• CRITICAL PATH PLANNING
• LAND PLANNING
• MANAGEMENT CONSULTING
• PLANT LOCATION

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October 29, 1986

Subject: Monitoring Report #1

University of Michigan Classroom and Laboratory Building - Flint Campus

Flint, Michigan

Erickson and Lindstrom - general contractors

Project: 86:78

Date of Planning and Monitoring: October 22, 1986 (working day 207)

Monitored from Issue #1 of the network models prepared and dated October 22 and 23, 1986 (working days 207 and 208)

Actions taken:

- Discussed project in detail with Mr. Dave Anthony and Mr. Bud Halstead
- Reviewed project with mechanical, electrical, masonry, glass and glazing, and acoustical contractors
- Prepared network model for foundations, structural frame, and close in, sheets 1, 2, and 3
- Prepared network model for typical floor interior work in main classroom building
- Provided subcontractors with check list for their trades which can be used for establishing durations at each major area.

General Summary

The initial planning work concentrated on construction of foundations for the west and east main buildings, and the auditorium. The network proceeded from construction of the substructure work to erection of structural steel at the west and east buildings and then into construction of supported floor decks, erection of exterior masonry backup, installation of roofing, face brick, and through erecting of exterior pre-glazed aluminum sash.

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The project contains 3 major elements, the west main building (WMB), the east main building (EMB), and at the north of the west main building, a one story auditorium (AUD) structure. Each of the main buildings contain 5 floors of classrooms and laboratories. There is also at each main building a penthouse for mechanical and electrical equipment. A greenhouse is provided as a adjunct structure. The 2 main buildings are connected by a facility designated as the link (LIN) and the main buildings are connected to the existing buildings on campus by a skywalk west (SKW) and a skywalk east (SKE).

Details of these designated areas and other information of general concern is given in the attached set of notes taken during our planning and diagramming sessions. Selected portions of these notes were provided to the subcontractors during our meetings for their use and reference. I recommend that distribution of the notes be limited to internal use by Erickson & Lindstrom.

Key dates on the project are as follows:

- Letter of intent: September 19, 1986 (working day 184)
- Move on job: September 22, 1986 (working day 185)
- Contract execution - contract was executed by Erickson & Lindstrom on Monday, October 20, 1986, not yet signed by owner.
- Completion 900 calendar days as set in proposal
- Intermediate contract dates - none specified in contract.

At our planning sessions we were able to prepare network models for the substructure, superstructure, and exterior skin work. Structural steel is to be delivered to the job site for the west main building on December 3, 1986 (working day 236). Structural steel for the east building is presently planned to arrive by March 2, 1987 (working day 297) or earlier. Supported floor slab work will probably be held until April 1, 1987 (working day 319), although, if weather permits, some supported deck areas may be poured out earlier. This is particularly the case at the auditorium where it would be of help to have the auditorium roof deck and the second floor deck of the west main building constructed so that work could proceed during winter at the first floor and auditorium areas. This matter will be reviewed by Mr. Anthony.

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The exterior skin of the building will probably be erected early with masonry block backup, installed level by level, and face brick being applied later by elevation. Exterior sash and glass will be installed as exterior masonry progress permits.

At present it appears that the west building could be closed to weather sometime in mid May, 1987, and the east building sometime in mid June, 1987. This would permit interior finish work probably dry wall trades to begin. Meanwhile, interior rough trades will proceed as soon as the decks below and above have been poured and spray on fireproofing applied.

As part of our work, we also prepared a network model for a typical interior floor area. This network will be put into a useable format and provided to Mr. Anthony for his analysis and use in establishing logic and durations with his subcontractors.

I shall also have the close in network completed and run, along with single copies of the typical floor interior work, one for the west and one for the east. These will be reproduced full size, put on vellums and sent to Mr. Anthony with sepias from which further reproductions can be made. I shall also provide him 7 blue lines of each drawing for use with his staff and subcontractors.

I suggest that another planning meeting be held when information from the subcontractors is available for the typical floor diagrams. I shall be in touch soon with Mr. Anthony regarding this next meeting.

At the close of our session, I provided Mr. Siewick with a copy of the master data disk used during the planning session. Since then some editing and changes have been made to the notes. Therefore, a copy is enclosed with this report.

Ralph J. Stephenson, P.E.

TO: Mr. David Anthony
RJS:gmy

RALPH J. STEPHENSON, P.E., P.C.
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January 13, 1987

Subject: Monitoring Report #2

University of Michigan Classroom and Laboratory Building - Flint Campus

Flint, Michigan

Erickson & Lindstrom - General Contractors

Project: 86:78

Disk: #067

Date of Planning and Monitoring Meeting: December 23, 1986 (working day 250)

Monitored from Issue #1 dated October 22 and 23, 1986 (working days 207 and 208)

Actions taken:

- Reviewed current status of project
- Continued preparation of typical interior work network
- Reviewed durations for work activities at each floor of lab buildings with speciality contractors
- Updated close in network models issue #1 to issue #2, December 23, 1986

General Summary

As of December 23, 1986 (working day 250) structural steel erection has started at the west end of the project and is, at present, moving reasonably well. Structural steel erection started on December 22, 1986 (working day 249). It was due to have started on December 3, 1986 (working day 236). Therefore the current lag over the early starts and early finishes is 13 working days. At present this is not expected to disrupt job sequencing since there was a gap planned between structural steel erection and the start of floor pours. However, the problem that might be encountered through this delay is that the late delivery might put structural steel erection into more severe weather than had been anticipated.

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As we reviewed the job sequencing and planning, it was decided that a basic revision to the floor pour sequencing was in order. Therefore, as part of our work, we updated the close in network model and revised the floor pour plan so that the individual decks are poured out as follows: supported deck 2 first; next level 3; then level 4; followed by level 5; with the penthouse deck being poured out as the last sequence of pours. It was originally thought that construction of the penthouse deck could be done at an early date. However, the differential between the issue #1 sequence and the current sequence was found not to be great enough to give an advantage to pouring out the higher floor earlier. The change in sequence should not seriously affect the total close in of the project.

It is still the intent to pour out the roof of the auditorium just as early as possible so as to provide early working space at the interior of the building. If the weather holds good and steel erection proceeds well at this area, it is possible that the roof slab could be poured out earlier than is presently shown in the network models.

A major portion of our work today consisted of completing network models for interior rough and finish work at each of the laboratory floors. To accomplish this we had asked the speciality contractors involved to review their work and to provide durations of their activities at each floor. These were tabulated into an activity/location matrix and at each intersection the estimated elapsed duration and working days was shown. A copy of this was left with Mr. Anthony for his continuing study.

We shall prepare a network model for each floor using these durations. However, we will not prepare hard copies of the network models for each floor until further discussions on the format in which they will be issued are held. Responsibility codes were assigned to the various activities in the interior network models. These responsibility codes will be issued in the near future for ongoing references. Thus, at present, the project appears to be moving relatively well in the field, although it is somewhat too early to accurately assess the actual progress in relation to the anticipated close in date of late May or early June, 1987.

The updated close in diagram has been issued. The individual laboratory floor interior work plans are being prepared and will be kept stored on data disks until a decision is made as to what form the printout should take.

I shall be in touch with Mr. Anthony shortly to set the next planning session. At this session, we should complete our work on the interior network models for each floor and also prepare a network model for auditorium interior work.

Ralph J. Stephenson, P.E.

RJS:gmy
TO: Mr. David Anthony

RALPH J. STEPHENSON, P.E., P.C.
CONSULTING ENGINEER

April 10, 1987

Subject: Monitoring Report #2

University of Michigan Classroom and Laboratory

Flint, Michigan

Erickson & Lindstrom - General Contractors

Project: 86:78

Disk #67

Date of Planning and Monitoring Meeting: April 2, 1987 (working day 320).

Monitored from Issue #2, dated December 23, 1986 (working day 250).

Actions taken:

- Reviewed current status of project
- Reviewed current network models for interior work at each wing and confirmed logic
- Establish starting points for various rough and finish operations on interior work.
- Set starting dates for key operations at each floor

General Summary

As of April 2, 1987 (working day 320) the project is meeting most targets between early and late starts and finishes with much of the work bettering early start, early finish dates.

At the west building, structural steel, metal floor and roof deck, and shear studs, along with most miscellaneous iron is complete. The second floor deck at the west wing has been poured out and the third floor deck is ready for a pour. Weather has tended to delay this, but it should be made sometime within the next few days. Work on the third floor west building deck was due to begin April 14, 1987 (working day 328) and the floor was due to be poured out by April 23, 1987 (working day 335).

At the east wing most structural steel has been erected, plumbed, and welded and much of the metal deck has been installed. No shear studs have been started as yet. Also miscellaneous iron remains yet to be completed. This miscellaneous iron was due to begin no later than April 3, 1987 (working day 321). No floor decks have been poured out at the east wing.

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At the auditorium the floor slab on grade is complete and the supported roof deck has been poured out. Roofing and installation at the auditorium has not yet been installed.

At the east wing the floor slab on grade has been substantially completed. No block backup has started as yet.

At the west wing, exterior block backup is to begin about April 15, 1987 (working day 339). It is desired by the field forces to get block underway and moving up in the building ahead of spray on fireproofing at each floor. No major rough interior utility work has yet begun at supported decks.

At our session today we selected starting points for spray on fireproofing work and rough above floor interior work, and for the start of hanging board and the start of acoustic ceiling work. These 3 points were identified as critical and depend, to a considerable extent, upon the close in condition of the building.

For start of rough above floor work, which is basically initiated by the spray on fireproofing, exterior block backup at the floor should be substantially complete. This means that spray on fireproofing could start at the first floor of the west wing by April 8, 1987 (working day 324) and at the second floor by April 22, 1987 (working day 334). From there the spray on fireproofing will follow block backup to the fifth floor.

Following spray on, above floor trades, such as sheet metal, piping, rough electrical will be installed.

The start of hanging board is restrained by having the main and penthouse roof complete at the wing, as well as having block backup complete for the full building height. Acoustic ceiling work can begin once the exterior preglazed sash has been installed at a wing. Thus, there have been well defined beginning points set for each of the key interior finish trades.

We now have most of the durations for interior work at each floor, starting points for the key trades, and a suitable logic plan showing the interrelationship between the activities. I shall have these networks put into final form, using the data available and will check with Mr. Anthony regarding the method by which they are to be processed. I will make no final hard copies and reproducibles of work plans until we have discussed how to issue these networks.

Meanwhile, I shall also be in touch with Mr. Anthony to set the next planning and monitoring session

RJS:gmu
TO: Mr. David Anthony

Ralph J. Stephenson, P.E.

RALPH J. STEPHENSON, P.E., P.C.
CONSULTING ENGINEER

August 12, 1987

Subject: Monitoring Report #3

University of Michigan Classroom and Laboratory

Flint, Michigan

Erickson & Lindstrom - general contractor

Project: 86:78

Disk #67 and #100

Date of Planning and Monitoring: July 31, 1987 (working day 404).

Monitored from: issue #2, dated December 23, 1986 (working day 250).

Actions taken:

- Reviewed current status of project
- Made evaluation of current sequence of interior finish work
- Discussed potential revision of finishing sequence with owner representative and subcontractors

General Summary

As of July 31, 1987 (working day 404), the project continues to meet major targets between early and late starts and finishes. At the west building, the slab on grade is completed, all supported floor slabs are poured out, and exterior block backup is complete. Exterior face brick is about 90% complete and exterior pre-glazed sash is about 85% complete. The west main building roofing is complete.

At the east building supported decks are complete, exterior block backup is nearly complete, and exterior face brick and pre-glazed sash is currently in work. Roofing is expected to be completed in early August, 1987. The floor slab on grade at the east unit is poured out.

Interior spray on fireproofing at the west main building has been completed and is nearly complete in the east main building. Rough overhead work has started at several floors in both the west and east main buildings.

At present, the sequence of interior work being used is to move from the first floor of the west unit up to the fifth floor of the west unit, then to come back to the first floor of the east unit and complete up from the first through the fifth floor.

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However, there was intensive discussion at this meeting re the possibility of working up from one through five in the west building and then down from five through one at the east building. This matter was discussed with the subcontractors and with the owner representative. It was decided to replan the project up in west and down in east so as to project a completion of base building work by the end of July, 1988. The University of Michigan will now initiate planning for a fall, 1988 move in.

This means that temporary permanent heat will be needed by early November, 1987 in the west building and it will probably be necessary to provide temporary heat from a supplemental system from early November, 1987 to early January, 1988 in the east building.

It will be necessary to consult with the controls contractor and the lab equipment contractor regarding that revised sequences just as quickly as possible. It is expected that owner fixturing and fitting up work will require from one to two months, once areas have been turned over to them.

In evaluating the revised sequence, it was decided that the network model should be updated to reflect this revision. Therefore, I shall review and revise the interior work diagrams, using a start cycle on acoustic ceiling work, as is presently being used, of 15 working days, starting September 23, 1987 (working day 441) at the first floor of the west main building. The east building sequence will be shown starting with a continuation of this cycle on acoustic work at the fifth floor of the east main building in mid January, 1988 and starting subsequent floors from four through one on a 15 day cycle also. This should bring completion of the total project to sometime in mid to late July, 1988.

It will be necessary to check this set of assumptions very carefully to assure that the sequence can be met without excessive overlapping of resources required, However, I shall proceed to update the diagrams in accordance with this plan of work and to print them in rough form for review by Mr. Anthony before printing them in final form for issuance. This updating will proceed in the near future.

I shall be in touch with Mr. Anthony shortly to set the subsequent planning and monitoring sessions as may be required.

Ralph J. Stephenson, P.E.

RJS:gmy
TO: Mr. David Anthony