafeteria, and kitchen to provide sunlight

### **Structural System**

- Foundations: Shallow footings with 4000psi concrete reinforced with rebar and synthetic fibers.
- Framing: Steel columns encased in masonry pilasters supporting wide flange beams and joists
- Floors: All slab on grade floors, 4" typical, 6" in select locations, and 10" at masonry partitions and mechanical areas.
- Decking: 22 gauge with 2 <sup>1</sup>/<sub>2</sub>" reinforced concrete slab at mechanical mezzanines
- Façade: Non load bearing architectural brick with masonry backup with glazed aluminum storefront entrances and windows.
- Roofing: 22 gauge metal deck with isocyanurate insulation, followed by a standing seam metal deck on the sloped roof sections, and a bitumen membrane on the flat roof.

### <u>Project Team</u>

Owner Architect General Contractor MEP Engineer Food Service Roofing Consultant Colonial School District Tetra Tech, Inc. EDiS Company Paragon Engineering Zaralban and Assoc., Inc. NTH Consultants, LD

### <u>Mechanical System</u>

- (12) Roof top air handling units totaling 52,000 cfm.
- (66) Unit Ventilators in the classroom areas
- (4) enthalpy wheels

### <u>Electrical System</u>

- 480Y/277 V 3 phase 25 kV, 1500 kVA pad mounted transformer
- Backup Diesel engine generator, 200 kW, 250 kVA

## <u>Lighting System</u>

- Classrooms have all florescent lights with daylight controccupancy sensor, A/V mode, and a "Timeout" occupan sensor override switch.
- Classroom florescent light fixtures give downlight in normal mode, only uplight in A/V mode
- Gymnasiums have HID downlights



### <u>Dave Fox</u>

**Construction Management** 

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Norwood Construction
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### **Executive Summary**

The project utilized for this thesis report is Wrangle Hill Elementary School, located just south of Wilmington, DE. This is a one story elementary school being built to accommodate an increasing population and demand for full time kindergarten rooms throughout the district. The school is under a very tight schedule, the building envelope has been examined and re-designed to find if an alternate system could alleviate the schedule concerns.

Research has been compiled regarding the use of prefabrication in the construction industry today. There are several items that need to be overcome on a typical project in order to utilize prefabrication on a more frequent basis. Suggestions have been made to combat these issues on all projects, and on Wrangle Hill. A schedule analysis has revealed that prefabrication on Wrangle Hill can have a significant influence on the project schedule.

Changing to a prefabricated system will also affect other items throughout the building. Due to the nature of the panels, the architecture has been preserved, however the mechanical performance of the wall has drastically changed. A mechanical analysis was performed in order to assure that the performance will not be greatly reduced. Thermal movement and a condensation analysis were performed in order to assure similar performance.

An additional study was performed to study the feasibility of adding a photovoltaic system onto the roof of the school. The system was designed using panels that are integrated with the standing seam metal roof. Weather data was analyzed in order to provide electrical output and to determine the feasibility of this system.

All of these studies wrap up a study on Wrangle Hill to build in a more efficient manner, with more energy efficient materials, with the possibility of using one of the most abundant natural resources, solar energy, to increase the efficiency of this school.

### Introduction and Background

#### **Project Information**

Wrangle Hill Elementary School is a one story school located in Colonial School District, located in New Castle, DE, just south of Wilmington. The school is a one story, 157,000 square foot school separated into four separate wings and a central core area. The wings are in an "X" shape, with the central core in the center of the "X". The four wings of the school contain the majority of the classroom spaces varying from kindergarten all the way through fifth grade. The central core area holds the support functions including three administration areas, two cafeterias, one kitchen, a mechanical room, a storage room, library, and a large multi-purpose room.

The building consists of primarily non load bearing concrete masonry unit walls, the exterior walls are faced with hand laid face 4" brick. The interior walls are all concrete masonry unit walls, with the exception of the administration area, which are metal stud framed with gypsum board. The roof over the classroom wings is an angled standing seam metal roof, while the roof over the core area is primarily a flat roof. The structural system of the building is compromised of multiple different types of structural steel, including square hollow steel columns, wide flange beams, and joists. There is no basement to the building, allowing all floors to be simply slab on grade concrete. The concrete is then topped off with different finishing materials.

In the hallways, a durable terrazzo has been chosen, while in the classrooms vinyl composition tile has been used. The administration areas have a combination of terrazzo, VCT, and carpet. The kitchen has a special epoxy coated floor to aid in the durability of the floor in such a harsh environment. Within the hallways of the central core area, several skylights spread throughout. The windows and the entrance areas all consist of an aluminum storefront with insulating glass. All exterior doors are made from Fiberglass Reinforced Polyester.

#### **Owner Information**

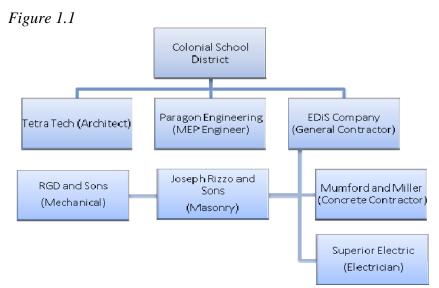
The owner of Wrangle Hill Elementary School is Colonial School District. There are eight different elementary schools, three middle schools and one high school within the school district. This school district covers a large area in northern Delaware in the Wilmington area. The school district has experienced rapid growth recently and needed to expand their elementary school capacity with the addition of Wrangle Hill. Additionally, the school district has recently adopted a full day kindergarten program requiring the addition of more kindergarten classrooms throughout the district.

Colonial School District has chosen to re-use the architectural plans from a previous elementary school, Southern Elementary School, which finished construction in 2001. When questioned about why they chose to re-use the plans, the construction representative Steve Hudson stated that Southern Elementary was very successful and everyone in the district loved it. There would also be a significant reduction in the architects design fee since the drawings could be considered 95% complete to start.

Colonial School District is well versed in construction and has its own department to handle construction management. This department is run by Steve Hudson. Mr. Hudson oversees all of the construction projects from minor repair work to the construction of new schools. He has a vast knowledge of the construction industry, allowing the school district to eliminate the need for a construction manager. Wrangle Hill Elementary School is the first school in the district being built by a general contractor instead of a construction manager.

The school district has high expectations for this project. An identical school has already been built on time and on budget by a different contractor, so they expected no less from EDiS Company. The school district has included a \$10,000 per day liquidated damage penalty if the school is not complete on August 1, 2007. Colonial School District is a construction oriented district with a desire for quality.

#### **Project Delivery**

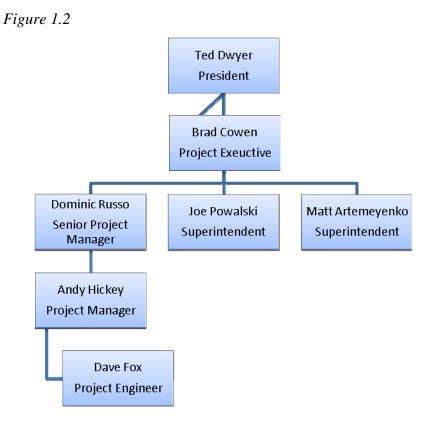


The construction of Wrangle Hill Elementary School is being delivered as a "Design-Bid-Build" project with a general contractor. This project delivery method was decided upon by the Colonial School District to try to save money, and bring the project in on time. Colonial School District feels as though when the project is delivered by a Construction Manager, they have problems with bringing the project in on budget and on time. This is a first time experiment by the school district to decide the project method for future projects.

The contracts between Colonial School District, Tetra Tech and Paragon Engineering are both cost plus fee contracts. The contract between EDiS Company and Colonial School district is a lump sum contract. All of the relationships can be seen above in Figure 1.1. EDiS's contract was awarded as a low bid public bid, based on base bid, or bid plus any combination of alternate estimates listed on proposal form. There was a 10% bid bond and a 100% performance bond required of all bidders.

The delivery method and contract method all seem to be very typical of similar public school projects. This is an affective method of managing a project because all of the involved players acclimated to this system from previous experience with public school construction.

#### **Project Team**



EDiS, the General contractor on the project, staffed the job with the necessary team due to the tight schedule that the project was under. A break down can be seen above in Figure 1.2. Dominic Russo and Andy Hickey shared project management tasks, with Dominic Russo taking more of the executive position as he was the senior member of the team. Joe Powalski and Matt Artemeyenko were superintendents and worked along side both of the project managers, and reported to the Project Executive Brad Cowen. Joe was the superintendent throughout the entire job; Matt was bought in through the heart of construction when coordination was getting difficult. Throughout the project, Andy Hickey had one onsite project engineer, and an office engineer who would help with distributing communication. This organization worked out well as all of the key players were located on site to take care of day to day issues as well as long term issues.

#### **Project Estimate**

The project estimate can be seen in Figure 1.3 below. The majority of the numbers

included below are estimates; the final total was estimated as well.

-	
Site Work	\$3,457,020
Roofing	\$2,409,645
Concrete	\$1,265,000
Masonry	\$4,475,000
Structural Steel	\$2,130,000
Carpentry	\$2,611,736
Joint Sealants	\$137,710
Doors and Windows	\$1,278,688
Flooring	\$1,216,759
Finishes	\$566,692
Accessories	\$560950
Food Services	\$800,000
HVAC	\$5,100,000
Fire Protection	\$295,914
Electric	\$3,375,000
General Conditions	\$2,858,087
Total (Approximate)	\$32,540,000

Figure 1.3

#### **General Conditions Estimate**

The General Conditions Estimate includes all items that the general contractor would need to provide on Wrangle Hill Elementary School. Items like temporary heating and staffing costs are dependent upon the schedule, others such as blueprint copying are simple costs that are related to the size of the project. The General Conditions Estimate includes a general contractor's fee of 5% of the total project cost. The total General Conditions Estimate is **\$2,858,087**, which translates into about **8.7%** of the total project cost.

Please see Appendix A for a detailed breakdown of the General Conditions

#### **Detailed Project Schedule**

#### Key Dates for Wrangle Hill Construction

Figure 1.4	
Item	Date
Notice to Proceed	4/3/2006
Install Site Trailer	5/8/2006
Temporary Heat	11/5/2006
Substantial Completion	6/15/2007
Final Completion	7/12/2007

The schedule that has been formulated was a combination of the contractors' initial schedule, as well as including some other items. A general overview can be seen above in Figure 1.4

Please see Appendix B for a detailed project schedule.

#### **Central Building Core**

The central building core of Wrangle Hill Elementary School is broken down into three different sections. The three different sections correspond with different sections in the project documents. Core area one and core area two are identical, just mirrored about the centerline of the building. Core area three contains the cafeteria, kitchen, and mechanical room. Core area three will require more coordination between the mechanical and electrical contractors due to the mechanical room.

#### **Building Wings**

The wings of Wrangle Hill Elementary School are all identical to each other. Due to the repetition, it makes sense to break out the construction by wings. When one task has been completed in the first wing, the crew can proceed to the next wing, creating a parade of trades.

#### Site Layout Plan

The site layout plan was performed for interior MEP work, and interior finishing trades. This time is the most congested due to the fact that everything is taking place inside of the building. The owner also had a requirement that all of the materials must be stored in the back of the building, and everything had to be in material trailers.

At this point, the silt fence is still in place, as can be seen on the drawings. There was no site fence installed due to the safe location and the large site. All deliveries are to enter at the main entrance, and follow the loop road towards the right of the building. There is a loading dock accessible for deliveries. The delivery trucks then must leave the site as the owner did not want trucking trailers on the site.

There is a vast parking lot in the back of the building for material trailers. Contractors may use this space for equipment or material, or anything that they want to secure at the end of the day. Material staging is also available inside of the building. The two cafeterias have Masonite board protecting the flooring, allowing both of these large areas to be used.

Work that is taking place in the wings of the building may use the hallways as a staging area. As with the cafeteria, Masonite board is down to protect the flooring. Materials being used can be stored along the wide hallways, providing that they do not block a means of walking up and down the hallways.

The contractor's trailers along with the owner's trailer are located at the end of the South East wing. This location provides a great location to allow the contractor to access the building easily, as well as being located near the entrance of the site to provide direction for deliveries.

Please see Appendix C for a diagram of the Site Layout Plan.

### Prefabrication: A Study on what needs to be done

#### Introduction

Prefabrication is a construction technique that can be implemented to some extent on just about any job. Prefabrication involves constructing a portion of a building either off site, or in a different location then its final installation on the building. Prefabrication has many benefits that can be seen on projects with tight schedules and a lot of repetition. There are drawbacks; however these can be minimized with a good design. There are also a lot of misconceptions that surround prefabrication and are holding it back from reaching its full potential. All of these items will be addressed in this report, based on a prefabricated façade system compared to a masonry wall system.

There are many benefits to prefabrication in the construction industry that would be beneficial to all parties involved. When implemented correctly, benefits can be seen in the schedule, cost, quality, and construction waste. The schedule can be reduced due to the fact that work can be completed offsite before that trade would be able to work on site. The cost can be cut with the standardization of the prefabricated elements. The work is also taking place in a controlled environment, allowing efficiency and quality to be maximized. The construction waste can be minimized with prefabrication due to the controlled environment and the standardization of the elements. The minimized waste makes the building construction more sustainable and environmentally friendly, an increasing trend in the industry.

The disadvantages to adopting prefabrication in the construction industry along with misconceptions hold back implementation on more projects. Some of the disadvantages include the fact that it is inflexible for design changes. Once the elements have been constructed, it is difficult to make changes to the design and coordination. Another disadvantage to owners is a perceived is a higher initial cost. Implementation is also held back due to the misconception that prefabricated elements are of a lower quality. The word "prefabrication" lends some to think about trailers and cheaply made elements.

Prefabrication has many advantages, and a few disadvantages, both of which will be covered in this report. The schedule savings and cost savings are only the tip of the iceberg when looking at the benefits of a prefabricated system. This report will look at both benefits and drawbacks for a prefabricated façade system compared to a masonry wall system.

#### The Issues

#### Upfront Design and Construction Cost

According to research in "Towards Adoption of Prefabrication in Construction," the initial construction cost is one of the most important reasons that prefabrication is not being implemented. One of the contributors to this is upfront design fees. Major decisions about the building façade need to be made early in the design. Some of these decisions include window openings, door openings, structural connections, and mechanical/electrical penetrations.

In an interview, Tom Seeman stated that "Prefabrication limits the allowable duration and flexibility of the design process since all shell decisions must be made at once and very early in the process." The necessity for major design decisions to be made upfront can result in increased costs later on in design if changes need to be made. These increased costs make owners and architects hesitant to employ a large scale prefabricated design. Deciding to use prefabricated façade panels at the very beginning of design can eliminate the costly changes in the future. Retrofitting a design will result in a largely increased cost.

The design style also requires repeatability, limiting the architect's creativity in design. According to John Barnes of Daniel J. Keating Construction, "it is tough to do custom work. Everything needs to retain some sort of repeatability in order for prefabrication to be economical." The limited design keeps architects from bringing prefabrication to the table at the beginning of design, and keeps owners from thinking about the benefits of the system.

#### Schedule Impacts

Using a prefabricated façade can reduce the overall schedule of a project by allowing the building façade to become enclosed faster. The prefabricated panels can simply be put in place, connected to the existing structure, and then sealed. According to Ashley Smith at SlenderWall, their precast façade systems can be erected at a rate of 360 linear feet of wall system per day. This speed will significantly reduce the construction time from a typical masonry wall system.

Employing a prefabricated façade system will allow for the wall to be erected in any weather. A masonry wall system requires extra add mixtures and care to be taken when the temperatures drop too low. The prefabricated panels by SlenderWall can be erected in just about any weather, reducing the schedule risks for the contractor.

Following the exterior wall construction, windows can be placed in the wall system almost immediately after the wall panel has been placed. Once all of the windows are installed and sealed, temperature control on the interior of the building can begin. Enclosing the building earlier can be extremely helpful in colder climates where a cold day can bring worker productivity to a standstill. For a project like Wrangle Hill Elementary school, this is a crucial benefit, allowing the interior masonry work to continue regardless of the outside weather.

Another schedule benefit to using precast façade panels instead of a masonry system is the setup time. When the precast panels are ready to be installed, they can be trucked in the very day that they are needed. With a masonry system, the materials need to be sent to site in advance, and distributed throughout the site. The masonry system also requires a scaffolding setup which takes time away from completing the masonry work. No scaffolding is needed for a precast façade system; the panels are tilted in place by a crane, and connected from the ground by workers.

Despite all of the schedule benefits, there are some drawbacks to a precast façade system. Utilizing a precast façade system can put a project schedule at the mercy of the prefabricator. If the prefabricator is delayed in the construction of the panels, there is going to be a schedule delay. As Tom Seeman stated, "If a prefabricator just got awarded that fifty story building, at the same time as your project, there will be a schedule delay. The flexibility of outsourcing is more limited in prefabrication firms." The single source for prefabricated panels can introduce schedule risks of its own if the prefabricator becomes overloaded. This is different from other trades like structural steel. If a structural steel contractor becomes delayed, outsourcing to a different fabricator is relatively easy.

#### Quality

"The words "Prefabrication" gives the impression of trailers and/or modular housing. It is viewed as something that one must settle for when they can not afford real construction" –Tom Seeman. This quote explains how many view prefabrication today; however it is a view that seems to be slowly disappearing as more and more projects are being completed. The "assembly line" construction of a prefabricated unit can actually lead to higher quality work, something that many members of industry are starting to realize.

The construction representative for Colonial School District, Steve Hudson realizes the increased quality, and stated in an interview that "Assembly line construction seems to have better quality, and can be delivered on a more dependable basis." John Barnes, a Project Executive in the Philadelphia area has a very similar idea about prefabrication. He noted that on one project he worked on the quality of the prefabricated elements met the same quality of the work put in place on the jobsite. He had also mentioned that quality control is significantly easier to manage because the workers are all located in one area; supervisors do not have to chase down workers. He stated "Because everything is done in a controlled environment, elements can be made to precision just like with car production."

#### Labor Force

The labor force used for prefabricated elements brings another dynamic to construction. When unions have disputes and go on strike, work can stop on a typical jobsite. However, due to the fact that most prefabrication is done with non-union labor work can continue. This can help enable a schedule to stay on track despite strikes. Even though the workforce can be seen as a positive, it also can have negative consequences. In highly areas with highly unionized labor like Philadelphia, the use of prefabrication is very limited. According to John Barnes, unions usually will not allow pre-wired, preassembled wall panels to be put in place, especially if the panel was not constructed with union labor.

#### **Reduction in Construction Waste**

An issue that is not emphasized as much as a benefit of prefabrication is the reduction of construction waste. With the recent trends like LEED, pushing buildings towards more sustainable design, prefabrication can produce huge benefits. There are LEED credits for diverting waste from landfills and also for re-using materials, both of which are very easy to accomplish with prefabrication. The assembly line construction allows workers to determine how to reduce construction waste, and re-use items that otherwise would have gone right to the dumpster.

#### **The Solution**

The ultimate decision to use a prefabricated façade system lies with the owner. It is our job as construction specialists to inform owners of the benefits of a prefabricated system so they can make it clear to architects and designers to look at these systems. As Tom Seeman stated, prefabrication can be optimized if "the owner is showed a prefabricated building that would be similar to his building." This would help ease the owners preconceived notions of what a building with prefabricated panels would look like. Showing pictures like the one below in Figure 2.1 would help show that prefabricated façade panels don't have to look prefabricated.





Another suggestion from Tom Seeman suggests a great way to aid owners in achieving a building that looks and functions as they would like, without increasing the architect's design cost dramatically. "Since prefabrication is a relatively new thing in the market, the fabricator should offer four weeks of design services for the package." Having prefabricators meet with owners prior to the bidding of a building design can make it clear to the architects that the owner wants a building that includes prefabricated building elements from X Company. This is how many successful prefabricated designs have begun, such as the Chester County parking garage that Tom Seeman was in charge of. Bringing in the prefabricator designers early in the design stage of a building can help mitigate the extra design fees and or construction costs with changes later in design.

#### As it Relates to Wrangle Hill Elementary School

SlenderWall panels were proposed to be used on Wrangle Hill Elementary School primarily for the schedule benefits. The school was under a very tough schedule and the contractor was looking for any possible way to save time. The existing design is a hand laid brick façade with a concrete masonry unit backup. The system is non load bearing and simply rests on the slab on grade floor system. SlenderWall panels would fit in very similar to a masonry system, yet would erect much quicker then a masonry wall. The schedule savings could help reduce the burden on the construction manager and potentially reduce increased fees due to the original risk.

It was important to contact the owner, Colonial School District in order to determine why a prefabricated system was not looked into in the initial design. When prefabrication was mentioned to Steve Hudson, the construction representative, he stated that the main reason that the school had not looked into prefabrication was money. He stated that due to the school being financed by public money, it can be difficult for the school district to have the increased money flow at a beginning of a project using prefabrication. He also mentioned that the architect's fee would have been increased due to the upfront engineering involved in using a prefabricated system. Clearly something needs to be done to provide the public projects with an easier method of using prefabrication.

Tom Seeman suggested an idea that would help Colonial School District get a step closer to using prefabrication in their buildings. He said that "since prefabrication is a relatively new thing in the market, the fabricator should offer four weeks of design services for the package." This would help to reduce the architect's fee and create a well rounded design with the new prefabricated panels. The issue of money flow at the beginning of a project needs to be addressed as well. Delays in the funds for the panels would result in a delay on the project schedule. Having the fabricator aid with design services could also help this situation. The fabricator could help provide a billing schedule to the owner prior to construction even beginning. This would allow the school district to appropriate the required funds on time.

The schedule benefits from using a prefabricated system on Wrangle Hill Elementary School have been reported in the following section. It is definite that using SlenderWalls will reduce the schedule and provide the contractor with a slightly relaxed schedule to deal with. Bringing on the prefabricator early in the design phase would aid Colonial School District. The prefabricator would be able to work with the architect to change the design to include the new panels. It is also hoped that the prefabricator would be able to provide the owner with a preliminary billing schedule to prepare the school district for future billings. These suggestions should help Wrangle Hill Elementary School become a more successful project.

#### **Future Research**

There are many benefits and drawbacks to a prefabricated system, determining the extent to which some of the proposed solutions would help is essential. One of the major factors that deterred Colonial School District from pursuing prefabrication was cash flow. The suggestion of bringing a prefabricator into the design at the beginning of the design seems like a great solution. Research could be completed to determine if bringing the prefabricator into design early on will actually affect design fees.

#### References

Tom Seeman, Project Manager, Norwood Construction John Barnes, Project Executive, Daniel J. Keating Construction Mike Dooley, Project Manager, Daniel J. Keating Construction Andy Hickey, Project Manager, EDiS Steve Hudson, Construction Representative, Colonial School District Tim Skibicki, Architect, Tetra Tech Ashley Smith, VP of Sales, SlenderWall Tam, Vivian, "Towards Adoption of Prefabrication in Construction," Science <u>Direct</u>, 11 October, 2006.

### Prefabrication: Construction Management Issues at Wrangle Hill

#### Problem

Wrangle Hill Elementary School is under a tight schedule with extreme penalties of \$10,000 per day if the project is not delivered on time. The construction managers have made it clear that any method to save time on the construction of this school would be worth the extra cost, within reason.

#### Solution

Prefabrication is not being implemented on projects even when it would be the most economical and feasible way to construct the building. Wrangle Hill Elementary School is no exception to this. Wrangle Hill Elementary School is a very large school that is extremely repetitive. The classroom spaces are just about all identical and there are four different wings which are all exactly the same as one another. I have proposed to use a prefabricated exterior wall on Wrangle Hill Elementary School in hopes to reduce the project schedule. The wall panels that will be used are made and erected by SlenderWall.

#### Methodology

The project schedule will be examined and modified in order to accommodate the new SlenderWall panels for the four wings of the building. A cost analysis will also be performed in order to determine any increases or savings with switching to the new system. If the new system costs too much, it would not be feasible, but if it within reason, it would be an option to explore further.

#### **Resources and Tools**

Ashley B. Smith, VP Sales, SlenderWall Microsoft Project Microsoft Excel R.S. Means 2007

#### **Schedule Impacts**

The main purpose behind switching the façade system to a prefabricated system was to save time on the schedule. After analyzing the schedule, it was clear that the exterior masonry construction was on the critical path for each of the wings. Switching to the quicker prefabricated system would yield a much quicker construction time. After speaking with a representative from SlenderWall, Ashley Smith, it was determined that the prefabricated panels could be installed within three days per wing, being followed by the caulking sealants between each panel.

Figure 3.1		
Schedule Item	Prefabricated Start Date	Masonry Start Date
Concrete Foundations	6/12	6/12
Slab on Grade	7/6	7/6
Structural Steel	7/14	7/14
Prefabricated Panels	8/3	-
CMU Backup	-	8/3
Brick	_	8/16
Standing Seam Metal Roof	8/28	9/7
Windows	8/10	9/13
Temp. Heat and Conditioning	9/5	10/9

As can be seen above in Figure 3.1, the schedule savings can potentially be huge for the project. The above schedule is only for the first of the wings to be completed, wings that will be completed later in the winter will see a more significant benefit due to the interior spaces being heated. This not only will reduce the overall schedule for the entire project but it will also reduce the weather related risks in the project, likely reducing the general contractors overall fee. The reduction of the construction time for the first wing was found to be 34 days. After analyzing the initial project schedule, this reduction is carried through the entire project, but no additional days are saved during separate wings. This savings will make a large difference however, as the substantial completion date has moved from July 15<sup>th</sup>, to June 11<sup>th</sup>. This savings is huge, and will give the contractor more time to complete other items, including the punch list.

Please see Appendix D for a detailed schedule of a typical wing.

#### **Cost Impacts**

Prefabricated façade panels can introduce changes in the construction cost, determining the quantity of these changes is important in order to make an informed decision. As can be seen below, in Figure 3.2, the new prefabricated system will cost more then the existing masonry design. A cost comparison was performed for the building wings, as these are the most repetitive, and consume the most time on the project schedule.

#### Figure 3.2

Building Envelope Cost Comparison				
Description	Quantity	Unit	Unit Price	Cost
Brick with CMU Backup	9,036	SF	\$25.00	
Split-Face CMU	4,368	SF	\$18.00	\$78,624.00
Prefabricated Brick	9,036	SF	\$30.00	\$271,080.00
Prefabricated CMU	4,368	SF	\$28.00	\$122,304.00
Estimated Cost Savings with Prefabricated System				\$88,860.00
Percentage Increase on Initial Building Cost				0.28%

The overall cost differential between the prefabricated panels and the existing masonry design is very minimal. There is a 29 percent increase in the cost of the façade, however only a 0.28 percent increase in the overall building cost of \$32.1 million.

#### **Conclusion and Recommendation**

The schedule benefits from switching to a prefabricated system are apparent. The general contractor, EDiS, stated that the project had such a demanding schedule; something should be done to reduce the construction time. With the interior spaces of the wings being heated over a month earlier with the new prefabricated system, it seems as though it would be the route to follow. The cost increases are very minimal and the schedule increases are generous. The reduced risk in the project schedule could also reduce the general contractors overhead enough to offset the additional cost of the prefabricated system.

I believe that the prefabricated SlenderWall panels should be introduced to the design of Wrangle Hill Elementary or other similar schools in the future.

# Mechanical Analysis of a Prefabricated Wall Panel (Breadth Study)

#### Problem

The existing design for the building envelope is made a hand laid masonry cavity wall system. This design remains consistent with other schools located within Colonial School District and continues the masonry aesthetic. Wrangle Hill Elementary School has a very strict schedule, placing the contractor under a serious deadline, potentially reducing quality and/or increasing the cost.

#### Solution

I have recommended the use of SlenderWall panels. SlenderWall panels incorporate a steel stud wall system with a precast concrete cladding with a brick reproduction finish. Due to the fact that the prefabricated panels incorporate a steel stud wall, a mechanical analysis is necessary to ensure that the switch will not affect the heating and cooling loads.

#### Methodology

A U-Value analysis was performed on both the existing masonry design as well as the suggested new SlenderWall panels. The analysis was simplified to simply a comparison of the wall systems, instead of including the windows. The change will not have any impact on the window panels, or any other part of the building enclosure.

A dew point analysis was performed in order to ensure that condensation will not be a problem. Metal stud walls are notorious for creating condensation which will lead to mold problems in the future. The condensation is formed because the metal stud walls are at such a low temperature in the winter time that it is lower then the dew point of the interior air. Condensation is also introduced from vapor pressures formed as water diffuses through the envelope system. Ensuring that this will not be an issue is imperative.

#### **Resources and Tools**

SlenderWall Panels

www.slenderwall.com

Ashley B. Smith, Vice President of Sales and Marketing

Mechanical Analysis and Calculations

Andreas Phelps, Graduate Student

Avoiding Thermal Bridging and Moisture Problems in BVSS Wall Design, James

B. Posey, www.buildingenvelopeforum.com.

www.npga.org

#### Calculations

Microsoft Excel

ASHRAE Psychrometric Chart

#### **Energy Transfer Impacts**

Please see Appendix E for detailed mechanical calculations.

#### **Existing** Conditions

The existing design is a hand laid masonry cavity wall system, consisting of 4" face brick, polystyrene insulation and 8" CMU backup. The existing wall was intended to be a mass wall, the main insulation values from the wall came from the 2" of polystyrene insulation.

A U-Value analysis was performed on the wall for both summer and winter conditions. Brief results are included below for a typical classroom exterior wall. As can be seen in Figure 4.1 the energy transfer through the wall results in a cost of approximately \$32.53 for the entire year.

Figure 4.1

Calculati	ion Results		
Average R-Value	12.8	hr*ft <sup>2</sup> °F/ Btu	
Overall Heat Flow Rate	787.6	Btu / hr	
Annual Heating	g and Coolin	g Energy	Losses
Cooling (Summer)		386,636	Btu/Yr
Heating (Winter)		1,679,889	Btu/Yr
Total		2,066,524	Btu/Year
Energy Cost	\$32.53		

#### **Prefabricated Design**

The prefabricated design consists of 2" of precast concrete, an air gap, metal studs in filled with insulation, and gypsum board on the interior of the wall. This system provides a decent insulation value, a slight improvement from the existing masonry design, however there are some drawbacks. Due to the use of metal stud framing, thermal bridging has been created making thermal calculations difficult. This has been accounted for by assuming that metal studs will make up 30% of the wall by area, when this is obviously not the case due to how thin the studs are. There is also a concern for condensation as will be analyzed in the Dew Point Analysis further in this report.

Figure 4.2 below illustrates the SlenderWall panel construction. SlenderWall uses an epoxy coated metal anchor which holds the precast concrete, which eliminates thermal bridging from the precast concrete to the metal studs. For this analysis I have taken this into account, and will treat the <sup>1</sup>/<sub>2</sub>" air space as simply an air space, without the metal anchor.





(Image courtesy of SlenderWall)

An R-Value analysis was performed on the wall, details can be seen in Appendix E. Brief results are included below for a typical classroom exterior wall. As can be seen in Figure 4.3 the energy transfer through the wall results in a cost of approximately \$27.10 for the entire year. This value is slightly lower then the existing design, showing a savings in operating costs.

Figure 4.3
------------

Calcula	tion Results			
Average R-Value	16.3	hr*ft <sup>2</sup> °F/ Btu		
Total Heat Flow Rate	617.2	btu/hr		
Annual Heating and Cooling Energy Losses				
Cooling (Summer)		303,010	Btu/Yr	
Heating (Winter)		1,316,544	Btu/Yr	
Total		1,619,554	Btu/Yr	
Energy Cost	\$25.49			

#### Prefabricated Design with Insulation

The prefabricated design with insulation is identical to the prefabricated design; however the air gap seen in Figure 4.2 above will be replaced with ½" insulation. This will significantly increase the temperature of the metal studs and reduce if not eliminate the potential for condensation. This measure will also reduce the effects of thermal bridging due to the metal studs. This change can be made, at a small price if it is deemed necessary.

An R-Value analysis was performed on the wall, details can be seen in Appendix E. Brief results are included below for a typical classroom exterior wall. As can be seen in Figure 4.4 the energy transfer through the wall results in a cost of approximately \$23.31 for the entire year. This value is significantly lower then the existing masonry design, indicating a large savings when adjusted for the entire building.

Figure 4.4				
Calculation Results				
Average R-Value	17.8	hr*ft <sup>2</sup> °F/ Btu		
<b>Total Heat Flow Rate</b>	564.3	btu/hr		

Annual Heating and Cooling Energy Losses				
Cooling (Summer)		277,018	Btu/Yr	
Heating (Winter)		1,203,612	Btu/Yr	
Total		1,480,629	Btu/Yr	
Energy Cost	\$23.31			

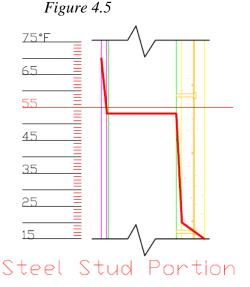
#### **Condensation Analysis**

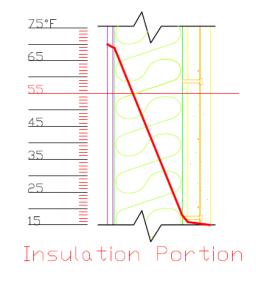
Please see Appendix E for detailed mechanical calculations.

Due to the use of metal stud framing, a dew point analysis is essential to determine the risks for condensation within the wall system. The metal studs will reach all the way in to the gypsum board, and moisture in the air touching the metal studs will condense if the temperature of the stud is too low. As stated above, two different prefabricated systems will be analyzed to determine which should be employed in this situation.

For the dew point analysis, some assumptions had to be made for the internal air temperature and the temperature difference across the wall. A 70°F internal air temperature with a 50% relative humidity was assumed. Using this data on the ASHRAE Psychrometric Chart, the dew point for this air condition is approximately 55°F which is highlighted by the horizontal red line in Figures 4.5 and 4.6 below. If the metal studs reach a temperature lower then 55°F, there is a potential for condensation and future mold problems.

#### **Design without Additional Insulation**





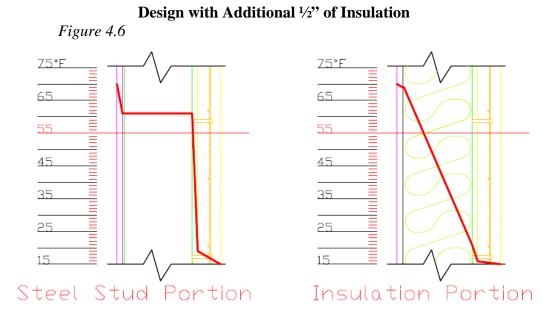


Figure 4.7			
Ten	nperature Compar	ison	
	Temperature of Metal Studs	Dew Point	
Design Without Insulation	53.9	55.0	°F
Design With Insulation	61.7	55.0	°F

As can be seen in the temperature comparison in Figure 4.7 above, the initial prefabricated panel design without the <sup>1</sup>/<sub>2</sub>" of extra insulation will have a risk for condensation. The temperature of 53.8°F is below the dew point and any interior air that seems through a crack in the drywall will cause immediate condensation on the studs. Due to this it will be imperative to add the extra insulation to these prefabricated panels.

As can be seen above in figure 4.7, the dew point temperature will be reached within the fiberglass insulation. Calculating the vapor flow throughout each element in the wall system will provide information regarding where the condensation will occur, and how much. If the amount of condensation is low enough, it can be assumed that within a few temperature cycles the condensation will have the chance to evaporate and eliminate any

risk of mold. The condensation calculations have been performed for the wall system with the extra  $\frac{1}{2}$  of insulation.

Condensation Rates				
Upstream Flowrate	32812.66	ng/s*m <sup>2</sup>		
Downstream Flowrate	7603.34	ng/s*m <sup>2</sup>		
Condensation Rate	25209.32	ng/s*m <sup>2</sup>		
Condensation Rate	0.0768	oz/day*m <sup>2</sup>		
Condensation Total	0.393	oz/day per wall		

The results of the condensation calculations can be seen above in Figure 4.8. The detailed calculations can be seen in Appendix E. The calculations show that in a 183 square foot wall, there is only .4 ounces of water condensing. The condensation would occur between the board insulation and the fiberglass insulation. This is such a low quantity it can be assumed that the condensation will evaporate within just a few days when the exterior temperature changes.

#### **Conclusion and Recommendation**

After analyzing the three proposed systems, the modified prefabricated panel has the best performance and will aid in reducing the cost spent heating and cooling the school. Adding the half inch of insulation in between the precast concrete and the metal stud walls greatly reduced the effect of thermal bridging, as well as reduced the quantity of condensation in the wall system. From a purely mechanical standpoint the modified prefabricated wall performs better then the existing design and should be pursued.

# Integration of a Photovoltaic System (Breadth Study)

#### Problem

Escalating fuel prices are driving up the price of electricity. Everyone is affected by the rising cost of electricity, and starting to look towards renewable sources of energy, solar power being one of the up and coming new systems. A statement needs to be made in the community to make it known to the residents that the schools are doing something good for the environment.

#### Solution

Adding a set of photovoltaics to the roof of Wrangle Hill Elementary School would be beneficial to the community, as well as help to reduce the electric demand from the school. Due to the orientation of the school, the roof over the multipurpose room would be ideal for southern exposure. This would allow the panels to be visible from the entrance of the school as well as the main road that runs in front of the school, allowing the photovoltaic to be showcased for the community. The elementary school students can learn about the benefits of the photovoltaic system in science classes and help to inform every one of the benefits.

#### Methodology

The first step in determining the feasibility of adding a photovoltaic system to the school is to pick out a system that would work with the standing seam metal roof. There are many different companies that manufacture photovoltaic panels that integrate with a standing seam metal roof; however, I chose to use Uni-Solar products due to the fact that they can be put on at the time of construction or as a retrofit later on if the school can't afford the money at the time of construction. The Uni-Solar products I have chosen to use are the PVL-136 and PVL-124. These products are solar laminates that are simply laid on top of the existing standing seam metal roof. Due to the area I have chosen for the solar panels an array of 80 PVL-136 panels, 40 wide by 2 panels deep, can fit on the

roof. I also determined that there was a section of the roof over the north east classroom wing which could hold 80 PVL-124 panels if the school wished to increase the solar power output.

The second step in this study was to determine the actual output that would be generated by these panels. For this information, I used a photovoltaic system performance calculator provided by the National Renewable Energy Laboratory entitled PVWatts. This calculator analyzed the location of the school, orientation of the building, slope of the roof, size of the roof panels, de-rating for the power inverters, and weather data for the school. This calculator provided approximate cost savings per year for the addition of the solar panels.

Now that the savings per year data has been calculated, I needed to determine if there were any federal and state rebates available for installing such a system. I determined that there is a 30% federal rebate, as well as a 50% state rebate for total cost of the installation of a photovoltaic system. This significantly reduced the cost of the system to the owner. I then took the total cost, and savings per year and calculated how long it would take for the system to pay itself off.

#### **Resources and Tools**

Solar Panel Data and Information
http://www.uni-solar.com/
Inverter and Array Sizing
http://www.xantrex.com/support/gtsizing/index.asp?lang=eng#calculator
Photovoltaic System Performance Calculator
http://rredc.nrel.gov/solar/codes_algs/PVWATTS/
Solar Panel Details and Pricing Information
http://preview.inovateus.com/
Delaware State Incentive Information
http://www.delaware-energy.com/
Microsoft Excel

#### **Products Chosen**

Solar Panels

Uni-Solar PVL-136	Uni-Solar PVL-124
136 Watts/Panel	124 Watts/Panel
216" x 15.5"	197.1" x 15.5"
33 Vac Max	30 Vac Max
4.1 Aac Max	4.1 Aac Max

Inverter

SatCon PowerGate AE50-60PV-A

Max DC Amps: 160Adc Max DC Volts: 600Vdc Volt Output: 480 Vac

#### **Architectural Implications**

While the installation of the solar panels will have minimal effects on the aesthetics of the school, they must be examined. A picture of the existing school has been edited in order to include the proposed photovoltaics.

Before



After



As can be seen from these simple photos, the addition of the photovoltaic system will have minimal effects on the aesthetics of the school entrance. The addition of these will make a statement to everyone who enters the school.

#### Calculations

Please see Appendix F for detailed photovoltaic calculations.

#### **Energy Produced**

Calculating the output of the system throughout the year is crucial. PVWatts was used to calculate the effective energy produced by the solar array throughout the entire year. PVWatts uses hourly Typical Meteorological Year weather data for a given location in order to provide energy produced throughout the year. Figure 5.1 below includes information from the analysis provided by PVWatts regarding the cost savings for the energy produced.

## Figure 5.1

Energy Analysis per Year				
Array	kWh Produced	Energy Cost	Total Energy Savings	
Multipurpose Room	26116	10 ¢/kWh	\$2,612	
NE Wing	23721	10 ¢/kWh	\$2,372	

#### **Cost Impacts**

A cost analysis was performed in order to determine the amount of years it would take for the proposed solar array to pay itself off. This calculation includes a rebate from the state of Delaware as well as from the Federal Government for the purchase of the system. As can be seen in Figure 5.2, it will take approximately 10 years after the rebates in order for the systems to be paid off. This is a long time; however for an elementary school which is going to be around for many years to come this would start generating money for the school after the first ten years. This calculation did not incorporate inflation due to the nature of the funds generated by the school. The funds to pay for the school were raised from taxes which will rise along with the inflation rate.

Tigure J.2						
Cost Comparison						
	Multipurpose Room	NE Wing				
Number of Panels	160	160				
Cost per panel	\$563.00	\$521.00				
Panel Type	PVL-136	PVL-124				
Voltage per panel	136 W	124 W				
Inverter Costs	\$22,500	\$22,500				
Total System Cost	\$112,580	\$105,860				
DE State Grant	\$56,290	\$52,930				
Federal Tax Credit	\$33,774	\$31,758				
Total Cost of System	\$22,516	\$21,172				
Annual Savings	\$2,612	\$2,372				
Years to Pay Off	8.6	8.9				

Figure 5.2

#### **Conclusion and Recommendation**

In conclusion this system does not seem to generate a significant amount of electricity; however, the benefits from including a photovoltaic system on the elementary school far exceed just an energy savings. The school district would be emphasizing to the community that they are dedicated to using natural resources for power. The students would also have the ability of seeing and learning about a system in place on the very school they attend. The benefits of this are hard to estimate; however they will extend far into the future as generations pass through the school with a new understanding of natural resources.

From an economic basis, the photovoltaic panels are not a great investment; however they could have a much greater impact on the residents of the area and the students. Further research would need to be done to determine these benefits and comparing them to the additional costs. At this time it is not a beneficial improvement, however the building can be retrofitted with these panels at any time.

# **Conclusions**

This thesis has analyzed prefabrication in the construction industry and how it relates to Wrangle Hill Elementary School. The adoption of a prefabricated façade system would yield a significant schedule savings of approximately 34 days. The reduction of the schedule will aid the contractor in providing a higher quality, more complete building to the owner when required. It helps the contractor to avoid the huge \$10,000 per day liquidated damages if the schedule is delayed in the slightest. The extra cost for the prefabricated panels was so low it could almost be ignored.

The mechanical analysis showed that the new prefabricated system actually out performed the initial masonry design, and had little to no condensation occurring throughout the wall. From a mechanical standpoint, the prefabricated design was superior and should be used.

The photovoltaic system did not prove to yield large cost savings in the electricity bill. The system could have other impacts on the community and on each of the students; however that would need to be researched further. From an economical standpoint, the panels would pay themselves off in approximately 9 years, at which point they would start saving the school money.

The thesis analyzed multiple different methods of making the construction of Wrangle Hill more efficient, with more efficient building materials. The photovoltaics even took the efficiency to a new level, having the building create its own power. Appendix A General Conditions Estimate

14 Months

#### **General Conditions Estimate**

Wrangle Hill Elementary School New Castle, DE

Schedule:

	Approximate Budget:\$29,767,000Building Size60,000 SF	
Items		Total Cost
Tools and Miscellaneous Suppli	es	\$1,000
Safety and Protection Supplies		\$15,000
Scaffolding and Shoring	By Trade	-
Material Hoists and Lifts	By Trade	-
Cleaning and Dumpsters		\$10,000
Jobsite Identification and Signs		\$1,000
Jobsite Fence, Gates, and Lock		\$6,000
Temporary Heat, Water, Electric	city, and Phone	\$60,000
Temporary Toilets		\$9,000
Jobsite and Building Progress P		\$2,000
Temporary Roads	By Trade	-
Jobsite Trailers and Office		\$18,900
Office Supplies, Equipment and	Furniture	\$25,000
Building and Site Surveys		\$12,000
Budget and Schedule Maintaine	ence	\$5,000
Project Staff - Base		\$508,480
Project Staff - Fringes and Bene	efits	\$203,392
Blueprint Copying and Shipping		\$33,000
Relocation and Travel		\$15,000
Building Permits	By Owner	-
General Liability Insurance		\$148,835
Workers Compensation		\$66,000
Builders Risk Insurance	By Owner	-
Auto/Employers Liability Insurar	ice	\$20,000
Bonds and Surety		\$208,369
Тах		\$1,761
Item Sub-Total		\$1,369,737
Fee	5%	\$1,488,350
Total General Conditions Esti	mate	\$2,858,087

Projected Staff Monitor Wrangle Hill Elementary School New Castle, DE

Months of Construction	PC1	~	7	ი	4	S	9	7	ω	0	10	5	12	13	14
Vice President	10%	10%	10%	10%											
Director of Pre- Construction	25%														
Estimator	100%	50%	25%												
Project Executive	25%	25%	25%	25%	25%	10%	10%	10%							
Senior Project Manager	25%	50%	50%	50%	50%	50%	50%	50%	50%	50%	25%	25%	25%	25%	25%
Project Manager		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Project Engineer		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Superintendent	10%	100%	100% 100%	100%	100%	100% 100% 100%	100%	100% 100% 100%	100%	100%	100%	100%	100% 100% 100%	100%	100%
Assistant Superintendent		50%	100%	100%	100%	100% 100% 100% 100% 100% 100% 100% 100%	100%	100%	100%	100%	100%	100%	100%	50%	50%

Appendix B Project Schedule

Instruction         Landom         Data model	- F		2	2 1 1		EDIS Company 4/10/06	EDIS Company 4/10/06						
185         180 <th>ID Task Name</th> <th></th> <th>Duration</th> <th>Baseline Start</th> <th>Baseline Finish</th> <th>Actual Start</th> <th>Actual Finish</th> <th>Mav</th> <th>-</th> <th>la</th> <th>Mav</th>	ID Task Name		Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	Mav	-	la	Mav		
T         Total         Matrix         Matrix <th matrix<="" th=""> <th matrix<="" th=""></th></th>	<th matrix<="" th=""></th>		PRECONSTRUCTION ACTIVI	IES	168 days	Wed 3/1/06	Thu 10/12/06		NA		Eh.	5	3
Number         Number<	BID & AWARD CONTRAC		10 deys	Wed 3/1/06	Tue 3/14/06	NA	NA						
NUMBER         NUMBER<	EDIS AWARDS SUBCON	RACTS	18 days	Wed 3/15/06	Fri 4/7/06	NA	NA	UUUUU *******					
	PROCURE BULLING FEF	MIL DEPART	10 days	ODICLIC DAV	FI14///U0	NA	AN.						
		CANUE MERMII	10 days	MAN 411008	The 6/6/06	NA	NA						
EVENCION         TOTAL         International         International <thinternational< th="">         International</thinternational<>	SUBMIT/APPROVE/DELIV	ER STR STEFL (phased)	78 dave	Tue 4/18/06	Mon 8/7/06	NA	NA						
Image: constraint of constraints of constra	SUBMIT/APPROVE/DELIV	ERWINDOWS	120 days	Tue 4/25/06	Thu 10/12/06	NA	NA						
National													
Image:	SITE WORK		312 days	Mon 4/3/06	Tue 6/26/07	AN	AN	₽			₽		
mercine         1 app         mercine         mercine <thmercine< th=""></thmercine<>	MOBILIZE AT SITE	1 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	5 days	Mon 4/3/06	Fri 4/7/06	N.A.	NA	=20					
Image: control         Image:	PRELIM SITE CONTROLS	MEETING	1 day	Tue 4/4/06	Tue 4/4/06	NA NA	NA						
Introl         Intro         Intro         Intro <td>SITE LAVOLT</td> <td>CIINO</td> <td>2 risue</td> <td>Thi 46406</td> <td>Fri 4/7/06</td> <td>AN</td> <td>AN</td> <td></td> <td></td> <td></td> <td></td>	SITE LAVOLT	CIINO	2 risue	Thi 46406	Fri 4/7/06	AN	AN						
STREWCE         Size         Marching	INSTALL DEDIMETED CO		A date	Mon 4/10/06	Thu 2/13/06	Na	Na	IN SITE CREW 1 SITE CREW 2					
Norm         Norm <th< td=""><td>INSTALL CONSTRUCTION</td><td>FNTRANCE</td><td>3 dave</td><td>Mon 4/10/06</td><td>Wad 4/12/06</td><td>AN</td><td>AN AN</td><td>SITE CREW 3</td><td></td><td></td><td></td></th<>	INSTALL CONSTRUCTION	FNTRANCE	3 dave	Mon 4/10/06	Wad 4/12/06	AN	AN AN	SITE CREW 3					
NUMBER         NUMMER         NUMMER         NUMMER<	STRIP TOPSOIL		5 days	Thu 4/13/06	Thu 4/20/06	NA	NA	In					
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00.000         0000         <	INSTALL TEMP STONE EI	<b>JTRANCE ROAD &amp; TRAILER</b>		Fri 4/28/06	Mon 5/8/06	NA	NA						
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NU         State         Not2500         Not15400         Not15	PRIMARY FLECTRICAL FL	FDFR		Fri 5/12/06	Fri 6/2/06	AN	AN		2EW 1				
CUTSFILIS         000         Fn 2000         Non 7/300         Non 7/	INSTALL SANITARY SYST	M	15 days	Wed 5/24/06	Wed 6/14/06	NA	NA	1000					
OCD-FOAD         0 date         Fit #2006         Tit #1006         Ti	COMPLETE BALANCE OF	: CUTS/FILLS	40 days	Fri 5/26/06	Mon 7/24/06	NA.	NA	SITE	CREW 1, SITE CREW	2			
ECNOLIT         70 desk         Marcholo         Pri Nitrolio         Name         Marcholo         Pri Nitrolio         Name         Marcholo         Name         Name <th< td=""><td>TEMPORARY 12' STONE I</td><td>OOP ROAD</td><td>8 days</td><td>Fri 6/2/06</td><td>Tue 6/13/06</td><td>NA</td><td>NA</td><td></td><td></td><td></td><td></td></th<>	TEMPORARY 12' STONE I	OOP ROAD	8 days	Fri 6/2/06	Tue 6/13/06	NA	NA						
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SPARIMELOT         Form         Non         Span         Tun 7/2010         Mon 8/1400         Non           5 AND BACK FARKING         13 3ps         Tun 7/2010         Mon 8/1400         Na         Na           1         13 3ps         Tun 7/2010         Won 8/1400         Na         Na         Na           1         20 3ps         Tru 7/2010         Won 8/1400         Na	DEDIALL WALCK STSICN		10 days	Tun 0/22/00	00/01// Englo	AN A	NA		CREWS				
Non-service         13 days         Fir affinition         Mail affinition	STONE RASE ENTRANCE	S. DADI/ING LOT	15 date	00/11// en1	VA/AH 8/0/06	AN A	NA						
J ND SACK PARKNG         I S days         Fin 31006         Wed 382006         NA         NA           RM         3 days         Fin 37006         Wed 382006         NA         NA         NA           RM         3 days         Fin 37006         Wed 38007         Na         NA         NA           RM         3 days         Fin 37006         Wed 38007         NA         NA         NA           RM         3 days         Mon 49007         Te 6/5007         NA         NA         NA           RM         20 days         Mon 671206         Fe 6/2007         NA         NA         NA           RE         20 days         Mon 671206         Fe 6/2007         NA         NA         NA           RE         20 days         Mon 671206         Fe 6/2007         NA         NA         NA           RE         20 days         Mon 671206         Fe 6/2007         NA         NA         NA           RE         20 days         Mon 671206         NA         NA         NA         NA           RE         20 days         Mon 671206         NA         NA         NA         NA           RE         20 days         Won 671206         NA	SITE LIGHTING		13 davs	Thu 7/27/06	Mon 8/14/06	NA	NA	Constant District					
Image: constraint of the	STONE BASE LOOP ROA	D AND BACK PARKING	15 days	Thu 8/10/06	Wed 8/30/06	NA	NA	()):	100				
Image:	BASE COURSE PAVING		3 days	Fn 9/1/06	Wed 9/6/06	NA	NA		SITE CREW 1,P/	AVING CREW 1			
IEM         8 day         Tru 922000         Mon 108106         NA         NA           NG         0 days         Mon 45007         Tue 66507         NA         NA           T         25 days         Mon 45007         Tue 66507         NA         NA           T         25 days         Mon 671206         NA         NA         NA           260 days         Mon 671206         NA         NA         NA           280 days         Mon 67106         NA	RESPREAD TOPSOIL		20 days	Thu 9/7/06	Wed 10/4/06	NA	NA		SITE CRE	W4			
NG T T O Gays Mon A Gays Mon B Ga	INSTALL IRRIGATION SYS	TEM	8 days	Thu 9/28/06	Mon 10/9/06	NA	NA						
III         20 Gley         Tue 672/307         Tue 673/307         Tue 673/307 <thtue 307<="" 673="" th=""> <thtue 307<="" 673="" th=""> <thtue 673="" <="" td=""><td>FINISH SITEWORK &amp; PAV</td><td>NG</td><td>40 days</td><td>Mon 4/9/07</td><td>Tue 6/5/07</td><td>NA</td><td>NA</td><td></td><td></td><td></td><td>SITE CREW 1,SI</td></thtue></thtue></thtue>	FINISH SITEWORK & PAV	NG	40 days	Mon 4/9/07	Tue 6/5/07	NA	NA				SITE CREW 1,SI		
And offstalling         And offstalling         Indextalling         Number of the extalling		17	20 days	Tue 5/22/07	Tue 6/19/07	NA	NA						
Number         Number<			SVED C7	10072/0 011	Ture 6/26/07	NA	NA						
1         280 days         Mon Er1206         Wed 62007         NA         NA           7         260 days         Mon Er1206         Wed 62007         NA         NA           FUNDATIONS         10 days         Mon Er1206         Wed 62007         NA         NA           50         300 days         Mon Er1206         NA         NA         NA           50         10 days         Mon Er1206         NA         NA         NA           50         10 days         Mon Er1206         NA         NA         NA           50         10 days         NA         Mascher         Mascher         Mascher           50         10 days         Mascher         Mascher         Mascher         Mascher         Mascher         Mascher         Mascher			sin nais	INCL O DAVA	10/07/0 en I	1	CN.						
260 days         Mon 617206         Wed 62007         NA         NA           FOUNDATIONS         10 days         Mon 617206         Fri 8/2306         NA         NA           SS         34 days         Mon 617206         Fri 8/2306         NA         NA         NA           NMASONEY         7 days         Mon 617206         Fri 8/2306         NA         NA         NA           NMASONEY         13 days         Mon 617206         Fri 8/2306         NA         NA         NA           VMASONEY         13 days         Wool 6/2306         Fri 7/706         NA         NA         Masonery creevit           ADE         13 days         Mon 67/06         Fri 8/2306         NA         NA         Masonery creevit           Task Progres         13 days         Mon 67/06         Fri 8/2306         NA         NA         Masonery creevit           Task Progres         Image         Meetone         Masonery creevit         Masonery creevit         Masonery creevit         Masonery creevit           Task Progres         Image         Masonery creevit         Masonery	CENTRAL BUILDING CORE		260 davs	Mon 6/12/06	Wed 6(20)07	NA	NA	D			Đ		
FOUNDATIONS     10 days     Mon 6/1206     Fri 6/2306     NA     NA       SS     34 days     Mon 6/1206     Fri 6/2306     NA     NA       NMASONKY     7 days     Word 6/2306     Fri 7/706     NA     NA       VMASONKY     7 days     Word 6/2306     Fri 7/706     NA     NA       VMASONKY     13 days     Word 6/2306     Fri 7/706     NA     NA       VME     13 days     Mon 87/06     Kei 7/706     NA     MA       VME     13 days     Mon 87/06     Fri 7/706     NA     MA       VME     13 days     Mon 87/06     NA     MA     MA       Task Progres     Mason     Baseline Milestone     Meetone     Meetone     Meetone       Critical Task     Mon 87/06     Minestone     Milestone     Milestone     Milestone       Critical Task Progres     Minestone     Milestone     Milestone     Milestone     Milestone       Critical Task Progres     Milestone     Milestone     Milestone     Milestone     Milestone       Milestone     Milestone     Milestone     Milestone     Milestone     Milestone       Milestone     Milestone     Milestone     Milestone     Milestone       Milestone     Milestone<	Core Area 3		260 days	Mon 6/12/06	Wed 6/20/07	NA	NA	Đ			Ð		
S     34 Carys     Mon 6/1906     Fri 8406     NA     NA       NMSSONRY     7 days     Wein 6/2506     Fri 77/06     NA     NA       NMSSONRY     13 days     Wein 6/2506     Fri 77/06     NA     NA       ADE     13 days     Mon 8/706     NA     NA     NA       Task     Mon 8/706     NA     NA     Roled Up Miestone     Image: concrete crew 1       Task     Mon 8/706     NA     NA     Roled Up Miestone     Image: concrete crew 2       Task Progress     Mon 8/706     Na     Roled Up Task     Image: concrete crew 2       Critical Task Progress     Minestone     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: concrete crew 2     Task Progress     Image: concrete crew 2       Minestone     Image: concrete crew 2     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: concrete crew 2     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: concrete crew 2     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: concrete crew 2     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: concrete crew 2     Image: concrete crew 2     Image: concrete crew 2       Minestone     Image: con	INSTALL CONCRETE	FOUNDATIONS	10 days	Mon 6/12/06	Fri 6/23/06	NA	NA	UN CONCRETE	CREW 1		•		
NMASONRY T dzys Wed 6/28/06 Fri 7/7/06 NA NA ADE 13 dzys Mon 8/7/06 Ved 8/28/06 Fri 7/7/06 NA NA ADE 13 dzys Mon 8/7/06 Ved 8/23/06 NA NA Task Progress Milestone Critical Task Progress Milestone Critical Task Progress Milestone Baseline Milestone Critical Task Progress Milestone Baseline Milestone Critical Task Progress Milestone Regel Cub Task Progress Progress Milestone Regel Cub Task Progress P	INSTALL U.G. UTLITE	S	34 days	Mon 6/19/06	Fri 8/4/06	NA	NA	P	-UMBING CREW 1				
CADE     13 days     Mon 8/7/06     Wed 8/23/06     NA     NA       Task     Task     Easeline     Easeline     Easeline     Easeline       Task Progress     Easeline     Easeline     Easeline     Easeline     Easeline       Critical Task     Variant Task Progress     Easeline     Easeline     Easeline     Easeline       Critical Task Progress     Easeline     Critical Task     Easeline     Easeline       Baseline     Milestone     Critical Task     Easeline     Easeline       Critical Task Progress     Easeline     Easeline     Easeline	INSTALL FOUNDATIC	N MASONRY	7 days	Wed 6/28/06	Fri 7/7/06	NA	NA	Ì	RY CREW 1				
Task     Milestone     Milestone<	INSTALL SLAB ON G	RADE	13 days	Mon 8/7/06	Wed 8/23/06	AN	NA			2			
Task Progress     Baseline Mitestone     Image: Summary     Milestone       Critical Task Progress     Milestone     Image: Summary     Task Progress     Milestone       Critical Task Progress     Milestone     Critical Task Progress     Summary     Summary       Baseline     Milestone     Critical Task Progress     Critical Task     Summary		Task	264 Sector S		Ľ.		Rolled	\$	Baseline				
Critical Task Progress IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		· · ·		Baseline N			Beselir	₽	Milestone				
CriticalTaskProgress	oct Official Schedule - baseline~66 Tue 4/8/08		permentacettacettacetta	w Summary			Task P		Baseline Milestone	Commencement			
UIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII					Task	ALL DESCRIPTION OF THE PARTY OF	Critical		Summary				
		Baseline					Critical	Task Progress announcementation	Rolled Up Task	\$			

							4/10/06	4/10/06					
ID Tas	Task Name		Duration	Baseline Start	Baseline Finish	Actual Start	Actual Finish	Mar	hin. Visio	Cav	Nov Jan Mar	May	
60	INSTALL OIL TANKS		3 days				NA		5	-3			
49	ERECT STRUCTURAL STEEL	STEEL	25 days	1			NA			STEEL CREW 2	REW 2		
20	PERIMETER CMU BACK-UP	K-UP	25 days				NA						
8	INSTALL BLOCKING FOR FASCIA	OR FASCIA	7 days		5		NA	_		CARPE	CARPENIKY CKEW 1		
58	INSTALL FLAT ROOF BASE SHEE	SASE SHEET	25 days			AZ .	NA						
60	POUGHIN HVAC DUCT	AL DIDING	3/80 GP	Tue 10/3/06	Vied 12/6/06		NA				HVAC CKEW 1[34%]		
5 2	DOLICH IN SECTIMIC		28 days				VIN						
51	PERIMETER FACE BRICK	CK	25 davs				NA				MASONRY CREW 3		
55	INSTALL MECHANICAL UNITS	UNITS	10 days				NA			1007			
56	INSTALL BOILERS		10 days	Tue 11/7/06			NA						
99	ROUGH IN PLUMBING		45 days	Tue 11/7/06	Fri 1/12/07	NA	NA			100			
52	INTERIOR MASONRY		40 days	Tue 11/21/06		NA	NA				MASONRY CREW 4	V4	
62	ROUGH IN ELECTRIC/	ROUGH IN ELECTRICAL CONDUIT IN MASONRY	40 days				NA				ELECTRICAL CREW 1	LEW 1	
61	INSTALL WINDOWS		19 days		5	NA	NA				WINDOW CREW 2		
21	INSTALL ROOF FASCIA	4	9 days				NA				ROOF CREW 2		
69	INSTALL FLAT ROOF FINISH PRODUCT	INISH PRODUCT	15 days		Ē	AN	NA				R00F CREW 4[34%]		
23	METAL STUDS & DRYWAL	WALL	10 days		FI 2/2/01	AN I	NA				1		
20 03	KOUGH IN ELECTRICAL STSTEMS	L STSTEMS	50 Gays	Mon 1/2/10/	T 248401	NN NN	NIN						
00		00	10 days	TAIAN DISCUSSION	LUIS NO STORE	VN VN	VIN				annual 111111		
80	ACOUSTIC CELLIVE GI	SIU	c/pn ci	MACH 2/2010	Tux 2/20/07	VIA VIA	VIN				desized and a second se		
3 22	GRILLES REGISTERS DIFFUSERS	DIFFUSERS	6 davs	Tue 3/13/07	Tue 3/20/07	AN	AN				NAME OF A DESCRIPTION O		
70	FINISH PAINT		17 days	Wed 3/14/07	Thu 4/5/07	AN	NA				10000		
82	ACOUSTIC CEILING TI	ILES	7 days		Tue 4/10/07	NA	NA					_	
11	CASEWORK		5 days	Wed 4/4/07	Tue 4/10/07	AN	NA				1 = 3		
72	INSTALL CHALKBOARDS/TACKBOARDS	DS/TACKBOARDS	5 days	Wed 4/11/07	Wed 4/18/07	NA	NA					10	
74	CARPET & VCT		15 days	Wed 4/11/07	Wed 5/2/07	AN	NA					1000000	
-19	EPOXY FLOOR		8 days	Wed 4/11/07	Mon 4/23/07	AN	NA					tituti	
88	CERAMIC TILE		5 days	Wed 4/11/07	Wed 4/18/07	AN	NA					-11	
13	TERRAZZO		30 days		Fn 6/8/01	AZ .	NA						
80	FOOD SERVICE EQUIPMENT	MENT	15 days		Mon 5/14/07		NA						
15	INSTALL PLUMBING FIXTURES	XTURES	5 days	Mon 6/11/07			NA					-10	
11	INSTALL WINDOW TREATMENTS	CATMENTS	2 days	Mon 6/11/07		AN	NA						
18	INSTALL ENTRANCE MATS	ATS	3 days	Mon 6/11/0	5	AZ.	NA					- 8	
10	DOOKS AND HARDWARE	NRE	5 days	Mon 6/11/0/		AZ -	NA					= 3	
0/		AULESS	S days	Mon brilling			AN		1			56	
129	Core Area 1 NICTAUL CONCRETE FOUNDATIONS	ON INDATIONO	239 days	Thu 6/22/06	Fri 6/1/0/	AN N	AN			CONCRETE CREWS		D	
	INSTALL CONCRETE FOUNDATIO		10 dave	111U 0/22/00			VIV			MONONE E CREWS			
101	INSTALL FUORUMENTION	I MNOCHMI	c/ph of	AAA T/2400			VN			ANN OVER 2			
133	INSTALL SU AB ON GRADE	ADE	10 davs	1	F	AN AN	AN			uu CONCRETE CREW 3			
134	ERECT STRUCTURAL STEEL	STEEL	25 davs		Ň		NA		1000				
136	PERMETER CMU BACK.UP	K,UP	21 davs	Tue 10/24/06			NA						
139	INSTALL BLOCKING FOR FASCIA	OR FASCIA	7 davs	1			AN			U	CARPENTRY CREW 1		
149	ROUGH IN HVAC DUCT		30 davs	ľ	>		NA				HVAC CREW 1[33%]		
148	ROUGH IN MECHANICAL PIPING	AL PIPING	25 davs				NA			1000			
140	INSTALL ROOF FASCIA	4	9 days				NA						
		Task		Milestone	Ľ.		Roll	Rolled Up Milestone		Baseline			
( +	00 10 10 10 10 10 10 10 10 10 10 10 10 1	Task Progress		an Baseline	Baseline Milestone		Bas	Baseline SummTask	•	Milestone			
plect U	Project Umicial Schedule - baseline~ob Date: Tue 4/8/08	Critical Task	new every every	www.Summary	Þ		Tasl	Task Progress		Baseline Milestone	Carrowseenseenseen		
		Critical Task Progress Baceline			al Tack		8	Critical Task Progras	\$	Summary Rolled Lin Tack			

Duellon         Besine State											
1         1	150 151 137 135	lame			aseline Start		_	μ	-		lan
E         Same         National         Nation	151 137 135	ROUGH IN PLUMBING		45 days	Tue 11/14/06	Fri 1/19/07		4A		=3	
CLC         Close         Close         Filteriol         Filterio         Filterio	137 135	ROUGH IN SPRINKLER			Tue 11/14/06	Tue 12/26/06	NA	NA		1111 Total	
CC         CC         CO         CC         CC <thc< th="">         CC         CC         CC<td>135</td><td>PERIMETER FACE BRI</td><td>CK</td><td></td><td>Ned 11/15/06</td><td>Fri 12/15/06</td><td>NA</td><td>NA</td><td></td><td>111</td><td>1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.</td></thc<>	135	PERIMETER FACE BRI	CK		Ned 11/15/06	Fri 12/15/06	NA	NA		111	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
State state         State         In 1000         No         No <td></td> <td>INSTALL TECTUM DEC</td> <td>X</td> <td></td> <td>Ned 11/22/06</td> <td>Thu 11/30/06</td> <td>NA</td> <td>NA</td> <td></td> <td>-20</td> <td>TECTUM CREW 1</td>		INSTALL TECTUM DEC	X		Ned 11/22/06	Thu 11/30/06	NA	NA		-20	TECTUM CREW 1
ES         7.240         Fr 3/300         Mon 1/300         Mon 1/300<	143	INSTALL FLAT ROOF B	BASE SHEET	25 days	Thu 11/30/06	Fn 1/5/07	NA	NA			ROOF CREW 4[33%]
Non-control         Total         Non-control         Non-control <th< td=""><td>141</td><td>INSTALL METAL PANE</td><td>ILS .</td><td>12 days</td><td>Fri 12/1/06</td><td>Mon 12/18/05</td><td>NA</td><td>AA</td><td></td><td></td><td></td></th<>	141	INSTALL METAL PANE	ILS .	12 days	Fri 12/1/06	Mon 12/18/05	NA	AA			
N. COECTE NAMEGORY         WORP IX. SUMM         WOR	138	INTERIOR MASONRY			Tue 12/19/06	Wed 1/17/07	NA	AN			
ACCOUNT INTRACTORY         ADDR         MAT	145	INSTALL WINDOWS			Ned 12/20/06	Wed 1/17/07	NA	AN			
Kurstensis         Wares         Frazio         Mares         Mares <th< td=""><td>146</td><td>ROUGH IN ELECTRICA</td><td>L CONDUIT IN MASONRY</td><td>20 days</td><td>Mon 1/22/07</td><td>Fn 2/16/07</td><td>NA.</td><td>NA</td><td></td><td></td><td>ELECTRICAL CREW 1[50%]</td></th<>	146	ROUGH IN ELECTRICA	L CONDUIT IN MASONRY	20 days	Mon 1/22/07	Fn 2/16/07	NA.	NA			ELECTRICAL CREW 1[50%]
No. Statutus         Component	142	DRYWALL CEILINGS	- CUCTTAIN	10 days	Mon 1/22/07	Fi 2/2/07	AN	NA			
Reference(T         1000	147		IL STSTEMS	50 Gays	NIOR 2/5/07	Ed 3/16/07	NA NA	ANA ANA			
Octoor         1300         Montroling	144	INSTALL FLATBOOF	INIGH PRODUCT	15 days	Mon 2/5/07	Eri 2/23/07	TAN AN	41V			POOF CREW 403%1
1         1	161	ACOLISTIC OFILING GE		13. dave	TOTO TOTO TOTO	70/80/0 PMM	4N	NA			
CF-TUGES         6 ab	163	Incousing detailing of		10 days	Mon 3/10/07	Fri 3/2/07	VN VN	NA NA			
Image: constraint of	163	GRILLES REGISTERS I	DIFFUSERS	6 davs	Fri 2/23/07	Eri 3/2/07	NA	NA			11
Image: constraint of	167	FINISH PAINT	0000	15 davs	Tue 2/27/07	Mon 3/19/07	NA	NA			
(E3)         1 0pi (E3)         0 0pi (E3) <td>165</td> <td>CERAMIC TILE</td> <td></td> <td>5 davs</td> <td>Mon 3/5/07</td> <td>Fri 3/9/07</td> <td>NA</td> <td>NA</td> <td></td> <td></td> <td>in a constant of the constant</td>	165	CERAMIC TILE		5 davs	Mon 3/5/07	Fri 3/9/07	NA	NA			in a constant of the constant
Unit         2048         Interaction         12048         Interaction	164	ACOUSTIC CEILING TIL	ES	7 days	Mon 3/12/07	Tue 3/20/07	NA	NA			=2
Diff         Total         Total         West         <	160	TERRAZZO		20 days	Tue 4/10/07	Tue 5/8/07	NA	NA			
EMPERIS         2.486         WestS00         FISTION         MM           MISS         1038         WestS00         FISTION         MM           VILUEES         5436         WestS200         FISTION         MM           VILUEES         5436         WestS200         FISTION         MM           OFINICADINEDS         5436         WestS200         FISTION         MM           SCREENDOR         10349         WestS200         FISTION         MM         MM           SCREENDOR         10349         WestS200         FISTION         MM         MM         MM           SCREENDOR         10349         WestS200         FISTION         MM         MM         <	154	GYMNASIUM EQUIPME	ENT	8 days	Mon 4/23/07	Wed 5/2/07	NA	NA			=8
Mits         3456         Massion         Mit           Circle         1046         104500         165100         Mit           Circle         546         165100         Mit         9400           Circle         546         165100         Mit         9400           Circle         546         165100         Mit         9400           Circle         546         165100         Mit         Mit           Control         5496         167500         Mit         Mit           Control         26400         167500         Mit         Mit           Control         12400         Mit         Mit         Mit         Mit           Control         12400         Mit         17000         Mit         Mit           Control         12400         Mit         17000         Mit         Mit           Control         12400         Mit         17200         Mit         Mit           Control         12400         Mit         17200         Mit         Mit           Control         12400         Mit         17200         Mit         Mit           Control         12400         Mit         Mit <td>156</td> <td>INSTALL WINDOW TRE</td> <td>EATMENTS</td> <td>2 days</td> <td>Wed 5/9/07</td> <td>Thu 5/10/07</td> <td>NA</td> <td>NA</td> <td></td> <td></td> <td></td>	156	INSTALL WINDOW TRE	EATMENTS	2 days	Wed 5/9/07	Thu 5/10/07	NA	NA			
Norm         Norm         Norm         Norm         Norm         Norm           String         163/807         163/807         144         Norm	157	INSTALL ENTRANCE N	AATS	3 days	Wed 5/9/07	Fri 5/11/07	AN	AN			
(1)日日         (1)日         <	166	CARPET & VCI		10 days	Wed 5/3/0/	Tue 5/22/07	AN	AN .			
Minimize         State         Firstration         Instance	155	BYNNASIUM FLOOR		10 days	Mon 5///0/	FIL 5/18/07	AN AN	NA NA			1001
Nick         Signed         Nick         <	162	INSTALL FLUNDING FU		2 days	T0/01/5/10/01	1012/4/07	AM MA	ALA ALA			3
COSTACCEONECIS         5 days 5 days         Turing Figure	158	CASEM/DBK	NOTICE	5 date	Wed 5/23/07	Viad 5/20/07	AN AN	ANA ANA			
Name         State         Firstein         Massention	150	INICTALL CHALLEDAD	DELLACVEDADDE	6 date	The S/2407	Thu 5/21/07	VI	VIN			B =
Nill         Solge         For 2500         For 2700         Fo	160	INSTALL CHARNEGAR	TIONS	2 dave	Ed 5/25/07	70/06/2 PMA	AN AN	NA			3 -
Total         Total         Num	170	DOORS AND HARDWA	ARE	5 davs	Fri 5/25/07	Fri 6/1/07	NA	NA			u =1
1         238 days         Turi 1100         Wenskardn         NA         NN           FNDDARDNS         12 days         Turi 1100         Wenskardn         NA         NN           FNDDARDNS         10 days         Wenskardn         NA         NN         MASONRY CREW 1           NADONRY         10 days         Wenskardn         NA         NN         MASONRY CREW 1           Na         10 days         Wenskardn         NA         NN         MASONRY CREW 1           Na         10 days         Wenskardn         NA         NN         MASONRY CREW 1           Na         21 days         Teal 122/06         NA         NN         NN           STEEL         26 days         Teal 122/06         NA         NN         NN           ONSLOPEDROF         26 days         Teal 122/06         NA         NN         NN           ONSLOPEDROF         26 days         Teal 122/06         NA         NN         NN         NN           ONSCREAL         2 days         Teal 122/06         NA         NN         NN         NN           ONSCREAL         2 days         Teal 122/06         NA         NN         NN         NN           ONSCREAL         2	86										1
FOUNDATIONS         12 days         Tue 7/11/10         Wood 7/26/00         N/M         N/M           NMNSONRY         10 days         Nun 7/2006         Nun N/M         Nun         Nun         Nun           SC         10 days         Nun 7/2006         Nun N/M         Nun         Nun         Nun           SUE         10 days         Nun 7/2006         Nun N/M         Nun         Nun         Nun           SUE         10 days         Nun 1/21006         Fin 1/22/06         Nun         Nun         Nun           SUE         21 days         Tue 1/12/106         Fin 1/22/06         Nun         Nun         Nun           SUELE         25 days         Tue 1/12/06         Fin 1/22/06         Nun         Nun         Nun           SUE         24 days         Nun 1/21/06         Fin 1/23/06         Nun         Nun         Nun           SUE         26 days         Mun 1/21/06         Nun         Nun         Nun         Nun           SUE         26 days         Mun 1/21/06         Nun         Nun         Nun         Nun           SUE         26 days         Mun 1/21/06         Nun         Nun         Nun         Nun           SUE		ore Area 2		228 days	Tue 7/11/06	Mon 6/4/07	NA	NA	Ð		₽
NMASONEY         10 days         Thu 7/2006         Ved 8/2016         NM         NM           S         00 days         Men 87/06         Fin 97/16         NM         NM           S         00 days         Men 87/106         Fin 97/16         NM         NM           S         10 days         Ved 87/106         Fin 1/22/106         NM         NM           S         21 days         Tue 1/12/106         Fin 1/22/106         NM         NM           S         25EL         25 days         Tue 1/12/106         Fin 1/22/106         NM         NM           GNUD         7 days         Pun 1/27/106         NM         NM         NM         NM           GNUSCPEDROOF         7 days         Pun 1/27/106         NM         NM         NM           GNUSCPEDROOF         7 days		INSTALL CONCRETE F	COUNDATIONS	12 days	Tue 7/11/06	Wed 7/26/06	NA	NA	CON CON	CRETE CREW 1	
S         10 days         Mon 87/06         Fit 97/05         NA         NA           ADE         10 days         Won 87/06         Fit 97/05         NA         NA           ADE         21 days         Tue 11/21/06         Fit 122/05         NA         NA           STEL         25 days         Tue 11/21/06         Fit 122/05         NA         NA           STEL         25 days         Tue 11/21/06         Fit 122/05         NA         NA           ONSLOPED FOOF         7 days         Tue 11/20/06         Fit 127/05         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         7 days         Mon 12/11/06         Tue 12/160         NA         NA           CK FASCIA         12/04/05	68	INSTALL FOUNDATION	IMASONRY	10 days	Thu 7/20/06	Wed 8/2/06	NA	NA	AM III	SONRY CREW 1	
ADE         10 days         Ware 816.06         En 980.6         NA         NA           STEL         25 days         Tue 11/2106         En 12/2106         NA         NA           STEL         25 days         Tue 11/2106         En 12/2106         NA         NA           STEL         25 days         Tue 11/2106         En 12/206         NA         NA           BASE SHEET         25 days         Tue 11/2106         En 12/206         NA         NA           BASE SHEET         25 days         Tue 11/2106         En 12/206         NA         NA           BASE SHEET         25 days         Tue 11/2106         En 12/206         NA         NA           CR FASCIA         7 days         Man 12/106         NA         NA           CR FASCIA         7 days         Man 12/106         NA         NA           CR FASCIA         7 days         Ma         NA         NA           CR FASCIA         7 days         Ma         NA         NA           CR FASCIA         7 days         Ma         NA         NA           CR FASCIA         12 days         Tue 12/100         NA         NA           CR FASCIA         12 days         Tua 12/100 <td>90</td> <td>INSTALL U.G. UTILITIES</td> <td>~</td> <td>10 days</td> <td>Mon 8/7/06</td> <td>Fri 9/1/05</td> <td>NA</td> <td>NA</td> <td></td> <td>PLUMBING CREV</td> <td>W1</td>	90	INSTALL U.G. UTILITIES	~	10 days	Mon 8/7/06	Fri 9/1/05	NA	NA		PLUMBING CREV	W1
CK-UP         21 days         Tue 1/12/06         Tue 1/12/07         Tue	91	INSTALL SLAB ON GR/	ADE	10 days	Wed 8/16/06	Fri 9/8/06	NA	NA	-9	CONCRETE CR	REW 3
-> Stet:         -> 045         Let         Let <thl< th="">         Let         <thl< th=""> <thlet< <="" td=""><td>2 8</td><td>PERIMETER CMU BAC</td><td>X-UP</td><td>21 days</td><td>Tue 11/21/06</td><td>Thu 12/21/06</td><td>AN .</td><td>NA</td><td></td><td></td><td></td></thlet<></thl<></thl<>	2 8	PERIMETER CMU BAC	X-UP	21 days	Tue 11/21/06	Thu 12/21/06	AN .	NA			
Network     State	26	INCTALL FELTDADED	STEEL MISTORED DOOF	S/BD C7	Th:: 10/24/05	00/67/11 DeVV	NA	AN A			BOOF COEW1
CK     5 days     Fri 12/106     Thu 12/206     NA     NA       IA     7     30	101	INSTALL FLEL FAUS C	BASE SHEFT	25 days	Thu 11/30/06	En 16/07	NA	NA			ROOF CREW 4133%1
CRFASCIA     7 days     Mon 12/11/06     Tue 12/19/05     NM     NM       IT     3 days     Wed 12/2006     Wed 13/207     NA     NA       IT     3 days     Wed 12/2006     Wed 13/207     NA     NA       IT     12 days     Mon 12/2006     Wed 13/207     NA     NA       IT     20 days     Mon 12/2007     Fn 1/19/207     NA     NA       It     20 days     Mon 12/2007     Fn 1/19/207     NA     NA       It     20 days     Mon 1/2007     Fn 1/19/207     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk     20 days     Mon 1/2007     Fn 2/16/07     NA     NA       Italk	93	INSTALL TECTUM DEC	X	5 days	Fri 12/1/06	Thu 12/7/06	NA	NA			U TECTUM CREW 1
Name         9 days         Wed 12/2006         Veed 13/07         NA         NA           1         0 days         Thu 13/07         Fin 13/2007         NA         NA         NA           1         0 days         Thu 13/2006         Fin 13/2007         Fin 13/2007         NA         NA           1         12 days         Mon 12/2007         Fin 13/2007         NA         NA           1         12 days         Mon 12/2007         Fin 13/607         NA         NA           1         Task         20 days         Mon 1/22/07         Fin 2/607         NA         NA           1         Task         assemine         Mestone         Roled Up Miestone         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk           1         Task Progress         asseline Summitsk         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk           1         Chicki Task         Chicki Task         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk         Paseline Summitsk           1         Task Progress         Immunititititititik         Roled Up Critical Task         Paseline Summitsk         Paseline Summitsk	98	INSTALL BLOCKING FC	OR FASCIA		Mon 12/11/06	Tue 12/19/06	NA	NA			CARPENTRY CREW 1
T         30 days         Thu 1/200         Fri 2/307         NA         NA           ELS         12 days         Thu 1/200         Fri 1/1907         NA         NA           Z6 days         Mon 1/2207         Fri 2/1907         Fri 2/1907         NA         NA           Z6 days         Mon 1/2207         Fri 2/1907         NA         NA           Task         Paseline Summinals         Roled Up Task         Paseline Summary         Easeline           Critical Task         Summary         Task Progress         Summary         Critical Task         Summary           Easeline         Annontical Task         Summary         Summary         Summary           Easeline         Annontical Task         Summary         Summary         Summary	66	INSTALL ROOF FASCI	4		Ned 12/20/06	Wed 1/3/07	NA	NA			ROOF CREW 2
ELS     12 days     Thu 14007     Fri 1/1907     NA     NA       20 days     Mon 1/2207     Fri 2/1907     NA     NA       20 days     Mon 1/2207     Fri 2/1607     NA     NA       1 Task     20 days     Mon 1/2207     Fri 2/1607     NA     NA       1 Task     assentements     Ministone     Ministone     Ministone     Longers       1 Task Progress     assentements     Niestone     Ministone     Ministone     Longers       Critical Task Progress     assentements     Rolled Up Task     Ministone     Longers       Critical Task Progress     annmary     Critical Task     Summary     Longers	124	ROUGH IN HVAC DUCT		30 days	Thu 12/21/06	Fri 2/2/07	NA	NA			HVAC CREW 1[33%]
Task	100	INSTALL METAL PANE	ILS	12 days	Thu 1/4/07	Fri 1/19/07	AN	NA			ROOF CREW 3
20 days     Mon 1/2/201     Fn 2/10/U1     Fn 2/10/U1     Fn       Task     Task     P     Rolled Up Miestone     P       Task     P     Rolled Up Miestone     P     Miestone       Critical Task     V     Baseline Summary     Task Progress     P       Critical Task Progress     Ministone     Critical Task     P     Milestone       Critical Task Progress     Ministone     Critical Task     P     Milestone       Baseline     Ministone     Critical Task     P     Milestone     P	671	HOUGH IN FLUMBING		40 GA/S	10/8/L UOW	FIL 5/9/07	MN	×2			
Task     Image: State in the st	96	IN ERICH MASONKY		ZU days	MON 1/22/U/	FIL 2/16/07	NA	EN I			MASONKI CKEW 4
Task Progress     Baseline Milestone     Image: Search and Summark     Milestone       Critical Task     Critical Task Progress     Image: Search and Summary     Search Milestone       Critical Task Progress     Critical Task     Summary     Summary       Baseline     Image: Search and Summary     Critical Task     Summary			Task	19		\$		Rolled Up Milestone	\$	Baseline	
Critical Task Progress IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII			Task Progress	Construction of the state of the	Baseline N			Baseline SummTask		Milestone	
Critical Task Progress	Project Offici	al Schedule - baseline-66	Critical Task	A STORAGE AND A ST	Summary	•		Task Progress		<b>Baseline Milestone</b>	Carrier and the
diffilling in the second of Critical Task Critical Task Progress	NA DAL DADA	3	Critical Task Progress		Rolled Up			Critical Task	\$	Summary	
			Baseline					Critical Task Progress		Rolled Up Task	¢

						4	4/10/06			
D	Task Name		Duration	Baseline Start	Baseline Finish	Actual Start	Actual Nav	-		lan Mor
103	INSTALL WINDOWS		19 days	Thu 1/18/07	Tue 2/13/07	NA	NA Na	IND ADD	NI DAC I	MUV VIII WINDOW CREW 2 MICY JU
104	ROUGH IN ELECTRICA	ROUGH IN ELECTRICAL CONDUIT IN MASONRY	20 days	Fri 1/26/07	Thu 2/22/07	NA	NA			ELECTRICAL CREW 1[33%]
95 136	PERIMETER FACE BRICH POLICH IN SEDINICI FE	ick	21 days	Trie 1/15/06	Tue 1/16/07	NA	NA			A DESCRIPTION OF A DESC
123	ROUGH IN MECHANICAL PIPING	AL PIPING	25 davs	Wed 1/17/07	Tue 2/20/07	NA	NA			
102	INSTALL FLAT ROOF FINISH PRODUCT	FINISH PRODUCT	15 days	Mon 2/5/07	Fri 2/23/07	NA	NA			ROOF CREW 4[33%]
105	DRWALL CEILINGS		10 days	Wed 2/21/07	Tue 3/6/07	NA	NA			mm
127	1ST COAT PAINT		10 days	Fri 3/2/07	Thu 3/15/07	NA	NA			Carter Control of Cont
128	ACOUSTIC CEILING GRID	KID.	10 days	Mon 3/12/07	FII 3/23/07	NA	AA			100
122	ROLIGHIN FLECTRICAL SYSTEMS	AL SYSTEMS	35 davs	Fri 3/23/07	Fri 5/11/07	AN	NA			ELECTRICAL CREW 1
107	GRILLES REGISTERS DIFFUSERS	DIFFUSERS	6 davs	Tue 3/20/07	Tue 3/27/07	NA	NA			
112	FINISH PAINT		15 days	Fri 3/23/07	Thu 4/12/07	NA	NA			
108	ACOUSTIC CEILING TLES	LES	7 days	Mon 3/26/07	Tue 4/3/07	NA	NA			T
110	TERRAZZO		15 days	Fri 3/30/07	Fri 4/20/07	NA	NA			TERRAZZO CREW 2
113	CERAMIC TILE		5 days	Thu 4/5/07	Wed 4/11/07	AN	NA			-18
109	GYMNASIUM EQUIPMENT	IN	8 days	Tue 4/10/07	Fri 4/20/07	NA	NA			
111	INSTALL WINDOW TEATWENTS	ATMENTS	2 dave	Mon 4/23/07	Tria APANT	AN	AN			ij.
118	INSTALL ENTRANCE MATS	AATS	3 days	Mon 4/23/07	Wed 4/25/07	NA	NA			18. aut
119	CARPET & VCT		10 days	Mon 4/23/07	Fri 5/4/07	NA	NA			.3
120	INSTALL PLUMBING FIXTURES	IXTURES	5 days	Mon 4/30/07	Fri 5/4/07	NA	NA			5
114	CASEWORK		10 days	Mon 5/7/07	Fri 5/18/07	NA	NA			1000 1000
121	TOLET PARTITIONS & ACCESS	ACCESS	3 days	Mon 5///0/	VVed 5/9/07	AN 1	NA			
011	INSTALL UTALKBUAKUS/TAUKBUARUS DOODS AND HADDWADE	AUS/IAUKBUARUS ADE	SVED C	70/07/2 UOM	10/07/C U-I	NA	NA			
171			cáphin	Inic 7/2 and						ા
	NORTHEAST WING		195 days	Mon 6/12/06	Mon 3/19/07	NA	NA	Đ		B
	INSTALL CONCRETE FOUNDATIONS	NDATIONS	8 days	Mon 6/12/06	Wed 6/21/06	NA	NA	CONCRETE CREW2	CREW2	•
174	INSTALL FOUNDATION MASONRY	SONRY	8 days	Thu 6/22/06	Mon 7/3/06	NA	NA	MASONRY CREW 2	Y CREW 2	
175	INSTALL U.G. UTLITES		10 days	Thu 6/22/06	Thu 7/6/06	NA	NA	HILP PLUMBING CREW 2	NG CREW 2	
176	INSTALL SLAB ON GRADE		6 days	Fri 7/7/05	Fri 7/14/06	NA	NA	III CONCI	III CONCRETE CREW 3	
177	ERECT STRUCTURAL STEEL	EL	15 days	Mon 7/17/06	Fri 8/4/06	NA	NA	S mm	WWW STEEL CREW 1	
185	INSTALL BLOCKING FOR FASCIA	ASCIA	8 days	Tue 8/1/06	Thu 8/10/06	AN	NA	1	CARPENTRY CREW 2	
179	PERIMETER CMU BACK-UP		15 days	Fn 8/4/05	Thu 8/24/06	NA	NA		MASONRY CREW 2	
188	INSTALL POOF FASCIA METAL STLINS	STAL STLINS	R dave	Trie R/R/DR	Thu 8/17/06	AN	AN			
183	INSTALL FOOT FROM MELIAL STUDY	I OPEN ROOF	5 davs	Fri 8/11/06	Thu 8/17/06	NAN	NA	90) 	ROOF CREW 1	
180	PERIMETER FACE BRICK		20 days	Thu 8/17/05	Thu 9/14/06	NA	NA	3	MASONRY CREW 3	EW 3
196	ROUGH IN PLUMBING		25 days	Thu 8/17/06	Thu 9/21/06	NA	NA			
207	INSTALL GUTTERS		7 days	Fri 8/18/06	Mon 8/28/06	NA	NA			
197	ROUGH IN SPRINKLER		10 days	Mon 8/21/06	Fri 9/1/06	NA	NA		THE OWNER OF THE OWNER OWNER OF THE OWNER OWNE	
193	LAYOUT INTERIOR WALLS		3 days	Tue 8/22/06	Thu 8/24/06	AN	NA			
192	KOUGH IN MECHANICAL PIPING	PING	12 days	90/97/8 UH	1 ue 9/12/06	AN S	NA			
194	INSTALL INTERIOR DOOR FRAMES	-RAMES	5 days	FI 8/25/05	Thu 8/31/06	AN 1	NA			
187	INSTALL RUCH FASCIA. INSTALL METAL PANELS		3 days	Mon 9/11/06	En 9/2/06	NA	NA		ROOF CREW 2	5
181	INTERIOR MASONRY		35 days	Wed 9/13/06	Tue 10/31/06	NA	NA		MAS	MASONRY CREW 5
									2000 a 200 a 2004	
		Task		Milestone	\$		Rolled Up Milestone	e 🔷	Baseine	
		Task Progress	and the second states the	Baseline Milestone	dilestone		Baseline SummTask		Milestone	
Project 0	Project: Official Schedule - baseline-66	Critical Task	And a subscription of the	Summary	b		Task Progress		Baseline Milestone	
nge i ne	40,00	Critical Task Progress		Rolled Up Task	Task men	and the second se	Critical Task	$\diamond$	Summary	
		Baseline			Rolled Up Critical Task		: Critical Task Progress	Concentration and SSB1	Rolled Up Task	4
						WALK AND ADDRESS A				

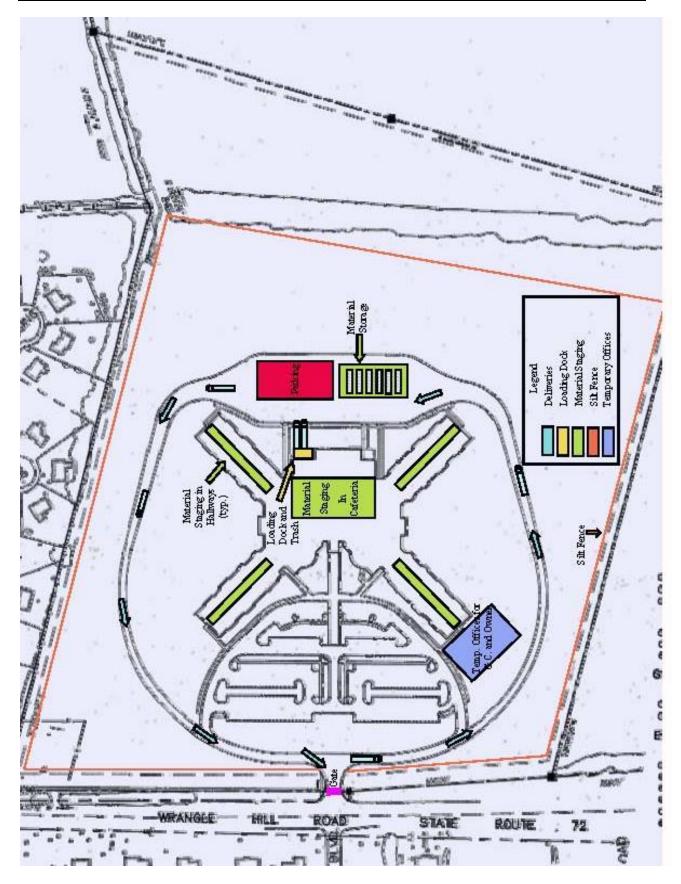
Task Name Rouch IN ELECTRICAL INSTALL WRIDOWS INSTALL WRIDOWS INSTALL WRIDOWS INSTALL WRIDOWS INSTALL WRIDOWS INSTALL RECTRICAL ROUGH INELECTRICAL IGHTS DEYWORD FILE INSTALL CELING FIL ACOUSTIC CELING FIL INSTALL ENTRANCE FIL INSTALL ENTRANCE FIL INSTALL LENTRANCE FIL INSTALL LENTRANCE FIL INSTALL CONDERCT INSTALL CONDERCT INSTALL CONDERCT INSTALL CONDERCT INSTALL CONDERCT INSTALL ELE PAREIDON GRA ROUGH INPLACE BRICHARICE INSTALL RELL PANEI INSTALL RELL RADICADOR ROUGH INFLUMENCE INSTALL RELL RADICADOR ROUGH INFLUMENCE INSTALL RELL PANEI INSTALL RECHANICA ROUGH IN RECHANICA INSTALL RECHANICA INSTALL RECHANICA ROUGH IN RECORDING ROUGH IN RECORDING ROUGH IN RECORD INSTALL METAL ROOF FASCIA INSTALL METARIANCE INSTALL METARIANCE INSTALL METARIANCE INSTALL METARIANCE INSTALL RECORDING ROUGH IN RECORDING ROUGH IN RECORDING ROUGH IN RECORDING ROUGH IN RECORDING INSTALL WEDANCE FASCIA INSTALL WEDANCE FASCIA INSTALL RECORDING ROUGH IN RECORD	Name Name	NAME RECORD IN THE CITICAL CONDUIT IN MASONRY INSTALL INCOMONS INSTALL INCOMONS BOROWING INCLECTRICAL SYSTEMS DERVINALL CELINGS DERVINALL CELINGS TERPORTAL UNITS ACOUSTIC CELING GRID UGHTS ACOUSTIC CELING GRID UGHTS ACOUSTIC CELING GRID UGHTS ACOUSTIC CELING GRID CARENOR ACOUSTIC CELING FILES TARAZZO CASEWOR INSTALL PULMENG FILES TARAZZO CASEWOR INSTALL PLUNENG FILES INSTALL PLUNENG FILES INSTALL PLUNENG ACTOR INSTALL PLUNENG ACTOR INSTALL CONCRETE FOURDATIONS INSTALL CHUNG ACTOR INSTALL CONCRETE FOURDATIONS INSTALL LOCONG FOR FASCIA RECOGHIN PLUNENG INSTALL LOCONG FOR FASCIA RECOGHIN PLUNENG INSTALL LOCONG FOR FASCIA RECOGHIN PLUNENG INSTALL LOCONG FOR FASCIA RECOGHIN PLUNENG INSTALL LUGHT INSTALL RECOR FOOR FASCIA RECOGHIN PLUNENG INSTALL LOCONG FOR FASCIA RECOGHIN PLUNENG INSTALL LUGHTS INSTALL RECOR FASCIA RECOGHIN PLUNENG INSTALL LUGHTS INSTALL RECOR FASCIA RECOGHIN PLUNENG INSTALL LICTOR INSTALL RECOR INSTALL LICTOR INSTALL RECOR INSTALL LICTOR INSTALL	Durabion         Durabion           35 days         35 days           5 days         5 days           5 days         5 days           10 days         10 days           11 days         10 days           12 days         12 days           13 days         13 days           14 days         10 days           15 days         10 days           17 days         10 days           18 days         3 days           19 days         10 days           10 days         10 days           15 days         10 days           15 days         10 days           16 days         10 days           17 days         10 days           15 days         10 days           15 days         10 days           15 days         10 days           15 days         10 days           10 days         10 days           10 days         10 days           10 days         10 days           10 days	Base         Monoch         Base         Monoch <th< th=""><th></th><th>Actual Start NA NA NA NA NA NA NA NA NA NA NA NA NA</th><th>ATTORE ALLANT AL</th><th></th><th>M 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4</th><th>Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar</th><th></th></th<>		Actual Start NA NA NA NA NA NA NA NA NA NA NA NA NA	ATTORE ALLANT AL		M 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Mar	
Project. Official Schedule - baseline-55 Date: Tue 4/8/08	è - baseline~66	Task Progress Task Progress Critical Task Progress Baseline			Milestone Baseline Milestone Summary Rolled Up Task Rolled Up Critical Task	*	Rolled Up Milestone Baseline SummTask Task Progress Critical Task Progress	ask d Straine	Baseline Milestone Baseline Milestone Summary Rolled Ub Task		

Table Non-Non-Non-Non-Non-Non-Non-Non-Non-Non-							EDIS 4	EDIS Company 4/10/06			
CTORDS         TORD         FUNDO         FUNDO <th< th=""><th>ID Tas</th><th>k Name</th><th></th><th>Duration</th><th>Baseline Start</th><th>Baseline Finish</th><th></th><th>Ш</th><th></th><th>-</th><th>tan Mar</th></th<>	ID Tas	k Name		Duration	Baseline Start	Baseline Finish		Ш		-	tan Mar
Image: constraint of	236	ROUGH IN ELECTRICAL SY	STEMS	18 days		Thu 1/18/07		AA			
1000         1000 <th< td=""><td>242</td><td>1ST COAT PAINT</td><td></td><td>10 days</td><td></td><td>Wed 1/10/07</td><td>ΝA</td><td>NA</td><td></td><td></td><td>Little Control of Cont</td></th<>	242	1ST COAT PAINT		10 days		Wed 1/10/07	ΝA	NA			Little Control of Cont
USE         1240         Mon 1950         To a 100         Mon 1950         Mon	243	ACOUSTIC CEILING GRID		17 days		Eri 1/26/07	NA	NA			
	247	LIGHTS		12 days		Tue 1/30/07	NA	NA			
Not         Not <td>248</td> <td>GRILLES REGISTERS DIFF</td> <td>USERS</td> <td>8 days</td> <td></td> <td>Tue 1/30/07</td> <td>NA.</td> <td>NA</td> <td></td> <td></td> <td></td>	248	GRILLES REGISTERS DIFF	USERS	8 days		Tue 1/30/07	NA.	NA			
Effer         Original         Markado         Markado <th< td=""><td>250</td><td>FINISH PAINT</td><td></td><td>15 days</td><td></td><td>Tue 2/13/07</td><td>AN 2</td><td>AN</td><td></td><td></td><td>1111111 Transmission</td></th<>	250	FINISH PAINT		15 days		Tue 2/13/07	AN 2	AN			1111111 Transmission
	249	ACOUSTIC CEILING TLES		V days		Thu 2/15/07	NA	NA			
	IC7	CASEWORK		20 GBYS 10 days		Mon 3/78/07	NA	AN NA			
EETS         3.00         0.0001000         100 <th< td=""><td>252</td><td>INSTALL PLIMBING FIXTUR</td><td>DES</td><td>5 dave</td><td></td><td>Mon 3/19/07</td><td>NAN</td><td>AN</td><td></td><td></td><td></td></th<>	252	INSTALL PLIMBING FIXTUR	DES	5 dave		Mon 3/19/07	NAN	AN			
Sile         Sile <th< td=""><td>265</td><td>INSTALL WINDOW TREATM</td><td>TENTS</td><td>2 days</td><td></td><td>Wed 3/14/07</td><td>NA</td><td>NA</td><td></td><td></td><td>Ð.,</td></th<>	265	INSTALL WINDOW TREATM	TENTS	2 days		Wed 3/14/07	NA	NA			Ð.,
CSC         State         Description         Not 4200	256	INSTALL ENTRANCE MATS		3 days		Thu 3/15/07	NA	NA			
NCCOORDEG         5 and b         B 2070 b         Non-4000 b         NM         NM           1	253	TOLET PARTITIONS & ACC	ESS	3 days		Thu 3/22/07	NA	NA			
Image: constraint of	245	INSTALL CHALKBOARDS/	ACKBOARDS	5 days		Mon 4/2/07	NA	NA			TT .
Noticity         Solide         Notacyclo         No	246	CARPET & VCT		10 days		Mon 4/9/07	NA	NA			1012
Sincert         Sincert         Tue         Concert         Co	254	DOORS & HARDWARE		5 days	Tue 3/27/07	Mon 4/2/07	NA	NA			-10
MONTONS         213-05         MONTONS         10-00         MONTONS         MONT									Ì		
MINIONS         TOTAL         MONTON         MONTON<		UTHEAST WING		Z15 days	1	I ue pi I pi01	NA	NA	Ð		
Norverti         Order         Description         New Net	807	INSTALL CUNCRETE FOUR	NUATIONS	10 08/5	100 1/1 1/00	MON //24/UB	AN NA	A.A.		AURELE UREW Z	
Image: constraint of constraints of constra	107	INSTALL FUUNDATION MA.	SUNKT.	0 UB/S		Mon 9/200	AN N	NN		DI IMBING CREW?	
El         1 dep         matrix	+	INCLUDE OF OUR INCOME		7 4440		Micel 011 011 00	NN N	VIN		TONICHETE CE	
m         constrained         m <th< td=""><td>+</td><td>EDECT STDI ICTI IDAL STDI</td><td></td><td>15 days</td><td>Thu 0/12/06</td><td>Wed 3/13/00</td><td>AN AN</td><td>AN</td><td></td><td>STEFI CR</td><td>SEW 1</td></th<>	+	EDECT STDI ICTI IDAL STDI		15 days	Thu 0/12/06	Wed 3/13/00	AN AN	AN		STEFI CR	SEW 1
	+	PERIMETER CMI I BACK. I F		15 dave	Thu 10/5/06	Wed 10/25/06	an N			MASO	DNRY CREW 2
FRANCE         20 Gap         Turu (10500         Neu (117100         Nu         <	+	INSTALL BLOCKING FOR F.	ASCIA	8 days	Thu 10/5/06	Mon 10/16/06	NA			CARPEI	ENTRY CREW 2
PRIG         55 apid         Thr (0A1206         Vold 115500         Not         Not <td>-</td> <td>ROUGH IN HVAC DUCT</td> <td></td> <td>20 days</td> <td>Thu 10/5/05</td> <td>Wed 11/1/06</td> <td>NA</td> <td>NA</td> <td></td> <td>HVA</td> <td>AC CREW 2</td>	-	ROUGH IN HVAC DUCT		20 days	Thu 10/5/05	Wed 11/1/06	NA	NA		HVA	AC CREW 2
ICOFED ROF         5 5ab         Ter (1705)         Mon (102300)         NM         NM           ETAL STLDS         1 6 april (1700)         Fin (102300)         NM         NM         NM           ETAL STLDS         1 6 april (1705)         Fin (1705)         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM         NM         NM         NM         NM           Image:         1 7 6 april (1710)         NM	-	ROUGH IN MECHANICAL PI	PING	25 days	F	Wed 11/15/06	A.N	NA		and the second s	
ETAL STUDS         8 dags         Ten 01706         Ten 117006         NM         NM           1 dags         Ten 01706         Fra 117100         NM         NM         NM           1 dags         Ten 01706         Wed 117006         NM         NM         NM           1 dags         Ten 01706         Wed 117006         NM         NM         NM           1 find         Wed 117006         NM         NM         NM         NM           1 find         Wed 117006         NM         NM         NM         NM           0 find         Wed 117006         NM         NM         NM         NM           0 find         Wed 11806         Wed 11806         NM         NM         NM           0 find         Wed 11806         Wed 11806         NM         NM         NM           0 find         Wed 11806         Ten 11200         NM         NM         NM           0 find         Wed 11806         Ten 11200         NM         NM         NM           0 find         Wed 11806         Ten 11200         NM         NM         NM           0 find         Wed 11806         Ten 11200         NM         NM         NM	-	INSTALL FELT PADS ON SI	LOPED ROOF	5 days		Mon 10/23/06	NA	NA		L ROOF	CREW 1
19 Gate         Ten 10/17/05         Fit 11/1005         NA         NA           1         10 Gate         Ten 01/17/16         Wea 11/2006         Na         NA           1         10 Gate         Ten 01/17/16         Wea 11/2006         Na         NA           1         10 Gate         Ten 01/17/16         Wea 11/2006         Na         NA           11S         3 Gate         Ten 02/2006         Na         NA         NA           01CNANGS         5 Gate         Ten 10/27/06         Ten 11/2006         NA         NA           01CNANGS         3 Gate         Weat 11/8006         NA         NA         NA           01CNANGS         3 Gate         Weat 11/8006         NA         NA         NA           01CNANGS         3 Gate         Weat 11/8006         NA         NA         NA           01CNANGS         3 Gate         Men 11/8007         NA         NA         NA           01CNUNGS         10 Gate         Veat 11/8007         NA         NA         NA           01CUTIN MASONEY         2 Gate         Men 12/8007         NA         NA         NA           01CUTIN MASONEY         2 Gate         Men 12/8007         NA         NA		INSTALL ROOF FASCIA ME	TAL STUDS	8 days		Thu 10/26/06	NA	NA		100	
Total         Total         Total         Total         Nucl. 107/06         Nucl. 102/06         Nucl. 102/0		ROUGH IN PLUMBING		19 days		Fri 11/10/06	NA	NA			
Image:         Notes         Nut         N		INSTALL GUTTERS		7 days		Wed 10/25/06	NA	AN		==3 ·	
No.         Statistic         Statistic         Number         Num	$\downarrow$	ROUGH IN SPRINKLER		10 days	Thu 10/19/06	Wed 11/1/06	AN	AN		and a	
FEAMES         5 days         Fi nuzziono biolitziono         Nun biolitziono	_			S days	100 10/20/00	T- 10/000	AN AN	AN NA		30	
Trivinus         3 dags         Min 116/06         Min 116/06 <td>_</td> <td>INSTALL KUOF FASCIA</td> <td>DAMEC</td> <td>8 days</td> <td>En 10/2//U6</td> <td>Thu 11//U5</td> <td>NA</td> <td>NA</td> <td></td> <td>2</td> <td></td>	_	INSTALL KUOF FASCIA	DAMEC	8 days	En 10/2//U6	Thu 11//U5	NA	NA		2	
OTICINIG         0 days         Mon 11600         Mon 11500         Na         NB           OTICINIG         0 days         Mon 11500         Na         NB         NB         NB           10 days         Mon 11500         Ten 11507         NA         NB         NB         NB           20 days         Min 11500         Ten 11507         NA         NB         NB         NB           20 days         Min 11500         Ten 12007         NA         NB         NB         NB           ONUTIT NMSONEY         35 days         Ten 12007         NA         NB         NB <td>_</td> <td>INSTALL INTERIOR DOORT</td> <td>TS</td> <td>3 davs</td> <td>Mon 11/6/06</td> <td>Wed 11/8/06</td> <td>NA</td> <td>AN</td> <td></td> <td>U .</td> <td></td>	_	INSTALL INTERIOR DOORT	TS	3 davs	Mon 11/6/06	Wed 11/8/06	NA	AN		U .	
10 days         10 days         Wed 118/06         Tue 112/106         NM         NM           19 days         Fn 128/06         Fn 129/07         NA         NA         NA           19 days         Fn 128/06         Fn 129/07         NA         NA         NA           20 days         Mod 118/06         Tue 112/07         NA         NA         NA           10 days         Tue 12/07         Mon 21/907         NA         NA         NA           10 days         Tue 12/07         Mon 21/907         NA         NA         NA           15 FEMS         10 days         Tue 12/07         NA         NA         NA           15 FEMS         10 days         Tue 12/907         NA         NA         NA           15 FEMS         10 days         Tue 12/907         NA         NA         NA           15 FEMS         10 days         Tue 22/070         NA         NA         NA           15 FEMS         10 days         Tue 22/070         NA         NA         NA           12 days         Tue 22/070         NA         NA         NA         NA           12 days         Tue 22/070         NA         NA         NA         NA     <		TEMPORARY HEAT & CON	DITIONING	0 days	Mon 11/6/06	Mon 11/6/06	NA	NA		- 🔿	
19 days         Fr 128/06         Fn 126/07         NA         NA           20 days         Tou 12070         Non 21907         NA         NA           CNDUT NASONRY         35 days         Tou 12070         Non 21907         NA         NA           CNDUT NASONRY         35 days         Tou 12070         Non 21907         NA         NA           STEMS         10 days         Tou 12070         Non 21907         NA         NA           STEMS         10 days         Tou 2007         NA         NA         NA           STEMS         10 days         Tou 2007         NA         NA         NA           STEMS         10 days         Tou 22507         NA         NA         NA           STEMS         10 days         Tou 22507         NA         NA         NA           STEMS         10 days         Tou 22507         NA         NA         NA           STEMS         12 days         Tou 22507         NA         NA         NA           STEMS         12 days         Tou 22507         NA         NA         NA           Steptores         Tou 23607         NA         NA         NA         NA           Steptores		INSTALL METAL PANELS		10 days	Wed 11/8/06	Tue 11/21/06	NA	NA			ROOF CREW 3
20 Garge         Mon 12/18/06         Tue 1/10/17         Mon 12/18/07         Nuk         <		INSTALL WINDOWS		19 days		Fri 1/5/07	AN	NA			WINDOW CREW 1
NSULTR MASONEY         35 days         Tue 1/20/0         Mon 2/1907         NA         NA           ONDUT NMSONEY         35 days         Tue 1/20/7         Mon 2/1907         NA         NA           1         10 days         Tue 1/20/7         Mon 2/1907         NA         NA           1         10 days         Tue 1/20/7         Mon 2/1907         NA         NA           1         10 days         Tue 2/2007         Mon 2/2607         NA         NA           1         10 days         Tue 2/2007         NA         NA         NA           1         10 days         Tue 2/2007         NA         NA         NA           1         10 days         Tue 2/2007         NA         NA         NA           1         12 days         Tue 2/2007         NA         NA         NA           20 days         Tue 2/13/07         NA         NA         NA         NA           20 days         Tue 2/13/07         NA         NA         NA         NA           20 days         Tue 2/13/07         NA         NA         NA         NA           1ask Progres         Tue 2/13/07         NA         NA         NA         NA		PERIMETER FACE BRICK		20 days		Tue 1/16/07	AN	NA			MASONRY CREW 3
ONDUIT IN MASONRY         35 days         The 1/207         Mon 2/1907         NA         NA           STEMS         10 days         Tue 2/1307         Mon 2/1907         NA         NA           STEMS         18 days         Tue 2/1307         Mon 3/1507         NA         NA           STEMS         18 days         Tue 2/2007         Mon 3/1507         NA         NA           17 days         Tue 2/2007         Mon 3/507         NA         NA         NA           12 days         Tue 2/2007         Mon 3/507         NA         NA         NA           20 days         Tue 2/2107         NA         NA         NA         NA           20 days         Tue 3/1307         Mon 4/507         NA         NA         NA           18 days         Tue 3/1307         Mon 4/507         NA         NA         NA           17 days         Tue 3/1307         Mon 4/507         NA         NA         NA           17 days         Tue 3/1307         Mon 4/507         NA         NA         NA           17 days         Tue 3/1307         Mon 4/507         NA         NA         NA           17 days         Tue 3/1307         Mon 4/507         Mon 4/507		INTERIOR MASONRY		35 days		Mon 2/19/07	NA	NA			MASONRY CREW 5
Tistem         10 days         Tue 2/13/07         Mon 3/5/07         NA         NA           15FMS         18 days         Tue 2/2007         The 3/15/07         NA         NA           16 days         Tue 2/2007         The 3/15/07         NA         NA           17 days         Tue 2/2007         Ma 3/5/07         NA         NA           17 days         Tue 2/2007         Ma 3/5/07         NA         NA           12 days         Tue 2/2/07         NA         NA         NA           12 days         Tue 2/2/07         NA         NA         NA           12 days         Tue 3/13/07         Mad 4/3/07         NA         NA           13 days         Task         Tue 3/13/07         Ma 4/3/07         NA           13 days         Task         Tue 3/13/07         Ma 4/3/07         NA           13 days         Task         Tue 3/13/07         Ma         Ma           13 days         Task         Tue 3/13/07         Ma 4/3/07         NA           13 days         Task         Mestone         Image and a base		ROUGH IN ELECTRICAL CO	ONDUIT IN MASONRY	35 days		Mon 2/19/07	NA	NA			
VSTEMS         18 days         The 220007         Thu 31507         NA         NA           10 days         The 220007         Mon 3507         NA         NA         NA           11 days         The 220007         Mon 3507         NA         NA         NA           11 days         The 220707         Mon 3507         NA         NA         NA           12 days         The 230707         Ved 32307         NA         NA         NA           12 days         The 23707         Ved 32307         NA         NA         NA           12 days         The 23707         Ved 32307         NA         NA         NA           12 days         The 23707         NA         NA         NA         NA           12 days         The 23707         NA         NA         NA         NA           12 days         The 31307         NA         NA         NA         Ma           13 days         Mestore         Elseline bummfask         Paseline Bummfask         Paseline Bummfask         Mestore           13 days         Summas         Baseline Bummfask         Paseline Bummin         Mestore         Elseline Bummin         Mestore           Critical Task         Summas <td></td> <td>DRYWALL CEILINGS</td> <td></td> <td>10 days</td> <td></td> <td>Mon 2/26/07</td> <td>NA</td> <td>NA</td> <td></td> <td></td> <td></td>		DRYWALL CEILINGS		10 days		Mon 2/26/07	NA	NA			
10 days         Tue 22:007         Mini 3507         NA         NA           17 days         Tue 22:107         Win 3507         NA         NA           17 days         Tue 22:107         NA         NA         NA           12 days         Tue 23:107         NA         NA         NA           20 days         Tue 23:107         NA         NA         NA           12 days         Tue 23:1307         Non 49:07         NA         NA           13 day         Tue 31:307         Mon 49:07         NA         NA           14sk         Progress         Beseline         Ministone         Milestone           Critical Task         Summany         Beseline Summaski         Milestone         Milestone           Critical Task         Non-49:07         NA         NA         NA         Milestone           Critical Task         Summany         Ease Progress         Milestone         Summany           Critical Task         Milestone         Summany         Summany         Summany		ROUGH IN ELECTRICAL SY	STEMS	18 days		Thu 3/15/07	NA	NA			
17 days     Tue 227/07     Wed 327/07     NA     NA       12 days     Tue 313/07     Fil 3/23/07     NA     NA       12 days     Tue 313/07     Fil 3/23/07     NA     NA       12 days     Tue 313/07     Fil 3/23/07     NA     NA       13 days     Tue 3/13/07     Mon 4/3/07     NA     NA       14 days     Task     Baseline Miestone     Paseline Miestone     Paseline Miestone       Critical Task     Summay     Sale Frogress     Paseline Miestone     Paseline Miestone       Critical Task     Summay     Paseline Miestone     Summay     Paseline Miestone       Critical Task     Summay     Paseline Miestone     Summay     Summay       Reseline     Immunitinititi     Paseline Miestone     Summay	4	1ST COAT PAINT		10 days		Mon 3/5/07	AN	NA			
Task     12 age     11 al 20 age     11 al 20 age     11 al 20 age       Task     20 days     Tue 313/07     Mon 413/07     NA     NA       Task     Assessment and a constraint and constraint and a constraint and a constraint and a constraint and	4	ACOUSTIC CEILING GRID		17 days		Wed 3/21/07	NA	NA			A CONTRACTOR OF A CONTRACTOR O
Task     Avoided Link     Milestone     Avoided Link     Milestone     Avoided Link       Task Progress     Milestone     Avoided Link     Milestone     Avoided Link       Critical Task     Milestone     Avoided Link     Milestone     Avoided Link       Critical Task     Milestone     Baseline Milestone     Avoided Link     Milestone       Critical Task     Milestone     Milestone     Avoided Link     Milestone       Critical Task     Milestone     Summary     Milestone     Milestone       Reseline Milestone     Milestone     Summary     Milestone     Milestone	+	TEDD&770		20 4845	F	Mon 4/0/07	NA NA	AN			TERRA770 CRFW 1
Task     Managementant     Milestone     Easeline       Task Progress     Managementant     Beseine Milestone     Easeline       Critical Task     Milestone     Easeline     Milestone       Critical Task     Milestone     Task Progress     Milestone       Reserve     Reserve     Task Progress     Milestone       Reserve     Reserve     Critical Task     Summary       Reserve     Reserve     Critical Task     Summary	_	IEKKW770		50 0B/8	Injelie ani	MUI 413101	WN.	VN.			
Task Progress and Allestone Control Task Progress and Progress			Task	12		\$		Rolled Up Mil		Baseline	
Critical Task Concertask Summary Task Progress IIIIIIIIIIIIIIIII Baseline Milestone Critical Task Progress IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII			Task Progress	and the second se	Baseline h	1		Baseline Sur	Ð	Milestone	
Critical Task Progress	oct Of	ficial Schedule - baseline~66	Critical Task		Summary			Task Progres		Baseline Milestone	Character and the
Critical Tack Priories and an Critical Tack	AD	00,001	Critical Task Progress	18		Task		Critical Task	$\diamond$	Summary	Common and a second
			Baseline			al Task				Rolled Up Task	-

						41	4/10/06			
288 290 289	Task Name		Duration	Baseline Start	Baseline Finish Actual Start	_	Actual Mor	Maco La	000	Los Marc Marc
290 289 291	GRILLES REGISTERS DIFFUSERS	SERS	8 days	Wed 3/14/07	Fri 3/23/07		AN			
289	FINISH PAINT		15 days	Thu 3/15/07	Vved 4/4/07	NA	NA			
291	ACOUSTIC CEILING TILES		7 days	Wed 3/21/07	Thu 3/29/07	NA	NA			
200	CASEWORK		10 days	Tue 4/10/07	Tue 4/24/07	NA	AN			
667	INSTALL FLUMBING FLATURES INSTALL WINDOW TREATMENTS	LS NTC	o days	Tue 4/10/07	106 4/11/0/	AN	NA			1
299	INSTALL ENTRANCE MATS		3 davs	Tue 4/10/07	Thu 4/12/07	NA	AN AN			-
296	TOILET PARTITIONS & ACCESS	SS	3 davs	Wed 4/18/07	Fri 4/20/07	NA	NA			1
292	INSTALL CHALKBOARDS/TACKBOARDS	CKBOARDS	5 days	Wed 4/25/07	Tue 5/1/07	NA	NA			, II
293	CARPET & VCT		10 days	Wed 4/25/07	Tue 5/8/07	NA	NA			
297	DOORS & HARDWARE		5 days	Vied 5/9/07	Tue 5/15/07	NA	NA			3
300	SOLITUMEST WIND		240 dame	Thu 70706	Thu 6PA01	VIV	NA	E		I
	INSTALL CONCRETE FOI INDATIONS	ATIONS	10 days	BUTCIT Int	Wed 8/0/06	NA	NA	•	CONCRETE CREW 1	•
303	INSTALL CONSTRUCTION MASONEY	NBV	8 riaus	Thu stame	Mon 8/14/06	NA	NA		MASONRY CREW 1	
304	INSTALL U.G. UTILITES		10 days	Thu 8/10/06	Wed 8/23/06	NA	NA	24	PLUMBING CREW 1	1
305	INSTALL SLAB ON GRADE		7 days	Thu 8/24/06	Fri 9/1/06	NA	NA		III CONCRETE CREW 3	E M 3
306	ERECT STRUCTURAL STEEL		15 days	Thu 9/28/06	Wed 10/18/06	NA	NA		11111	
307	PERIMETER CMU BACK-UP		15 days	Thu 10/19/06	Wed 11/8/06	NA	NA		TITITI:	
313	INSTALL BLOCKING FOR FASCIA	SCIA	8 days	Thu 10/19/06	Mon 10/30/06	NA	AN		CAF	CARPENTRY CREW 2
324	ROUGHIN HVAC DUCT		20 days	Thu 10/19/06	Wed 11/15/06	NA	NA			
323	ROUGH IN MECHANICAL PIPING INSTALL FELT PADS ON SLOPED BOOS		SVED 62	True 10/26/06	Fn 12/1/06	AN NA	NA NA			
314	INSTALL FELL FAUS ON SLOFED ROOT INSTALL POOF FASCIA METAL STUDS	AL STUDS	8 dave	Tile 10/31/06	Thu 11/2/00	AN AN	AN AN			
325	ROUGH IN PLUMBING	0000	20 davs	Tue 10/31/06	Wed 11/29/06	NA	NA			
308	PERIMETER FACE BRICK		20 days	Thu 11/2/06	Fri 12/1/06	NA	NA			
326	ROUGH IN SPRINKLER		10 days	Thu 11/2/06	Wed 11/15/06	NA	NA			
311	INSTALL MECHANICAL UNITS	0	5 days	Thu 11/9/06	Wed 11/15/06	NA	NA		-3	
315	INSTALL GUTTERS		7 days	Fn 11/10/06	Mon 11/20/06	NA	NA.			
316	INSTALL ROOF FASCIA		8 days	Tue 11/21/06	Mon 12/4/06	AN	AN N			ROOF CREW 2
202	IN ERIOR MASONET POLICHINELECTRICAL COMPLETINI MASON DV	DULT IN MACONDV	20 days	MOD 12/4/06	The: 1/23/07	AN NA	NA			
317	INSTALL METAL PANELS	THUCKIN NI INCONST	10 days	Tue 12/5/06	Mon 12/18/06	NA	AN AN			ROOF CREW 3
322	ROUGHIN ELECTRICAL SYSTEMS	TEMS	18 days	Fri 1/5/07	Tue 1/30/07	NA	NA			Control of
320	INSTALL WINDOWS		19 days	Mon 1/8/07	Thu 2/1/07	NA	NA			WINDOW CREW 1
310	DRYWALL CELINGS		10 days	Wed 1/17/07	Tue 1/30/07	NA	NA			ALLER .
327	1ST COAT PAINT		10 days	Thu 1/25/07	Wed 2/7/07	NA	NA			and a second sec
328	ACOUSTIC CEILING GRID		11 days	Fn 2/20/	Mon 2/26/07	NA	NA.			
330	GRILES REGISTERS DIFFUSERS	SFRS	8 davs	Mon 2/19/07	10/02/2 DeVV	NA	AN NA			-111-
332	FINISH PAINT		15 days	Tue 2/20/07	Mon 3/12/07	NA	NA			
331	ACOUSTIC CEILING TILES		7 days	Vied 3/7/07	Thu 3/15/07	NA	NA			
337	TERRAZZO		18 days	Mon 4/9/07	Thu 5/3/07	NA	A N			
318	CARPET & VCT		10 days	Fn 5/4/07	Thu 5/17/07	NA	NA NA			
335	INSTALL WINDOW TREATMENTS	NTS	2 dave	Fri 5/4/07	Mon.5/2/07	NA	AN NA			1
336	INSTALL ENTRANCE MATS		3 davs	Eni 5/4/07	Tue 5/8/07	NA	NA			• 3
338	INSTALL PLUMBING FIXTURES	S	5 days	Eri 5/4/07	Thu 5/10/07	NA	NA			a 38
		Task	2010/00/00/00/00/00/00/00/00/00/00/00/00/	Milestone			Rolled Up Milestone	0	Baseline	
		Task Progress	ADDRESS DESCRIPTION OF THE PROPERTY OF THE PRO	as Baseline Milestone	filestone		Baseline SummTask			
Project Date: Tu	Project Official Schedule - baseline~66 Date: Tue 4/8/08	Critical Task		·- Summary			Task Progress			Comments and the second s
		Critical Task Progress		📷 Rolled Up Task	Task	and the second second	Critical Task	0	Summary	
		Baseline			Rolled Up Critical Task		Critical Task Progress	ress announcementation	Rolled Up Task	\$
						a.	Page 7			

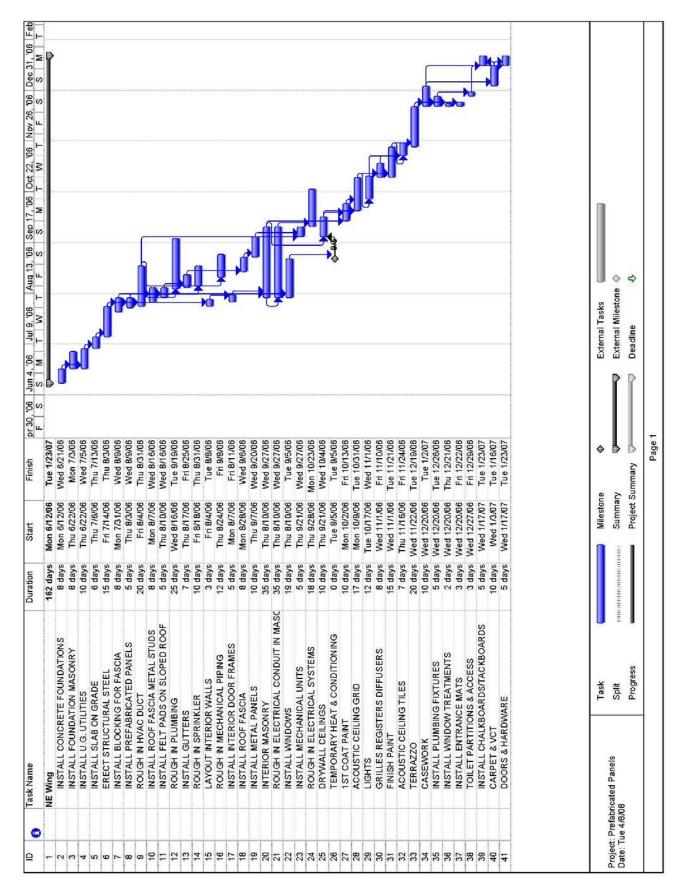
Indivination         Description         State         Restrict Freih         Annal Set	D Task Name					4	4/10/06					
TOCE         TOCE <th< th=""><th></th><th></th><th>-</th><th></th><th></th><th>Actual Start</th><th></th><th>,-</th><th>-</th><th>Inn</th><th>3</th></th<>			-			Actual Start		,-	-	Inn	3	
Docsss Luedbounds         3 and         Fristion         Instand         Nu         Nu           Refin         Number of the component of the	339 TOLET PARTITIONS & AC	DOESS	3 days	Wed 5/9/07	Fri 5/11/07	NA	AN N			IDMI IDA	Inc	
Instruct Counciency         Cade         Findual counciency         Cade         Findual counciency	L		3 days	Fri 5/18/07	Tue 5/22/07	NA	NA					
Matrix International	334 INSTALL CHALKBOARDS	S/TACKBOARDS.	5 days	Fri 5/18/07	Thu 5/24/07	NA	NA			1.3		
BUNGE         TOPONE         TOPONE         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         1 0 0 m         NM 1000         NM 1000         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         1 0 0 m         NM 1000         NM 1000         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         1 0 0 m         NM 1000         NM         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         1 0 0 m         NM         NM         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         1 0 0 m         NM         NM         NM         NM           FIFTUL CONCRETE CONTINUESCIAT         0 0 m         NM         NM         NM         NM           FIFTUR COULD         0 0 m         NM         NM         NM         NM         NM           FIFTUR COULD         0 0 m         NM         NM         NM         NM         NM         NM         NM           FIFTUR COULD         0 0 m         NM	349									3		
Instruct Condense February         Instruct Condense February <th< th=""><td></td><td></td><td></td><td>Mon 10/2/06</td><td>Thu 3/22/07</td><td>AN</td><td>NA</td><td></td><td>₽</td><td></td><td></td></th<>				Mon 10/2/06	Thu 3/22/07	AN	NA		₽			
Instruct Conventionationary         Instruct Conventionationany         Instruct Conventionationary <t< th=""><td></td><td>UNDATIONS</td><td>10 days</td><td>Mon 10/2/05</td><td>Fri 10/13/05</td><td>NA</td><td>NA</td><td></td><td>CONCR</td><td>tETE CREW 1</td><td></td></t<>		UNDATIONS	10 days	Mon 10/2/05	Fri 10/13/05	NA	NA		CONCR	tETE CREW 1		
Instruct use final decision         2 app         The instruction         2 app         Mm instruction         Mm instruction <th instruct<="" mm="" th=""><td></td><td>ASONRY</td><td>7 days</td><td>Thu 10/12/06</td><td>Fri 10/20/05</td><td>NA</td><td>NA</td><td></td><td>MASO</td><td>INRY CREW 1</td><td></td></th>	<td></td> <td>ASONRY</td> <td>7 days</td> <td>Thu 10/12/06</td> <td>Fri 10/20/05</td> <td>NA</td> <td>NA</td> <td></td> <td>MASO</td> <td>INRY CREW 1</td> <td></td>		ASONRY	7 days	Thu 10/12/06	Fri 10/20/05	NA	NA		MASO	INRY CREW 1	
Instrut Sub Could         5 dag         Min 102000         Ind         Min         Min           FRAMETER CAU JACAUD         0 dag         Ind 117000         Ind 117000         Min         Missoner Ceewa         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 117000         Ind 117000         Missoner Ceewa         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 117000         Missoner Ceewa         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 117007         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 117007         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 117007         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 11707         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 11707         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 11707         Nix         Nix         Missoner Ceewa           INSTALL WOOD RIGSES & BLOCKWO         8 dag         Ind 11707         Nix </th <td></td> <td></td> <td>2 days</td> <td>Thu 10/19/06</td> <td>Fri 10/20/05</td> <td>NA</td> <td>NA</td> <td></td> <td>PLUM</td> <td>BING CREW 1</td> <td></td>			2 days	Thu 10/19/06	Fri 10/20/05	NA	NA		PLUM	BING CREW 1		
FERMETER CMU BOOCU         640         Int 172/05         Int 172/05         Int 172/06         Int 172/07         Int 172/07 <thint 07<="" 172="" th="">         Int 172/07         Int 172</thint>		U		Aon 10/23/06	Fri 10/27/05	NA	NA		L CON	ICRETE CREW 3		
NETAL SULFACE CNU         8 days NETAL SULFACE CNU         8 days Net TAL SUL NETAL SUCO SULFACE CNU         8 days Net TAL SULFACE CNU         8 days Net TAL SULFACE NETAL SUCO SULFACE NETAL SURVEL SET CLOCKUE         8 days Net TAL SURVEL SET CLOCKUE         8 days Net TAL SURVEL SET CLOCKUE         N day Net CLOCKUE         N days Net TAL SURVEL SET CLOCKUE         N days Net CLOCKUE         N days Net TAL SURVEL SET CLOCKUE         N days Net TAL SURVEL STERNE         N days N days		UP		Tue 11/21/06	Thu 11/30/05	NA	NA		c	IIII MASONRY CREW 3		
Instrutt wood Fracesis all ocnore         3 days         Wed 12,000         Tur 271406         Not         Tur 271406         Not         Not           INCERNARCAL         3 days         Tur 271406         Not         Yand         Not         Not <td< th=""><td>1</td><td>Ð</td><td></td><td>Fri 12/1/06</td><td>Tue 12/12/05</td><td>NA</td><td>NA</td><td></td><td></td><td>MASONRY CREW 3</td><td></td></td<>	1	Ð		Fri 12/1/06	Tue 12/12/05	NA	NA			MASONRY CREW 3		
MECHARICIL         MECHARICIL         MACCRENT         3 days         Thu 121/400         MA         MA         MA           FUMBRIG         FUMBRIG         May         En 12/300         May 1700         NA         NA         NA           FUMBRIG         FUMBRIG         FUMBRIG         Adys         En 12/300         May 1700         NA         NA           FUMBRIG         APROCRENT         3 days         Thu 171/10         Wed 1700         NA         NA           FNUMBRIG         STAL         3 days         Thu 171/10         Wed 1700         NA         NA           FNUMBRIG         3 days         Thu 171/10         Wed 1700         NA         NA         NA           FNUML         STAL         Star         Thu 171/10         Wed 1700         NA         NA           FNUML         Star         Thu 171/10         Wed 171/10         NA         NA         NA           FNUML         Star         Thu 171/10         Wed 171/10         NA         NA         NA           FNUML         Star         Thu 171/10         Ned 171/10         NA         NA         NA           FNUML         COGNER         3 days         Thu 171/10         NA         N		S & BLOCKING		Ved 12/20/06	Tue 1/2/07	NA	NA			CARPENTRY CREW 1		
FUMBRIG         FUMBRIG <t< th=""><td>+</td><td></td><td></td><td>Thu 12/14/06</td><td>Mon 12/18/05</td><td>NA</td><td>NA</td><td></td><td></td><td>I HVAC CREW 1</td><td></td></t<>	+			Thu 12/14/06	Mon 12/18/05	NA	NA			I HVAC CREW 1		
Instrut Simulation         Individual         Wed (1700)         Wed (1700) <th< th=""><td>+</td><td></td><td>4 davs</td><td>Fri 12/29/06</td><td>Thu 1/4/07</td><td>NA</td><td>NA</td><td></td><td></td><td>III PLUMBING CREW 3</td><td></td></th<>	+		4 davs	Fri 12/29/06	Thu 1/4/07	NA	NA			III PLUMBING CREW 3		
ONG CELING         5 days         Thu 17/107         Wed 17/707         Na         Na         Na           INSTALL OVERHEAD DOORS         3 days         Thu 17/1807         Mon 122207         NA         NA         NA           INSTALL OVERHEAD DOORS         3 days         Thu 17/1807         Mon 122207         NA         NA           INSTALL OVERHEAD DOORS         3 days         Thu 17/1807         Mon 122207         NA         NA           INSTALL OVERHEAD DOORS         3 days         Thu 17/1807         Fn 17/1807         NA         NA           INSTALL OVERHEAD DOORS         3 days         Verd 31/407         Mon 122207         NA         NA           INSTALL OVERHEAD FOORS         3 days         Verd 31/407         NA         NA         NA           ROUGHINELECTRICAL CONTINAMSONRY         3 days         Tue 22/307         NA         NA         NA           INSTALL OVERHEAD FOORS         3 days         Tue 22/307         NA         NA         NA           BULDNG FEDRICAL SYSTEMIN         0 days         Tue 22/307         NA         NA         NA           BULDNG FEDRICAL SYSTEMIN         0 days         Tue 22/307         NA         NA         NA           BULDNG FEDRICAL SYSTEMIN         0 day		FATHING	6 davs	Wed 1/3/07	Wed 1/10/07	NA	NA			u ROOF CREW 1		
Instruct OVERHEAD DOORS         3 days         Thu 1/1807         Mm 1/2200         Na         Na         Na           DOOSS & HAEDWARE         2 days         Thu 1/1807         Fn 1/1807<			5 davs	Thu 1/11/07	Wed 1/17/07	NA	NA			II DRYWALL CREW 1		
DOORS & HARDWARE         Z days         Thu 1/1607         Fin 1/1607         NA         NA         NA           ROUGHINELECTREAL CONDIT NMASONRY         2 days         Fin 1/1607         NA         NA         NA         NA           ROUGHINELECTREAL CONDIT NMASONRY         13 days         Fin 2/2307         Tue 3/1307         NA         NA         NA           ROUGHINELECTREAL CONDIT NMASONRY         13 days         Fin 2/2307         Tue 3/1307         NA         NA           ROUGHINELECTREAL SYSTEMS         3 days         Fin 2/2307         NA         NA         NA           BULDMGENCY         3 days         Tue 3/2307         NA         NA         NA           BULDMGENCY         0 days         Tue 2/2007         Tue 2/2007         NA         NA           BULDMGENCHEC         0 days         Tue 2/2007         Tue 2/2007         NA         NA           BULDMGENCHEC         0 days         Tue 2/2007         Tue 2/2007         NA         NA           BULDMGENCHEC         0 days         Tue 2/2007         Tue 2/2007         NA         NA           BULDMGENCHEC         0 days         Tue 2/2007         Tue 2/2007         NA         NA           SUBSTANTAL COMPLETON         0 days		ORS	3 davs	Thu 1/18/07	Mon 1/22/07	NA	NA			III OVH DOOR CREW 1		
ROUGH NELECTRICAL CONDUT NAMSONRY         13 days         F. 22300         Tue 31307         NA         NA         NA           ROUGH NELECTRICAL CONDUT NAMSONRY         13 days         F. 22300         Tue 31307         NA         NA         NA         NA           ROUGH IN ELECTRICAL CONDUT NAMSONRY         3 days         Tue 31307         NA         NA         NA         NA         NA           UGHTNG         3 days         Tue 32007         Tue 31307         NA         NA         NA         NA           ULOFTNG         3 days         Tue 27307         Tue 21307         NA         NA         NA           BULDING ENCLOSED         0 days         Tue 22007         Tue 21307         NA         NA         NA           BULDING ENCLOSED         0 days         Tue 22007         Tue 27307         NA         NA         NA           BULDING ENCLOSED         0 days         Tue 22007         Tue 27307         NA         NA         NA           BULDING ENCLOSED         0 days         Tue 27307         Tue 27307         NA         NA           BULDING ENCONDITIONED         0 days         Tue 27307         Tue 27307         NA         NA           BULDING ENCONDITIONED         0 days <t< th=""><td>-</td><td></td><td>2 dave</td><td>Thu 1/18/07</td><td>Eri 1/19/07</td><td>NA</td><td>NA</td><td></td><td></td><td>CARPENTRY CREW 1</td><td></td></t<>	-		2 dave	Thu 1/18/07	Eri 1/19/07	NA	NA			CARPENTRY CREW 1		
ROUGH NELECTRICAL SYSTEMS         4 days         Wed 3/14/07         Mm 3/1907         N M         N M           UGHTNG         UGHTNG         3 days         Tue 32007         Tuu 3/2207         N M         N M           UGHTNG         0 days         Tue 2/3007         Tue 2/307         Tue 2/307         Tue 2/307         N M         N M           BULDING ENCLOSED         0 days         Tue 2/307         Tue 2/307         N M         N M           BULDING ENCLOSED         0 days         Tue 2/307         Tue 2/307         N M         N M           BULDING ENCLOSED         0 days         Tue 2/307         Tue 2/307         N M         N M           BULDING ENCLOSED         0 days         Tue 2/307         Tue 2/307         N M         N M           BULDING ENCLOSED         0 days         Tue 2/307         N M         N M         N M           BULDING ENCLON         0 days         Tue 2/2007         N M         N M         N M           SUBSTANTIAL COMPLETE & CONDITIONED         0 days         Tue 2/307         N M         N M           BULDING ENCLON         0 days         Tue 2/307         N M         N M         N           COMPLETE ALL PUNCHUST ACTIVITES         19 days         M M M </th <td></td> <td>CONDUIT IN MASONRY</td> <td>13 davs</td> <td>Fri 2/23/07</td> <td>Tue 3/13/07</td> <td>NA</td> <td>NA</td> <td></td> <td></td> <td>TUDI.</td> <td></td>		CONDUIT IN MASONRY	13 davs	Fri 2/23/07	Tue 3/13/07	NA	NA			TUDI.		
LIGHTING         3 days         Tue 32007         Thu 37207         Th		SYSTEMS	4 days	Wed 3/14/07	Mon 3/19/07	NA	NA			ELECTRICAL CREW 1		
BULDING ENCLOSED         0 days         Tue 2/1307         Tue 2			3 days	Tue 3/20/07	Thu 3/22/07	NA	NA			ELECTRICAL CREW 1		
BULDING ENCLOSED         0 days         Tue 21307         N.H.         N.												
BULDING HEATED & CONDITIONED         0 days         Tue 22007         Tue 22007         NA         NA           BULDING HEATED & CONDITIONED         0 days         Fit 0.1507         Tue 22007         NA         NA           SUBSTATIFIL COMPLETION         0 days         Fit 0.1507         Fit 0.1507         NA         NA           SUBSTATIFIL COMPLETION         0 days         Fit 0.1507         NA         NA         NA           CLOSEOUT         19 days         Mon 6/1807         Fit 7/1307         NA         NA           COMPLETE ALL PUNCHUST ACTIVITIES         19 days         Mon 6/1807         Fit 7/1307         NA         NA           ENAL         COMPLETE ALL PUNCHUST ACTIVITIES         19 days         Mon 6/1807         Fit 7/1307         NA         NA           ENAL         COMPLETE ALL PUNCHUST ACTIVITIES         19 days         Mon 6/1807         Fit 7/1307         NA         NA           ENAL         COMPLETE ALL PUNCHUST ACTIVITIES         19 days         Mon 6/1807         Fit 7/1307         NA         NA			0 days	Tue 2/13/07	Tue 2/13/07	AN	NA			\$		
SUBSTATINL COMPLETION     0 days     Fn 6/15/07     Fn 6/15/07     NA     NA       CLOSEOUT     19 days     Mon 6/18/07     Fn 7/13/07     NA     NA       CLOSEOUT     19 days     Mon 6/18/07     Fn 7/13/07     NA     NA       COMPLETE ALL PUNCHLIST ACTIVITIES     19 days     Mon 6/18/07     Fn 7/13/07     NA     NA       EINAL COMPLETE ALL PUNCHLIST ACTIVITIES     19 days     Mon 6/18/07     Fn 7/13/07     NA     NA		IONED	0 days	Tue 2/20/07	Tue 2/20/07	NA	NA			\$		
SUBSTANTIAL COMPLETION U days FR0150/ Pr 6/150/ Pr 6/150/ NA NA COMPLETION 19 days Mon 6/180/7 Fr 7/1307 NA NA COMPLETE ALL PUNCHLIST ACTIVITIES 19 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 19 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 19 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/1307 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Mon 6/180/7 Fr 7/130/7 NA NA ENVIRES 10 days Fr 7/130/7 A MA MA MA ENVIRES 10 days Fr 7/130/7 A MA MA MA ENVIRES 10 days Fr 7/130/7 A MA M							4					
CLOSEOUT     19 days     Mon 6/1807     Fri 7/1307     NA     NA       COMPLETE ALL PUNCHLIST ACTIVITIES     19 days     Mon 6/1807     Fn 7/1307     NA     NA       EINAL COMPLETE ALL PUNCHLIST ACTIVITIES     19 days     Mon 6/1807     Fn 7/1307     NA     NA			0 days	FII 6/15/07	Fn 6/15/07	AN	AN			\$		
COMPLETE ALL PUNCH LIST ACTIVITIES 19 days Mon 6/18/07 Fin 7/13/07 NA				Mon 6(18107	EH 701307	NA	MA					
COMPLETE ALL PUNCH LIST ACTIVITIES     19 days     Mon 6/18/07     Fin 7/13/07     NA     NA       EINAL COMPLETE ALL PUNCH LIST ACTIVITIES     0 days     En 7/13/07     NA     NA												
ENAL COMPLETION 0.45445 En 2013/07 NA NA NA		LIST ACTIVITIES	19 days	Mon 6/18/07	Fri 7/13/07	NA	NA			TOTOTO DE LA COMPANYA		
D device Eri 7/13.07 Eri 7/13.07 NA NA												
	368 FINAL COMPLETION		0 days	Fri 7/13/07	Fri 7/13/07	NA	NA			\$		
		Task	one and the second s	Milestone	٩		Rolled Up Milestone		Baseline			
ARRAGAMMARARAMARAMARAMARAMARAMARAMARAMAR		Task Progress		Baseline M	lestone 🔷		Baseline SummTask		Milestone			
Task zazazzazzazzazzazzazzazzazzazzazzazzazz	oject Official Schedule - baseline~6t ate: Tue 4/8/08			Summary			Task Progress		Baseline Milestone	<u>6</u>		
Task     xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		Critical Task Progress		Rolled Up T				\$	Summary			
Second concentration         Milestone         Second concentration         Second concentration         Second concentration         Baseline           Second concentration         Second concen		Baseline		Rolled Up C	Rolled Up Critical Task		<ul> <li>Critical Task Progress</li> </ul>	55 presentationentition	Rolled Up Task	\$		

Appendix C Site Layout Plan



Appendix D Prefabrication on Wrangle Hill

<u>с</u>	Task Name		Duration	Start	Finish	Predecessors	pr 30, ' Jun 4	Jun 4, '0 Jul 9, '06 Aug 13,	g 13, ' Sep 17	, Oct 22	, ' Nov 26, ' Dec 31	31, ' Feb 4,
	NE Wind		175 davs	Mon 6/12/06	Fri 2/9/07					A		
2	INSTALL CONCRE	INSTALL CONCRETE FOUNDATIONS	8 days	Mon 6/12/06	Wed 6/21/06					101010		>
3	INSTALL FOUNDA	INSTALL FOUNDATION MASONRY	8 davs	Thu 6/22/06	Mon 7/3/06 2	2	1	<b>J</b>				1211112
4	INSTALL U.G. UTILITIES	ILITIES	10 days	Thu 6/22/06	Wed 7/5/06 2	10	1	vŕ	1810101			
5	INSTALL SLAB ON GRADE	N GRADE	6 days	Thu 7/6/06	Thu 7/13/06 4	4						
9	ERECT STRUCTURAL STEEL	JRAL STEEL	15 days	Fri 7/14/06	Thu 8/3/06 5	5	1	ĺ				
7	INSTALL BLOCKING FOR FASCIA	NG FOR FASCIA	8 days	Mon 7/31/06	Wed 8/9/06	Wed 8/9/06 6FS-4 days			0101010			
8	PERIMETER CMU BACK-UP	J BACK-UP	15 days	Thu 8/3/06	Wed 8/23/06 6FS-1 day	6FS-1 day	1		ſ			
<b>0</b>	ROUGH IN HVAC DUCT	DUCT	20 days	Fri 8/4/06	Thu 8/31/06 6	6	1					
10	INSTALL ROOF F.	INSTALL ROOF FASCIA METAL STUDS	8 days	Mon 8/7/06	Wed 8/16/06 7FS-3 days	7FS-3 days						
11	INSTALL FELT PA	INSTALL FELT PADS ON SLOPED ROOF	5 days	Thu 8/10/06	Wed 8/16/06 7	7						
12	PERIMETER FACE BRICK	E BRICK	20 days	Wed 8/16/06	Tue 9/12/06	Tue 9/12/06 8FS-6 days		Ţ	Í			
13	ROUGH IN PLUMBING	BING	25 days	Wed 8/16/06	Tue 9/19/06	Tue 9/19/06 9FS-12 days		<b>•</b>				
14	INSTALL GUTTERS	3S	7 days	Thu 8/17/06	Fri 8/25/06 11							
15	ROUGH IN SPRINKLER	JKLER	10 days	Fri 8/18/06	Thu 8/31/06	Thu 8/31/06 9FS-10 days			-			
16	LAYOUT INTERIOR WALLS	DR WALLS	3 days	Fri 8/4/06	Tue 8/8/06 6	9		6				
17	ROUGH IN MECHANICAL PIPING	IANICAL PIPING	12 days	Thu 8/24/06	Fri 9/8/06	Fri 9/8/06 9FS-6 days			0			
18	INSTALL INTERIC	INSTALL INTERIOR DOOR FRAMES	5 days	Wed 8/9/06	Tue 8/15/06 16	16	1	6				
19	INSTALL ROOF FASCIA	ASCIA	8 days	Mon 8/28/06	Wed 9/6/06 14	14	1		t d			
20	INSTALL METAL PANELS	PANELS	10 days	Thu 9/7/06	Wed 9/20/06 19	19	1					
21	INTERIOR MASONRY	NRY	35 days	Thu 8/24/06	Wed 10/11/06 8,18	8,18	1	T		F		
22	ROUGH IN ELECT	ROUGH IN ELECTRICAL CONDUIT IN MASONRY	35 days	Thu 8/24/06	Wed 10/11/06 21SS	21SS		3				
23	INSTALL WINDOWS	NS	19 days	Wed 9/13/06	Mon 10/9/06 8,12	8,12			Í	0101010		
24	INSTALL MECHANICAL UNITS	NICAL UNITS	5 days	Thu 9/21/06	Wed 9/27/06 20,9	20,9			,			
25	ROUGH IN ELECT	ROUGH IN ELECTRICAL SYSTEMS	18 days	Thu 10/12/06	Mon 11/6/06 22	22						
26	DR YWALL CEILINGS	les	10 days	Tue 10/10/06	Mon 10/23/06	Mon 10/23/06 27,21FS-5 days				ſ		
27	TEMPORARY HE	TEMPORARY HEAT & CONDITIONING	0 days	Mon 10/9/06	Mon 10/9/06 23	23			\$	6/01		
28	1ST COAT PAINT		10 days	Thu 10/19/06	Wed 11/1/06	Wed 11/1/06 26FS-3 days,21						
29	ACOUSTIC CEILING GRID	NG GRID	17 days	Thu 10/26/06	Fri 11/17/06	Fri 11/17/06 26,28FS-5 days			1010101	J		
30	LIGHTS		12 days	Fri 11/3/06	Mon 11/20/06	Mon 11/20/06 29FS-11 days	1		0101010	ļ	-	
31	GRILLES REGIST	GRILLES REGISTERS DIFFUSERS	8 days	Mon 11/20/06	Wed 11/29/06 29	29	1			4		
32	FINISH PAINT		15 days	Mon 11/20/06	Fri 12/8/06 29	29			010101	J	d	
33	ACOUSTIC CEILING TILES	NG TILES	7 days	Tue 12/5/06	Wed 12/13/06	Wed 12/13/06 32FS-4 days,31,30	8		010101			
34	TERRAZZO		20 days	Mon 12/11/06	Fri 1/5/07 32	32	1					
35	CASEWORK		10 days	Mon 1/8/07	Fri 1/19/07 34	34	1		1010101		4	F
36	INSTALL PLUMBING FIXTURES	NG FIXTURES	5 days	Mon 1/8/07	Fri 1/12/07 34	34	. 1		.010101		4	
3/	INSTALL WINDOW IREALMENTS	V IREALMEN IS	2 days	10/9/1 UOM	1 ue 1/9/0/ 34	34 2.1	1				<b>→</b>	
38	INSTALL EN IRANCE MATS	VCE MAIS	3 days	Mon 1/8/0/	Wed 1/1 0/0/ 34	34	1		.0101010		-	
200			5 days	10/21/1 10M	VVEU 1/1 1/10/ 30	30 25 41					-	-
41	CARPET & VCT		10 days	Mon 1/22/07	Fri 2/2/07 35	35	1		8101010			
42	DOORS & HARDWARE	NARE	5 days	Mon 2/5/07	Fri 2/9/07 41,39	41,39	1					
		Task	ſ	Milestone	۵	Ext	Extemal Tasks					
Project: Masonry	sonry	Split		Summary	₽	Ēxt	External Milestone	•	ſ			
Dale. Ide	4/0/00	ress	1	Project Summary	N C	De	Deadline					
					Dage 1							
					rage -							



Appendix E Mechanical Analysis



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

### Calculating Heat Gain/Loss in the Existing Masonry Design

	,	Cumme	
		Summe	
Problem D	esign Criteria		
Design Temp Change:	25	°F	l
Area of Wall	183	ft <sup>2</sup>	

<b>Element</b> Units	(k)	Thickness (L) in	Conductance (C) Btu / hr*ft <sup>2</sup> °F	(R)	Temp. Change (ΔT) °F		
	Masonry Mass Wall						
Exterior Air Film	-	-	193.052	0.01	0.01		
Brick	9.03	4.00	2.26	0.44	0.87		
Air Gap	-	-	-	0.97	1.90		
Polystyrene Insulation	0.20	2.00	0.10	10.00	19.56		
CMU	-	8.00	0.75	1.34	2.62		
Interior Air Film	-	-	47.13	0.02	0.04		
Total		14.00	0.078	12.8	25.00		

Calculation Results					
Average R-Value 12.8 hr*ft <sup>2</sup> °F/ Btu					
Overall Heat Flow Rate	358.0	Btu / hr			



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

#### Calculating Heat Gain/Loss in the Existing Masonry Design

		Winter	
Problem Design Criteria			
Design Temp Change:	55	°F	
Area of Wall	183	ft <sup>2</sup>	

<b>Element</b> Units	(k)	Thickness (L) in	Conductance (C) Btu / hr*ft <sup>2</sup> °F	(R)	Temp. Change (ΔT) °F	
Masonry Mass Wall						
Exterior Air Film	-	-	193.052	0.01	0.02	
Brick	9.03	4.00	2.26	0.44	1.91	
Air Gap	-	-	-	0.97	4.17	
Polystyrene Insulation	0.20	2.00	0.10	10.00	43.04	
СМИ	-	8.00	0.75	1.34	5.77	
Interior Air Film	-	-	47.13	0.02	0.09	
Total		14.00	0.078	12.8	55.00	

Calculation Results					
Average R-Value 12.8 hr*ft <sup>2</sup> °F/ Btu					
Overall Heat Flow Rate 787.6 Btu / hr					

Annual Heating and Cooling Energy Losses					
Cooling (Summer)		386,636	Btu/Yr		
Heating (Winter)		1,679,889	Btu/Yr		
Total		2,066,524	Btu/Year		

Energy Cost \$32.53



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

# Calculating Heat Gain/Loss in the New Prefabricated Design

			Summe	r
Problem I	Design Criter	a		
Design Temp Change:	25	°F		
Area of Wall	183	ft <sup>2</sup>		
Percentage Stud	30%			
Percentage Insulation	70%			

			Thermal	Temp.	
Element	Thickness	Conductance	Resistance	Change	<b>Temperature of</b>
	(L)	(C)	(R)	(ΔT)	Interior Face
Units	in	Btu / hr*ft <sup>2</sup> °F	hr*ft <sup>2</sup> °F/ Btu	°F	
	Metal	<b>Stud Portion of</b>	Wall Section		
Exterior Air Film	-	193.052	0.01	0.08	99.92
Precast Concrete	2.00	6.25	0.16	2.49	97.43
Air Gap	0.5		0.97	15.10	82.33
Metal Studs	6.00	-	0.00	0.00	82.33
Gypsum	0.75	2.22	0.45	7.00	75.33
Interior Air Film	-	47.13	0.02	0.33	75.00
Total	9.25	0.623	1.6	25.00	75.00
	Insula	ation Portion of	Wall Section		
Exterior Air Film	-	193.052	0.01	0.01	99.99
Precast Concrete	2.00	6.25	0.16	0.18	99.82
Air Gap	0.5		0.97	1.07	98.74
Batt Insulation	6.00	0.05	21.00	23.22	75.52
Gypsum	0.75	2.22	0.45	0.50	75.02
Interior Air Film	-	47.13	0.02	0.02	75.00
Total	9.25	0.044	22.6	25.00	75.00

Calculation Results					
Average R-Value 16.3 hr*ft <sup>2</sup> °F/ Btu					
Total Heat Flow Rate	280.6	btu/hr			



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

# Calculating Heat Gain/Loss in the New Prefabricated Design

			Winter
Problem I	Design Criter	ia	
Design Temp Change:	55	°F	
Area of Wall	183	ft <sup>2</sup>	
Percentage Stud	30%		
Percentage Insulation	70%		

			Thermal	Temp.	
Element	Thickness	Conductance	Resistance	Change	Temperature of
	(L)	(C)	(R)	(ΔT)	Interior Face
Units	in	Btu / hr*ft <sup>2</sup> °F	hr*ft <sup>2</sup> °F/ Btu	°F	
	Metal	<b>Stud Portion of</b>	Wall Section		
Exterior Air Film	-	193.052	0.01	0.18	15.18
Precast Concrete	2.00	6.25	0.16	5.48	20.66
Air Gap	0.5		0.97	33.21	53.87
Metal Studs	6.00	-	0.00	0.00	53.87
Gypsum	0.75	2.22	0.45	15.41	69.27
Interior Air Film	-	47.13	0.02	0.73	70.00
Total	9.25	0.623	1.6	55.00	70.00
	Insula	ation Portion of	Wall Section		
Exterior Air Film	-	193.052	0.01	0.01	15.01
Precast Concrete	2.00	6.25	0.16	0.39	15.40
Air Gap	0.5		0.97	2.36	17.76
Batt Insulation	6.00	0.05	21.00	51.09	68.85
Gypsum	0.75	2.22	0.45	1.09	69.95
Interior Air Film	-	47.13	0.02	0.05	70.00
Total	9.25	0.044	22.6	55.00	70.00

Calculation Results					
Average R-Value 16.3 hr*ft <sup>2</sup> °F/ Btu					
Total Heat Flow Rate	617.2	btu/hr			

Annual Heating and Cooling Energy Losses				
Cooling (Summer)		303,010	Btu/Yr	
Heating (Winter)		1,316,544	Btu/Yr	
Total		1,619,554	Btu/Yr	
Energy Cost	\$25.49			



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

#### Calculating Heat Gain/Loss in the New Prefabricated Design Summer

		Summe		
Problem Design Criteria				
Design Temp Change:	25	°F		
Area of Wall	183	ft <sup>2</sup>		
Percentage Stud	30%			
Percentage Insulation	70%			

			Thermal	Temp.	
Element	Thickness	Conductance	Resistance	Change	<b>Temperature of</b>
	(L)	(C)	(R)	<b>(ΔT)</b>	Interior Face
Units	in	Btu / hr*ft <sup>2</sup> °F	hr*ft <sup>2</sup> °F/ Btu	°F	°F
	Meta	Stud Portion of	f Wall Section		
Exterior Air Film	-	193.052	0.01	0.04	99.96
Precast Concrete	2.00	6.25	0.16	1.28	98.68
Board Insulation	0.5	0.40	2.5	19.93	78.76
Metal Studs	6.00	-	0.00	0.00	78.76
Gypsum	0.75	2.22	0.45	3.59	75.17
Interior Air Film	-	47.13	0.02	0.17	75.00
Total	9.25	0.319	3.1	25.00	75.00
	Insu	ation Portion of	Wall Section		
Exterior Air Film	-	193.052	0.01	0.01	99.99
Precast Concrete	2.00	6.25	0.16	0.17	99.83
Board Insulation	0.5	0.40	2.5	2.59	97.24
Batt Insulation	6.00	0.05	21.00	21.75	75.49
Gypsum	0.75	2.22	0.45	0.47	75.02
Interior Air Film	-	47.13	0.02	0.02	75.00
Total	9.25	0.041	24.1	25.00	75.00

Calculation Results				
Average R-Value 17.8 hr*ft <sup>2</sup> °F/ Btu				
Total Heat Flow Rate	256.5	btu/hr		



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

# Calculating Heat Gain/Loss in the New Prefabricated Design

			Winter
Problem	Design Crite	ia	
Design Temp Change:			
Area of Wall	183	ft <sup>2</sup>	
Percentage Stud	30%		
Percentage Insulation	70%		

			Thermal	Temp.	
Element	Thickness	Conductance	Resistance	Change	<b>Temperature of</b>
	(L)	(C)	(R)	<b>(ΔT)</b>	Interior Face
Units	in	Btu / hr*ft <sup>2</sup> °F	hr*ft <sup>2</sup> °F/ Btu	°F	°F
	Meta	I Stud Portion o	f Wall Section		
Exterior Air Film	-	193.052	0.01	0.09	15.09
Precast Concrete	2.00	6.25	0.16	2.81	17.90
Board Insulation	0.5	0.40	2.5	43.84	61.74
Metal Studs	6.00	-	0.00	0.00	61.74
Gypsum	0.75	2.22	0.45	7.89	69.63
Interior Air Film	-	47.13	0.02	0.37	70.00
Total	9.25	0.319	3.1	55.00	70.00
	Insu	lation Portion o	f Wall Section		
Exterior Air Film	-	193.052	0.01	0.01	15.01
Precast Concrete	2.00	6.25	0.16	0.36	15.38
Board Insulation	0.5	0.40	2.5	5.70	21.07
Batt Insulation	6.00	0.05	21.00	47.85	68.93
Gypsum	0.75	2.22	0.45	1.03	69.95
Interior Air Film	-	47.13	0.02	0.05	70.00
Total	9.25	0.041	24.1	55.00	70.00

Calculation Results			
Average R-Value 17.8 hr*ft <sup>2</sup> °F/ Btu			
Total Heat Flow Rate 564.3 btu/hr			

Annual Heating and Cooling Energy Losses				
Cooling (Summer)		277,018	Btu/Yr	
Heating (Winter)		1,203,612	Btu/Yr	
Total		1,480,629	Btu/Yr	

Energy Cost \$23.31



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

#### Dew Point Analsys for Prefabricated System

Outside RH	80%	
Inside RH	50%	
Outside Pressure	130.24	Pa
Inside Pressure	595.48	Pa
Pressure Change	465.24	Pa

Element	Thickness (L)	Permeability	Vapor Resistance (R)	Vapor Pressure (P)	Saturation Pressure	Interior Surface Temp
Units	m	ng/Pasm	Pasm <sup>2</sup> /ng	Pa	Pa	С
	Insulation Portion of Wall Section					
Precast Concrete	0.0508	6.00	8.467E-03	309.41	162.80	-9.44
Board Insulation	0.0127	7.5	1.693E-03	345.25	165.22	-9.24
Batt Insulation	0.1524	245.00	6.220E-04	358.41	207.49	-6.07
Insulation Backing	0.0050	20.00	2.500E-04	363.70	1150.28	20.51
Gypsum	0.0191	20.00	9.525E-04	383.86	1189.11	21.08
Paint	-	100.00	1.000E-02	595.48	1190.96	21.11
Total	0.24	398.5	0.022			

Condensation Rates				
Upstream Flowrate	32812.66			
Downstream Flowrate	7603.34			
Condensation Rate	25209.32	ng/s*m²		
Condensation Rate		oz/day*m <sup>2</sup>		
Condensation Total	0.393	oz/day per wall		

External Temperature	10 °F
Internal Temperature	70 °F
Temperature Chage	55 °F
Relative Humidity	50%

Temperature Comparison			
	Temperature of Metal Studs	Dew Point	
Design Without Insulation	53.9	55.0 °F	
Design With Insulation	61.7	55.0 °F	



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

#### Cost Analysis of Energy Consumption

Square Footage in Panel	183 ft <sup>2</sup>
Total Square Footage	36,939 ft <sup>2</sup>

	Masonry Design	Prefabricated Design	Prefabricated With Insulation	Differential	Units
R-Value	12.8	16.3	17.8	5.1	hr*ft <sup>2</sup> °F/ Btu
Heat Flow Rate	787.6	617.2	564.3	-223.3	Btu / hr
Cooling Energy Losses	386,636	303,010	277,018	-109,618	Btu / Yr
Heating Energy Losses	1,679,889	1,316,544	1,203,612	-476,277	Btu / Yr
Total Energy Losses	2,066,524	1,619,554	1,480,629	-585,895	Btu / Yr
Energy Cost	\$32.53	\$25.49	\$23.31	-\$9.22	

Extrapoloated Savings Per Year for All Brick and CMU Areas

\$1,861.53

Appendix F Photovoltaic Integration



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

### **Results of Photovoltaic Calculation**

Photovoltaic Array Located Above Multipurpose Room			
Month	Solar	AC	Energy
	Radiation	Energy	Value
	(kWh/m²/day)	(kWh)	(\$)
1	2.85	1519	\$151.90
2	3.81	1844	\$184.40
3	4.53	2316	\$231.60
4	5.23	2538	\$253.80
5	5.66	2738	\$273.80
6	6.28	2820	\$282.00
7	6.10	2810	\$281.00
8	5.50	2530	\$253.00
9	4.81	2183	\$218.30
10	4.34	2135	\$213.50
11	3.00	1477	\$147.70
12	2.34	1206	\$120.60
Year	4.54	26116	\$2,611.60

Photovoltaic Array Located Over NE Wing			
Month	Solar	AC	Energy
	Radiation	Energy	Value
	(kWh/m²/day)	(kWh)	(\$)
1	2.85	1379	\$137.90
2	3.81	1675	\$167.50
3	4.53	2104	\$210.40
4	5.23	2306	\$230.60
5	5.66	2487	\$248.70
6	6.28	2561	\$256.10
7	6.10	2552	\$255.20
8	5.50	2298	\$229.80
9	4.81	1983	\$198.30
10	4.34	1939	\$193.90
11	3.00	1342	\$134.20
12	2.34	1095	\$109.50
Year	4.54	23721	\$2,372.10



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

# **PVWATTS Calculation Data**

Photovoltaic Array Located Above Multipurpose Room			
City:	Wilmington		
State:	DE		
Latitude:	39.18° N		
Longitude:	76.67° W		
Elevation:	47 m		
PV System Specifications			
DC Rating:	21.8 kW		
DC to AC Derate Factor:	0.77		
AC Rating:	16.8 kW		
Array Type:	Fixed Tilt		
Array Tilt:	20.0°		
Array Azimuth:	170.0°		
Energy Specifications			
Cost of Electricity:	10 ¢/kWh		

Photovoltaic Array Located Over NE Wing			
City:	Wilmington		
State:	DE		
Latitude:	39.18° N		
Longitude:	76.67° W		
Elevation:	47 m		
PV System Sp	ecifications		
DC Rating:	19.8 kW		
DC to AC Derate Factor:	0.77		
AC Rating:	15.3 kW		
Array Type:	Fixed Tilt		
Array Tilt:	20.0°		
Array Azimuth:	170.0°		
Energy Specifications			
Cost of Electricity:	10 ¢/kWh		



Wrangle Hill Elementary School New Castle, DE Mechanical Breadth

# Life Cycle Cost Analysis

Cost Comparison				
	Multipurpose Room	NE Wing		
Number of Panels	160	160		
Cost per panel	\$563.00	\$521.00		
Panel Type	PVL-136	PVL-124		
Voltage per panel	136 W	124 W		
Inverter Costs	\$22,500	\$22,500		
Total System Cost	\$112,580	\$105,860		
DE State Grant	\$56,290	\$52,930		
Federal Tax Credit	\$33,774	\$31,758		
Total Cost of System	\$22,516	\$21,172		
Annual Savings	\$2,612	\$2,372		
Years to Pay Off	8.6	8.9		