

# Construction project 8517

[Engineering](#)



After several months of planning and design, excavation for the new ACES library

on the University of Illinois campus began in May 1999. The project is sponsored

and will be owned by the Board of Trustees for the University of Illinois. Six separate contractors are working together under one general contractor. The project, which began in May of 1999, is scheduled to be completed by February

2001. Through informal interviews with Charles O. Pickar we learned that the project is 4-5 weeks behind schedule. Pending weather conditions 25 to 35 workers usually present on site. The typical workday can run between 6:30am and

depending on deadlines can last until 9-10pm. As of the third week in January

2000, the concrete foundation and the steel framework for the five-story structure, with the exception of the roof, were intact. The appendix of this report contains photographs of observed procedures and site materials.

Observed

Operations January 27, 2000 On the morning of January 27, two massive 18-wheel

<https://assignbuster.com/construction-project-8517/>

trucks carrying various shapes and sizes of steel beams were unloaded on site.

It took almost two hours to unload each truck. A crane approximately 200 ft. high was used to move the steel from the truck onto wooden planks on the ground.

The steel was separated by shape, and by using the quite large reaching span of

the crane, the workers were able to deliver the beams directly from the truck to

their appropriate sides of the site. This operation involved a six-man crew.

Two

men connected the hooks from the crane onto the steel. Two men guided the steel

onto the planks on the ground. Two men took turns operating the crane. This

process was very time consuming due to the amount of steel needed to be lifted

entirely over the five story structure to the other side of the site, and due to

what seemed to be a lack of experience of the rigging crew. It took them a very

long time to make the connections on each beam, and check for security.

These

factors may have influenced the unloading time taken that morning. As

these

trucks were being unloaded, another crew of men worked in the basement.

No

equipment was being placed at that time, but people were hauling down

tools and

what looked to be some sort of electrical cords. Perhaps they were working

to

install some piece of equipment already lowered down there, or maybe they

were

moving already dropped equipment away from the opening in the floor to

make room

for more to be lowered. January 28, 2000 Installation of metal decking floor

supports began on Friday, January 28. By the early afternoon, the level

between

the first and second stories was nearly complete. There were some openings

left,

mostly on the south side of the building, which will serve as stairways and

elevator shafts. The center of the building also lacked decking, and judging by

the design drawings, this section was left opened for a skylight, which will cover the apex of the roof upon completion. The decking between the second and

third stories was about half installed by 3: 00pm. A two-man team of welders worked to secure the union of the decking to the steel framework as each section

was placed. Special protective masks and eye shields were used to ensure no

damage was done to the eyesight of the welders during this process.

Decking

sheets lay in bundles on the beams between the third and fourth floors, awaiting

installation. Upon completion, safety inspectors will come out to the site to check the torque on the bolts and the security of the welds. The sheets were placed connecting to studs sticking upward from the steel framework. The outside

beams were such that they remained higher vertically than the steel

reinforcement going in. This design allows for concrete to be poured over the <https://assignbuster.com/construction-project-8517/>

decking without it spilling over the sides of the building. This entire process, including the welders, men placing the decking, and one man who was sweeping

debris from the recently installed supports, entailed a crew of seven men. Due

to the afternoon increase in snowfall, and the increase of wind, the crew began

covering their equipment with plastic tarps and prepared to quit for the day at

around 3: 30pm. January 31, 2000 No work was done on this site during the weekend, but activity began again early Monday morning, January 31. The 200 ft.

crane lifted three of six large steel beams onto the top mid section of the building, which will eventually support a roof that slants upward from the fifth

story to the top of the skylight. The crane was attached to the top of the beams

and lowered them vertically onto the structure. Each beam had three small steel

ledges, which stuck out horizontally near the top, and were designed to support

pipings that will run above the ceiling. Two men waited, standing on the fifth story framework to secure the beams in place once the crane had placed them.

These men drove spikes into holes in the beam to anchor them to the structure.

Both wore safety harnesses to ensure that they wouldn't lose their balance while

hammering the beams in place. By noon, three beams were set and secured.

At the

same time the mid section steel erection was taking place, another crew worked

to pump concrete into the basement of the structure. A concrete mixing truck was

backed up to a pump truck, which had a long arm reaching over into a hole in the

concrete foundation. Two men watched to ensure that the materials flowed

smoothly from the mix truck to the pump truck. Two other men stood near the end

of the long arm of the pump truck, making sure the concrete reached its final destination. Perhaps this meant that all the necessary equipment for that area

of the basement was installed, so the flooring was ready to be set. February 1,

2000 The afternoon of February 1 was exceptionally slow. The blowing snow forced

the ironworkers to abandon their placement of any additional decking.

Storage of

steel beams is adjacent to the construction site organized by type and size.

The

steel beams are the main materials being used during this phase of the

construction and are closest to the workers for convenience and efficiency. A

few men worked down below in the basement, but no surface activity was

happening. This delay no doubt forced the schedule back for the completed

installation of flooring reinforcement, and in effect caused delays for pouring

the floors. This leads to a domino effect, pushing back the completion dates

of

every other part of the process dependent on the flooring being secured and

the

<https://assignbuster.com/construction-project-8517/>



basement equipment being installed, which in essence, is every other part of the

project. February 2, 2000 While observing construction on Wednesday there were

approximately eight workers operating the machinery and working with the steel

materials. Two men were on the ground going through the piles and hooking up

pieces of steel to the crane. The crane operator would move the beams away from

the steel beam piles to other workers who would bolt the beams into position.

You could observe today that workers have begun to lay steel sheets on the second story that has already been assembled. This steel is placed over the floor trusses and then bolted down. Within in the site there was a concrete bucket for the crane, which will most likely be used to pour concrete for the individual floors. They can only lay the steel and pour one floor at a time or the steel from the above floor will be in the way of getting the concrete bucket

through. Within the construction site were piles of wire mesh and reinforcement

bars. This probably will be used as reinforcement for the concrete floors.

Safety remained important through out this phase of construction and was demonstrated through rails, which were placed around the floors and during the

systematic processes used during the hooking and moving of individual steam

beams. There were four electricity trucks present today and they appeared to be

digging the power supply line to the building. Three men and a digging machine

conducted the digging of the power supply line. February 3, 2000 On the afternoon of Thursday February 3, the site, just by looking, didn't seem to have

made any progress from the previous day. However, workers were going down into

the basement. Due to safety concerns, visitors were not allowed down below the

structure. In order to find out what was happening, discussions with engineer

<https://assignbuster.com/construction-project-8517/>

Charles Pickar of Sebesta Blomberg and Associates, Inc. were used to fill in the

blanks. He explained that the electricians and pipe fitters were working in the

basement running conduit and laying pipe. As soon as they were done, the fire

suppression people could get down there to spray the piping. They were working

to get the necessary wiring complete so more equipment could be lowered and

hooked up as soon as weather allowed. As for now, the site was supplied power

through a shed, which was tapped into a near by permanent power supply. Some

parts of the basement were already filled in, but one main hole was left opened

to get the transformers and air handling units down. Also in the basement, men

were laying diamond supports on the steel footings to prevent cracking in the

concrete foundation from the stress of the columns. These processes all  
<https://assignbuster.com/construction-project-8517/>

continued underground through the afternoon. February 4, 2000 The snow and wind

on the afternoon of Friday, February 4 again forced the ironworkers to abandon

lying any additional floor decking. A crew of three men prepared to drop a transformer into the basement. The crane was extendible and looked to be at

about 100 ft. The riggers took their time securing the connection, but due to wind, never attempted to move the unit. Mr. Pickar later explained that this particular type of crane is not very stable. If the load sways while being transferred, there is a great possibility that it will flip. Keeping in mind operator safety, as well as the safety of nearby crewmembers, risks are just too

great to attempt transfer today. Tarps covered the transistors and the crane lowered and folded up. Mr. Pickar also mentioned that a late delivery of hangers

for the basement earlier in the project was already pushing everything behind

schedule. The weather problems further added to those delays. Looking at the

<https://assignbuster.com/construction-project-8517/>

architectural drawings covering several tables in the construction office, it was noted that there will eventually be a tunnel running underground out the north end of the library and into nearby buildings. Several revisions had to be

made on these drawings, especially in regards to the structure itself, to modify

the ideas of the designer with the feasibility of engineering. Sebesta Blomberg,

which is primarily an engineering company, did most of the modifications.

There

were almost 1000 pages just of architectural design and several other books of

drawings, such as electrical and mechanical work, which were equally as thick.

These all seemed to be labeled in an efficient manner to assure that pages could

be easily located. This is especially useful when phone calls come in and

someone needs to know something like a dimension on a certain machine in a

certain room. People with identical books can easily direct another over the

phone to a specific page. Depending on the type of work it entails, specific areas within each book are easy to find just by reading the markings on the bottom corners of the pages. Safety Issues In reference to safety issues other

than the specific situations mentioned before, it was noted that anyone entering

the site was required to wear a hard hat as well as construction boots. Every worker wore thick gloves and some wore safety eyeglasses. All crane operations

were taken slowly and all ironwork was called off at the first signs of slickness or dangerous winds. Anyone operating machinery, such as the welders or

crane operators were trained and certified prior to working. All visitors were required to sign in and out to alert those in charge as to who was on site in case of an emergency. The construction office bookcase was filled with safety

manuals, OSHA guides, project management workbooks, structural welding guides

etc. All the drawings contained clear markings referring to placement of safety

<https://assignbuster.com/construction-project-8517/>

equipment, such as fire alarm and hose reels. Safety inspection was accounted

for in the scheduling process and any sort of risks taken very seriously by all members of the working and management crew. Construction Observation  
Conclusions

In conclusion, this construction project reflects a complex system of seemingly

unrelated activities, which in actuality are crucially dependent on one another.

The timing of the start and finish of every little detail is scheduled so that it fits in the order necessary to complete the project in the most efficient way. Advanced planning, foresight, and experience are used to ensure processes

are done in the right order. An example of this is the basement project. The design must call for a section of flooring to be left out. Hangers have to go in before wire and pipes, which have to go in before machinery, which has to go in

before fire safety equipment and inspection, which has to be done before the floor gets closed up. Each link in the chain is essential. Delays can easily

build up fast if one link can't finish the job. It's the responsibility of the

construction manager to ensure that materials get there on time and that workers

have the qualifications and tools necessary to complete the task. The

construction manager must keep an eye on all aspects of the project, paying

special attention to safety codes and restrictions, and understand the

interdependence of each days events in order to avoid delays, maintain a safe

working environment, and keep the schedule moving smoothly until every final

detail has reached completion.