RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

November 6, 1976

Subject: Monitoring Report #1

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #1 dated November 1, 1976

Date of Monitoring: November 1, 1976 (working day 214)

Target Completion Date: September 2, 1977 (working day 428)

Actions taken:

- **Inspected project**
- **Prepared preliminary network model for work from November 1, 1976 (working day 214)**
- **Reviewed major interfaces with other adjoining projects**
- **Evaluated current job status**

General

The project breaks into two major groups - the utility tunnel (T) and the power house (PH). Utility tunnel work is being done in four major sections - the classroom and office building (CROB) to Stevens, Liberty to Stevens, King's Daughter to Liberty and King's Daughter to the power house.

The CROB to Stevens tunnel is constructed and is being waterproofed and backfilled. Electrical duct will be in work shortly. The Liberty to Stevens section is under construction with walls, deck, waterproofing, backfilling and installation of electrical duct currently in work or about to start. From King's Daughter to Liberty walls are substantially complete and deck is in work. Construction of electrical manhole and telephone manhole at Liberty will be put into the field shortly. The section from King's Daughter to the power house is well along and should be complete including installation and encasement of electrical duct but excluding total backfill by the end of November.

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At the power house, current activities are concerned primarily with completing forming, reinforcing and pouring the first floor deck. Basement walls are complete and the basement floor slab is in place. It is expected that the first floor slab will be poured out within 15 working days.

The network diagrams prepared were on sheets 1, 2 and 3, Issue #1 dated November 1, 1976. Sheet 1 contains fabrication and delivery work; sheet 2 - utility tunnel work; and sheet 3 - power house work. We were not able to complete the total diagram but were able to plan field operations up through close-in and installation of major mechanical and electrical equipment. Copies of the network have been distributed - 12 sets to Mr. Hurl Rutherford of Sorensen-Gross and 3 sets to Mr. Jim Tripp of the University of Michigan Flint Campus. These gentlemen will make further distribution to those involved.

It will probably require another diagramming session to review the work to date and complete the network to turnover of the building. I shall be in touch with Mr. Wilson to set this next meeting.

Projecting work on the tunnel, it is presently expected that the CROB to Stevens section can be complete with all backfilling by November 17, 1976 (working day 226). The Liberty to Stevens section should be complete and backfilled to grade by December 16, 1976 (working day 246). The King's Daughter to Liberty section is to be backfilled to grade by December 13, 1976 (working day 243) and the King's Daughter to power house section should be finished by December 7, 1976 (working day 239). In the power house area there is a 12" water main to be installed at Kearsley to the power house. This will probably be placed after all backfilling has been completed on the King's Daughter to power house section. Completion of the underground water main is due for December 20, 1976 (working day 248).

At the power house, once pours have been completed, structural steel can be erected. There is a current delay of structural steel to the job site and it is anticipated to be on the job December 8, 1976 (working day 240). There have been some bulletin revisions to structural steel and these have apparently caused detailing and fabrication revisions. Attempts are being made now to improve this delivery date so as to allow earlier close-in of the building, than presently anticipated. It should also be remembered that Freedland Steel must have their affirmative action program approved. This is critical to start of field work on structural steel.

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Once structural steel is erected, plumbed and bolted, interior and exterior masonry can begin along with erection of metal deck and panels. Presently it is the intent to complete exterior masonry on or about March 8, 1977 (working day 302) and to have the building completely closed in including insulation and roofing by April 29, 1977 (working day 340). Meanwhile installation of major equipment can proceed although final installation will depend upon a closed in building.

With the current durations and deliveries, it appears we should be able to make our current target of September 2, 1977 (working day 428). All contractors will review the network data so far prepared and it will again be reviewed at our next session.

On sheet 1 of the network is shown the major delivery items. A summary of these is given below.

- Structural steel

  To be delivered December 8, 1976 (working day 240)

Note: - This date should be improved, if possible.

- Brick

  To be delivered December 29, 1976 (working day 254)

- Stainless steel roof pan for cooling tower

  To be delivered January 7, 1977 (working day 260)

- Insulated metal siding

  To be delivered February 10, 1977 (working day 284)

- Cooling tower

  To be delivered April 1, 1977 (working day 320)

- New boiler

  To be delivered February 15, 1977 (working day 287)

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- Refrigeration machine

  To be delivered April 4, 1977 (working day 321)

- Absorption machine

  To be delivered March 1, 1977 (working day 297)

- Surge tank

  To be delivered April 1, 1977 (working day 320)

- Switchgear

  This equipment is being furnished by the University of Michigan and they will request a delivery of February 10, 1977 (working day 284). Since the original delivery set was considerably later, the switchgear will have to be expedited by the University of Michigan and the engineer.

- Annunciator panels

  To be delivered January 20, 1977 (working day 269)

- Motor control centers

  To be delivered February 11, 1977 (working day 285)

- Generator set

  To be delivered February 7, 1977 (working day 281)

- DC battery system

  To be delivered May 13, 1977 (working day 350)

All the above are currently tentative and I suggest an immediate check be made on deliveries to insure that they are in proper sequence. The key to finishing this project by next fall will be to insure that all pieces of equipment and all materials are expedited closely and brought to the job as needed.

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There was a brief discussion about the possibility of activating the cooling function of the power house earlier than the target completion date for the entire installation. This is to provide cooling to the new classroom and office building which presently has no system of its own. It would be appreciated if all concerned could review this matter prior to our next diagramming session.

I shall plan to monitor the project at periodic intervals and will contact Mr. Tripp prior to each monitoring review.

Ralph J. Stephenson, P.E.

RJS
m

To: Mr. Jim Tripp - U of M Flint
Mr. Robert Wilson - U of M Flint
Mr. Hurl Rutherford - Sorensen-Gross
Mr. Harold Wirtz - Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

January 12, 1977

Subject: Monitoring Report #2

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #1 dated November 1, 1976

Date of Monitoring: January 6, 1977 (working day 259)

Target Completion Date: September 2, 1977 (working day 428)

Actions taken:

- Inspected project
- Reviewed current job status with University of Michigan Flint personnel and contractor
- Evaluated current job status

General

Most tunnel work, except at the Stevens Street crossing, is now complete and installation of pipe work is proceeding well in the tunnels. There are some isolated sections of tunnel roof that are not poured as yet since access is being maintained at key points. However, for all intents and purposes, the tunnel is now available for most work that must go on inside the connecting link between the power house and the various buildings on the campus.

Structural steel is just starting up, having arrived on the job January 3, 1977 (working day 256), with erection beginning on January 5, 1977 (working day 258). The lag in structural steel erection is approximately 18 working days with the target in Issue #1 being a start of December 8, 1976 (working day 240). The delays have been caused by revisions to details and to shop drawings. Revisions were continuing on in early December and apparently by mid-December, they were of such nature that it was not possible to proceed with an immediate erection program due to other commitments by the contractor. This matter should be

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reviewed in some detail since erection of structural steel is a very critical item and is presently a major delay to closing in the building.

As a part of our work, we reviewed sheet 1 of the network diagrams showing the fabrication and delivery of key equipment.

A brief review follows.

- Brick - approval expected January 6, 1977 (working day 259); delivery will probably require at least 6 weeks.

- Stainless steel roof pan for cooling tower - available as needed.

- Insulated metal siding - shop drawings and a color sample on metal backing are yet to be submitted. They will probably be available by January 17, 1977 (working day 266). This is a sizable delay over our original anticipated date and will cause delivery of the metal siding to be as much as 30 - 35 working days later than expected. If we assume the information is submitted by January 17, 1977 (working day 266), allowing ten days for approval and forty working days for fabrication and delivery siding is on the job March 28, 1977 (working day 316).

- Cooling Tower - available as needed.

- Panel boards - hold delivery of February 4, 1977 (working day 280).

- Boiler - hold delivery of February 14, 1977 (working day 286).

- Refrigeration machine - hold delivery of April 1, 1977 (working day 320).

- Absorption machine - hold February 28, 1977 delivery (working day 296).

- Surge tank - shop drawings are back and there should be no difficulty with this item.

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- DC battery system - not reviewed at this session.

- Switchgear - current information is that this switchgear will not be on the job until May 31, 1977 (working day 361). This is a serious problem and will have to be resolved by the owner, supplier and architect/engineer. Immediate steps will be taken to clarify the delivery situation.

  It should be noted that there was little, if any, information available on floor inserts and therefore, careful check will have to be made that the proper setting conditions exist for the switchgear and the substation.

- Unit substation - same comments as for switchgear

- Generator set - shop drawings were submitted and disapproved. No current word on status.

- Motor control center - shop drawings have been submitted and approved. No current problems.

- Annunciator panels - all design has been completed except for information needed from the manufacturer of the other electrical equipment. This is a critical item.

Most major equipment deliveries to the project are very important since the completion time for the job is very tight and the conditions under which the building must be completed, crucial to operation of the campus.

We are planning to meet for a full day's session on Thursday, January 27, 1977 to update the network and complete planning all installation. I shall monitor the job at 8:30 A.M. and our diagramming session should begin at 10 A.M. in the office of the university. I recommend that the responsible decision-makers from each concerned group be invited to the meeting. Most of those who participated in today's monitoring have been notified although confirmation should be given them.

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Presently critical areas of the project are erection of structural steel, delivery of masonry and delivery of electrical equipment. The current lag on the job is approximately 18 working days and this is going to be very difficult to recapture unless timely expediting of all items is carried out on a continuing basis.

At this session I gave those attending drafted copies of the Issue #1 network dated November 1, 1976 showing both the manually computed working days and the calendar dates for early starts and early finishes.

Ralph J. Stephenson, P.E.

RJS
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To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson - U of M Flint
Mr. Hurl Rutherford - Sorensen-Gross
Mr. Harold Wirtz - Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

January 31, 1977

Subject: Monitoring Report #3

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #1 dated November 1, 1976 and Issue #2 dated January 27, 1977

Date of Monitoring: January 27, 1977 (working day 274)

Target Completion Date: September 2, 1977 (working day 428)

Actions taken:

- Inspected project
- Prepared Issue #2 network dated January 27, 1977 with major contractors and the owner

General

Work is moving very well in the tunnel and piping installation is well along at completed sections. The tunnel structure still remains to be completed across Stevens Street with work there expected to begin soon. Presently there appears to be no major problems with tunnel work. However, we did not review this matter in detail at our monitoring session. It should be covered at a subsequent monitoring.

At the main building structural steel is generally in place and being trimmed out. Mr. Wirtz expects that total completion of steel should take another 5 to 10 working days. Meanwhile, it has been possible to start some limited masonry at the west end first floor of the building. However, the extremely cold weather experienced during the latter part of January has slowed this work.

Brick has been approved and delivery of brick units now is expected by March 4, 1977 (working day 300). Exterior masonry is limited as to how far it can go until these face masonry units are delivered. It is expected that when they do arrive on the job it will take approximately 43 additional working days to complete exterior masonry.

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We spent some time planning installation of the insulated metal roofing and the insulated metal siding. For the insulated metal roofing, it will be important to approve the galbestos shop drawings and to get panels in production. There has been a stoppage of work at the fabrication plant due to energy shortages in the fabricator's state. The plant is presently shut down. Metal siding colors must be resubmitted and approved. In addition, siding fabrication is affected and delayed by the plant shutdown.

We continued major planning on these building skin elements assuming that fabrication of insulated metal roofing could proceed beginning February 4, 1977 (working day 280) to be delivered by April 1, 1977 (working day 320). Insulated siding fabrication production might be able to begin by February 11, 1977 (working day 285) and be completed by April 8, 1977 (working day 325). These are critical items and should be given a high priority of attention by those responsible for approvals and review. Generally we found in our diagramming that the building will be closed in over a period between mid-April and mid-May. This, of course, is an important point in the job and should be improved if possible since work progress would be better in a closed in structure.

At the basement floor installation of storm and sanitary sewers is proceeding and should be well along within the next 10 working days. Chilled water piping is due to begin by February 7, 1977 (working day 281) with small diameter piping to start shortly after. Large diameter water piping is expected to begin about March 4, 1977 (working day 300) and steam piping will follow soon after that. Electrical work in the basement is just getting underway and will be moving in a continuous manner from now on.

At the first floor no work is possible yet since structural steel is not complete and major equipment deliveries are not yet being made. Chilled water piping at the first floor is expected to begin about March 7, 1977 (working day 301).

Our work today showed that there were many critical deliveries yet pending and more particularly, that several mechanical shop drawings are awaiting approval. Mr. Tripp plans to meet with the architect/engineer January 28, 1977 (working day 275) to see if he can free these up to release equipment for fabrication. A detailed list of such items is shown on Issue #2 dated January 27, 1977, sheet 1.

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A brief review of the other major delivery elements follows:

- Roof pan for cooling tower - available
- Expansion tank - to be delivered March 2, 1977 (working day 298)
- De-aerator tank - to be delivered March 7, 1977 (working day 301)
- Blow down tank - to be delivered March 2, 1977 (working day 298)
- New boiler - to be delivered February 15, 1977 (working day 287)

  Note: There is some concern that the boiler will not be available on the date presently committed. Of concern also is that there seems to be some difficulty in obtaining stoker information. This matter should be followed on a continuing basis.

- Refrigeration machine - to be delivered April 1, 1977 (working day 320)
- Absorption machine - to be delivered March 10, 1977 (working day 304)
- Surge tank - to be delivered March 2, 1977 (working day 298)
- DC battery system - to be delivered May 13, 1977 (working day 350)
- Switchgear - to be delivered May 16, 1977 (working day 351)
- Substation - to be delivered May 16, 1977 (working day 351)
- Generator set - to be delivered May 5, 1977 (working day 344)
- Motor control centers - to be delivered March 25, 1977 (working day 315)
- Annunciator panels - to be delivered March 25, 1977 (working day 315)

  Note: These are presently in design and should be ready for fabrication within the next four weeks.

- Chilled water pumps 1 and 1A - presently scheduled for delivery April 29, 1977 (working day 340)

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Several other critical delivery items are shown on sheet 1 in Issue #2 dated January 27, 1977. These are very important and it would be best if they were reviewed directly from sheet #1.

A major part of our discussion concerned how to get the chilled water system in operation as early as possible next summer and fall. The general consensus is that if we can expedite deliveries of switchgear, refrigeration equipment, connections into the chilled water lines, the refrigeration panels and all other items connected or interfaced with the refrigeration system, there is a chance chilled water will be on line possibly by mid-August. This is a very optimistic schedule and will only work if extremely careful team attention is given to the project by all concerned - the owner, the architect/engineer and all contractors affected.

From present indications, it is going to be very difficult for the full power house to be completed by the current target of September 2, 1977 (working day 428), since there are many as yet unresolved matters and uncommitted delivery problems. Also, the extremely cold weather has tended to delay the close-in process although the current lag over the original Issue #1 network still is about 22 working days.

Structural steel was due to be completed no later than January 6, 1977 (working day 260). It probably will be completed by February 4, 1977 (working day 280) - a lag of 20 working days.

Masonry may prove to be a delay to closing in the building and subsequent installation of critical equipment but it probably will not increase the actual lag on the job any more than the current lag shown. It would be wise at our next meeting to carefully review the impact of the delays to date and insure that a good handle is obtained on predicting the various achievable operational dates of the utility building.

It was requested at the meeting that we have another diagramming session soon. I shall be in touch with Mr. Tripp and those concerned about this in the near future.

Ralph J. Stephenson, P.E.

RJS/m

To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson - U of M Flint
Mr. Hurl Rutherford - Sorensen-Gross
Mr. Harold Wirts - Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

February 28, 1977

Subject: Monitoring Report #4

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #2 dated January 27, 1977

Date of Monitoring: February 23, 1977 (working day 293)

Target Completion Date: September 2, 1977 (working day 428)

Actions taken:

- Reviewed job progress with major contractors
- Revised Issue #2 network to Issue #3 dated February 23, 1977

General

This session was devoted primarily to updating and completing the logic shown on sheets 1, 2 and 3, Issue #2 dated January 27, 1977. A blueline print of this drafted issue was given to Mr. Wirts and to Mr. Tripp. Further distribution was not felt necessary since the Issue #2 network was updated at our session according to the latest information available.

The project has slipped over the past month, primarily in the fabrication and delivery areas. Field work is still focusing on completion of the frame of the building and miscellaneous close-in. However, major close-in progress is being hampered by lack of roofing and siding panels, along with the need to wait on delivery of masonry. Brick is now a critical item to close-in with delivery projected at April 4, 1977 (working day 321), nearly 21 working days later than originally anticipated in the Issue #2 network.

Also, other front end problems have affected deliveries so that the presently projected completion date is now pushed tight to the target completion date of the job. Since this represents a progressive slippage over desirable field goals, the job will be difficult to bring home on time. Nevertheless every effort is to be made to do this since the facility is a very critical element in properly utilizing the new classroom and office building and auditorium.

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CONSULTING ENGINEER

A brief review of major delivery elements follows.

- Expansion tank

  Delivery delayed to March 22, 1977 (working day 312)

- De-aerator tank

  To be delivered March 7, 1977 (working day 301)

- Brick

  To be delivered April 4, 1977 (working day 321)

- Insulated metal roofing

  Fabrication cannot begin until the plant resumes production after an energy shutdown. Also, it will be essential that a satisfactory color sample be submitted and approved before fabrication can begin. This is critical and Mr. Hurl Rutherford is checking on it now.

- Cooling tower

  To be delivered March 31, 1977 (working day 319)

- Insulated siding

  Same comments as for insulated metal roofing above.

- Boiler feed pumps

  These are presently in for approval. Delivery is expected on May 20, 1977 (working day 355).

- Chilled and condenser water pumps

  To be delivered April 25, 1977 (working day 336)

- Blowdown tank

  To be delivered March 7, 1977 (working day 301)

- Boiler

  To be delivered March 7, 1977 (working day 301)

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Mr. Tripp is taking a trip to the fabricating plant to inspect boiler manufacturing progress. Some concern has been expressed about the validity of the above target date.

- Refrigeration machine

  To be delivered April 1, 1977 (working day 320)

- Absorption machine

  To be delivered March 10, 1977 (working day 304)

- Surge tank

  To be delivered March 11, 1977 (working day 305)

- DC battery system

  To be delivered April 1, 1977 (working day 320)

- Switchgear

  To be delivered May 16, 1977 (working day 351)

- Unit substation

  To be delivered May 16, 1977 (working day 351)

- Generator set

  To be delivered May 5, 1977 (working day 344)

- Motor control centers

  To be delivered March 25, 1977 (working day 315)

- Annunciator panels

  Presently in for approval. Delivery expected May 16, 1977 (working day 351)

- Air handling units #1 and #3

  To be delivered April 20, 1977 (working day 333)

- Main refrigeration panel

  Must be resubmitted for approval. Delivery now expected July 8, 1977 (working day 388)

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- BTU recorder

  Delivery expected June 16, 1977 (working day 373)

- City water flow and pressure recorder

  Delivery expected June 16, 1977 (working day 373)

- Water temperature indicator

  Delivery expected June 16, 1977 (working day 373)

- Campus water flow meter panel

  Delivery expected July 15, 1977 (working day 393)

- Chilled water bypass control

  Delivery expected June 16, 1977 (working day 373)

- Cooling tower fan controls

  Delivery expected June 16, 1977 (working day 373)

- Campus monitoring system

  Engineering for this system has not yet been completed and is presently being held for various reasons. This is a critical item since it plays an important role in the proper functioning of the entire central system. Some projections were made on the activities and their durations to be accomplished yet in getting the campus monitoring system to the job site. It indicated that immediate action is imperative if the monitoring system is to be in operation this year. Steps will be taken immediately to free this up.

- Flexible connectors

  To be delivered April 8, 1977 (working day 325)

- Air handling equipment #2

  To be delivered May 4, 1977 (working day 343)

- Air compressors

  Available in shop.

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CONSULTING ENGINEER

- Oil accessories

  To be delivered March 11, 1977 (working day 305)

- Pressure reducing valves

  To be delivered June 1, 1977 (working day 362)

- Expansion joints

  To be delivered May 16, 1977 (working day 351)

- Flash economizer

  To be delivered April 8, 1977 (working day 325)

- Continuous blowdown system

  To be delivered April 8, 1977 (working day 325)

We also reviewed the logic of the entire network and added critical items that were necessary to complete the majority of the diagram. There still are some minor elements of the network to be completed but these will be filled in as information becomes available.

Another very important element of the project is the fire alarm system. This must be yet incorporated into the project and it, along with the campus monitoring system, could become critical delivery and installation items. I strongly recommend immediate attention be given these two elements.

It is to be stressed that only 125 days remain to the present target operational date for the boiler house, most particularly the air conditioning system. This short time should impose upon the job a sense of urgency that is going to be badly needed to bring it to completion. I cannot recommend too highly that immediate and heavy effort be given to expediting all pending detailing, approving, fabricating and delivery (DAFD items) and that strong efforts be exerted continuously to close the building to weather.

The project, in my opinion, is not presently in as good condition as it was at the previous monitoring.

During our session it was also agreed that when adequate data is available that a detailed diagram will be prepared of the boiler installation. A tentative schedule has been provided showing the boiler fabricator's desires. However, this has not been completely tied in with the work of other contractors.

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CONSULTING ENGINEER

I shall be in touch with Mr. Tripp shortly to set the date for the next monitoring.

Ralph J. Stephenson, P.E.

RJS
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To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson, U of M Flint
Mr. Hurl Rutherford, Sorensen-Gross
Mr. Harold Wirts, Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

April 2, 1977

Subject: Monitoring Report #5

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #3 dated February 23, 1977

Date of Monitoring: March 30, 1977 (working day 318)

Target completion date: September 2, 1977 (working day 428)

Remaining to completion: 110 working days

Actions taken:

- Inspected project
- Conferred with Mr. Wirtz and Mr. Rutherford, and the electrical contractor re job status
- Evaluated current job status

General

As of March 30, 1977 (working day 318) the project generally is in fair shape. Close-in of the building is progressing although there has been some additional delay in delivery of insulated siding and metal roofing. Brick is now on the job and the erection of masonry is proceeding well. Chances are that the later deliveries than anticipated of siding and insulated roof panels will not materially affect work progress inside the building. It is expected roofing on the job will be started as soon as all vents have been placed through the roof so flashings can be installed as the roofing is put on.

The boiler is on the job and being installed. It appears work there is on schedule. However, there is concern, as has been expressed previously, with delivery and installation of the stoker equipment. Again, it would

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CONSULTING ENGINEER

be wise to continually review this item in detail and to expedite delivery of stoker equipment to the greatest extent possible. It is an integral part of the boiler installation and will be needed to complete tying in the boiler. I suggest the university, along with its architect/engineer, check into the stoker manufacture progress directly at the plant. This is often very effective.

The absorption machine arrived on the job today, March 30, 1977 (working day 318) and is being set. Most mechanical equipment deliveries are either complete or expected as previously scheduled. However, it was not possible, because of the work activity on the job of setting the absorption machine, to check in detail on panels, flow meters, recorders, controls and monitoring systems. We will do this at our next monitoring session. Meanwhile I suggest the contractors involved make a careful review of sheet #1 of the Issue #3 network to compare projected delivery dates to actual dates expected.

So far as electrical work is concerned, most target delivery dates are still as previously. However, there will be an 8 week delay on delivery of motor control centers #1 and #2 due to revisions to this equipment. Two of the six motor control centers are on the job.

It would be wise for the university, while checking the stokers, fans and other mechanical equipment, to also make an in-plant check of switchgear and unit substations. These are critical items and continuing concern at the job site indicates that there are some potential problems with these items. I have reviewed these items with Mr. Tripp personally.

So far as actual job progress is concerned, interior work and mezzanines are well along and meeting targets between early and late starts and finishes. Exterior masonry is on schedule and interior piping work, particularly at the first floor, is generally in line with current target early and late starts and finishes.

Again, because of the job activity, it was not felt desirable to monitor the mechanical installation work in detail at this session but it does appear that the work is moving reasonably well.

In summary and from conversations at the job site with field managers, the major delivery items of concern are the switchgear, unit substations and the stoker. In addition, it will be critical to obtain all of the various

RALPH J. STEPHENSON, P.E.
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flow and control equipment. However, it has been pointed out before that some of the systems can be operated without necessarily having all control equipment on the job and installed. Nevertheless it would be desirable to complete as much of the boiler house at as early a date as is possible.

I shall plan to monitor the project again in April and will set the date with those concerned shortly.

At this monitoring session I gave Mr. Rutherford and Mr. Wirtz 7 copies of the Issue #3 network for distribution. They will see that Mr. Tripp and Mr. Wilson receive their copies.

Ralph J. Stephenson, P.E.

RJS
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To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson, U of M Flint
Mr. Hurl Rutherford, Sorensen-Gross
Mr. Harold Wirtz, Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

April 29, 1977

Subject: Monitoring Report #6

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #3 dated February 23, 1977

Date of Monitoring: April 27, 1977 (working day 338)

Target completion Date: September 2, 1977 (working day 428)

Remaining to completion: 90 working days

Actions taken:

- Inspected project
- Conferred with Mr. Wirtz, Mr. Tripp, Mr. Brandt, Mr. Kirk and Mr. Archer re job progress
- Evaluated current job status

General

As of April 27, 1977 (working day 338) the project continues in fair condition. Close-in of the building with masonry is well along with metal roofing and siding due on the job May 9, 1977 (working day 346). Mr. Wirtz intends to start roofing tomorrow morning, April 28, 1977 (working day 339). Thus, the building, by late May, should be relatively well closed in. Progress has been good over the past month.

Mechanically, boiler installation has proceeded very well and is at a point now where the boiler contractor has pulled off the job waiting for the stoker to be delivered. The stoker is presently scheduled on the project May 16, 1977 (working day 351). The induced air fan arrived on the job today and most mechanical equipment is now either set in place or available.

Items that are still pending include:

- boiler feed pumps
- the refrigeration machine (due in April 29, 1977 - working day 340)

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- air handling units 1, 2 and 3 - all expected on the job soon.
- the main refrigeration panel
- the various recorders, indicators and meters
- the pressure reducing valves
- the continuous blowdown system

6/14/77
Here by July 1, 77 (384) (?) backup.

Of these, the most critical is the main refrigeration panel and the refrigeration machine. Shop drawings have just been approved for the refrigeration panel and it appears that there may be as many as 80 working days for fabrication which would bring delivery to August 19, 1977 (working day 418). Installation presently is set at 30 working days plus 9 days for testing bringing completion of the refrigeration panel to October 14, 1977 (working day 457). This is far too long past the present target completion date of September 2, 1977 (working day 428). Therefore, the owner has requested that a plan by which the plant could be operated manually without the refrigeration panel should be studied now. Mr. Tripp is to follow this matter. It is critical and I suggest every effort be made to expedite delivery of the refrigeration panel immediately.

It has been decided, due to the potentially long period of time required for processing and installation, to not consider the campus monitoring system as essential for the building being operative in September.

Electrical equipment is still a major problem. Mr. Tripp reports from a trip to the plant site that primary switchgear will be on the job by July 1, 1977 (working day 384) with secondary switchgear due in on June 1, 1977 (working day 362). If these target dates are met, the electrical contractor could probably install and hook up switchgear in adequate time to operate the equipment and conduct testing. However, if these dates slip, it is going to be essential to re-evaluate the procedure to be followed.

There is under study by the owners and architect/engineer a technique by which secondary power to the plant could be provided from the primary switchgear at the classroom and office and auditorium buildings. Thus, it would have a primary power source which would serve until the primary switchgear was installed at the boiler house and the system could be reversed. This is strictly a backup system and must be studied further to insure its validity. We should discuss this at our next session.

Overall, aside from primary and secondary switchgear, and some miscellaneous items that remain yet to be delivered such as the annunciator panels, the generator set and some light fixtures, electrical work appears to be

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in reasonably good condition.

In summary, work at the power house as of April 27, 1977 (working day 338) is in fair condition, showing a slight improvement in progress over the past month. Still of concern is the refrigeration panel, the refrigeration machine, primary and secondary switchgear and some miscellaneous equipment that is either in fabrication or on its way to the site. It appears presently that if the electrical and mechanical problems and deliveries can be resolved that we should be able to make a September 2, 1977 (working day 428) date for providing chilled water to the classroom and office building. However, this is conditional at this time since some critical elements necessary for the plant to be made operational are still somewhat in limbo.

The tunnel section at Stevens Street is now being completed and Mr. Wirts reports that piping and electrical work across this gap should be completed within three weeks of the tunnel completion. Therefore, this should not be a problem.

Exterior site work at the power house is yet to be done but this should have little, if any, impact upon operating characteristics of the plant.

I shall plan to monitor the project again in approximately one month and will be in touch with Mr. Wilson and Mr. Tripp regarding the next session.

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RJS
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To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson, U of M Flint
Mr. Hurl Rutherford, Sorensen-Gross
Mr. Harold Wirts, Sorensen-Gross

RALPH J. STEPHENSON, P.E.
CONSULTING ENGINEER

June 16, 1977

Subject: Monitoring Report #7

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76:58

Monitored from Issue #3 dated February 23, 1977

Date of Monitoring: June 14, 1977 (working day 371)

Target completion date: September 2, 1977 (working day 428)

Remaining to completion: 57 working days

Actions taken:

- Inspected project
- Conferred with Mr. Irwin, Mr. Rutherford, Mr. Brandt, Mr. Kirk and Mr. Montpas
- Evaluated current job status

General

As of June 14, 1977 (working day 371), the project appears in reasonably good condition to have a manually operated chilled water system available to the classroom and office building by September 2, 1977 (working day 428). It should be understood that the main refrigeration panel hookup, and completion of all control systems will probably extend beyond that date, perhaps as much as 2 to 4 weeks.

The other condition surrounding this completion date is that electrical deliveries pending are met. It is expected that ITE primary switchgear will arrive on the job June 27, 1977 (working day 380). Secondary switchgear is expected to arrive June 21, 1977 (working day 376). If these two dates are met, then the electrical contractor can proceed to set and connect these pieces of equipment.

There is a further recent complication in that 6 trip units must be replaced. This was just discovered. There is no current word on how long it will take to replace these units. They are critical to manual operation of the plant.

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Another indeterminate relative to the electrical system is when Consumers Power will come on the job, set their pole and pull the primary service. We are anticipating this will be done by July 15, 1977 (working day 393). The sooner it can be accomplished, the better it will be for the project.

Relative to mechanical equipment, the main refrigeration panel is expected on the job July 22, 1977 (working day 398). Allowing 30 days for installation and 9 working days for testing brings completion of this panel to September 16, 1977 (working day 437). This is an optimistic date and should be tempered by the consideration of slippages that could occur.

There are other pieces of mechanical equipment that still are not on the job site. These include:

- Air handling units 1 and 3

  expected on the job July 1, 1977 (working day 384)

- Pressure reducing valves ?

  expected on the job June 27, 1977 (working day 380)

- Continuous blowdown system ?

  no current word - Mr. Brandt will check.

- Chilled and condenser water pumps

  to be delivered July 27, 1977 (working day 401). These were revised on a change order.

Annunciator panels are still in fabrication but expected on the job by the end of this week.

So far as boiler installation is concerned, boiler work will continue on through and into mid-September, but apparently the boiler is not critical to fall operation until slightly later in the year. It was mentioned at the monitoring session that, as yet, no contract has been let for installing boiler controls. This is a loose end that should be investigated immediately. Mr. Montpas will do so.

In summary, the project currently appears feasible to complete and have ready for manual operation to provide chilled water to the classroom and office building by early September. It may be possible by late September to have the refrigeration system operating automatically and probably by late September or early October, the boiler will be ready for operation.

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Tunnel work is well along and no difficulties are anticipated there.

We made a small network diagram of the remaining electrical work to be accomplished, and as has been emphasized, it shows that permanent power can be available provided timely receipt of primary and secondary switchgear is maintained.

I shall plan to monitor the project again in mid-July and shall be in touch with Mr. Wilson regarding the next date.

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RJS
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To: Mr. Jim Tripp, U of M Flint
Mr. Robert Wilson, U of M Flint
Mr. Hurl Rutherford, Sorensen-Gross
Mr. Harold Wirts, Sorensen-Gross

7/14/77 - Need valve (3 way) in CROSS alley.
- Should be on job soon. Wiring needed.
- Must check all chiller water line control systems.

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July 18, 1977

Subject: Monitoring Report #8

University of Michigan Flint Campus

Utility Tunnel and Power House, Flint, Michigan

Project: 76: 58

Monitored from Issue #3 dated February 23, 1977

Date of Monitoring: July 14, 1977 (working day 392)

Target completion date: September 2, 1977 (working day 428)

Remaining to completion: 36 working days

Actions taken:

- Inspected project
- Conferred with Mr. Tripp, Mr. Wirtz, Mr. Stiles and Mr. Rumery re job progress
- Evaluated current job status

General

As of July 14, 1977 (working day 392) the project continues in reasonably good condition with the overall opinion of major contractors that U of M will have a manually operated chill water system available by September 2, 1977 (working day 428). It is to be emphasized that the system will be a manually operated system.

I have suggested to the contractors and to Mr. Tripp that a careful point by point check be made to insure that all controls needed for the manual operation are in place, on the job, or on their way. The main problem normally encountered on a complex project of this type while bringing it on line is the missing elements that sometimes are overlooked in the thrust to complete installation of major systems.

There are some difficulties, although they are gradually being ironed out. These are reviewed in the discussion below.

Primary and secondary switchgear have arrived on the job and are being installed. However, there are some missing parts on the ITE primary switchgear. These include the tie bus bars, a circuit breaker and the ground bus. The circuit breaker and the ground bus apparently are not a problem. However, the tie bus bars must be checked for quantity required and they are to be air freighted to the job immediately. Mr. Tripp says that they should pose no difficulties. At present it appears the permanent power will be available by early August. This should give adequate time to check out the system and insure it is fully operative for the September 2nd target.

There were six electrical trip units that had to be replaced according to our last monitoring report #7. However, the trip units that were shipped to the job are now approved and do not have to be replaced.

Consumers Power is completing installation of primary service and should be off the job by July 15, 1977 (working day 393).

We next talked about mechanical systems and Mr. Rumery said that the single most critical element presently is the condenser pump. This is an Aurora pump and the supplier has been on strike. The status of the pump is not fully known although some at the meeting thought it had been fabricated and was awaiting shipment. The pump will take approximately two weeks to install once it arrives on the job. This means that immediate action must be taken to determine the status of the equipment. I recommended to Mr. Tripp and to IMC that they initiate an intensive series of phone calls to determine the physical location of the pump presently and if necessary, to make a personal trip to the plant in Aurora, Illinois to insure that the pump is actually available and can be shipped. If the plant is still on strike, perhaps some arrangement can be made to get the pump out of the plant and to the job. It is important to understand that without this pump system the chilled water system cannot be operated manually.

The main refrigeration panel is now scheduled to be delivered to the site August 18, 1977 (working day 417). According to estimates, it should take approximately 30 working days to install the panel and then another nine days for testing which will bring completion of the refrigeration panel hookup to October 10, 1977 (working day 453). This is presumably when automatic chilled water operation can be available.

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In monitoring #7 we discussed other elements of mechanical equipment not yet on the job. Air handling units 1 and 3 are due at the site today. There should be no problem getting them installed and hooked up. Pressure reducing valves are still not on the job. However, they have no impact on the chilled water system. This is also true of the continuous blow-down system.

Annunciator panels are on the job and presently being installed.

Boiler installation is moving relatively well and the boiler installer should be completed by the end of this week. Installation of remaining boiler piping and trim will take another 20 working days. After that, controls can be completed, testing finished off and startup of the boiler can be expected. Boiler controls have still not been released and a contract let. This is now a serious matter since we are rapidly approaching the fall season when heat might be necessary. Of course, the small stand-by boiler from the original boiler house may be available but it is desirable to get the control contract released and let as quickly as possible. Mr. Tripp will give it his attention.

We still are planning to have the boiler ready for operation by late September or early October.

Tunnel work is now substantially complete except for a three way valve to be installed at the classroom and office building. There will be wiring needed for this valve and a check should be run to insure that provisions are made for the wiring to be installed.

Remaining architectural items including office finishes and glass should be put into work near the end of July. Siding will be complete in early August and thus, it appears that architecturally the building should be almost done by September 2, 1977 (working day 428).

It was mentioned at the meeting that a detailed checklist of all approvals needed be made so that we are certain that there are no loose ends regarding occupancy and operation of the building. The general contractor, Mr. Tripp and the architect/engineer will work on this list.

The critical point to remember on a project of this nature is that it is running so close to the target startup point of September 2, 1977 (working day 428) with installation work that there will be little, if any, time left to pick up omissions or discrepancies from the time installation is done until the time of startup. Thus, it becomes critical to pre-think as many difficult situations as might occur. Occupancy and operation of the building are definitely to be considered.

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In summary, the major obstacle to completion of the building is delivery of the condenser pump. I have recommended to the owner that a personal trip to the plant be made to insure that the pump is available since it is an absolutely crucial part of the total system. Also checks should be run to insure that there are no loose ends on the control systems needed for manual operation. In addition, those things necessary for full occupancy of the building on a manual basis should be checked out in detail by all concerned.

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