Ralph J. Stephenson, P. E., P. C.
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48858
ph 517 772 2537
December 27, 1995

Alan J. Kreyger
J. F. Cavanaugh Co., Inc.
Mechanical Contractors
P. O. Box 40
20750 Sunnydale Avenue
Farmington Hills, Michigan 48336

Re: Bloomfield Village C.S.O planning and scheduling

Dear Mr. Kreyger:

It was a pleasure working with you and Kamath the other day and I want to compliment you for the professional manner in which you organized the material for discussion. It helped greatly to speed preparation of the simulation network we prepared in our meeting.

As a follow up to the session I have listed below some of the steps and processes you might follow in order to use the network most effectively. The points below are numbered for ease of reference.

1. The network model, issue #1, dated December 20, 1995, sheet M1, has no durations assigned for the work depicted in the top section of the network. The plan merely shows the sequencing intent of J. F. Cavanaugh as of March 10, 1995. Therefore you must now assign durations to the activities that would result in completing the project in accordance with your contract. This is the basic action from which the other simulation analyses can proceed.

To calculate the network model duration in working days all you need do is to progressively add the items in sequence starting from the first activity box in any given sequence. For instance activity 303 at the far left sets the starting date of the sequence at the A.M. of February 1, 1995 or working day 531 (from the working day calendar for 1993, 94, 95, and 96 - copy enclosed). Thus if activity 304 was assigned a duration of 4 working days, and could start at working day 531 and continue for its duration it would be completed on the A.M. of working day 535 or February 7, 1995. However activity 305 restrains the start of activity 306 until the A. M. of March 2, 1995. Therefore the starting date of activity 306 must be the later date of the A.M. of March 2, 1995. After you have assigned working days to each activity you can easily calculate the length of any sequence. The calculated network should end at the contract completion date.

2. The next item of work is to assign other resources to each activity. In step 1 you assigned a working day duration to each activity that would bring you to completion at the contract end date. Now you should assign manpower, equipment, and money to each activity. Doing this will allow you to use the network to determine how the money and other resources will be spent as the job proceeds.

For instance if activity 023 - INSTALL WET WELL DEWATERING PUMP P-14 AT ELEV 686'1" requires 3 working days and has a total cost of $12,000, you can allocate the total cost over the 3 working days and roughly figure that the activity will be costed at $4,000 per working day. You can

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then track the cumulative increase in cost just like you calculated the cumulative time in step 1.

By drawing a bar chart showing each activity and assigning a resource to each activity you can total the amount of money or other resources required per day or week by adding the daily or weekly amounts expended on each activity for that particular day or week.

From the total cost per time unit you can plot the cumulative cost curve for this particular set of logic, activity costs and working conditions.

3. If you now want to know how much an acceleration will cost you must reprice the activities as if they were being done under the conditions of acceleration. Then repeating the process in step 2 above the cost of the accelerated plan of work can be determined.

4. You can also determine how resources are stacked by using the same technique as for money as described in step 2 above but substituting manpower for dollars.

I suggest you examine the network model and work through steps 1 and 2 above to get familiar with the method. Then it might be appropriate for us to meet again to review the methodology and to continue on to whatever degree of detail you feel is appropriate for the stage of the work.

Meanwhile I suggest you consider arranging all documents prepared, sent or received in the single number filing format we discussed during our meeting. Since early project work started in July, 1994 for the J. F. Cavanaugh Company you might wish to start numbering with month one being January, 1994.

The first two digits in the document number, i.e. September, 1995 would be month 09. The first document you received in September would be given a number 09001. Following documents would be numbered sequentially. This technique is called the single number filing system. It allows you to uniquely identify any document in the system since there is only one document that has any given number. I have enclosed copies of two handouts I use in my project management classes that describe the system in detail. For the time being I suggest however, that you merely copy the documents and number them in accordance with the method outlined above.

If appropriate and when we meet again we can include a discussion of the document control methodology along with continuing our work on the network planning analysis.

Thank you again for the excellent lunch and the courtesy you and Kamath extended during our meeting day. It was greatly appreciated. Have a happy New Years weekend!

Sincerely yours,

Ralph J. Stephenson, P.E.

date printed: 12/27/95

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Documentation Degree

The degree of needed documentation on any project is determined by the current or potential level of difficulty perceived.

One method of setting documentation degree (dd) is by use of a scale of one to ten, one being a minimum amount consistent with good practice and ten indicating a maximum amount needed to protect those involved from current or potential problems.

Expressed another way, level 1 documentation signifies an absolute minimum is being used. Level 10 documentation indicates the project is being fully documented.

The approximate ranges shown below are reference guidelines for selecting and preparing documentation systems:

- **Levels 1 & 2** Informal job structure - no planned documentation
- **Levels 3 & 4** Normal job - documentation as specified
- **Levels 5 & 6** Claim prone jobs on which trouble is conjectural
- **Level 7** Claim prone jobs on which trouble is very likely
- **Levels 8 to 10** Claim prone jobs on which trouble is a reality

Usually the degree of documentation index indicates an opinion as to how much trouble can be expected on the project.

A brief description of job conditions which may be encountered corresponding to a need for the degrees of documentation indicated is given below.

Documentation degree #1 to 2 (dd 1-2) - no planned documentation

At these levels the project usually is informally organized, with full trust by all parties of all other parties. Most instructions and requests are oral. Revisions and cost commitments are made on a full confidence basis relative to scope, expected payment and resolution. The project team understands and communicates well internally and externally, and all on the team exhibit a high degree of honesty, competence and integrity. Usually meetings are held on an as needed basis only.

It should be cautioned that a low dd does not mean the project will not encounter difficulties. The number merely indicates a recommended level of documentation being maintained as of a given point in time.

Documentation degree #3 to 4 (dd 3-4) - normal job with formal documentation as needed; minimal documentation level well defined by contract

In a dd 3-4 project the usual procedures for processing work during programming, planning, design and construction are well defined and followed carefully by all parties to the contracts. Usually the project

contract documents have been carefully prepared and checked thoroughly. This helps assure that the scope of work is clear and the project is constructible.

Documentation at dd 3-4 during the process of design and construction is maintained at a minimum level consistent with program and contract requirements. An audit trail of approvals, issues, money flow, revisions and quality of construction in place should be able to be followed easily from the system.

An important characteristic of the good level 3 & 4 documentation system is that it must be of a nature that can be increased to a higher level at any time without extensive backtracking and historical research. The fundamental needs of higher level dd's should be able to be easily achieved from the basic work accomplished in a dd 3-4 system. The reason is that the enormous expense and reduced accuracy of later historical research on a troubled construction program should be avoided by setting a good information filing and retrieval system at lower documentation degree level.

Documentation degree #5 & 6 (dd 5-6) - claim prone jobs on which trouble potential is conjectural

Documentation degrees of 5 or 6 should be set early on projects that show potential for claim, but on which no dominant reasons for such problems have yet appeared. For instance a project may be proceeding well despite having a large number of allowance items, several separate prime contractors, and a general trades contractor noted for his sloppy paper work. These are all indicators of potential difficulties but do not necessarily mean trouble.

In a dd 5-6 the level is set high to permit those involved to more quickly react to sudden project difficulties than on a normal project. **To reemphasize, the dd level is set by the nature of the project and is only raised or lowered when sufficient justification for a change is noticed.**

Documentation degree #7 (dd 7) - claim prone jobs on which trouble potential is very likely

On a dd 7 project, comments for dd 5-6 apply, with the qualification that a yet higher dd level requirement than 7 is highly probable. In other words if the job is claim prone and some of the claim prone characteristics are causing actual problems, the documentation level of 7 indicates a movement into higher levels is near at hand.

An example of this might be a claim prone project dd level of 6 as established by a high spread in proposal prices, poor specialty contractor reputations and an architect/engineer who is slow in submittal turnaround , which upon moving into the field, promptly runs into late submittals by the questionable subs and a reactionary slowness by the a/e in processing submittals. This combination might be cause to move the dd to 7, with a good chance it could go even higher within the next month or so. The dd 7 could be looked at as a holding plateau which might be lowered by prompt corrective action or might increase as negative positions harden and remain unresolved.

Documentation degree #8 to 10 (dd 8-10) - claim prone jobs on which trouble is a reality

Projects requiring a dd level of 8 to 10 can be considered to be in trouble and subject to present or future

third party action resolution. Usually the project that has moved to a dd 8-10 level has done so over a period of time during which the problem levels have progressively intensified. If such a project is encountered, the files for third party resolution action should be built as the work proceeds.

If dd 8-10 needs are met on a day to day basis as the documentation is sent or received, the cost will be much less than if it is done later. In addition the analysis will be fresher and more accurate. In addition, the knowledge that such a high level file is being built often acts to dampen the conflict and difficulty and may even lead to quick resolution of the difficulties.

* * *

As a general help in documentation a brief resume of procedures for preparing project documentation is given below. These steps may vary from situation to situation but can be summarized within seven basic documentation actions taken to respond to various dd levels.

Step 1 - Prepare and arrange the document file material - Document copies are arranged, usually chronologically, for future entrance into a single number filing system.

Step 2 - Month number the the documents - Each document is uniquely identified with a number that relates to the month in which the document was prepared.

Step 3 - Day number the documents - When the document has been assigned its month number it is further numbered sequentially by the date within the month. This system is called a single number filing system, since all documents are now uniquely numbered. For instance there would only be one document 04245, a document prepared in the 4th month from the base date, and being the 245th document chronologically entered in that 4th month.

Step 4 - Build the document control file format - With the document uniquely identified, the document copy of the original is coded and a data base retrieval system established. Code fields to be used might include:

Document control number
Document type
Date document prepared
Date document received
Organization from
Organization to
Individual from
Individual to
Subject codes
Others as needed

Step 5 - Enter the document data in the document control file - If justified and required, document data is now entered into the data base file for storage and retrieval in whatever manner required.

Step 6 - Prepare the project history - A project history is prepared in the form of a chronological narrative summarizing the entire project from the document control file. Each major document is reviewed, if appropriate, and entered as a brief unit description of an event, or of events, occurring within a given time period.

Step 7 - Prepare project problem tracking histories - Specific problems causing contested claims, say unexpected artesian water, are identified and the document control files and project history files are searched. The material found is used to build special chronological files for each problem area. These are then analyzed to determine the course of settlement action to be taken.

Rough guidelines for the relation of **dd level** to **documentation steps** as outlined above might be as follows:

• **dd levels 1 & 2 - totally informal - no planned documentation** - No special provisions made for preparing and arranging documents

• **dd levels 3 & 4 - normal job** - Take steps 1 and possibly 2

• **dd levels 5 & 6 - claim prone jobs on which trouble potential is conjectured** - Take steps 1, 2, 3 and possibly 4

• **dd level 7 - Claim prone jobs on which trouble potential is very likely** - Take steps 1, 2, 3, 4 and 5

• **dd levels 8 to 10 - Claim prone jobs on which trouble is a reality** - Take steps 1 through 6 and possibly 7 as required

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Procedures for preparing project documentation

Project documentation is an essential and routine part of every project. However from time to time a project exhibits signs of difficulty which may demand a heavier than normal documentation effort. One way of classifying the level needed is to give it a rating degree from 1 (the lowest level of documentation) to 10 (the highest level of documentation).

A low level of documentation normally utilizes inexpensive and uncomplicated project communication and record keeping. Level 1 encompasses virtually no documentation at all, a situation not usually encountered. Conventional low level routine documentation on a well operating project is normally rated from 2 to 4.

This memo addresses the higher levels of documentation.

Selecting, designing and maintaining a correct documentation level is called document control. Good document control starts with an appropriate method of filing the large number of documents that flow to, from and within the project. Documents include letters, transmittals, bulletins, requests for information, change orders, field orders, shop drawings, change instructions and on & on infinitum. To file these by subject, by document type, by project, by company, or by any other classification system most helpful to those using them. is necessary & desirable in most cases. The project management and the project team must determine how the main filing system classification is to function.

For a document control system the basic classification system is much simpler. A document irrespective of type or classification is filed by a single number assigned to it as it is received. This number is referenced to the date of its production and filed wherever possible in order according to that date. Thus a document dated July 30, 1987 is set earlier in the stack than one dated July 31, 1987 and receives a lower number in the sequence.

This is the fundamental classification system used in the project documentation system described in this discussion. The system is sometimes called a single number filing system.

The basic physical arrangement within the file system recommended here is in ascending order of date of document. Once consecutively numbered however, there are many other criteria by which the documents might be arranged, the content identified and the document retrieved.

A brief step by step description of the total process is given below:

Step #1- Preparing and arranging the document control material

To start the process a single document control copy is made of all written material received, sent or circulated internally that pertain to the project. These are physically arranged chronologically by their official date (the date of the document).

The documents are next divided into time span packets, punched with an oversized punch and put in

loose leaf binders. A packet period of one month has been found to work well in most cases.

Step #2 - Month numbering the documents

Each document is given a number that will identify it uniquely (the only document in the file that has that number). A workable system is to number by the month in which the document was prepared. Using this method a base month is selected and designated as month #1. Month #1 is preferably January of a year in advance of starting major work on the project. Succeeding months are numbered in ascending order. For example if the base date selected is January 1, 1987, then January, 1987 is considered period #1. February, 1987 is period #2, March, 1987 is period #3 and so on.

Thus a document written in June, 1987 and being filed in a document control system using a base date of 01 as January, 1987 will be assigned a document number starting with 06. When there are a large number of documents to be filed it is advisable to use a self advancing numbering stamp.

Step #3 - Day numbering the documents

Once the first two digits of the document identification number is assigned, the last three are then assigned. The remaining three digits reflect the approximate chronological position of the document within the month. If a letter is received dated March 20, 1987, with a control system base month #01 date of January, 1987, and it is the 102nd document entered chronologically in March, 1987, it will be assigned a document number 03102.

Now, every document in the entire file has a unique number and will be identified by that number as to the month and the approximate position in the month it was dated. The name of the system, single number filing, is used since every document filed is identified with a single number irrespective of what type of document it is.

Step #4 - Building the document control file format

With the document identification method set & the documents arranged in ascending document number order, a document retrieval system file is designed and built.

A retrieval data base file should contain the following minimum fields:

1. Document control number (dcn)
2. Document type (dty) - letter (ltr), transmittal (trm), etc.
3. Date document prepared (the basic criteria of the order of the documents in the file) (ddp)
4. Date document received (ddr) - all incoming documents should be date stamped
5. Organization from (ofr)
6. Organization to (oto)
7. Individual from (ifr)
8. Individual to (ito)
9. Subject codes (sco) - Subject codes identify the content nature of the document. For instance a letter concerning mud sills (msi), forming (fmg), supported decks (sde) and building 148 (148) along with a request for information (rfi) would be assigned all the subject codes indicated.

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Consulting Engineer

Step #5 - Entering document data in the document control file

The document records (unit entries in a data base program) are next put into the data base file. Methods of entering data vary but the guidelines below should assist in setting the procedure.

a. Item 1 through 8 in step #4 above are entered directly as a routine data entry task, directly from the master document file material.
b. The subject codes, item #9 in step #4 above, are assigned to the chronological file document by someone familiar with the subject codes and capable of abstracting the subjects to be entered by reading the document. As the documents are read, subject codes should be written directly on the document control copy.
c. Also as the files are read it is helpful to underline and annotate document control file copies to make subject identification as easy and rapid as possible.
d. Once a packet of material has been subject coded (probably one month's file) the subject codes should be entered in the master document control file. Usually the routine entries, items #1 through #8 are entered earlier and in larger batches. Subject codes will generally be assigned at a later date.

Step #6 - Preparing the project history

Let us assume the document file has been prepared for several months of document control records and you wish, or are required, to move to the next level of documentation by conditions encountered on the project.

This level of documentation usually involves preparing a project history from the master document file. The project history is an abstracted chronological narrative of important events on the job.

To prepare a project history, the master document file is read and annotated so each document (depending on relative importance) can be abstracted and put in some type of narrative. Often the annotation is completed in step #5 as subject codes are assigned.

The program selected to process the narrative should be a word processor of some type. For example Think Tank or More can be used by entering the document number number as a heading followed by the document date. Next, the main heading is exploded and a brief summary (under 30 words) of the document is entered in the exploded area. Thus when prepared properly, the information can be sorted by document number or date (whichever is typed first). In addition the abstracts can be searched for key words to build subject files for specialized uses.

The important pivot is the unique document control number which allows the document to be filed in ascending order of document number and to always be found in the file as a numbered file document, no matter how many subject codes it is assigned. For instance document number 09124 can always be found after 09123 and before 09125 in the master chronological file, no matter how many subjects are assigned or what the subject being sought.

An extended use of the project history is to build special reference files for specific uses. For instance one

such use is to search the data base subject codes for a set of documents, and then to call each of the project history abstracts of these documents from the file, and to print and assemble them into a subject file to be used for a deposition.

It is important to understand that not all related documents are abstracted in preparing a project history or the special use file. For instance a transmittal may have no impact on the project history and may not have to be made a part of the history. However the transmittal is still available for reference by a search of the data base file. It is simply not stored in the abstract file.

Step #7 - Preparing specific project problem tracking material

When the project history is partially or wholly available, the document control file can be used at a higher level by selecting major classifications of project problem areas. This selection is made on the basis of the strong positions the preparer of the claim feels he has.

Experience indicates it may be best to concentrate early on the strong positions and win them by good logic and sound documentation. However, additional strong points sometimes emerge by a combination of proper actions taken in a variety of smaller and apparently unimportant points and issues. The analyst must be able to discern and select what information is to be used in any given situation.

Problem areas on a job may cover a variety of situations. It is often of help to use a basic list of normal complaints (causes of contested claims) and to derive from these the specific complaints that are related. Let us take an example.

Presume a project has encountered apparent excessive interference of non liable parties acting as agents of the owner. In this hypothetical example, the agent, say a non liable construction manager, decides that the prime contractors under his control, should be working in a sequence that best suits the owner in the opinion of the non liable construction manager agent. Say further that the prime contractors have either individually or in concert given the non liable construction manager an intended plan of action, that in their opinion as liable parties to a contract arrangement with the owner (the ultimate decision maker), will satisfy the project contract they have with the owner, their client. This plan conflicts with that of the non liable construction manager.

When the owner's agent, the non liable construction manager, pits his desires against those of the prime contractor's, relative to achieving project objectives, the conditions of the contract must be closely analyzed.

In a hard money, fixed time contract, use of time and money are generally the prerogative of the contractor so long as the ends are achieved. Any interference with how the contractor achieves these ends must be viewed as an interference with the contractor's right to enjoy an optimum profit derived from the job plan which he has signified as his intended plan of work.

Such interference is legally known as maladministration. It is a common occurrence and many times is a result of honest misunderstandings about the project. However the dangers of maladministration are felt when the owner and/or his agents, by their actions or inactions affect the potential for a contractor to

make an expected profit, within the bounds of agreed upon performance standards. When owner interference occurs the contractor is entitled to reimbursement for the reduction in his ability to earn an intended profit, and to fully cover his costs on the job.

The proof in such situations is however often difficult to provide. But if the document control system is properly prepared, the subject coding accurately done and the project histories well written, it is a relatively simple matter to retrieve all documents relating to the problem and to build a special history for any specific delay or interference.

* * * * * *

Not all the above steps are taken in the preparation of project documentation. If the level of documentation called for is at 2 to 3, it is generally adequate to prepare a subject file of the documents and only take Step #1 above if specific minor problems are encountered in a well defined, limited time period.

If the problems mount on the job and a documentation level of 4 or 5 is indicated, Steps #1, 2, 3 might be advisable to implement. A higher level of project difficulty, say a level of 6 to 8 might call for Steps #4 and 5 to be put into work.

When the level of project difficulty is raised to 9 or 10 which indicates a job upon which very serious problems are being encountered, Steps #6 and 7 should be initiated. Hopefully a full Step #6 and 7 program will not be needed, but on especially troublesome jobs, may be necessary.

J. F. Cavanaugh Co. - Bloomfield Township C.S.O - disk 524

I. General notes

A. Dates of rjs work on project
1. Wednesday, December 13, 1995
2. Wednesday, December 20, 1995

B. Key dates - all to be checked
1. 09/26/94 - jfc submitted hard money proposal to Kajima
2. 09/27/94 - Kajima notified jfc that jfc was low on the job and they intended to award to jfc if qualified.
3. 11/01/94 - Kajima received notice of award from owner (to be confirmed)
4. 11/15/94 - jfc provided Kajima activity list with durations
5. 11/22/94 - Owner issued notice to proceed to Kajima.
6. 12/07/94 - jfc submitted schedule of values to Kajima.
7. 12/27/94 - jfc received first schedule from Kajima.
8. 01/03/95 - jfc responded to first Kajima schedule & provided Kajima an activity list.
9. 02/01/95 - jfc began procurement work & mobilized on site
10. 03/02/95 - jfc signed contract
11. 03/02/95 - Date of jfc contract with ken.
12. 03/10/95 - jfc submitted information re schedule to Kajima.
13. 11/20/96 pm - Current contract completion date.

C. Those involved
1. aia - Angelo Iafrate
2. ajk - Alan J. Kreyger - J. F. Cavanaugh Co.
3. ase - Ace Steel Erection, Inc.
4. cre - City Resteel
5. dbe - D. Best - Shaw Electric - not on this project currently
6. dbu - Doug Buchholz - Oakland County
7. dde - Dennis Dembiec - City of Birmingham
8. dmo - Dennis Monsere - hrc
9. fro - F. Rozelle - Kajima En gineering
10. gdi - Guy DiPonio - Kajima En gineering
11. hrc - Hubbell, Roth & Clark
12. hsc - Hausmann Steel Corportation
13. hue - H. Uehara - Kajima En gineering
14. jco - John Colley - Shaw Electric - Project manager
15. jfc - J. F. Cavanaugh Co.
16. jmo - J. Monahan - The Monahan Co.
17. jth - James Thompson - Kajima En gineering
18. ken - Kajima Engineering
19. npf - N. Pfaff - Angelo Iafrate

20. odc - Oakland County Drain Commission
21. psa - Phil Sanzika - Oakland County Drain Commission
22. pti - Paul Tittes -
23. rjo - Rick Johnson - Kajima Engineering
24. rsc - Rohrscheib Sons Caissions
25. sel - Shaw Electric
26. spc - Shelbey Precast Concrete
27. tmc - The Monahan Co.
28. wdo - Wayne Domine - Bloomfield Township

D. Documents reviewed
   1. 12/05/95 - Cover letter to rjs from gdi - describing general nature of situation.
   2. 11/15/94 - jfc schedule information sent to ken
   3. 12/19/95 - ken sent project bar chart schedule to jfc
   4. 01/03/95 - jfc sent info requested by ken re payment request, schedule of values, work activities, shop drawing submittal dates and material delivery dates.
      a) No information included in rjs copy except copy of material sent to ken on 11/15/94.
   5. 02/06/95 - Transmittal from ken/gdi
      a) Bar chart showing concrete pours in detail
      b) Original bar chart from ken
      c) Detailed narrative and plans showing concrete pours
      d) gdi requested additional information on item 39 - mechanical installation
   6. 01/06/95 - Letter from hrc approving horizontal bar chart schedule and requesting additional information on mechanical and electrical work along with other trade data.
   7. 03/10/95 - Letter from jfc/ajk giving detailed narrative information concerning scheduling of each work activity in the ken bar chart
   8. 08/15/95 - Letter from ajk to gdi expressing concern about progress on project particularly at the control building. ajk estimates ken approximately 2 months behind schedule. jfc needs about one year to complete control building work after given access to building at elevations 686' and 701'.
   9. 09/01/95 - Transmittal from gdi to hrc/dmo and enclosing bar chart for immediate attention and response
   10. 09/14/95 - Letter from ajk to gdi listing bar chart items for which he needs information to complete scheduling mechanical work. Reemphasize that jfc needs 12 months to complete mechanical piping in control building. jfc gave completion date in control building of November 1996, not June, 1996.

11. 09/20/95 - Letter from gdi to ajk reviewing schedule information. ken preparing a more precise revised schedule to incorporate conditions of all subcontractors and coordinate between subcontractors to share the spaces and resources of the project site.
12. 10/02/95 - Letter from ajk to dpi outlining history of project scheduling and construction. Urged ken to concentrate on control building. Encolosure of control building not nearly 6 months behind original date.
13. 10/06/95 - Letter from dpi to ajk asking to meet and jointly discuss a revised construction schedule. ken seems to be in schedule trouble due to weather, field conditions, and workin a congested small area. Enclosed a revised construction schedule.
14. 10/17/95 - Letter from ajk to ken outlining jfc approach to planning and scheduling the project at this time. Asked about revised completion date of 01/24/97. Original contract date was 11/20/96. ajk said he was unaware of a change order being issued. jfc reserved right to r ecover costs associated with any extension of time granted.
15. 11/01/95 - Letter from ajk about their review of the most recent ken schedule of October 24, 1995. Do not agree with it and requested it be revised to include jfc's data of 10/17/95. 10/24/95 schedule enclosed.
16. 11/06/95 - Letter from gdi to ajk stating that Mr. Phil Sanzika of the Oakland County Drain Commission has said that the original completion date of November 20, 1996 must be met. All subcontractors must find ways of meeting the schedule and identify additional costs for ken so they can request acceleration costs to be incurred from the owner.
17. 11/16/95 - Letter from ajk to gdi in response to gdi letter of 11/06/95. Requests copies of all correspondence with owner re time extension. Reviewed lags in current work over the latest schedule. Now 24 weeks behind original schedule and 4 weeks behind the latest schedule of 10/05/95. Relying on ken to reimburse jfc in full for jfc's addtional costs on the project.
18. 11/15/95 - Transmittal from hrc to ken. Returns horizontal bar chart of October 24, 1995 indicating that the schedule was reviewed for information only.
19. 11/28/95 - Letter to kmo from gdi outlining ken's position in respect to an extension of the work. Believes it would be inappropriate for ken to submit a schedule which is factually impossible to meet. Emphasized that ken is entitled to request and receive addtional time and the acceleration expense to meet the extended schedule of work. Copies apparently sent to all affected parties.
20. 12/07/95 (239) - Cover letter from gdi to ajk confirming results of scheduling meeting at ken's office with ken and Monahan held on 12/06/95

(238)

21. 12/07/95 (239) - Bar chart schedule from ken - sent formally to ajk on 12/11/95 (241)
22. 12/12/95 (242) - Response from ajk to gdi regarding bar chart of 12/07/95 (239)

E. Additional documents used in meetings
1. 12/07/95 (239) - Cover letter from gdi to ajk confirming results of scheduling meeting at ken's office with ken and Monahan held on 12/06/95 (238)
2. 12/07/95 (239) - Bar chart schedule from ken - sent formally to ajk on 12/11/95 (241)
3. 12/12/95 (242) - Response from ajk to gdi regarding bar chart of 12/07/95 (239)

II. **Meeting of Wednesday, December 20, 1995 (wd 248) - 10:00:22 AM**

A. Those attending
1. Alan J. Kreyger - J. F. Cavanaugh Co.
2. M. P. Kamath - J. F. Cavanaugh Co. - in meeting part time
3. Ralph J. Stephenson - Consultant

B. Agenda for meeting
1. Establish general procedures to cost out what needs to be done to meet an early date of completion - August 8, 1996 pm (wd 411)
2. Prepare network model for remaining work at the control building
3. Schedule jfc work so as to avoid excessive stacking of resources
4. Validate ken schedule of work dated 12/07/95 (wd 239)

C. Components of C.S.O.
1. Control building - cbu
2. Retention basin - rba
3. Site work - siw

D. Laundry list of activities to include in network model
1. Control building
a) INSTALL BASIN DEWATERING PUMPS P-1, P-2, & P-3 AT ELEV 679'6" (20)
b) INSTALL DUPLEX SUMP PUMP P-15 & P-16 AT ELEV 686'1" (21)
c) INSTALL FLUSHING PUMPS P-17 & P-18 AT ELEV 719'4" (22)
d) INSTALL WET WELL DEWATERING PUMP P-14 AT ELEV 701'3" (23)
e) INSTALL SODIUM HYPOCHLORITE FEED PUMPS P-7, P-8, & P-9 AT ELEV 715'3" (23a)
f) INSTALL DECANTING PUMPS P-4, P-5, & P6 AT 701'3" (24)
g) INSTALL SAMPLE PUMP AT 719'4" (25)
h) INSTALL AUTOMATIC SAMPLERS AT ELEV 719'4" (26)

i) INSTALL ODOR CONTROL EQUIPMENT AT ELEV 715'3" (27)
j) INSTALL SODIUM HYPOCHLORITE INDUCTION UNITS IN RETENTION BASIN (28)
k) INSTALL CHEMICAL STORAGE TANKS AT ELEV 715'3" (29)
l) INSTALL ROTARY DRUM STRAINER AT ELEV 701'3" (30)
m) INSTALL H & V UNIT #1 AT ELEV 738'0" (31)
n) INSTALL ELECTRIC UNIT HEATERS AT ELEV 738'0" (32)
o) INSTALL AIR COMPRESSORS & ACCESSORIES AT ELEV 738'0" (33)
p) INSTALL SAMPLE PIPING BETWEEN ELEV 719' & 738' (34)
q) INSTALL SODIUM HYPOCHLORITE PIPING BETWEEN 719' & 738' (35)
r) INSTALL BUBBLER TUBING & PIPING AT VARIOUS ELEVATIONS (36)
s) INSTALL NATURAL GAS PIPING ABOVE ELEV 738'0" (37)
t) INSTALL DRAIN WASTE & VENT PIPING AT VARIOUS ELEVATIONS (38)
u) INSTALL INDUSTRIAL & SEAL WATER PIPING AT VARIOUS ELEVATIONS (39)
v) INSTALL POTABLE WATER PIPING AT VARIOUS ELEVATIONS (40)
w) INSTALL PLUMBING FIXTURES & HOSES AT VARIOUS ELEVATIONS (41)
x) INSTALL COMPRESSED AIR PIPING AT VARIOUS ELEVATIONS (42)
y) INSTALL ODOR CONTROL VALVES/ DAMPERS AT ELEV 735' & 738' (43)
z) INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 680' & 738' (44)
aa) INSTALL STRAINER BACKWASH / DRAIN PIPE BETWEEN ELEV 701' & 719' (45)
ab) INSTALL DECANTING PUMP SUCTION PIPING BETWEEN ELEV 701' & 719' (46)
ac) INSTALL DECANTING PUMP DISCHARGE PIPING BETWEEN ELEV 701' & 738' (47)
ad) INSTALL DEWATERIN G PUMP DISCHARGE PIPING BETWEEN ELEV 680' & 738' (48)
ae) INSTALL ODOR CONTROL CHEMICAL PIPING BETWEEN ELEV 715' & 738' (49)
af) START UP & TEST (50)
ag) SHUT OFF & TURN OVER FACILITY (TO BE ADDED AS DESCRIPTIVE PHRASE) (51)

ah) INSTALL ODOR CONTROL DUCTWORK AT VARIOUS ELEVATIONS (52)
ai) INSTALL HVAC DUCTWORK & EQUIP AT VARIOUS ELEVATIONS (53)

2. Retention basin
3. Site work

E. General notes
1. Need costs for acceleration to permit meeting approximate 08/08/96 completion date of main mechanical work.
2. Need plan of work to reach 08/08/96 completion date of main mechanical work.
3. Mission of our work today included
   a) Avoid unreasonable stacking of activities & resources.
   b) Show impact of unreasonable stacking of activities & resources.
   c) Articulate intuitive feelings about current job issues and difficulties.
   d) Prepare a base plan of jfc's intended course of action on the job.
4. Liquidated damages are $1,000 per day to the general contractor from November 20, 1996.
5. Recommended to Alan that he use single number filing system for all job related documents.

J. F. Cavanaugh Co. - Bloomfield Township C.S.O - disk ?

I. **Date of rjs work on project - Wednesday, December 13, 1995**

II. **Those involved**

A. aia - Angelo Iafrate
B. ajk - Alan J. Kreyger - J. F. Cavanaugh Co.
C. ase - Ace Steel Erection, Inc.
D. cre - City Resteel
E. dbe - D. Best - Shaw Electric
F. dbu - Doug Buchholz ? - County
G. dde - Dennis Dembiec - City of Birmingham
H. dmo - Dennis Monsere - hrc
I. fro - F. Rozelle ?
J. gdi - Guy DiPonio - Kajima En gineering
K. hrc - Hubbell, Roth & Clark
L. hsc - Hausmann Steel Corportation
M. hue - H. Uehara ?
N. jfc - J. F. Cavanaugh Co.
O. jmo - J. Monahan - The Monahan Co.
P. jth - J. Thompson ?
Q. ken - Kajima Engineering
R. npf - N. Pfaff - Angelo Iafrate
S. odc - Oakland County Drain Commission
T. psa - Phil Sanxika - Oakland County Drain Commission
U. pti - Paul Tittes
V. rjo - R. Johnson ?
W. rsc - Rohrscheib Sons Caissions
X. sel - Shaw Electric
Y. spc - Shelbey Precast Concrete
Z. tmc - The Monahan Co.
AA. wdo - Wayne Domine - Bloomfield Township

John Colley - Shaw

III. **Documents reviewed**

A. 12/05/95 - Cover letter to rjs from gdi - describing general nature of situation.
B. 11/15/94 - jfc schedule information sent to ken
C. 12/19/95 - ken sent project bar chart schedule to jfc
D. 01/03/95 - jfc sent info requested by ken re payment request, schedule of values, work activities, shop drawing submittal dates and material delivery dates.
    1. No information included in rjs copy except copy of material sent to ken on 11/15/94.
E. 02/06/95 - Transmittal from ken/gdi
    1. Bar chart showing concrete pours in detail
    2. Original bar chart from ken
    3. Detailed narrative and plans showing concrete pours
    4. gdi requested additional information on item 39 - mechanical installation
F. 01/06/95 - Letter from hrc approving horizontal bar chart schedule and requesting additional information on mechanical and electrical work along with

other trade data.

G. 03/10/95 - Letter from jfc/ajk giving detailed narrative information concerning scheduling of each work activity in the ken bar chart
H. 08/15/95 - Letter from ajk to gdi expressing concern about progress on project particularly at the control building. ajk estimates ken approximately 2 months behind schedule. jfc needs about one year to complete control building work after given access to building at elevations 686' and 701'.
I. 09/01/95 - Transmittal from gdi to hrc/dmo and enclosing bar chart for immediate attention and response
J. 09/14/95 - Letter from ajk to gdi listing bar chart items for which he needs information to complete scheduling mechanical work. Reemphasize that jfc needs 12 months to complete mechanical piping in control building. jfc gave completion date in control building of November 1996, not June, 1996.
K. 09/20/95 - Letter from gdi to ajk reviewing schedule information. ken preparing a more precise revised schedule to incorporate conditions of all subcontractors and coordinate between subcontractors to share the spaces and resources of the project site.
L. 10/02/95 - Letter from ajk to dpi outlining history of project scheduling and construction. Urged ken to concentrate on control building. Encolosure of control building not nearly 6 months behind original date.
M. 10/06/95 - Letter from dpi to ajk asking to meet and jointly discuss a revised construction schedule. ken seems to be in schedule trouble due to weather, field conditions, and workin a congested small area. Enclosed a revised construction schedule.
N. 10/17/95 - Letter from ajk to ken outlining jfc approach to planning and scheduling the project at this time. Asked about revised completion date of 01/24/97. Original contract date was 11/20/96. ajk said he was unaware of a change order being issued. jfc reserved right to r ecover costs associated with any extension of time granted.
O. 11/01/95 - Letter from ajk about their review of the most recent ken schedule of October 24, 1995. Do not agree with it and requested it be revised to include jfc's data of 10/17/95. 10/24/95 schedule enclosed.
P. 11/06/95 - Letter from gdi to ajk stating that Mr. Phil Sanzika of the Oakland County Drain Commission has said that the original completion date of November 20, 1996 must be met. All subcontractors must find ways of meeting the schedule and identify additional costs for ken so they can request acceleration costs to be incurred from the owner.
Q. 11/16/95 - Letter from ajk to gdi in response to gdi letter of 11/06/95. Requests copies of all correspondence with owner re time extension. Reviewed lags in current work over the latest schedule. Now 24 weeks behind original schedule and 4 weeks behind the latest schedule of 10/05/95. Relying on ken to reimburse jfc in full for jfc's addtional costs on the project.
R. 11/15/95 - Transmittal from hrc to ken. Returns horizontal bar chart of October 24, 1995 indicating that the schedule was reviewed for information only.
S. 11/28/95 - Letter to kmo from gdi outlining ken's position in respect to an extension of the work. Believes it would be inappropriate for ken to submit a

schedule which is factually impossible to meet. Emphasized that ken is entitled to request and receive addtional time and the acceleration expense to meet the extended schedule of work. Copies apparently sent to all affected parties.

95:55

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48858
ph 517 772 2537
January 29, 1996

Alan J. Kreyger
J. F. Cavanaugh Co., Inc.
Mechanical Contractors
P. O. Box 40
20750 Sunnydale Avenue
Farmington Hills, Michigan 48336

Re: Bloomfield Village C.S.O planning and scheduling

Dear Mr. Kreyger:

Enclosed is two copies of the updated network model derived from your revisions of December 27, 1995. I have some questions about the corrections but since they might be difficult to discuss over the phone I decided to make the revisions according to my best reading of your notes.

Listed below is a brief narrative summary of some of the questions I had as I went through the updating.

1. The control building narrative listing on the two 8 1/2" x 11" sheets differed in some respects from notes on the network models. This was particularly the case at elevation 719'4" where the start of activity 047 was indicated as after the 7/21/95 date for activity 208. In the network model it appears that the revisions have activity 047 also restrained by activity 023a. This restraint gives a much later dates for the sequence to start.

2. There are some other apparent differences between the narrative listing and the information on the network model. Would you please review these.

3. Activity 039 is shown in the network with two different durations, 60 working days and 52 working days. I have used 52 working days in the update.

4. No date is shown for activity 210 which restrains activity 050, start up and test.

5. What task does activity 036 restrain? Activity 036 is shown deleted in the corrected copy.

6. Please clarify what is meant by the arrow labeled "Insert - critical activity for

Ralph J. Stephenson, P. E., P. C.
Consulting Engineer
323 Hiawatha Drive
Mt. Pleasant, Michigan 48858
ph 517 772 2537
January 29, 1996

milestone date" coming off the activity showing Kajima completing the concrete flow structure and show on the supplementary model for the retention basin schedule.

7. I wasn't totally certain what starting dates were to be used for activities 011a and 011b and so assumed they would be complete 6 working days before the activities they restrained. This made them parallel to the Kajima deck pours.

8. Durations were missing from the Kajima activity showing installation of precast roof and trough effluent channel cell #2 & #3

9. What does activity 005 restrain?

10. What does activity 019a restrain?

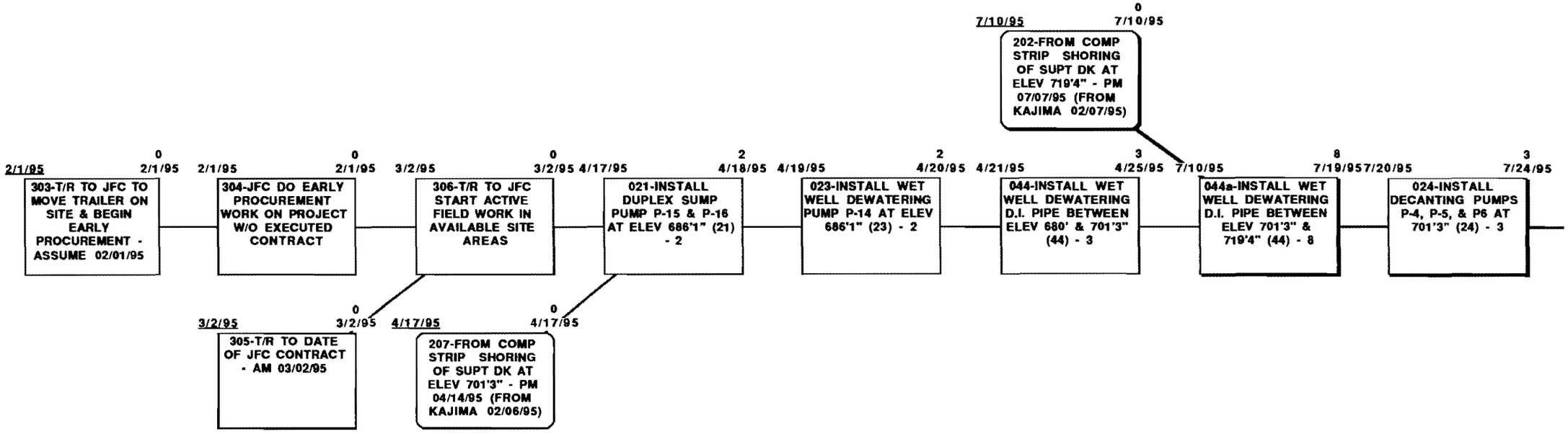
11. What does activity 019c restrain?

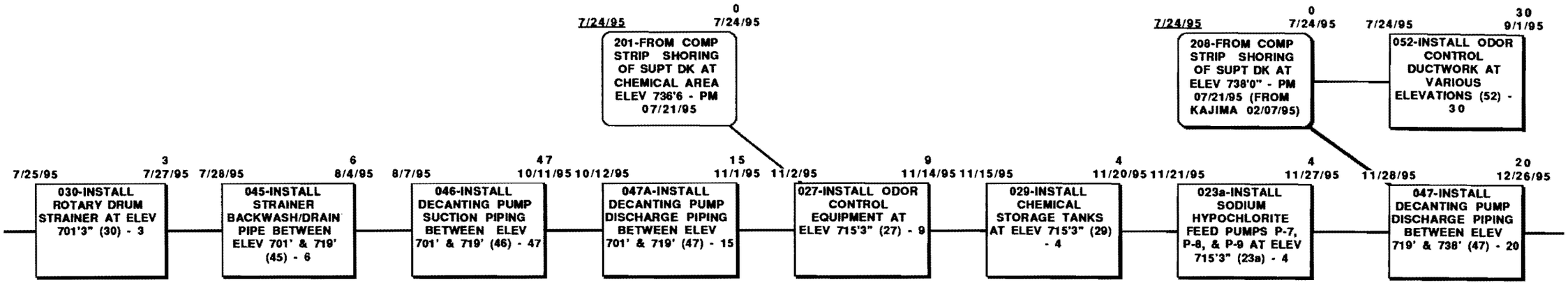
I have marked where these items occur on one copy of the updated network. The individual network sheets are numbered from one to eight, with sheets 1, 2, 3, and 4 lining up across the top and 5, 6, 7, and 8 lining up in the second row.

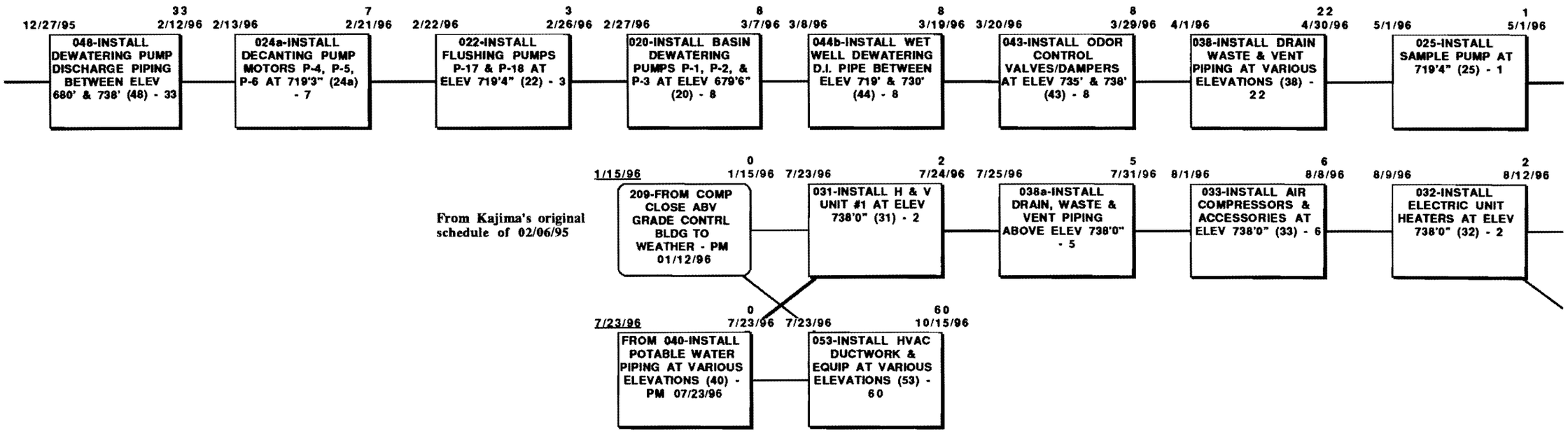
When you have had an opportunity to review the enclosed material, it might be appropriate for us to meet again to bring the information into the final form you wish to use for your ongoing needs. Please call if you have any questions.

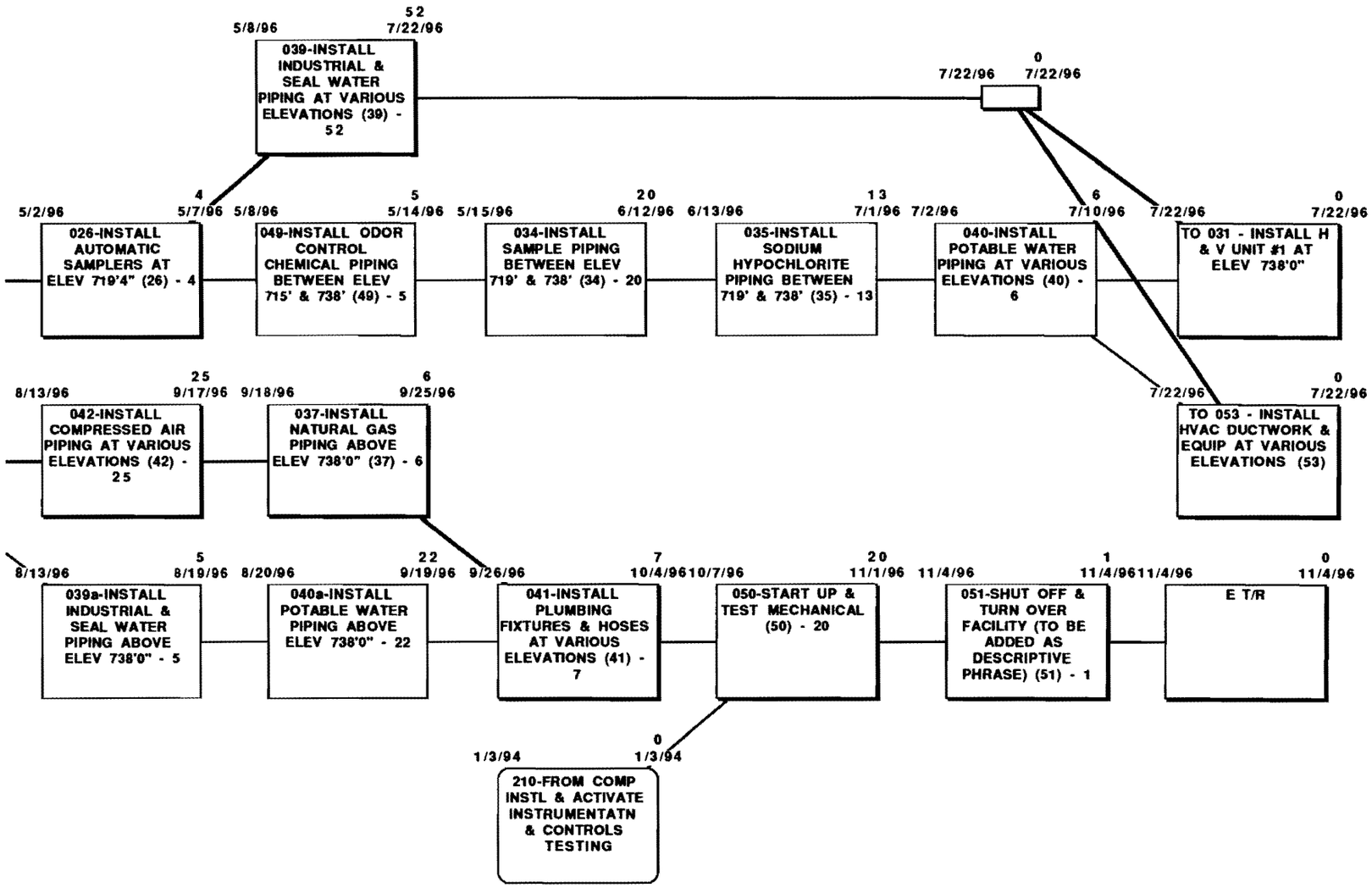
Sincerely yours,

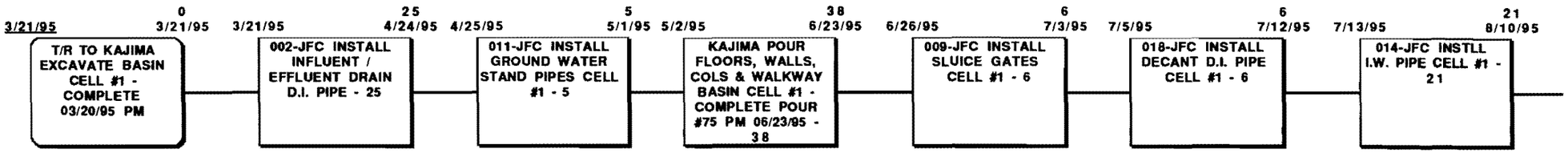
Ralph J. Stephenson, P.E.


2/1/95
0
2/1/95
303-T/R TO JFC TO MOVE TRAILER ON SITE & BEGIN EARLY PROCUREMENT - ASSUME 02/01/95
2/1/95
0
2/1/95
304-JFC DO EARLY PROCUREMENT WORK ON PROJECT W/O EXECUTED CONTRACT
3/2/95
0
3/2/95
306-T/R TO JFC START ACTIVE FIELD WORK IN AVAILABLE SITE AREAS
4/17/95
2
4/18/95
021-INSTALL DUPLEX SUMP PUMP P-15 & P-16 AT ELEV 686'1" (21) - 2
4/19/95
2
4/20/95
023-INSTALL WET WELL DEWATERING PUMP P-14 AT ELEV 686'1" (23) - 2
4/21/95
3
4/25/95
044-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 680' & 701'3" (44) - 3
7/10/95
8
7/19/95
044a-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 701'3" & 719'4" (44) - 8
7/20/95
3
7/24/95
024-INSTALL DECANTING PUMPS P-4, P-5, & P6 AT 701'3" (24) - 3
7/10/95
0
7/10/95
202-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 719'4" - PM 07/07/95 (FROM KAJIMA 02/07/95)
3/2/95
0
3/2/95
305-T/R TO DATE OF JFC CONTRACT - AM 03/02/95
4/17/95
0
4/17/95
207-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 701'3" - PM 04/14/95 (FROM KAJIMA 02/06/95)

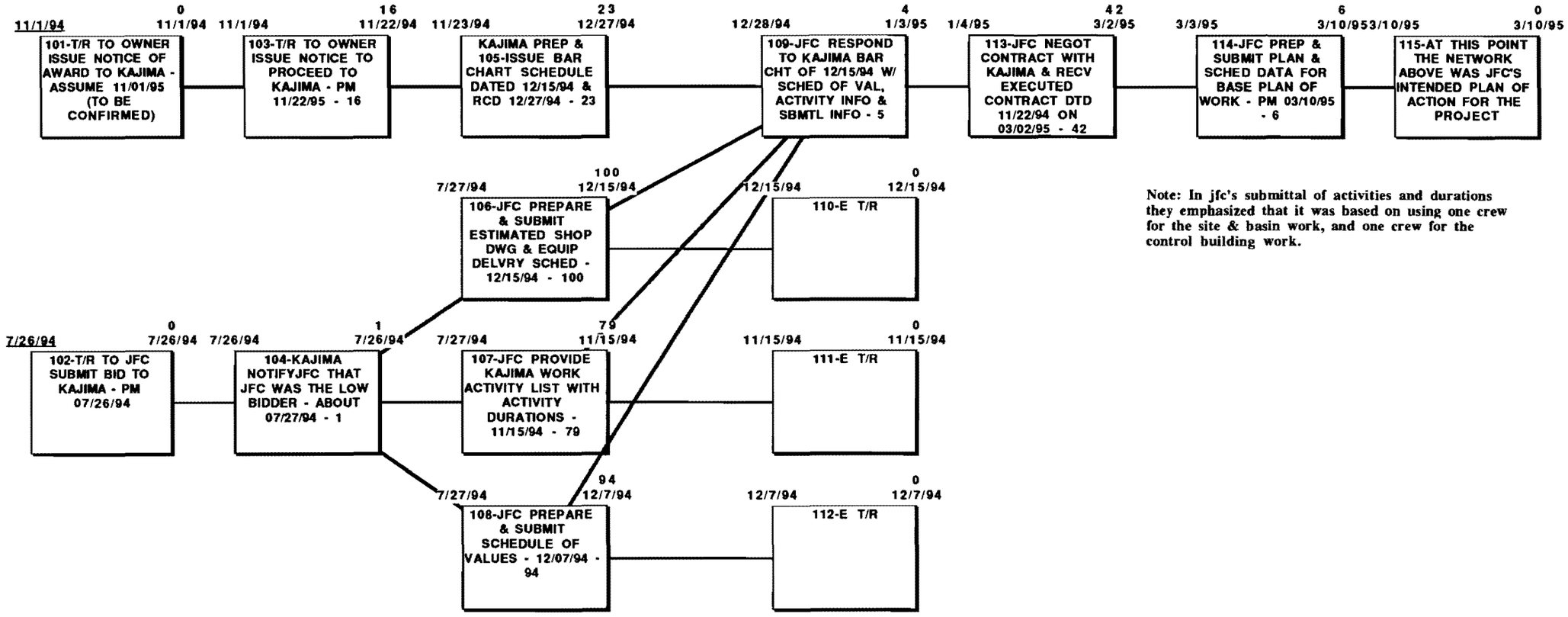

7/25/95
3
7/27/95
030-INSTALL ROTARY DRUM STRAINER AT ELEV 701'3" (30) - 3
7/28/95
6
8/4/95
045-INSTALL STRAINER BACKWASH/DRAIN PIPE BETWEEN ELEV 701' & 719' (45) - 6
8/7/95
47
10/11/95
046-INSTALL DECANTING PUMP SUCTION PIPING BETWEEN ELEV 701' & 719' (46) - 47
10/12/95
15
11/1/95
047A-INSTALL DECANTING PUMP DISCHARGE PIPING BETWEEN ELEV 701' & 719' (47) - 15
11/2/95
9
11/14/95
027-INSTALL ODOR CONTROL EQUIPMENT AT ELEV 715'3" (27) - 9
11/15/95
4
11/20/95
029-INSTALL CHEMICAL STORAGE TANKS AT ELEV 715'3" (29) - 4
11/21/95
4
11/27/95
023a-INSTALL SODIUM HYPOCHLORITE FEED PUMPS P-7, P-8, & P-9 AT ELEV 715'3" (23a) - 4
11/28/95
20
12/26/95
047-INSTALL DECANTING PUMP DISCHARGE PIPING BETWEEN ELEV 719' & 738' (47) - 20
7/24/95
0
7/24/95
201-FROM COMP STRIP SHORING OF SUPT DK AT CHEMICAL AREA ELEV 736'6 - PM 07/21/95
7/24/95
0
7/24/95
208-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 738'0" - PM 07/21/95 (FROM KAJIMA 02/07/95)
7/24/95
30
9/1/95
052-INSTALL ODOR CONTROL DUCTWORK AT VARIOUS ELEVATIONS (52) - 30


12/27/95
33
2/12/96
048-INSTALL DEWATERING PUMP DISCHARGE PIPING BETWEEN ELEV 680' & 738' (48) - 33
2/13/96
7
2/21/96
024a-INSTALL DECANTING PUMP MOTORS P-4, P-5, P-6 AT 719'3" (24a) - 7
2/22/96
3
2/26/96
022-INSTALL FLUSHING PUMPS P-17 & P-18 AT ELEV 719'4" (22) - 3
2/27/96
8
3/7/96
020-INSTALL BASIN DEWATERING PUMPS P-1, P-2, & P-3 AT ELEV 679'6" (20) - 8
3/8/96
8
3/19/96
044b-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 719' & 730' (44) - 8
3/20/96
8
3/29/96
043-INSTALL ODOR CONTROL VALVES/DAMPERS AT ELEV 735' & 738' (43) - 8
4/1/96
22
4/30/96
038-INSTALL DRAIN WASTE & VENT PIPING AT VARIOUS ELEVATIONS (38) - 22
5/1/96
1
5/1/96
025-INSTALL SAMPLE PUMP AT 719'4" (25) - 1
From Kajima's original schedule of 02/06/95
1/15/96
0
1/15/96
209-FROM COMP CLOSE ABV GRADE CONTRL BLDG TO WEATHER - PM 01/12/96
7/23/96
2
7/24/96
031-INSTALL H & V UNIT #1 AT ELEV 738'0" (31) - 2
7/25/96
5
7/31/96
038a-INSTALL DRAIN, WASTE & VENT PIPING ABOVE ELEV 738'0" - 5
8/1/96
6
8/8/96
033-INSTALL AIR COMPRESSORS & ACCESSORIES AT ELEV 738'0" (33) - 6
8/9/96
2
8/12/96
032-INSTALL ELECTRIC UNIT HEATERS AT ELEV 738'0" (32) - 2
7/23/96
0
7/23/96
FROM 040-INSTALL POTABLE WATER PIPING AT VARIOUS ELEVATIONS (40) - PM 07/23/96
7/23/96
60
10/15/96
053-INSTALL HVAC DUCTWORK & EQUIP AT VARIOUS ELEVATIONS (53) - 60

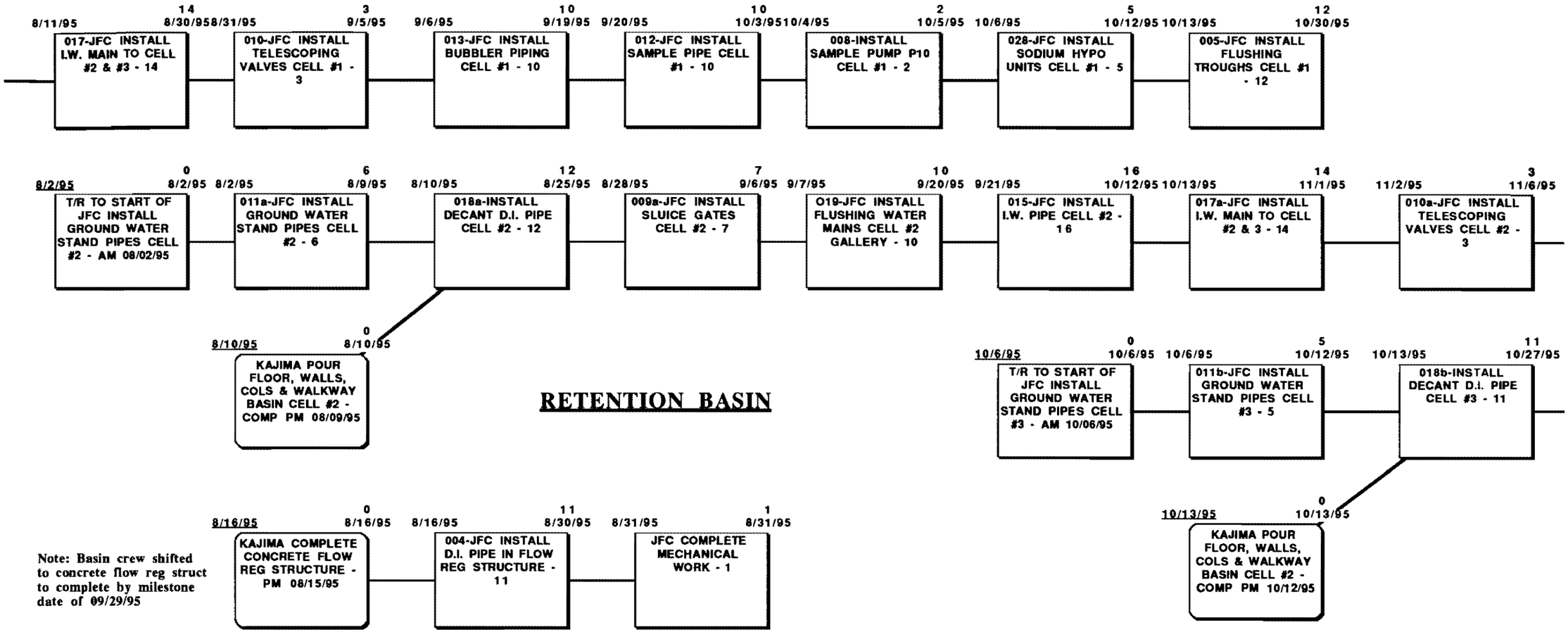

5/8/96
52
7/22/96
039-INSTALL INDUSTRIAL & SEAL WATER PIPING AT VARIOUS ELEVATIONS (39) - 52
7/22/96
0
7/22/96
5/2/96
4
5/7/96
026-INSTALL AUTOMATIC SAMPLERS AT ELEV 719'4" (26) - 4
5/8/96
5
5/14/96
049-INSTALL ODOR CONTROL CHEMICAL PIPING BETWEEN ELEV 715' & 738' (49) - 5
5/15/96
20
6/12/96
034-INSTALL SAMPLE PIPING BETWEEN ELEV 719' & 738' (34) - 20
6/13/96
13
7/1/96
035-INSTALL SODIUM HYPOCHLORITE PIPING BETWEEN 719' & 738' (35) - 13
7/2/96
6
7/10/96
040-INSTALL POTABLE WATER PIPING AT VARIOUS ELEVATIONS (40) - 6
7/22/96
0
7/22/96
TO 031 - INSTALL H & V UNIT #1 AT ELEV 738'0"
8/13/96
25
9/17/96
042-INSTALL COMPRESSED AIR PIPING AT VARIOUS ELEVATIONS (42) - 25
9/18/96
6
9/25/96
037-INSTALL NATURAL GAS PIPING ABOVE ELEV 738'0" (37) - 6
7/22/96
0
7/22/96
TO 053 - INSTALL HVAC DUCTWORK & EQUIP AT VARIOUS ELEVATIONS (53)
8/13/96
5
8/19/96
039a-INSTALL INDUSTRIAL & SEAL WATER PIPING ABOVE ELEV 738'0" - 5
8/20/96
22
9/19/96
040a-INSTALL POTABLE WATER PIPING ABOVE ELEV 738'0" - 22
9/26/96
7
10/4/96
041-INSTALL PLUMBING FIXTURES & HOSES AT VARIOUS ELEVATIONS (41) - 7
10/7/96
20
11/1/96
050-START UP & TEST MECHANICAL (50) - 20
11/4/96
1
11/4/96
051-SHUT OFF & TURN OVER FACILITY (TO BE ADDED AS DESCRIPTIVE PHRASE) (51) - 1
11/4/96
0
11/4/96
E T/R
1/3/94
0
1/3/94
210-FROM COMP INSTL & ACTIVATE INSTRUMENTATN & CONTROLS TESTING

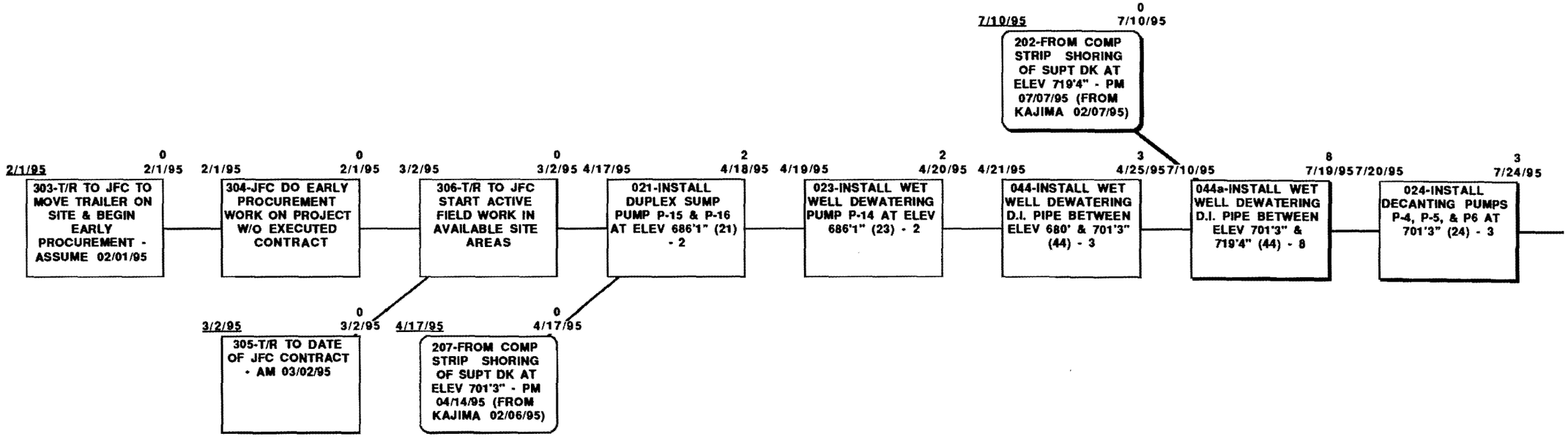


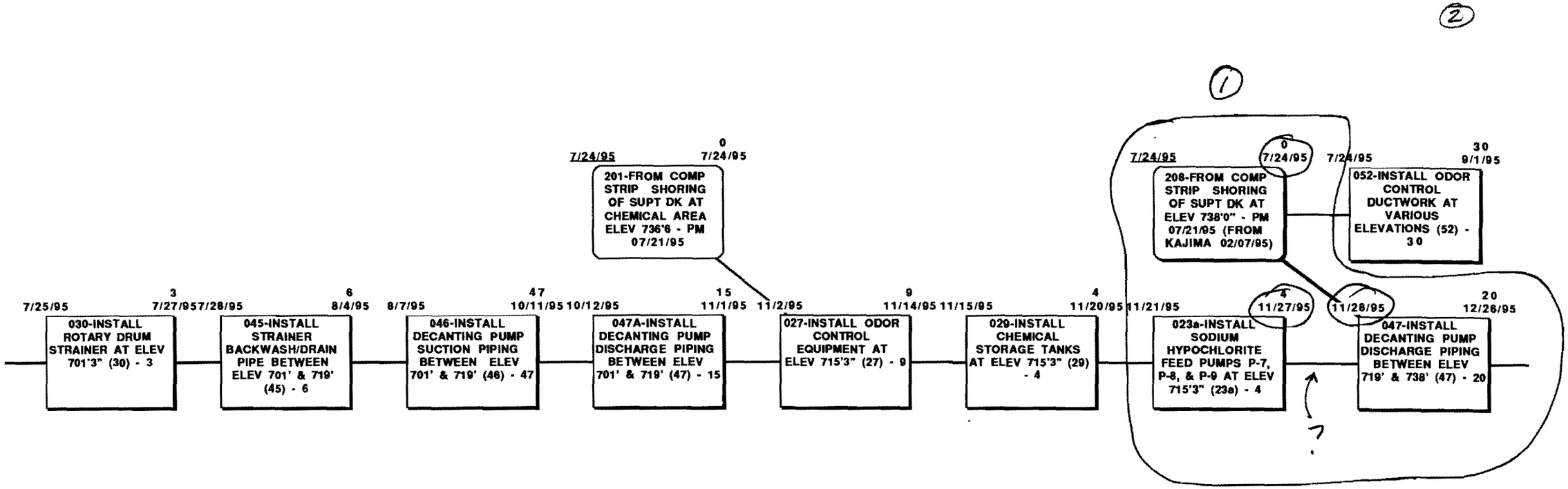
RETENTION BASIN

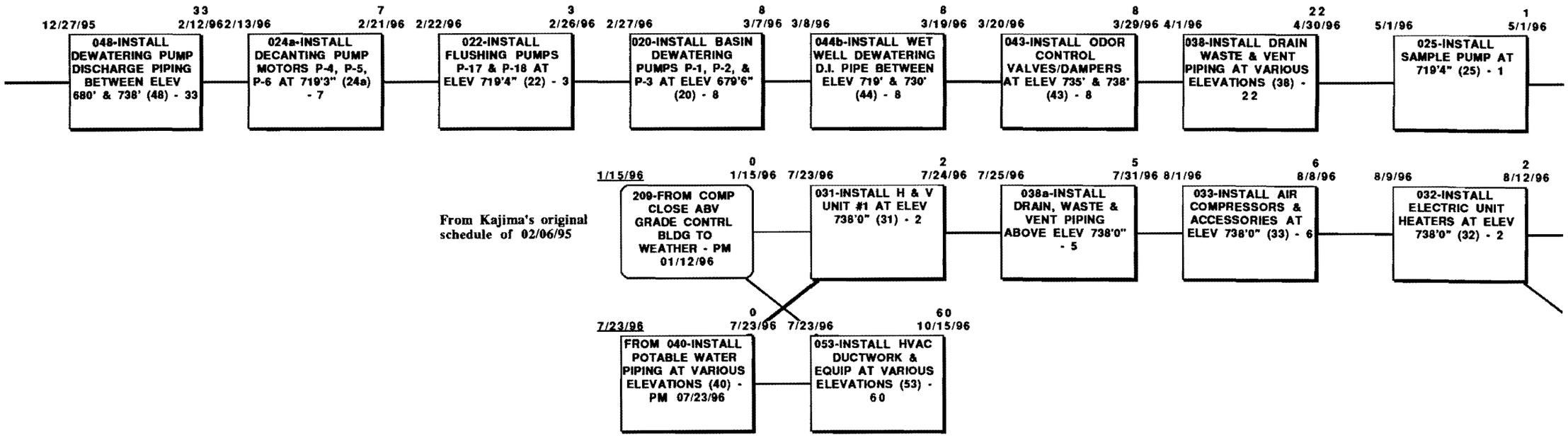


Note: In jfc's submittal of activities and durations they emphasized that it was based on using one crew for the site & basin work, and one crew for the control building work.

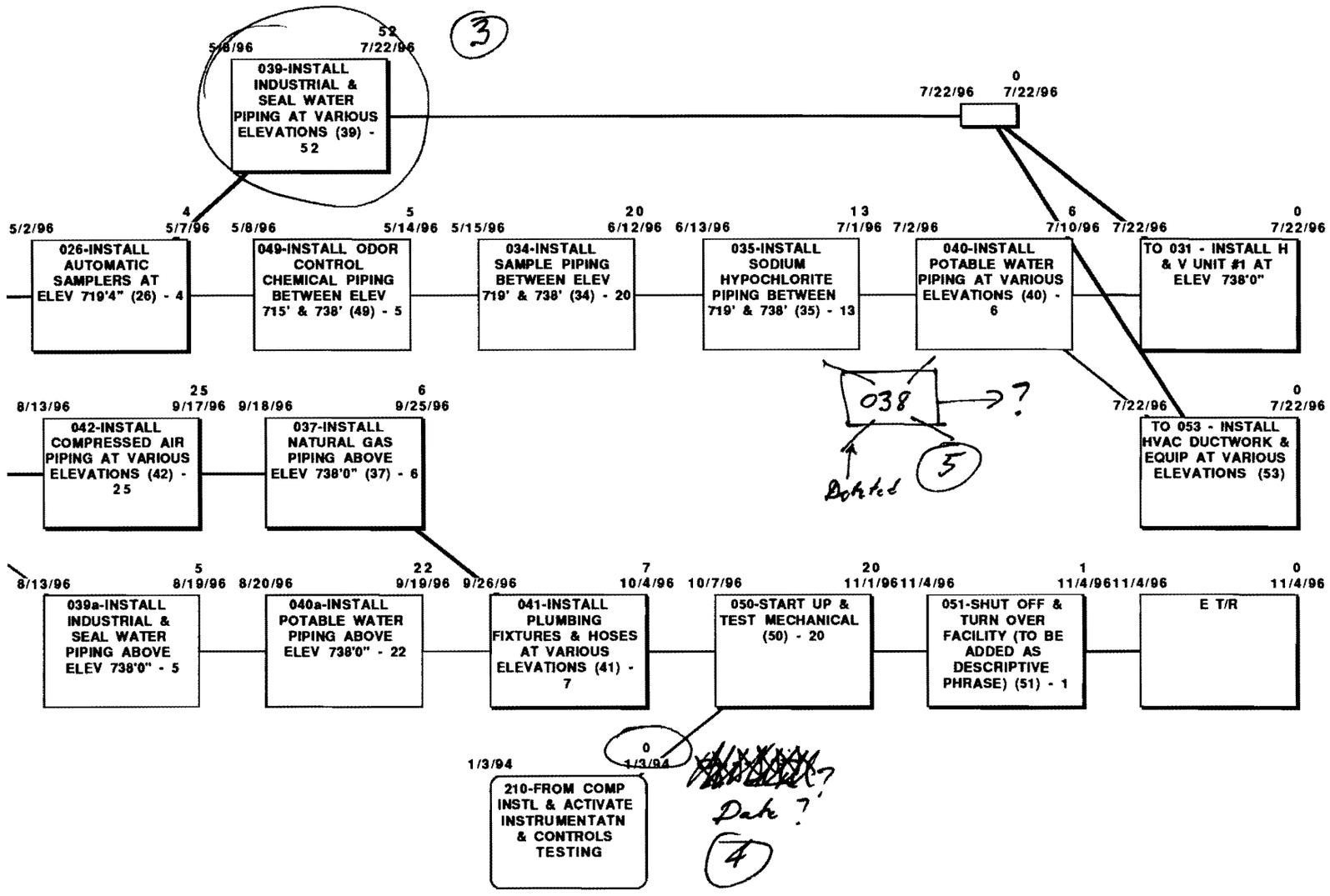

8/11/95
14
8/30/95
017-JFC INSTALL I.W. MAIN TO CELL #2 & #3 - 14
8/31/95
3
9/5/95
010-JFC INSTALL TELESCOPING VALVES CELL #1 - 3
9/6/95
10
9/19/95
013-JFC INSTALL BUBBLER PIPING CELL #1 - 10
9/20/95
10
10/3/95
012-JFC INSTALL SAMPLE PIPE CELL #1 - 10
10/4/95
2
10/5/95
008-INSTALL SAMPLE PUMP P10 CELL #1 - 2
10/6/95
5
10/12/95
028-JFC INSTALL SODIUM HYPO UNITS CELL #1 - 5
10/13/95
12
10/30/95
005-JFC INSTALL FLUSHING TROUGHS CELL #1 - 12
8/2/95
0
8/2/95
T/R TO START OF JFC INSTALL GROUND WATER STAND PIPES CELL #2 - AM 08/02/95
8/2/95
6
8/9/95
011a-JFC INSTALL GROUND WATER STAND PIPES CELL #2 - 6
8/10/95
12
8/25/95
018a-INSTALL DECANT D.I. PIPE CELL #2 - 12
8/28/95
7
9/6/95
009a-JFC INSTALL SLUICE GATES CELL #2 - 7
9/7/95
10
9/20/95
O19-JFC INSTALL FLUSHING WATER MAINS CELL #2 GALLERY - 10
9/21/95
16
10/12/95
015-JFC INSTALL I.W. PIPE CELL #2 - 16
10/13/95
14
11/1/95
017a-JFC INSTALL I.W. MAIN TO CELL #2 & 3 - 14
11/2/95
3
11/6/95
010a-JFC INSTALL TELESCOPING VALVES CELL #2 - 3
8/10/95
0
8/10/95
KAJIMA POUR FLOOR, WALLS, COLS & WALKWAY BASIN CELL #2 - COMP PM 08/09/95
RETENTION BASIN
10/6/95
0
10/6/95
T/R TO START OF JFC INSTALL GROUND WATER STAND PIPES CELL #3 - AM 10/06/95
10/6/95
5
10/12/95
011b-JFC INSTALL GROUND WATER STAND PIPES CELL #3 - 5
10/13/95
11
10/27/95
018b-INSTALL DECANT D.I. PIPE CELL #3 - 11
10/13/95
0
10/13/95
KAJIMA POUR FLOOR, WALLS, COLS & WALKWAY BASIN CELL #2 - COMP PM 10/12/95
8/16/95
0
8/16/95
KAJIMA COMPLETE CONCRETE FLOW REG STRUCTURE - PM 08/15/95
8/16/95
11
8/30/95
004-JFC INSTALL D.I. PIPE IN FLOW REG STRUCTURE - 11
8/31/95
1
8/31/95
JFC COMPLETE MECHANICAL WORK - 1
Note: Basin crew shifted to concrete flow reg struct to complete by milestone date of 09/29/95
CONCRETE FLOW STRUCTURE

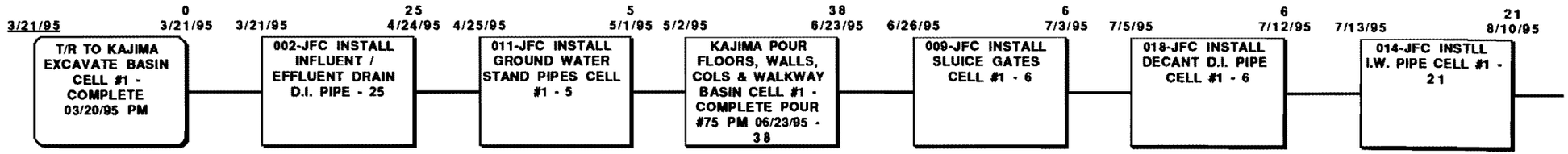

2/1/95
0
2/1/95
303-T/R TO JFC TO MOVE TRAILER ON SITE & BEGIN EARLY PROCUREMENT - ASSUME 02/01/95
2/1/95
0
2/1/95
304-JFC DO EARLY PROCUREMENT WORK ON PROJECT W/O EXECUTED CONTRACT
3/2/95
0
3/2/95
306-T/R TO JFC START ACTIVE FIELD WORK IN AVAILABLE SITE AREAS
4/17/95
2
4/18/95
021-INSTALL DUPLEX SUMP PUMP P-15 & P-16 AT ELEV 686'1" (21) - 2
4/19/95
2
4/20/95
023-INSTALL WET WELL DEWATERING PUMP P-14 AT ELEV 686'1" (23) - 2
4/21/95
3
4/25/95
044-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 680' & 701'3" (44) - 3
7/10/95
8
7/19/95
044a-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 701'3" & 719'4" (44) - 8
7/20/95
3
7/24/95
024-INSTALL DECANTING PUMPS P-4, P-5, & P6 AT 701'3" (24) - 3
7/10/95
0
7/10/95
202-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 719'4" - PM 07/07/95 (FROM KAJIMA 02/07/95)
3/2/95
0
3/2/95
305-T/R TO DATE OF JFC CONTRACT - AM 03/02/95
4/17/95
0
4/17/95
207-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 701'3" - PM 04/14/95 (FROM KAJIMA 02/06/95)


7/25/95
3
7/27/95
7/28/95
030-INSTALL ROTARY DRUM STRAINER AT ELEV 701'3" (30) - 3
6
8/4/95
8/7/95
045-INSTALL STRAINER BACKWASH/DRAIN PIPE BETWEEN ELEV 701' & 719' (45) - 6
47
10/11/95
10/12/95
046-INSTALL DECANTING PUMP SUCTION PIPING BETWEEN ELEV 701' & 719' (46) - 47
15
11/1/95
11/2/95
047A-INSTALL DECANTING PUMP DISCHARGE PIPING BETWEEN ELEV 701' & 719' (47) - 15
9
11/14/95
11/15/95
027-INSTALL ODOR CONTROL EQUIPMENT AT ELEV 715'3" (27) - 9
4
11/20/95
11/21/95
029-INSTALL CHEMICAL STORAGE TANKS AT ELEV 715'3" (29) - 4
7/24/95
0
7/24/95
201-FROM COMP STRIP SHORING OF SUPT DK AT CHEMICAL AREA ELEV 736'6 - PM 07/21/95
7/24/95
0
7/24/95
208-FROM COMP STRIP SHORING OF SUPT DK AT ELEV 738'0" - PM 07/21/95 (FROM KAJIMA 02/07/95)
4
11/27/95
023a-INSTALL SODIUM HYPOCHLORITE FEED PUMPS P-7, P-8, & P-9 AT ELEV 715'3" (23a) - 4
7/24/95
30
9/1/95
052-INSTALL ODOR CONTROL DUCTWORK AT VARIOUS ELEVATIONS (52) - 30
1
11/28/95
20
12/26/95
047-INSTALL DECANTING PUMP DISCHARGE PIPING BETWEEN ELEV 719' & 738' (47) - 20
(1)
(2)
?

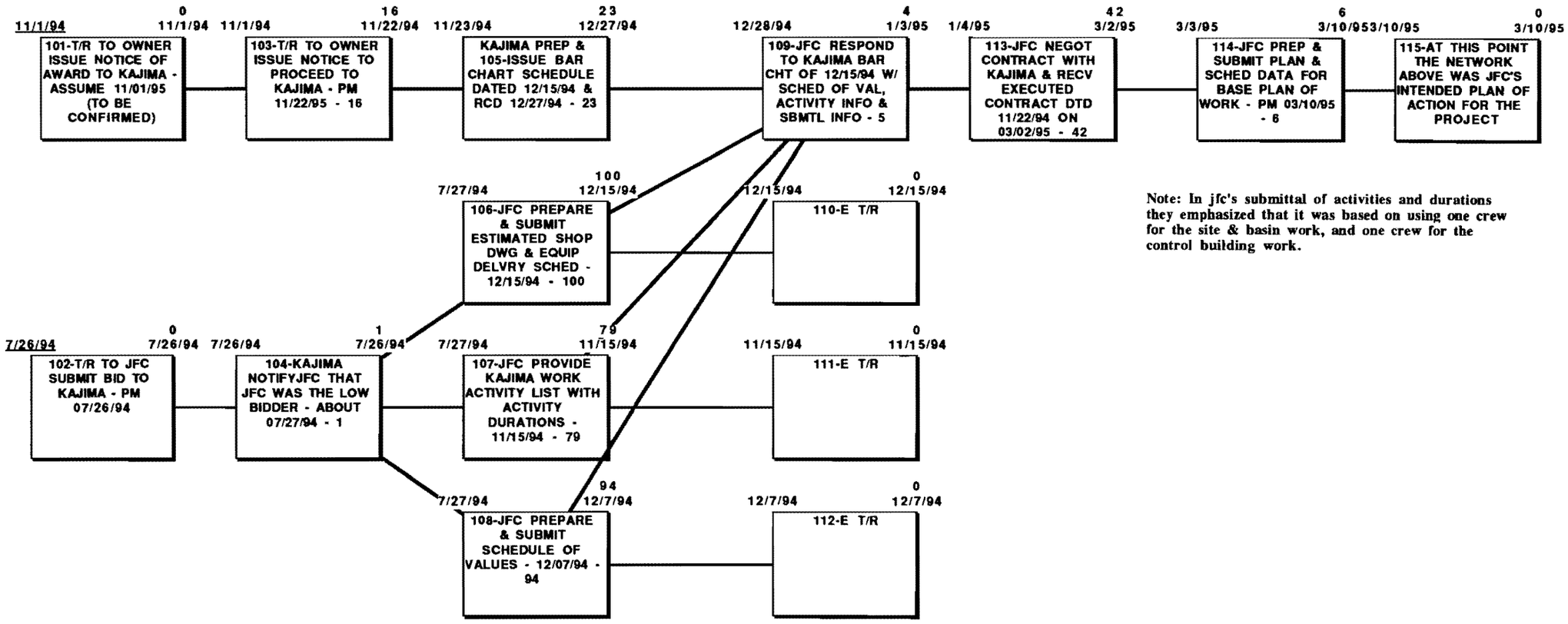

12/27/95
33
2/12/96
048-INSTALL DEWATERING PUMP DISCHARGE PIPING BETWEEN ELEV 680' & 738' (48) - 33
2/13/96
7
2/21/96
024a-INSTALL DECANTING PUMP MOTORS P-4, P-5, P-6 AT 719'3" (24a) - 7
2/22/96
3
2/26/96
022-INSTALL FLUSHING PUMPS P-17 & P-18 AT ELEV 719'4" (22) - 3
2/27/96
8
3/7/96
020-INSTALL BASIN DEWATERING PUMPS P-1, P-2, & P-3 AT ELEV 679'6" (20) - 8
3/8/96
8
3/19/96
044b-INSTALL WET WELL DEWATERING D.I. PIPE BETWEEN ELEV 719' & 730' (44) - 8
3/20/96
8
3/29/96
043-INSTALL ODOR CONTROL VALVES/DAMPERS AT ELEV 735' & 738' (43) - 8
4/1/96
22
4/30/96
038-INSTALL DRAIN WASTE & VENT PIPING AT VARIOUS ELEVATIONS (38) - 22
5/1/96
1
5/1/96
025-INSTALL SAMPLE PUMP AT 719'4" (25) - 1
From Kajima's original schedule of 02/06/95
1/15/96
0
1/15/96
209-FROM COMP CLOSE ABV GRADE CONTRL BLDG TO WEATHER - PM 01/12/96
7/23/96
2
7/24/96
031-INSTALL H & V UNIT #1 AT ELEV 738'0" (31) - 2
7/25/96
5
7/31/96
038a-INSTALL DRAIN, WASTE & VENT PIPING ABOVE ELEV 738'0" - 5
8/1/96
6
8/8/96
033-INSTALL AIR COMPRESSORS & ACCESSORIES AT ELEV 738'0" (33) - 6
8/9/96
2
8/12/96
032-INSTALL ELECTRIC UNIT HEATERS AT ELEV 738'0" (32) - 2
7/23/96
0
7/23/96
FROM 040-INSTALL POTABLE WATER PIPING AT VARIOUS ELEVATIONS (40) - PM 07/23/96
7/23/96
60
10/15/96
053-INSTALL HVAC DUCTWORK & EQUIP AT VARIOUS ELEVATIONS (53) - 60

60 - 52?

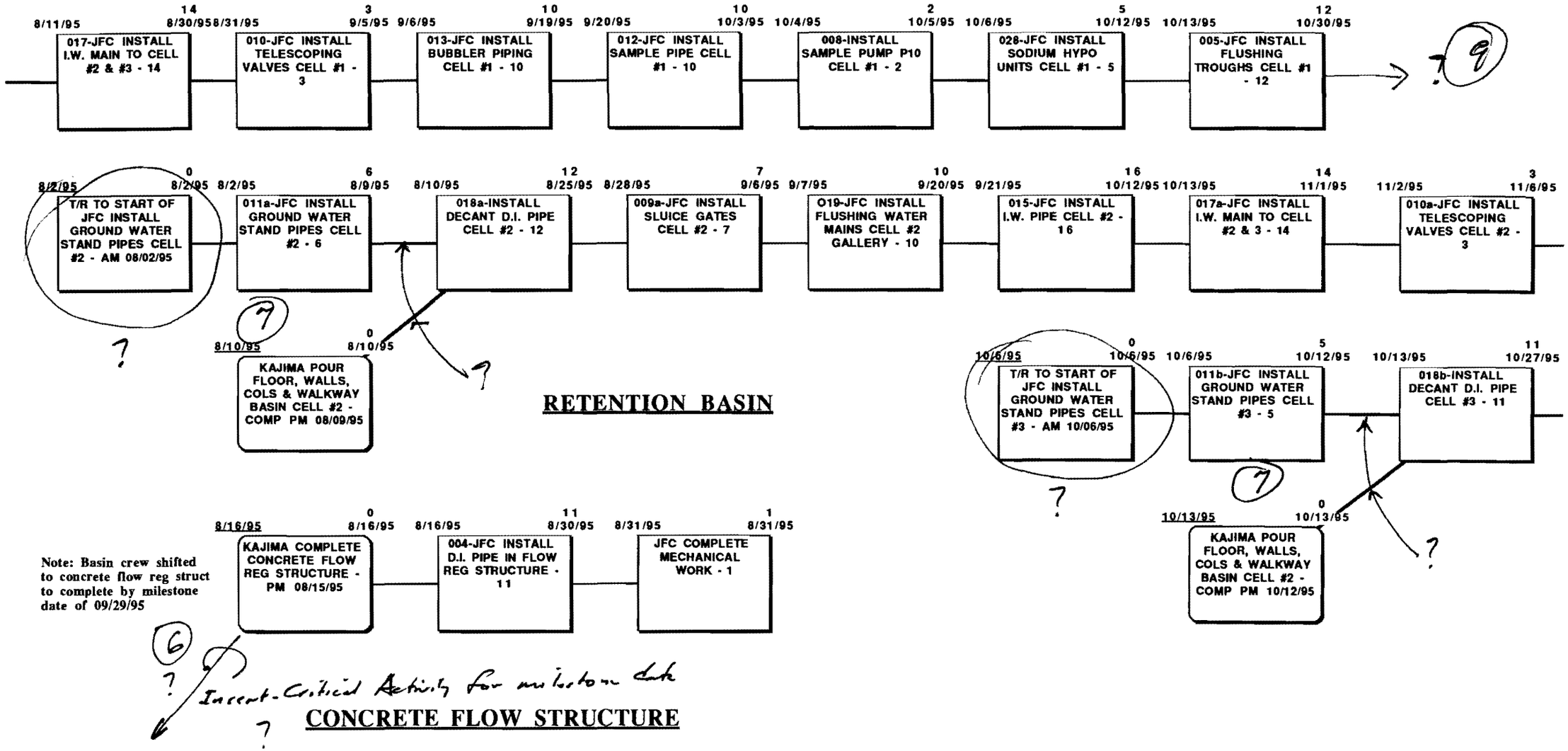

5/8/96
52
7/22/96
039-INSTALL INDUSTRIAL & SEAL WATER PIPING AT VARIOUS ELEVATIONS (39) - 52
3
7/22/96
0
7/22/96
5/2/96
4
5/7/96
026-INSTALL AUTOMATIC SAMPLERS AT ELEV 719'4" (26) - 4
5/8/96
5
5/14/96
049-INSTALL ODOR CONTROL CHEMICAL PIPING BETWEEN ELEV 715' & 738' (49) - 5
5/15/96
20
6/12/96
034-INSTALL SAMPLE PIPING BETWEEN ELEV 719' & 738' (34) - 20
6/13/96
13
7/1/96
035-INSTALL SODIUM HYPOCHLORITE PIPING BETWEEN 719' & 738' (35) - 13
7/2/96
6
7/10/96
040-INSTALL POTABLE WATER PIPING AT VARIOUS ELEVATIONS (40) - 6
7/22/96
0
7/22/96
TO 031 - INSTALL H & V UNIT #1 AT ELEV 738'0"
038
?
Deleted
5
8/13/96
25
9/17/96
042-INSTALL COMPRESSED AIR PIPING AT VARIOUS ELEVATIONS (42) - 25
9/18/96
6
9/25/96
037-INSTALL NATURAL GAS PIPING ABOVE ELEV 738'0" (37) - 6
7/22/96
0
7/22/96
TO 053 - INSTALL HVAC DUCTWORK & EQUIP AT VARIOUS ELEVATIONS (53)
8/13/96
5
8/19/96
039a-INSTALL INDUSTRIAL & SEAL WATER PIPING ABOVE ELEV 738'0" - 5
8/20/96
22
9/19/96
040a-INSTALL POTABLE WATER PIPING ABOVE ELEV 738'0" - 22
9/26/96
7
10/4/96
041-INSTALL PLUMBING FIXTURES & HOSES AT VARIOUS ELEVATIONS (41) - 7
10/7/96
20
11/1/96
050-START UP & TEST MECHANICAL (50) - 20
11/4/96
1
11/4/96
051-SHUT OFF & TURN OVER FACILITY (TO BE ADDED AS DESCRIPTIVE PHRASE) (51) - 1
11/4/96
0
11/4/96
E T/R
0
1/3/94
1/3/94
210-FROM COMP INSTL & ACTIVATE INSTRUMENTATN & CONTROLS TESTING
Dak ?
4

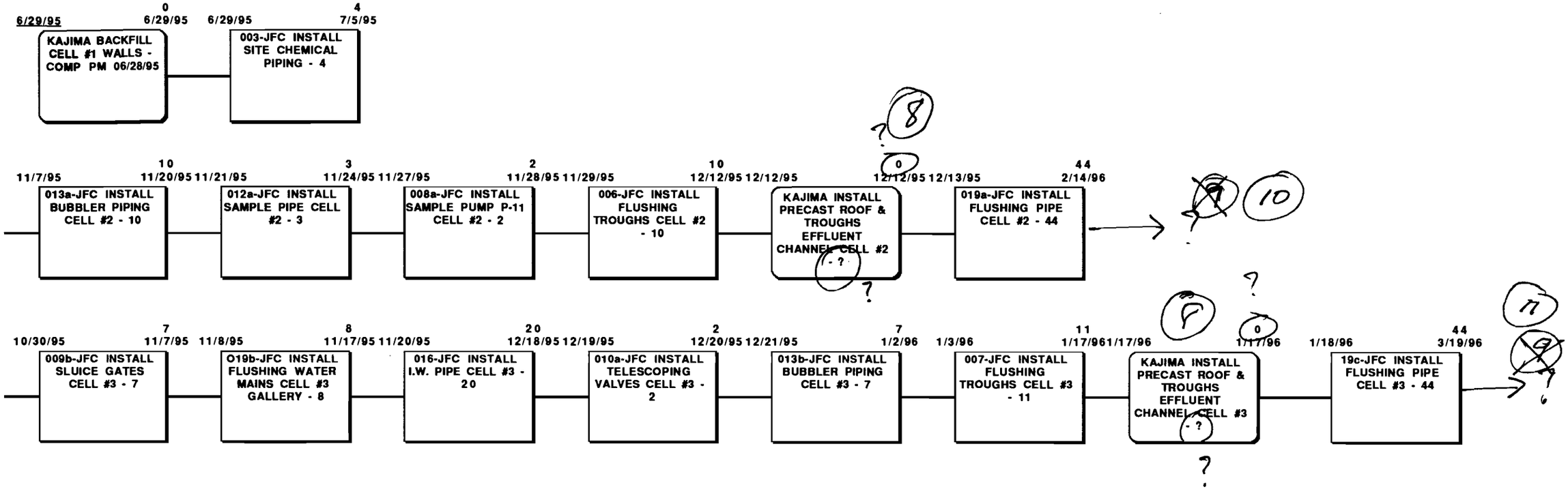


RETENTION BASIN

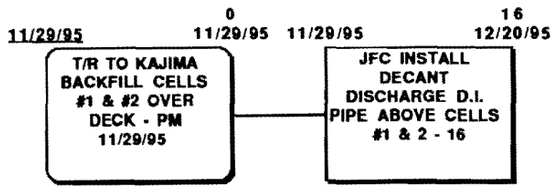


Note: In jfc's submittal of activities and durations they emphasized that it was based on using one crew for the site & basin work, and one crew for the control building work.


8/11/95
14
8/30/95
017-JFC INSTALL I.W. MAIN TO CELL #2 & #3 - 14
8/31/95
3
9/5/95
010-JFC INSTALL TELESCOPING VALVES CELL #1 - 3
9/6/95
10
9/19/95
013-JFC INSTALL BUBBLER PIPING CELL #1 - 10
9/20/95
10
10/3/95
012-JFC INSTALL SAMPLE PIPE CELL #1 - 10
10/4/95
2
10/5/95
008-INSTALL SAMPLE PUMP P10 CELL #1 - 2
10/6/95
5
10/12/95
028-JFC INSTALL SODIUM HYPO UNITS CELL #1 - 5
10/13/95
12
10/30/95
005-JFC INSTALL FLUSHING TROUGHS CELL #1 - 12
(9)
8/2/95
0
8/2/95
T/R TO START OF JFC INSTALL GROUND WATER STAND PIPES CELL #2 - AM 08/02/95
8/2/95
6
8/9/95
011a-JFC INSTALL GROUND WATER STAND PIPES CELL #2 - 6
8/10/95
12
8/25/95
018a-INSTALL DECANT D.I. PIPE CELL #2 - 12
8/28/95
7
9/6/95
009a-JFC INSTALL SLUICE GATES CELL #2 - 7
9/7/95
10
9/20/95
019-JFC INSTALL FLUSHING WATER MAINS CELL #2 GALLERY - 10
9/21/95
16
10/12/95
015-JFC INSTALL I.W. PIPE CELL #2 - 16
10/13/95
14
11/1/95
017a-JFC INSTALL I.W. MAIN TO CELL #2 & 3 - 14
11/2/95
3
11/6/95
010a-JFC INSTALL TELESCOPING VALVES CELL #2 - 3
(9)
8/10/95
0
8/10/95
KAJIMA POUR FLOOR, WALLS, COLS & WALKWAY BASIN CELL #2 - COMP PM 08/09/95
RETENTION BASIN
10/6/95
0
10/6/95
T/R TO START OF JFC INSTALL GROUND WATER STAND PIPES CELL #3 - AM 10/06/95
10/6/95
5
10/12/95
011b-JFC INSTALL GROUND WATER STAND PIPES CELL #3 - 5
10/13/95
11
10/27/95
018b-INSTALL DECANT D.I. PIPE CELL #3 - 11
(7)
10/13/95
0
10/13/95
KAJIMA POUR FLOOR, WALLS, COLS & WALKWAY BASIN CELL #2 - COMP PM 10/12/95
8/16/95
0
8/16/95
KAJIMA COMPLETE CONCRETE FLOW REG STRUCTURE - PM 08/15/95
8/16/95
11
8/30/95
004-JFC INSTALL D.I. PIPE IN FLOW REG STRUCTURE - 11
8/31/95
1
8/31/95
JFC COMPLETE MECHANICAL WORK - 1
Note: Basin crew shifted to concrete flow reg struct to complete by milestone date of 09/29/95
(6)
Incent-Critical Activity for milestone date
CONCRETE FLOW STRUCTURE



RETENTION BASIN



Issue #1 - December 20, 1995
Issue #2 - January 24, 1996
i2 sht M1 jfc cso la 55% - disk 524

Note: Rounded corners on activity indicate a Kajima or other than JFC related action

Earliest Start | Duration | Earliest Finish

Reserved activity numbers

041	046
042	047
043	048
044	049
045	050

LAN
HAN

Activity Legend

NETWORK MODEL FOR BLOOMFIELD VILLAGE C.S.O. BIRMINGHAM, MICHIGAN

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sheet #M1