

**Ralph J. Stephenson PE PC**  
Consulting Engineer

May 4, 1991

***Subject*** Monitoring report #1  
Minneapolis Convention Center Hotel and Garage  
Kraus-Anderson - General Contractors  
Minneapolis, Minnesota

***rjs project #*** 90:10

***Date of monitoring*** Tuesday & Wednesday, April 16, 17, 1991 (wd 330 & 331)

**Actions taken**

- Briefly inspected project
- Reviewed current status of project with project team
- Updated project record notes with Mark Coudron and Robert Carter
- Prepared monitoring matrix system for tracking project progress
- Reviewed auditing procedures
- Reviewed monitoring matrix with project interns
- Discussed close out process and developed responsibility matrix with Mr. Coudron and Mr. Carter
- Prepared preliminary model of bulletin request, change release and change order process with Mr. Carter
- Copied all KA Convention Center disks to Mr. Coudron's hard drive

**Monitored from**

Networks as noted in project notes, section on *plans and schedules in use as of April 16, 1991 (wd 330)*.

**Key dates**

- 06/01/90 (wd 109) - Contract date
- 06/26/90 (wd 125) - Start of pile driving by KA on site
- 11/01/90 (wd 216) - Completed mass excavation & installation of retention system
- 02/15/91 (wd 288) - Started installing rough fire protection work at garage level P5
- 02/22/91 (wd 294) - Completed pouring out west half level 1 supported deck
- 02/29/92 pm (wd 553) - Current contract completion date for garage
- 12/08/92 pm (wd 751) - Current contract completion date for hotel

**General summary**

This set of meetings was to make a general review of the project and to confer with the

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project staff re progress, procedures, trending on the job, and methods of tracking changes and trends.

Before detailed discussions began I walked around the the site and made a general visual inspection of the project. Currently KA is pouring out the upper levels of the parking deck and are also working on supported slab work for the 4th tower level. Fire protection piping installation is underway in the garage at level P5.

I did not make a comparison of field progress to the network models in effect as of April 16, 1991 (wd 331). However the project team generally feels the job is in substantial alignment with the work plans being used to track the job. I suggest that at our next planning and monitoring session we make a detailed analysis of the status of the work from the network models being used as of that date.

A brief discussion with the owner's representative on Wednesday afternoon indicated he was pleased with the planning and scheduling work of Kraus-Anderson.

One of the early efforts of our work was to update the general information section of the ongoing notes being kept by me of our meetings on the project. The update was made to the earlier material in our data files and the updated file was transferred to Mr. Coudron's hard disk. In addition I copied all disks related to the Convention Center and in my possession to Mr. Coudron's hard disk.

After the general review of the project and the general notes, we prepared a hotel monitoring matrix from which to record project progress. The work and areas concentrated on in this session included interior rough and finish work for all levels from one through 25.

The division of work within the levels was divided into specific areas as identified in the early job planning meetings. These area descriptions are reproduced below for ease of reference.

**Lower level 1**

- 1A - lobby lounge
- 1B - food service
- 1C - grill
- 1D - lobby
- 1E - front offices
- 1F - parking entry & office
- 1G - dock area

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**Lower level 2**

- 2A - health club
- 2B - balcony
- 2C - meeting rooms
- 2D - skyway corridor
- 2E - retail area
- 2F - mechanical space
- 1D - upper lobby

**Lower level 3**

- 3A - meeting rooms
- 3B - pre convene areas
- 3C - food services
- 3D - grand ballroom

**Lower level 4**

- 4A - laundry & housekeeping
- 4B - operations office
- 4C - employee's dining
- 4D - mechanical equipment
- 3D - upper ballroom

**Levels 5 through 22**

Typical tower floors

**Levels 23 through 25**

Special tower floors

There are still some action items to be added to the matrix list. The project team will review and complete these lists. Some areas were not put in the matrix including the first floor mechanical mezzanine and the third level mezzanine.

I reviewed the use of the monitoring matrix with the project team and suggest that once the work shown in the matrix gets under way that a detailed inspection of each area be made every two to four weeks, or more often as the situation warrants. The % of work complete should be noted for each action item in each of the areas.

The % complete tabulation should then be entered on a *saved as`* file for each date upon which a monitoring is conducted. When the dated matrix is printed I further recommend that it be color coded with hi lighters. Colors can be selected as the monitoring and management team desires. A system of colors I have used with success

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is to use the following designations:

Green	100% to 90% complete
Orange	89% to 75% complete
Blue	74% to 60% complete
Yellow	59% or less complete

However any color or percent range can be used , The project team should select a set of data measurements that reads well to them and their client.

Closing out a project is a complex set of actions that should be given careful and early attention. During our session we initiated discussions of this process with Mr. Coudron and Mr. Carter participating. An available close out checklist was used to prepared a matrix showing the actions to be taken in close out as one field, and those responsible in a set of additional fields. In the responsibility fields we entered a number one for each party primarily responsible. Other indicators can be selected and used by the project team as they desire to indicate the levels of responsibility and involvement for the various activities.

This list, like other material prepared during our meeting is for the project team's review, comment, revision and completion as they desire.

Mr. Coudron asked that I read the ffe (fixtures, furnishings and equipment) provisions of the contract along with the completion dates specified for various portions of the work. The contract specifies definite relationships the owner wants maintained between installation of fixture, furnishing and equipment work and the base building work by Kraus-Anderson. It is important that the two sets of actions be meshed carefully since the date of start and completion of ffe work is important in the hotel opening process. I shall study these provisions and convey any suggestions I have to Mr. Coudron.

On Wednesday afternoon Mr. Carter and I prepared a portion of a change order tracking system that I recommend be implemented and used at all project meetings. There are currently several unresolved revisions to the job that should be given careful attention. The document we prepared to show one possible tracking system and was left on Mr. Coudron's hard disk.

It was assembled in bar chart form and consists of a line item for each KA project revision. The time line for the work is shown by a bar extending along the horizontal line from the time the bulletin estimate request is issued by the owner to the date of issuance of a change order, to a cancellation date if the item has been aborted, or to the

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current date if the item is still in work.

The first sector of the bar is crosshatched from upper right to lower left and indicates the time from issuance by the owner to the submission of a quote for the change from Kraus-Anderson.

The second section of the bar, indicated by vertically crosshatched shading, is the length of time from submission of a quote for the work to the issuance of a change release (the proper name?). The change release apparently allows the work to proceed without a formal change order being issued. The work authorized by the change release cannot be billed until a formal change to the contract is made by the owner with the issuance of a change order.

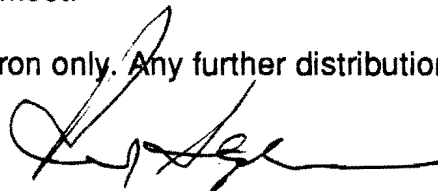
The last segment of the bar, shown as a black bar denotes the time between the change release and the issuance of a formal change order. If the change order has not been released as of the current date the bar is left unshaded to indicate an open item.

As with all the other graphic analysis tools prepared during this session, the project team should complete entering the data and decide on the graphic and presentation formats to be used. All the data discussed above is on Mr. Coudron's hard drive and can be used as desired by the project staff. I recommend that if any revisions are made to the work we did in our two days of analysis and discussion, that they be made on copies of the original files, and that the originals be kept for base record purposes.

On Wednesday morning Mr. Coudron, Mr. Carter, Ms. Annette Hutchins, intern and Ms. Heide Kleinstuber, intern met with me for a short time to review the monitoring matrix and other miscellaneous matters dealing with tracking progress of the project. We reviewed several job related ideas and techniques to help familiarize them with the management and construction requirements of the project. These meetings should be held periodically with the interns to keep them informed of the methods by which the job is being managed and built.

Mr. Coudron asked that I plan to meet with him about once each three months to assist to evaluate job status and progress on a regular basis. I shall be in touch with him shortly to determine specific times he wishes to meet.

This monitoring report is being sent to Mr. Coudron only. Any further distribution will be by him.



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September 23, 1991

**Subject** Monitoring report #2  
Minneapolis Convention Center Hotel and Garage  
Kraus-Anderson - General Contractors  
Minneapolis, Minnesota

**rjs project #** 90:10

**Date of monitoring**

- Tuesday & Wednesday, September 17, 18, 1991 (wd 437 & 438)

**Actions taken**

- Inspected project
- Reviewed current status of project with Mr. Coudron, Mr. Carter & Mr. Dahlin
- Updated project record notes with Mr. Coudron and Mr. Carter
- Reviewed monitoring matrices for tower and lower level areas
- Discussed completion date targets
- Copied all KA Convention Center files to Kraus-Anderson hard drive

**Monitored from**

Networks as noted in project notes under current date. Project notes for meeting are attached.

**Key dates**

- 06/01/90 am (wd 109) - Contract date
- 06/26/90 am (wd 125) - Start of pile driving by KA on site
- 02/29/92 pm (wd 553) - Current contract completion date for garage
- 11/23/92 pm (wd 465) - Current latest date in incentive period
- 12/08/92 pm (wd 751) - Current contract completion date for hotel

**General summary**

The objective of these two days of meetings was to make an overall analysis of the project and to identify items that might impact on the project over the next several months. The next overview session is currently set for early December, 1991.

I inspected the exterior of the project from each of the elevations and also walked

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the interior of floors one through five. Currently the concrete decks of the tower portion of the job (west half) should be completed within the next three weeks. Cold weather is on the way, so topping out is a critical close in element of the work.

Exterior masonry at the tower has closely followed the concrete structure, and has been erected off a swing stage supported at about the 19th floor of the structure. The next jump of the swing stage will be to the roof. Care should be taken that the swing stage supports do not interfere with closing the roof to weather for any extended period time.

Interior rough work at the tower room floors from five up, has followed closely on the structure along with exterior masonry and preglazed sash. Exterior brick is erected at the tower through the 11th floor and at part of 12. Sash & glass has been installed for about the lower four tower room floors. Sash and glass have been wrapped with visqueen before installation to allow protection during erection and cleaning of masonry.

Mr. Coudron and Mr. Carter feel that drywall taping and sanding in the tower will be able to begin about early October, 1991. There are 20 floors of typical interior finish work, So, if the turnover cycle is held at 10 working days and the duration of one floor of finishes from start of taping and sanding to complete clean up is maintained at 41 working days an estimate of the completion of tower finishes shows they will require about 231 working days from the start date of taping and sanding. If the start is the am of October 7, 1991 (wd 451), the completion date would be =  $451 + 231 = 682$ , or the pm of August 31, 1992 (wd 682).

This analysis is only a rough approximation and should be validated as additional information becomes available. The date of desired tower completion is strongly influenced by targets related to owner fixture, furnishing and equipment (ffe) work, and to current incentive/disincentive conditions.

At the lower levels the east half structural work was delayed by difficulties in completing the first level of the facility. According to Mr. Coudron problems were encountered in final setting some raised and depressed portions of the first level supported deck. These in turn delayed moving up in the east structure. At present structural steel in the east half is essentially complete and steel joists at the roof of the ballroom are being raised and trimmed out.

The current desire is to close in the east half lower level to weather by early December, 1991 which will allow start of drywall taping and sanding at critical lower level areas. Mr. Coudron, Mr. Carter and I discussed the sequencing of these areas in

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detail. From our discussions we established an initial desirable starting and desirable substantial completion date for each of major functional sections. These preliminary dates are shown in a data file copied to Mr. Carter's disk files.

I strongly recommend the project team concentrate on achieving a target completion date for KA work by the incentive date established as 15 calendar days before the contract completion date of December 8, 1991(wd 751). This would bring the desired target date of completion to the pm of November 23, 1991 (wd 741). There should be an actual target completion set slightly earlier, since as of the pm of November 23, 1991 the incentive is discontinued.

The lower level areas in a project of this type and size are frequently the portion of the work that sets the pace of the entire program. Therefore it is of great importance that a clear cut set of completion dates be set that will conform to the conditions set for earning the incentive bonus.

Mr. Coudron, Mr. Carter and I completed inserting the percent complete data in each box of the individual lower level monitoring matrix. We then color coded the boxes in accordance with the following criteria:

- Green      Activity 100% to 90% complete
- Orange     Activity 80% to 89% complete
- Blue        Activity 50% to 79% complete
- Yellow     Activity 0% to 49% complete

The activity listing matrixes being used for evaluation generally track the sequence of action from top to bottom. Thus the interior work trending can be seen by watching how the color sequence goes from the complete or nearly complete items colored green through those not so near complete shown by the orange, blue and yellow in that order.

We color coded both the matrixes and the network models currently in effect. Color coding for the network models was done with a similar color system as for the matrixes. Network color coding uses the following criteria for each activity:

- Green      Activity currently meeting or bettering early start date.
- Orange     Activity currently past early finish, but will make scheduled or late finish date.
- Blue        Activity currently not expected to make scheduled or late finish date.
- Yellow     Activity currently past late finish date.



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Both the matrix analysis and the network analysis indicate the project is in generally good condition, except for the east half, which is out of phase with the west half (tower area) of the low rise. This appears to be the result of not being able to move up with the east half structure as the west half at the lower levels was being built.

I recommended to Mr. Coudron and Mr. Carter that they consider updating the current lower level network models to more closely reflect the conditions now imposed on the project and to use a staggered sequencing by floor and then by area showing completion dates slightly earlier than the incentive cut off date. We will review these networks at our next planning and monitoring session.

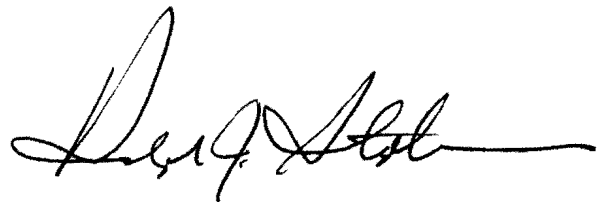
We did not have the opportunity, because of the press of time, to thoroughly discuss the integration of the owner's ffe work with the building work. However in our next meeting we should plan to do this in considerable detail, since in some areas the ffe installation is very complex and must be given adequate lead time to be completed by the opening date of the facility.

We did not discuss the garage area in detail except to confirm that it is currently meeting desired target dates to provide a completion in late February, 1992.

General

This monitoring report is being sent to Mr. Coudron. Any further distribution will be by Mr. Coudron.

Mr. Coudron suggested we meet again in early December, 1991 to evaluate job status and progress. I shall be in touch with him shortly to determine a specific date.



Ralph J. Stephenson PE PC

September, 1991 planing & monitoring meetings

1. **Tuesday, September 17, 1991 (437) - 10:56:32 AM**
  - 1.1. **Minneapolis Convention Center Hotel & Garage Project notes - disk #259**
  - 1.2. **By Ralph J. Stephenson**
  - 1.3. **Time to completion of hotel - 751 - 437 = 314 working days**
  - 1.4. **Those attending meetings**
    - 1.4.1. Mark Coudron - project manager
    - 1.4.2. Bob Carter - project manager
    - 1.4.3. Ralph J. Stephenson - consultant
  - 1.5. **Agenda**
    - 1.5.1. Use current bar chart schedule to prepare summary network
    - 1.5.2. Determine appropriate level of documentation
    - 1.5.3. Prepare monitoring report
    - 1.5.4. Prepare narrative analyses of delays to project
    - 1.5.5. Review documentation process
    - 1.5.6. Monitor & update close out process for garage
    - 1.5.7. Review monitoring procedures in depth
    - 1.5.8. √Inspect project
    - 1.5.9. √Tabulate plan of work history
    - 1.5.10. √Monitor current status of project
    - 1.5.11. √Consider reanalyzing status matrices prepared in April, 1991
    - 1.5.12. √Fill out status matrices for project as of 9/17/91 (437)
    - 1.5.13. √Validate current completion target dates
    - 1.5.14. √Validate current plans of work
  - 1.6. **Plans & schedules in use as of 09/17/91 (437)**
    - 1.6.1. Sht #?? - Site work bar chart schedule - as revised 04/04/91
    - 1.6.2. Sht #08 - Garage partial procurement networks & int rough & finish work P5 thru L1 - iss #2.2 dated 07/20/90
    - 1.6.3. Sht #09 - Garage elevators #s 1, 2, 3, 15 & 16, garage escalators #1, 2, 3 & 4 - iss #2.2 dated 07/20/90
    - 1.6.4. Sht #10 - Low rise superstruct lvls 2 thru 5 (ballroom roof) - iss #3.1 dated 10/01/90
    - 1.6.5. Sht #11 thru sht 15 - Tower superstruct lvls 2 thru main roof - iss #3.1 dated 10/01/90
    - 1.6.6. Sht #16 - Low rise ext skin elevations s, e & n - iss #3.1 dated 10/01/90
    - 1.6.7. Sht #17 - Ext skin at twr 2 story amenity struct lvls 1 thru 3 w elev. w elev main entry skin/canopy - iss #3.1 dated 10/01/90
    - 1.6.8. Sht #18 - Ext skin plan of work for twr fls 4 thru 25 - iss #3.1 dated 10/01/90
    - 1.6.9. Sht #19 thru sht 23 - Int finish plan of work for tower floors 5 thru 25 - iss #3.1 dated 10/01/90
    - 1.6.10. Sht #24 thru sht 34 - Int finish tower & low rise lvls 1 thru 4 - iss #3.1 dated 10/01/900

September, 1991 planing & monitoring meetings

- 1.6.11. Sht #35 - Hotel elevators # 4, 5, 7, 8 & 6 thru 14, & escalators #5, 6, 7 & 8 - iss #3.1 dated 10/01/90
- 1.6.12. Bar chart for garage finish work - iss #5, dated 09/10/91 (wd 432)
- 1.6.13. Bar chart for low rise enclosure/roofing - iss #1, dated 08/13/91 (wd 413)
- 1.6.14. Bar chart for tower interior dry wall schedule - iss #1, dated 08/01/91 (wd 405)
- 1.6.15. Bar chart for tower interior finish schedule - iss #1, dated 08/13/91 (wd 413)
- 1.6.16. Bar chart for above ceiling mech & elect and interior studs - iss #1, dated 09/03/91 (wd 427)  
Primarily levels 1 through 4
- 1.6.17. Planned work complete
  - Sht #01 - Garage struct plan of mobilization, mass excav & earth retention system for w & e halves - iss #2.2 dated 07/20/90
  - Sht #02 - Garage struct lvl P4 & P3 plan of work at west half to col line J. Concrete procurement - iss #2.2 dated 07/20/90
  - Sht #03 - Garage struct plan of work at lvls P2 & P1 west half to col J - iss #2.2 dated 07/20/90
  - Sht #04 - Garage struct plan of work at lvl 1 (street lvl) west half to col J - iss #2.2 dated 07/20/90
  - Sht #05 - Garage struct lvl P4 & part P3 east half to col line J - iss #2.2 dated 07/20/90
  - Sht #06 - Garage struct lvl part P3 & P2 & part P1 plan of work at east half to col line J - iss #2.2 dated 07/20/90
  - Sht #07 - Garage struct lvl part P1 & L1 plan of work at east half to col line J - iss #2.2 dated 07/20/90

**2. Wednesday, September 18, 1991 (438) - 8:09:35 AM**

**2.1. Minneapolis Convention Center Hotel & Garage Project notes - disk #259**

**2.2. By Ralph J. Stephenson**

**2.3. Those attending meetings**

- 2.3.1. Mark Coudron - project manager
- 2.3.2. Bob Carter - project manager
- 2.3.3. Ralph J. Stephenson - consultant

**2.4. Agenda -  $\checkmark$  items were completed**

- 2.4.1. a04 - Review rca impact graphics
- 2.4.2. b01 - Prepare narrative analyses of delays to project
- 2.4.3. b02 - Review documentation of project
- 2.4.4. b04 - Monitor & update close out process for garage
- 2.4.5. c01 - Determine areas essential to soft & hard openings
- 2.4.6. c02 - Validate current completion target dates
- 2.4.7. c03 - Use current bar chart schedule to prepare summary network
- 2.4.8. c04 - Prepare monitoring report

September, 1991 planing & monitoring meetings

- 2.4.9. √Consider reanalyzing status matrices prepared in April, 1991
- 2.4.10. √Inspect project
- 2.4.11. √Review monitoring procedures in depth
- 2.4.12. √Tabulate plans & schedules in effect & superseded
- 2.4.13. √Validate current plans of work
- 2.4.14. √a01 - Complete fill out low rise status matrices for project as of 9/17/91 (437)
- 2.4.15. √a02 - Complete monitor current status of low rise
- 2.4.16. √a03 - Evaluate various completion dates as shown on current networks for low rise areas
  - Start of finish work - taping and sanding
  - Completion of area to ka turn over
  - Completion of area to area ready to start of ffe by condition of area
  - Completion of area to owner desired start of ffe
- 2.4.17. √b03 - Evaluate start of ffe relative to early completion of total project

**Ralph J. Stephenson PE PC**  
Consulting Engineer

December 19, 1991

**Subject** Monitoring report #3  
Minneapolis Convention Center Hotel and Garage  
Kraus-Anderson - General Contractors  
Minneapolis, Minnesota

**To:** Mark Coudron, Kraus-Anderson project director

**From:** Ralph J. Stephenson, consultant

**rjs project #** 90:10

**Date of monitoring**

- Tuesday and Wednesday, December 17 & 18, 1991 (wd 501 & 502)

**Actions taken**

- Inspected project
- Reviewed status of project with Mr. Coudron and Mr. Carter
- Briefly reviewed monitoring matrices for tower and lower level areas
- Discussed completion date targets
- Reviewed lower level work plan for stud walls and hard ceilings
- Prepared translations of work plans for lower level stud walls & ceilings
- Began updating issue #3.1 lower level network models to issue #4

**Network plans & schedules now in use**

- Sht #? Site work bar chart schedule - as revised 04/04/91
- Sht #08 Garage partial procurement networks & int rough & finish work P5 thru L1 - iss #2.2 dated 07/20/90
- Sht #09 Garage elevators #s 1, 2, 3, 15 & 16, garage escalators #1, 2, 3 & 4 - iss #2.2 dated 07/20/90
- Sht #10 Low rise superstruct lvls 2 thru 5 (ballroom roof) - iss #3.1 dated 10/01/90
- Sht #11 thru sht 15 Tower superstruct lvls 2 thru main roof - iss #3.1 dated 10/01/90
- Sht #16 Low rise ext skin elevations s, e & n - iss #3.1 dated 10/01/90
- Sht #17 Ext skin at twr 2 story amenity struct lvls 1 thru 3 w elev. w elev main entry skin/canopy - iss #3.1 dated 10/01/90
- Sht #18 Ext skin plan of work for twr fls 4 thru 25 - iss #3.1 dated 10/01/90
- Sht #19 thru sht 23 Int finish plan of work for tower floors 5 thru 25 - iss #3.1 dated 10/01/90
- Sht #24 thru sht 34 Int finish tower & low rise lvls 1 thru 4 - iss #3.1 dated

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10/01/900

- Sht #35 Hotel elevators # 4, 5, 7, 8 & 6 thru 14, & escalators #5, 6, 7 & 8 - iss #3.1 dated 10/01/90
- Bar chart for garage finish work - iss #5, dated 09/10/91 (wd 432)
- Bar chart for low rise enclosure/roofing - iss #1, dated 08/13/91 (wd 413)
- Bar chart for tower interior dry wall schedule - iss #1, dated 08/01/91 (wd 405)
- Bar chart for tower interior finish schedule - iss #1, dated 08/13/91 (wd 413)
- Bar chart for above ceiling mech & elect and interior studs - iss #1, dated 09/03/91 (wd 427) - Primarily for levels 1 through 4

**Key dates**

- 06/01/90 am (wd 109) Contract date
- 06/26/90 am (wd 125) Start of pile driving by Kraus-Anderson on site
- 02/29/92 pm (wd 553) Current contract completion date for garage
- 11/23/92 pm (wd 465) Current latest date in incentive period
- 12/08/92 pm (wd 751) Current contract completion date for hotel

**General summary**

The major aim in these two days of work was to inspect the project and check the need for updating current network plans and schedules.

I briefly inspected the exterior skin of the building. Most bulk close in is being completed. However, there still is considerable detail and trim work on the skin to be done. This work is being installed as weather permits. Meanwhile interior finish work at both the low rise and the tower is in progress.

Interior work at the tower is proceeding in sequence from the fifth floor up. The approximate % complete matrix for the tower as of December 16, 1991 (wd 500) shows a noticeable bunching of completed work from matrix action 8 (set tubs) upward to matrix action 3 (install rough above floor electrical conduit and feeders).

Below line 8 (set tubs) the average % complete of the floors drops off rapidly. This is best seen by color coding the matrix as suggested on page 3 of monitoring report #2, dated September 3, 1991. A color coded copy is enclosed. The drop off shows a potential for unbalance in work progress of hanging & finishing drywall surfaces.

If we analyze the current tower status using a turnover cycle analysis the need to pick up the pace of work may be clearly seen. The completion cycling formula for work on similar floors such as in the tower is:

$$x = i + d + t(n - 1)$$

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where:

x = completion date in working days  
i = start of evaluation cycle in working days  
d = duration of one unit in working days  
t = turnover cycle in working days  
n = number of units

Taking our evaluation from the start of taping and sanding dry wall on a floor, and assuming a total completion duration per floor of 40 working days is a conservative assumption at present.

A reasonable turnover cycle is about 10 working days on projects of this nature. The turnover cycle is the time from when a floor is completed to when the next floor in sequence is completed.

There are 21 floors in the tower. As of December 16, 1991 (wd 500) the first of these was about 80% taped and sanded. So, assume there are 20 floors remaining to be taped and sanded from December 16, 1991 (wd 500). Thus:

x = completion date in working days - to be determined  
i = December 16, 1991 (wd 500)  
d = 40 working days  
t = 10 working days  
n = 20 floors,

giving the following:

$x = 500 + 40 + 10(20 - 1)$   
 $x = 540 + 190$   
 $x = 730$  (pm of November 6, 1992) - completion of KA tower finish work

This is achievable.

However, there has been some slippage in work progress since our previous monitoring on September 18, 1991. At that monitoring we assumed that tower taping and sanding would begin on the am of October 7, 1991 (wd 451). This translated into a finish date ready for completion of ffe work by early September, 1992.

Thus, we have lost as much as 8 to 10 weeks since mid September, 1991. If we are aiming for an early completion of the pm of November 23, 1992 (wd 741) the projected completion date is slipping too rapidly for comfort.

**Ralph J. Stephenson PE PC**  
Consulting Engineer

December 19, 1991

The Kraus-Anderson project team should review the above observations for validity. If found accurate I recommend they prepare & carry out a tight, carefully planned sequence of tower finish work immediately.

At lower levels, interior finish work is proceeding reasonably well. The garage is to be occupied by the owner in late February, 1992. I recommend a schedule for punching out garage spaces be prepared and put into work starting in very early January, 1992.

Lower level areas at one through four are closed to heavy weather although there remains considerable final close in work to complete. Much above floor mechanical and electrical rough in is nearing completion, and some dry wall installation is underway. Work in progress represents bulk work in open spaces that are gradually being partitioned into about 24 smaller areas.

As enclosure of smaller areas at each level continues, attention will be focused on finishing within each area. The project team has shown the area and activities needed in a matrix format on which progress is tracked as with the tower floors. Most work now is concentrated on completing above floor rough work, metal studs, in wall work and hanging gyp board at walls.

Lower level work progress is settling into a specific sequence of operations. These have been diagrammed by Mr. Carter in a summary network from which a set of start and finish dates has been abstracted. At our conference this material was converted to a bar chart format for the interior work functions needed through finishing all dry wall surfaces at the major lower level areas.

The functions described in the bar charts are as follows:

frc	Framing hard ceilings
rin	Installing mechanical & electrical rough in
msf	Installing metal stud framing
hdr	Hanging dry wall
tsd	Taping and sanding dry wall
spt	Installing special trades
sfi	Milestone for starting finishes following dry wall

We agreed that the level of detail in the summary of work through finishing dry wall was adequate to guide field work. However, the allocation of manpower for the activities will be further studied.

From these Mr. Carter and I began updating the issue #3.1 network models on sheets



**Ralph J. Stephenson PE PC**  
Consulting Engineer

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24 through 34. The diagrams show each of the areas in the low rise portion of the building minus the garage.

We completed a major portion of the issue #4 update for the food service area 1B at the first level. Mr. Carter will update the remaining sheets to issue #4.

We also prepared a data base file and a bar chart run for the food service area. This will serve as a model for the other areas at the lower level.

To summarize I suggest the project team prepare the following material for each of the lower level areas

- 1.) An updated network model of the area showing
  - a. Activity numbers
  - b. Area indicated in the subtitle field
  - c. Responsibility codes for execution of the action (by csi or organization)
  - d. Durations in the activity box
- 2.) A data base run showing all activities and arrayed in es sequence
- 3.) A bar chart translation showing early & late starts & finishes

A careful review and analysis of activity durations shown in issue #3.1 may be required to properly complete the updating. At present the project team is striving to achieve a completion date of November 23, 1992 (wd 741). This is possible but as with the tower work, will require very careful planning and good management.

Lower level work will probably set the pace of the entire program once the tower sequence evens out. Therefore it is important that Kraus-Anderson establish clear cut completion dates for the lower level that will conform to the conditions set for earning the incentive bonus.

We had a few brief and fragmented discussions about the punch out procedures to be used. It is the intent of the architect/engineer to prepare the punch list on a word processor. This information will be converted by Kraus-Anderson to a data base format. The total punch out process will then be tracked, monitored and completed from the data base material.

Mr. Rick Brostrom and I discussed the fields that might be appropriate in the Kraus-Anderson punch out data document. They include:

- 01.) An original entry record number (oen)
- 02.) The floor level of the item

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Consulting Engineer

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- 03.) The area designation of the item
- 04.) The room number of the item
- 05.) The item deficiency description
- 06.) Date of entry of description
- 06.) Those responsible for correcting (a code list should be prepared)
- 07.) The work status (not started, % corrected, complete)
- 08.) Date work complete ready for final inspection
- 09.) Date work accepted by architect/engineer
- 10.) Date work accepted by owner
- 11.) Date of notice of substantial completion provided
- 12.) Date certificate of occupancy issued
- 13.) Date Kraus-Anderson receives certificate of occupancy
- 14.) Date area ready for owner to install ffe

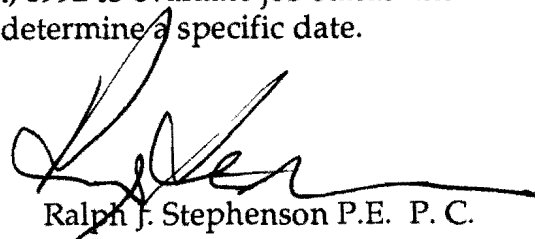
These items are not necessarily in the most effective order for the data file use. There may also be other special fields that should be included. The important feature of the punch list check list is that the process be planned and put into operation in a timely and approved manner.

Due to the press of time, and of higher priority items we deferred discussing details of the furniture, fixture and equipment work (ffe) installation. KA's prime concerns are to reduce base building disruptions and interference resulting from installation of ffe. This poses special problems of turnover, access and protection of work. We should cover these items in our next meeting.

### General

I am sending this monitoring report to Mr. Coudron. Further distribution will be by him.

Mr. Coudron suggested we meet again in March, 1992 to evaluate job status and progress. I shall be in touch with him shortly to determine a specific date.



Ralph J. Stephenson P.E. P. C.



Ralph J. Stephenson PE PC  
Consulting Engineer

March 23, 1992

Subject: Monitoring report #4  
Minneapolis Convention Center Hotel and Garage  
Kraus-Anderson - General Contractors  
Minneapolis, Minnesota

To: Mark Coudron, Kraus-Anderson project director

From: Ralph J. Stephenson, consultant

rjs project # 90:10

Dates of monitoring

- Thursday & Friday, March 19 and 20, 1992 (wd 566 and 567)

Actions taken

- Inspected project
- Reviewed status of project with Mr. Coudron, Mr Dahlin, and Mr. Carter
- Reviewed monitoring matrices for lower level areas
- Discussed completion date targets
- Reviewed lower level work plan for stud walls and hard ceilings
- Continued updating issue #3.1 lower level network models to issue #4
- Prepared elevator lobby network template
- Prepared typical tower floor ffe network model
- Evaluated potential for completing total project ka work by pm 10/30/92 (725)

Key dates

- 06/01/90 am (wd 109) Contract date
- 06/26/90 am (wd 125) Start of pile driving by Kraus-Anderson on site
- 02/29/92 pm (wd 553) Contract completion date for garage
- 11/23/92 pm (wd 465) Current latest date in incentive period
- 12/08/92 pm (wd 751) Current contract completion date for hotel  
751 - 566 = 185 wd remaining
- 10/30/92 (wd 725) pm KA desired target date  
725 - 566 = 159 wd remaining

Those attending meetings - some in meeting part time

- Mark Coudron - project manager
- Syd Dahlin - project superintendent
- Bob Carter - project manager

Ralph J. Stephenson PE PC  
Consulting Engineer

March 23, 1992

- Ralph J. Stephenson - consultant

**Plans & schedules in use or for work recently completed as of 03/19/92 (wd 566)**

- Garage networks - work completed - area not in use by owner as of 03/19/92 (566)  
Garage certificate of substantial completion executed on 02/24/92 (wd 549)  
Garage certificate of occupancy obtained on 02/10/92 (wd 539)
- Bar chart for low rise enclosure/roofing - iss #1, dated 08/13/91 (wd 413) - work completed
- Sht #10 - Low rise superstruct lvls 2 thru 5 (ballroom roof) - iss #3.1 dated 10/01/90
- Sht #11 thru sht 15 - Tower superstruct lvls 2 thru main roof - iss #3.1 dated 10/01/90
- Sht #16 - Low rise ext skin elevations s, e & n - iss #3.1 dated 10/01/90
- Sht #17 - Ext skin at twr 2 story amenity struct lvls 1 thru 3 w elev. w elev main entry skin/canopy - iss #3.1 dated 10/01/90
- Sht #18 - Ext skin plan of work for twr fls 4 thru 25 - iss #3.1 dated 10/01/90
- Sht #19 thru sht 23 - Int finish plan of work for tower floors 5 thru 25 - iss #3.1 dated 10/01/90
- Sht #24 thru sht 34 - Int finish tower & low rise lvls 1 thru 4 - iss #3.1 dated 10/01/90
- Sht #35 - Hotel elevators # 4, 5, 7, 8 & 6 thru 14, & escalators #5, 6, 7 & 8 - iss #3.1 dated 10/01/90
- Bar chart for tower interior dry wall schedule - iss #1, dated 08/01/91 (wd 405)
- Bar chart for tower interior finish schedule - iss #1, dated 08/13/91 (wd 413)
- Bar chart for above ceiling mech & elect and interior studs - iss #1, dated 09/03/91 (wd 427) - primarily levels 1 through 4
- Networks, data files & bar charts for low rise dry wall work - file lvl 1-4 int wk cpm dated 11/26/91 - by rca - for internal KA use only

**Current status of project**

**Definitions**

Current lags - Those measured by the current date minus the planned late finish or late start date of the activity.

Projected lags - Those measured by the anticipated finish or start of an activity minus the planned late finish or late start of the activity.

**Garage**

The garage certificate of substantial completion was executed on 02/24/92 (wd 549) and the garage certificate of occupancy was obtained on 02/10/92 (wd 539). Currently

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the garage is not in use by owner for parking purposes. However the owner is maintaining and securing garage areas

**Low Rise** - monitored against issue #3.1 dated 10/01/91 (wd 405) and dry wall networks dated 11/26/91 (wd 487) - issued for internal KA use only.

• Lobby & lounge area - 1-A/D

Dry wall network completion date - pm 05/26/92 (wd 614)  
Issue 3.1 start date for painting - am 06/05/92 (wd 621)

**Status of work as of 03/19/92 (wd 566)**

The lobby and lounge area currently lags the dry wall network targets by about 38 working days. This lag was caused according to Mr. Carter, by delays to laying the topping slab in the area. However Mr. Carter feels with present projections the dry wall target end date of 05/26/92 (wd 614) could be met.

• Food service area - 1-B

Dry wall network completion date - pm 02/21/92 (wd 548)  
Issue 3.1 start date for hard tile - am 04/30/92 (wd 596)

**Status of work as of 03/19/92 (wd 566)**

Currently, work at the food service area is meeting or bettering targets set in both the issue 3.1 and the dry wall networks.

• Grille area - 1-C

Dry wall network completion date - pm 02/19/92 (wd 546)  
Issue 3.1 start date for painting - am 06/25/92 (wd 635)

**Status as of 03/19/92 (wd 566)**

Currently, work at the food service area is meeting or bettering targets set in both the issue 3.1 and the dry wall networks.

• Front office area - 1-E

Dry wall network completion date - pm 02/19/92 (wd 546)

March 23, 1992

Issue 3.1 start date for painting - am 03/19/92 (wd 566)

**Status as of 03/19/92 (wd 566)**

The current lag over the dry wall network model is about 21 working days. The project team anticipates that the front office finish work will begin about 03/30/92 (wd 573) giving a projected lag over the dry wall network of about 27 working days. However the projected lag over the issue #3.1 network model will probably be about 7 working days.

In any event careful attention must be given the front office area early, since the hotel staff will probably want to occupy this space as they take over operation of the hotel. Front office and desk areas are usually high early priority spaces for the hotel management to have available.

• Health Club - 2-A

Dry wall network completion date - pm 03/17/92 (wd 565)  
Issue 3.1 start date for painting - am 06/12/92 (wd 626)

**Status as of 03/19/92 (wd 566)**

Painting in the health club started on 03/17/92 (wd 564) and is proceeding well. This area is currently ahead of early starts and early finish targets.

Painting should be carefully sequenced from the health club area because it will probably set the finish trade movements at the low rise for the remainder of the project.

• Balcony & Corridor area - 2 B/D

Dry wall network completion date - pm 05/22/92 (wd 613)  
Issue 3.1 start date for painting - am 06/25/92 (wd 635)

**Status as of 03/19/92 (wd 566)**

Currently ceiling framing at the 2nd floor balcony and corridor areas has not started, and lags the dry wall network by about 9 working days. Mr. Carter feels that they will recapture this lag, and begin finishes on or close to the target date of 05/26/92 (wd 613).

• Meeting rooms and elevator lobby area - 2-C

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Dry wall network completion date - pm 06/05/92 (wd 622)  
Issue 3.1 start date for painting - am 06/25/92 (wd 677)

**Status as of 03/19/92 (wd 566)**

Currently dry wall installation lags by about 4 working days. The KA field staff feel they will regain this lag, and plan to begin finish work in mid May, 1992.

• Retail area - 2-E

**Status as of 03/19/92 (wd 566)**

All metal stud and drywall work for the retail area has been deleted from the KA contract scope of work.

• Meeting rooms - 3-A

Dry wall network completion date - pm 03/13/92 (wd 563)  
Issue 3.1 start date for painting - am 06/25/92 (wd 635)

**Status as of 03/19/92 (wd 566)**

Taping of gyp board walls currently lags the dry wall network model by about 34 working days. The lag has been caused by delays in putting the exterior walls in the dry. The project team estimates the meeting room finishes at the third floor should start about 04/20/92. This gives a projected lag of about 25 working days. However this completion is earlier than the dates established in the issue #3.1 network model.

Pre convene areas - 3-B

Dry wall network completion date - pm 04/22/92 (wd 591)  
Issue 3.1 start date for painting - am 06/24/91 (wd 634)

**Status as of 03/19/92 (wd 566)**

The current lag over the dry wall network at the pre convene area is about 54 working days in completion of metal stud framing. This work is about 90% complete and some following work has been started. Thus the true lag is probably between 10 and 20 working days, tending toward the lesser amount.

Mr. Carter anticipates they will start finishing work at the preconvene area about 04/23/92. This is somewhat earlier than the issue 3.1 target.



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Main ball room - 3D

Dry wall network completion date - pm 04/24/92 (wd 593)  
Issue 3.1 start date for painting - am 06/24/91 (wd 634)

**Status as of 03/19/92 (wd 566)**

Ballroom painting will probably start by about the am of 04/27/92 (wd 593). This start would generally bring the area back into alignment with the desired plan of field action.

Offices, dining and laundry areas - 4-A/B/C

Dry wall network completion date - pm 06/09/92 (wd 624)  
Issue 3.1 start date for painting - am 06/24/91 (wd 634)

**Status as of 03/19/92 (566)**

All major work at lower level 4 is meeting targets between early and late starts and finishes.

Mr. Carter and I continued updating the issue #3.1 network models for the low rise interior work to issue #4. Mr. Carter will complete this work and issue the networks as required.

**Tower**

No detailed analysis of tower work was made at this session. However I did inspect the 5th level where KA finish work is approaching completion. The project team feels work at the tower is in relatively good condition and should allow fixtures, furnishings and equipment work (ffe) by the owner to begin at an early date.

Completion of tower finish work by KA will be started as soon as room doors can be closed and locked to prevent casual construction traffic and possible damage to finishes. Locking of floors will follow in warmer weather when heat is not as essential as now for maintaining room temperatures.

We prepared a finish network for the tower elevator lobbies and the main corridors. These models were reviewed by Mr. Coudron, Mr. Carter and Mr. Dahlin, and will be incorporated into a full updating of tower networks as the low rise networks are revised and reissued.

**Ralph J. Stephenson PE PC**  
Consulting Engineer

March 23, 1992

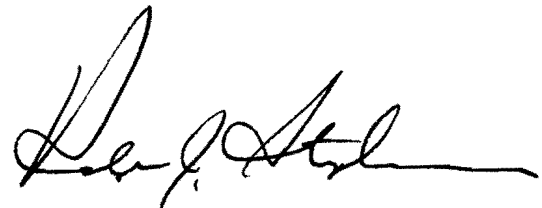
Present plans are to begin the work for the elevator lobby and main corridor in late May, 1992 and to maintain a turnover cycle of 4 working days per floor. This should put completion of tower work at mid or late October, 1992.

We prepared a preliminary analysis of the ffe work to be installed by the owner. The network logic was completed and estimated durations in working hours assigned to the diagram. It appears that about 8 working days may be needed for this work. The plan, timing, overlapping and required starting point for ffe installation should be discussed in detail with the owner as soon as possible.

Also to be noted is that this work places high demands on vertical hoisting operations, and must be closely tied to KA's work in finishing out the elevator lobbies and main corridors.

General

This monitoring report is being sent to Mr. Coudron. Further distribution will be by him. I shall be in touch with Mr. Coudron shortly to determine the time and agenda of our next planning and monitoring meeting.



Ralph J. Stephenson P.E. P. C.

# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

ka convention center hotel - certificate of occupancy notes

I. ka convention center hotel - c of o notes - disk ?

II. 3:33:59 PM - Wednesday, June 17, 1992

A. Purpose of meeting

1. To prepare a generic laundry list of activities needed to obtain a certificate of occupancy. This is then to be used as a guide to deciding on the advisability and sequencing of obtaining temporary c of o's.

B. Those attending

1. Mark Coudron - project manager
2. Bob Carter - project manager
3. Ralph J. Stephenson - consultant

C. Permit requirement check list from Mark Coudron & Bob Carter - on office board 6/17/92

1. Preliminary C of O check list considerations

a) KA permit - General building construction (permit)

- (1) Exiting/egress requirements
- (2) Door hardware
- (3) Fire sealing rated assemblies

b) Olympic permits - Drywall & plaster

- (1) Fireproofing (permit)
- (2) Fire rated dry wall (permit)

c) Egan permits - Mechanical systems

- (1) Heating and cooling - pipe (permit)
- (2) Oil piping (permit)
- (3) Plumbing (permit)
- (4) Ventilation/controls/smoke exhaust (permit)

d) Montgomery permits - Vertical transportation

- (1) Escalator 5 through 8 (4 permits)
- (2) Elevators 6 through 14, 4, 5 & 3 (12 permits)

e) Western States Fire Protection permits - Fire suppression system (permit)

- (1) Piping water pressure test

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# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

- (2) Fire pump test
  - (3) Tamper & flow switch
  - f) **Electric Repair & Construction - Electrical systems (permit)**
    - (1) General work
    - (2) Fire alarm (permit)
      - (a) Voice annunciation - speakers
      - (b) Smoke detectors
      - (c) Emergency system
      - (d) Fireman's phone jacks
      - (e) Elevator recall
  - g) **Associated Pools - swimming pool & spa system (permit)**
    - (1) Chemical system
    - (2) Recirculation system
    - (3) General pool & spa construction
  - h) **Garage work**
    - (1) Clear out level P1 - start 10/15/92, complete 11/01/92
    - (2) Complete remaining P1 work - start 11/01/92, complete 12/01/92
    - (3) Obtain certificate of occupancy for garage - 12/01/92, complete 12/15/92
2. **Inspection group & schedule - with c of o check list considerations noted**
- a) **2nd floor corridor - B0588616**
    - (1) Permit #B0588616 was obtained by HBE on ? (spring or summer of 1992)
  - b) **Tower non life safety**
    - (1) KA permit - General building construction (permit) - 09/08/92 thru 09/11/92
      - (a) Exiting/egress requirements
      - (b) Door hardware
      - (c) Fire sealing rated assemblies
    - (2) Olympic permits - Drywall & plaster - 09/08/92 thru 09/11/92
      - (a) Fireproofing (permit)
      - (b) Fire rated dry wall (permit)

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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  - (a) Heating and cooling - pipe (permit)
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- (4) Montgomery permits - Vertical transportation - 09/08/92 thru 09/11/92
  - (a) Escalator 5 through 8 (4 permits)
  - (b) Elevators 6 through 14, 4, 5 & 3 (12 permits)
- (5) Western States Fire Protection permits - Fire suppression system (permit) - prior to 09/11/92
  - (a) Piping water pressure test
  - (b) Fire pump test
- (6) Electric Repair & Construction - Electrical systems (permit) - prior to 09/11/92
  - (a) General work
- c) **Tower life safety**
  - (1) Egan permits - Mechanical systems - 09/14/92 thru 09/18/92
    - (a) Ventilation/controls/smoke exhaust (permit)
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      - ii) Smoke detectors
      - iii) Emergency system
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      - v) Elevator recall
- d) **Low rise non life safety**
  - (1) KA permit - General building construction (permit) - 09/21/92 thru 09/25/92

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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  - (a) General work
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  - (b) Recirculation system
  - (c) General pool & spa construction
- e) **Low rise life safety**
  - (1) Egan permits - Mechanical systems - 10/05/92 thru 10/09/92
    - (a) Ventilation/controls/smoke exhaust (permit)

# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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  - (b) Elevators 6 through 14, 4, 5 & 3 (12 permits)
- (5) Western States Fire Protection permits - Fire suppression system (permit) - prior to 09/25/92
  - (a) Piping water pressure test
  - (b) Fire pump test
- (6) Electric Repair & Construction - Electrical systems (permit) - prior to 09/25/92
  - (a) General work
- (7) Associated Pools - swimming pool & spa system (permit) - prior to 09/25/92
  - (a) Chemical system
  - (b) Recirculation system
  - (c) General pool & spa construction
- e) **Low rise life safety**
  - (1) Egan permits - Mechanical systems - 10/05/92 thru 10/09/92
    - (a) Ventilation/controls/smoke exhaust (permit)

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

- (2) Western States Fire Protection permits - Fire suppression system (permit) - 10/05/92 thru 10/09/92
  - (a) Tamper & flow switch
- (3) Electric Repair & Construction - Electrical systems (permit) - 10/05/92 thru 10/09/92
  - (a) Fire alarm (permit)
    - i) Voice annunciation - speakers
    - ii) Smoke detectors
    - iii) Emergency system
    - iv) Fireman's phone jacks
    - v) Elevator recall

### f) Parking facility

## D. Laundry list for c of o

### 1. What and who?

- a) What is needed from the architect?
  - (1) Occupancy load calculations
- b) What is needed from the owner?
  - (1) Evidences of permits - see permit requirement check list
  - (2) Acknowledgement of operator on site life safety monitoring systems
- c) What is needed from the engineer?
- d) What is needed from the subcontractors?
  - (1) Evidence of final inspection and acceptance by regulatory agencies
  - (2) Balancing reports
  - (3) Evidences of permits - see permit requirement check list
- e) What is needed from the city?
  - (1) Elevator department
    - (a) Inspection and acceptance of elevators
  - (2) Health department
    - (a) Inspection and acceptance of food operations
  - (3) Fire marshall
    - (a) Exit and egress approval
    - (b) Smoke exhaust approval
    - (c) Tamper and flow switch approval

# KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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(a) Tamper & flow switch

(3) Electric Repair & Construction - Electrical systems (permit) - 10/05/92 thru 10/09/92

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(1) Evidence of final inspection and acceptance by regulatory agencies

(2) Balancing reports

(3) Evidences of permits - see permit requirement check list

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(a) Inspection and acceptance of elevators

(2) Health department

(a) Inspection and acceptance of food operations

(3) Fire marshall

(a) Exit and egress approval

(b) Smoke exhaust approval

(c) Tamper and flow switch approval

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

- (4) Who is involved from the City of Minneapolis?
  - (a) Gordy Bates - Fire Marshall for City of Minneapolis
  - (b) Don Hadd - Supervisor of Minneapolis Inspections Department
  - (c) Al Olson - General Building Inspector for City of Minneapolis
  - (d) Fuel oil inspector
  - (e) HVAC inspector
  - (f) Plumbing inspector
  - (g) Lath and plaster inspector
  - (h) Heating & cooling pipe inspector
  - (i) Elevator inspector
  - (j) Department of Health inspector
  - (k) Electrical inspector
- f) **What is needed from the county?**
- g) **What is needed from the state?**
  - (1) Check and acceptance of boiler installation
- h) **What is needed from the hotel operator?**
- i) **What is needed from the bonding company?**
- j) **What is needed from Kraus-Anderson?**
  - (1) Evidences of permits - see permit requirement check list
  - (2) Sound tests
- 2. **Activities at random**
  - a) **Assume these are needed for tower certificate of occupancy**
    - (1) Document submittal
      - (a) Show evidence of permits issued
      - (b) Submit occupancy load calculations
      - (c) Submit results of sound tests
      - (d) Submit balancing reports
      - (e) Submit evidence of final inspections and acceptances (see systems operability demonstration list)
      - (f) Certification of fire alarm device testing
      - (g) Prepare egress and exiting plan (for temporary c of o)

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

- (h) Prepare transmittal document packages for city review
- (i) Submit transmittal document packages
- (2) Demonstrations  
To be organized with City of Minneapolis inspections department. Demonstrations will take place at a specific time and date to be mutually agreed upon.

The agenda to demonstrate these systems will be determined by the fire marshall and general building inspector on the day the demonstration is to take place.

Life safety and non life safety demonstrations may be made at different times depending on the schedule of inspections and observations.

- (a) Elevator operation
- (b) Escalator operation
- (c) Elevator recall
- (d) Emergency systems
  - i) Lighting
  - ii) Power
  - iii) Generator
- (e) Fire pump test
- (f) Fireman's phone jacks
- (g) Smoke detectors
- (h) Smoke evacuation tests
- (i) Tamper & flow switches
- (j) Voice annunciation - speakers
- (k) Boiler operation
- (l) Fire alarm systems
- (3) Inspections
  - (a) Confirm piping water pressure tests
  - (b) Confirm door hardware adherence
  - (c) Confirm fire sealing rated assembly adherence
  - (d) Inspect fire proofing system

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

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  - (c) Confirm fire sealing rated assembly adherence
  - (d) Inspect fire proofing system



## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

- (e) Inspect fire rated dry wall
- (f) Inspect heating & cooling piping
- (g) Inspect fuel oil piping
- (h) Inspect domestic plumbing piping
- (i) Inspect heating, ventilating, air conditioning system
- (j) Inspect escalators 5 through 8
- (k) Inspect elevators 6 through 14, and 4, 5 and 3
- (l) Inspect pool chemical system
- (m) Inspect pool recirculation system
- (n) Inspect general pool and spa construction
- (o) Inspect electrical systems
- (4) Applications
  - (a) Prepare & submit application for certificate of occupancy
- (5) Information collection
  - (a) Hold early procedural discussions with regulatory agencies
  - (b) Obtain acknowledgment of off site fire alarm monitoring requirements

## KA Convention Center Hotel Certificate of Occupancy Notes

June 17, 1992

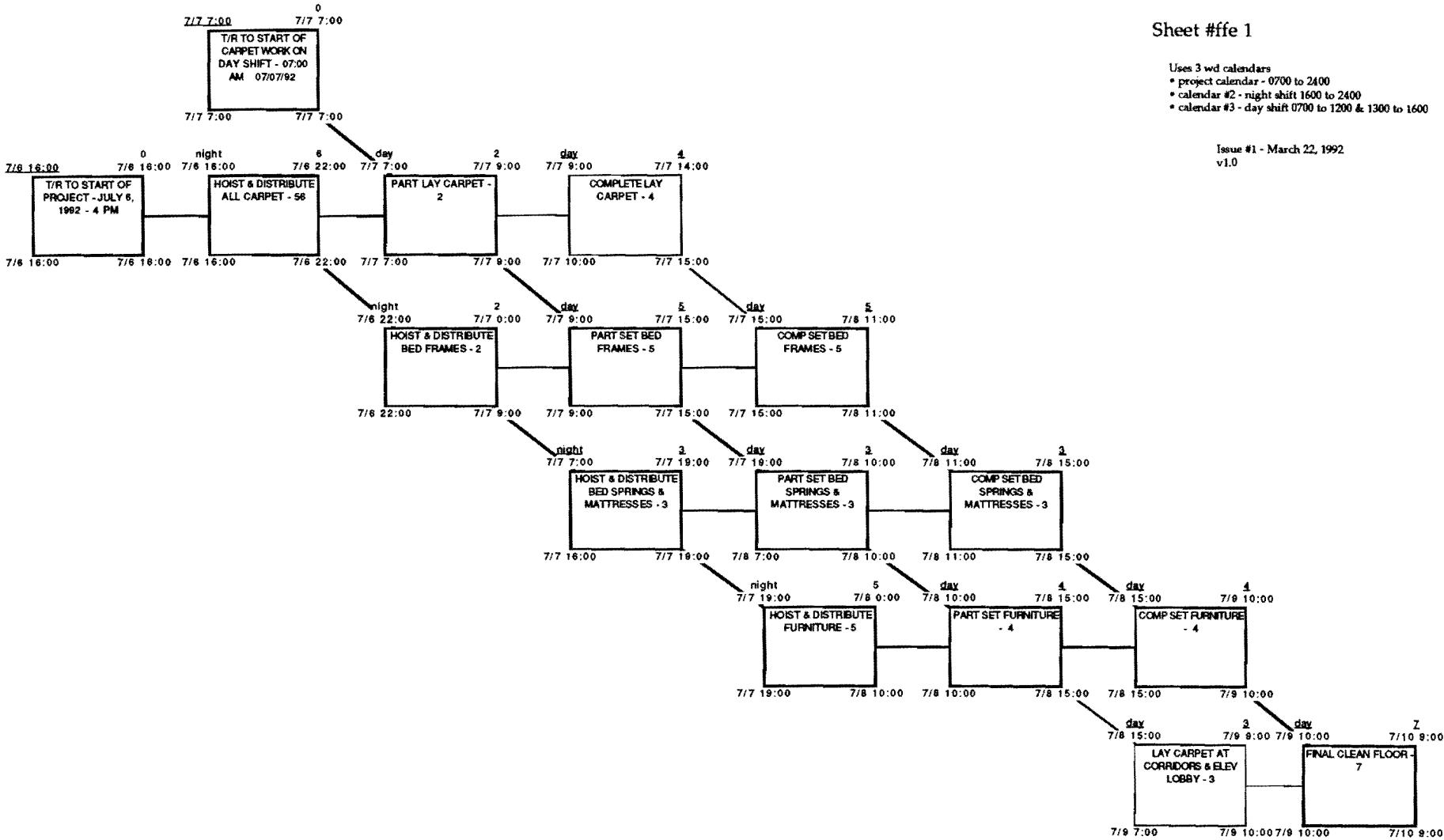
- (e) Inspect fire rated dry wall
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90:32

Sheet #ffe 1

- Uses 3 wd calendars
- project calendar - 0700 to 2400
- calendar #2 - night shift 1600 to 2400
- calendar #3 - day shift 0700 to 1200 & 1300 to 1600

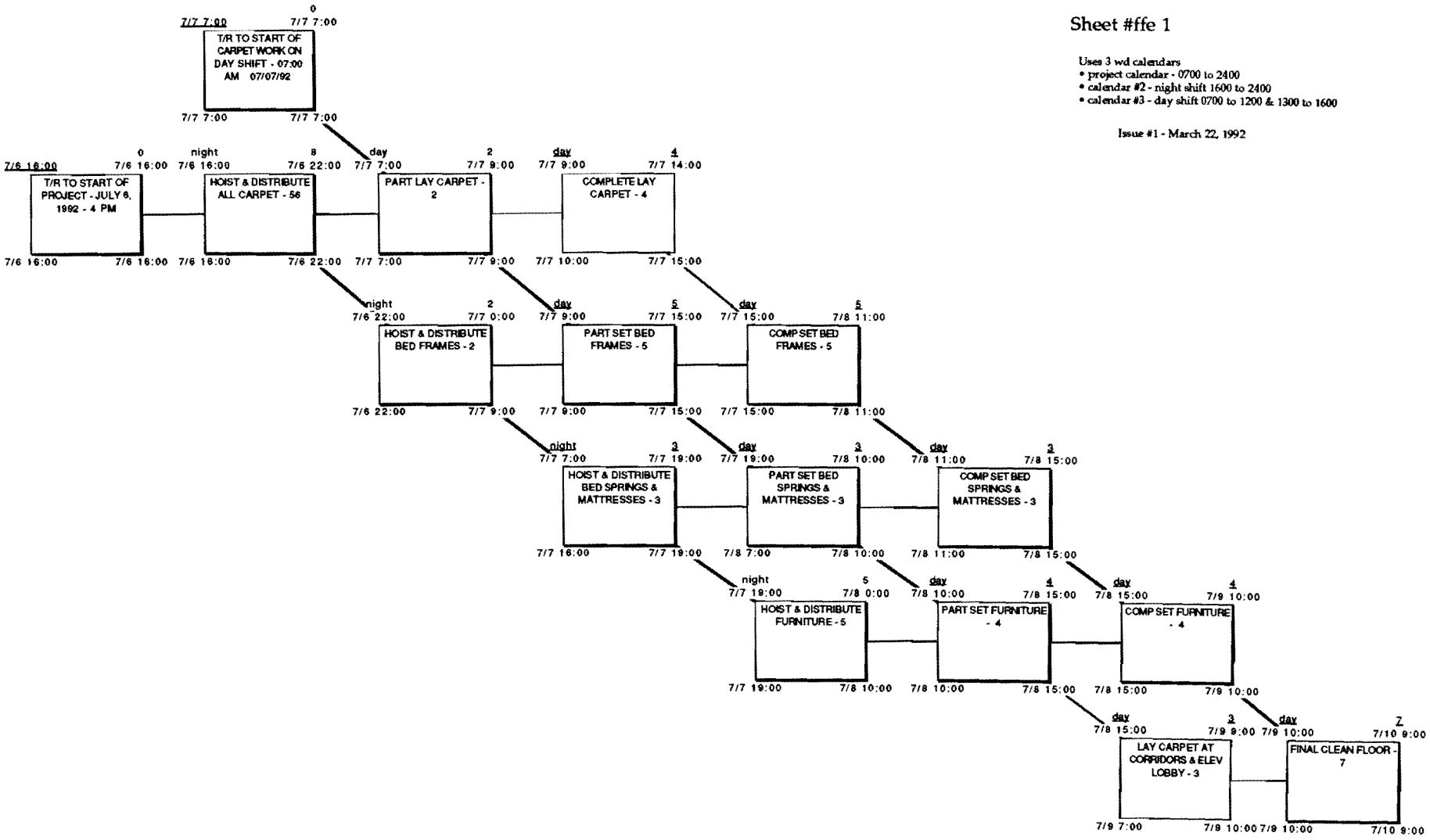
Issue #1 - March 22, 1992  
v1.0



Sheet #ffe 1

- Uses 3 wd calendars
- project calendar - 0700 to 2400
- calendar #2 - night shift 1600 to 2400
- calendar #3 - day shift 0700 to 1200 & 1300 to 1600

Issue #1 - March 22, 1992



**Ralph J. Stephenson P.E. P.C.**  
Consulting Engineer

July 2, 1992

**To:** Mark Coudron, Project manager

**From:** Ralph J. Stephenson

**Re:** Generic close out list

Dear Mark:

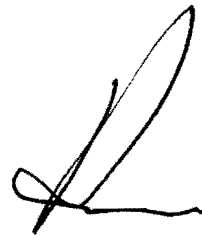
Enclosed are three documents concerning close out, and the obtaining of certificates of occupancy. Please use these as you as you see fit.

Item A is a print out of a generic close out list in data base form. I have a disk copy of this material, but decided to send you the hard copy for your use since you may wish to combine the data with other material on your project. The three data columns are subject coding, action or abbreviation meaning, and remarks. This document is a relatively new listing and probably will fit your project quite well.

Item B is an essay handout on closing out a construction project. You probably already have a copy, but I thought it would be of help to have it attached to A since I have referred to it in A.

Item C is a matrix showing various record types and their uses. It is self explanatory and is helpful to use as a check list of documents frequently encountered in construction

None of these three documents is as complete as it should be. So, if you have any comments, additions or revisions to suggest please call or write. Also, if you have any questions please don't hesitate to contact me.

A handwritten signature in black ink, appearing to be 'R. Stephenson', written in a cursive style.

	subject coding	action	remarks
1	act	• act - Accounting	abb - includes actions concerning project business
2	arc	• arc - Archives	
3	cel	• cel - Celebration	abb
4	cls	• cls - Close out	abb - check to see if cls items should be combined with
5	coa	• coa - Close out administration	
6	crd	• crd - Construction record documents	abb
7	csc	• csc - Certificate of substantial completion	abb
8	ctr	• ctr - Check, test and run in	abb - define the scope of work on this action very carefully
9	doc	• doc - documentation	abb - (see rjs ho 375 for types of documents)
10	fco	• fco - Final certificate of occupancy	abb - Also called a full certificate of occupancy
11	fpv	• fpv - Final payment	
12	fup	• fup - Follow up, public relations & marketing	abb
13	gua	• gua - Guarantees	abb
14	isp	• isp - Inspections	abb
15	omm	• omm - Operating and maintenance manuals, project directories and related job data	abb
16	pou	• pou - Punch out	abb - these applies to contractor & owner punch out
17	ppc	• ppc - Post project critique	abb
18	sur	• sur - Surety	abb - also called bonding
19	tco	• tco - Temporary certificate of occupancy	abb - Also called a partial certificate of occupancy
20	tov	• tov - Turnover	abb
21	tra	• tra - Training	abb - training elements should be identified in detail
22	war	• war - Warranty	abb
23	act/fyp	Arrange for audit of project expense	
24	cel	Arrange for open house activities as may be desired or required	
25	fco	Attach permanent warning signs to all trash chute doors	
26	tco	Attach permanent warning signs to all trash chute doors	
27	arc	Bring all meeting minutes & notes up to date to permit easy use and retrieval of information	
28	coa	Change insurance requirements from contractor to owner	
29	ctr/fco/omm/tco	Check, test and run in equipment	define the scope of run in work very carefully
30	cls/fyp	Clear final project payments & obtain required waivers of lien	
31	arc/doc	Close exceptions & data bases and send to archives	
32	arc	Collect & bind all official and unofficial project photos	
33	arc	Collect & store project related documents	Documents include logs, diaries, reports, etc. (see ho
34	arc	Collect, record & store all project correspondence	
35	arc	Collect, record & store all project network plans & schedules	Recording can be by issue #, subject & date
36	arc	Collect, record & store all shop drawings & other project related submittals	

listed in alphabetical order

	subject coding	action	remarks
37	arc	Collect, record & store all test reports	
38	coa/ppc	Compile project manager unit of work cost summaries	
39	arc	Compile subcontractor files and send to archives	
40	tov	Complete all keying & coding and turn material over to owner and occupant	
41	ctr/omm	Complete maintenance install finish cabs on construction elevators	
42	omm/tco/tra	Conduct systems orientation sessions with staff	
43	omm/tco/tra	Conduct systems training programs with operating staff	
44	pou	Contractor punch out project and correct deficiencies	
45	pou	Correct punch list deficiencies	
46	tco	Define areas to be included in temporary or partial certificate of occupancy application	
47	tco	Define boundaries and characteristics of all areas to be occupied under temporary certificates of occupancy	
48	csc	Define conditions to be met to obtain certificate of substantial completion	
49	fco	Define conditions to be met to obtain final certificate of occupancy	
50	isp/tco	Define conditions to be met to obtain temporary certificate of occupancy	
51	gua	Establish & approve start dates & lengths of all guarantee periods for material & equipment on project	
52	war	Establish & approve start dates & lengths of all warranty periods for material & equipment on project	
53	gua	Establish (identify) all elements or systems requiring guarantees	
54	tra/war	Establish and publish procedures for defining and executing warranty agreements	
55	gua	Establish and publish procedures for defining guarantee conditions	
56	crd	Establish and publish procedures for preparing and issuing construction record documents	
57	omm	Establish and publish procedures for preparing and submitting operating and maintenance manuals	
58	pou	Establish and publish punch list procedures	
59	arc	Establish record storage system and location for project documents (identify record keeper?)	
60	omm	Establish requirements (need) for operating & maintenance manuals	
61	fco/isp/tco	Give special attention to the fire life safety system inspection and approval	
62	isp/tov	Have final inspection made by exterminator to rid job of rodents, insects or other pests	
63	isp/tco	Hold early discussions with regulatory inspectors to determine needs for a successful inspection	
64	cel	Hold grand opening festivities as appropriate for team members, clients and others	
65	cel	Hold interim festivity events for project team members, clients and others	
66	ppc/tra	Hold post project critique sessions	
67	sur/tov	Identify & post additional long term or maintenance bonds required for the project (landscaping, sidewalks, streets, skyway elements, etc.)	
68	isp/tco	Identify & tabulate the trades that will need final inspection to obtain temporary certificate of occupancy	
69	isp	Identify & tabulate the trades that will need final inspection to obtain final certificate of occupancy	
70	fco/isp/tco	Identify all inspectors and their names who are to be involved with issuing the final certificate of occupancy	
71	isp/tco	Identify all inspectors and their names who are to be involved with issuing the temporary certificates of occupancy	
72	tov	Identify project personnel responsible for maintenance & guarantees of areas	

listed in alphabetical order

	subject coding	action	remarks
73	isp/tco	Identify, define & code all areas to receive temporary certification	
74	fup	If permitted place contractor identification in building	
75	fco/isp/tco	Inspect & approve elevators and other vertical transportation components?	
76	isp/tco	Inspect and approve smoke evacuation system at atrium if access/egress is at 2nd level	
77	csc/isp	Inspect project for issuing certificate of substantial completion	
78	fco/isp	Inspect project for issuing final certificate of occupancy	
79	isp/tco	Inspect project for issuing temporary certificate of occupancy	
80	fco/pou/tco/tov	Insure project is as clean or better than called for in contract	
81	fup	Insure the owner is placed on a technical and marketing action follow up list to insure periodic contacts are made	
82	csc	Issue certificate of substantial completion	
83	fco/isp	Issue final certificate of occupancy	
84	tco	Issue temporary certificate of occupancy	
85	ctr/pou	Label all electrical panel boxes, plumbing lines, valves & equipment as required for operation & maintenance	
86	fpv/gua	Obtain guarantees	
87	fco/isp/tco	Obtain releases such as inspection & operating certificates, health dept approvals & others needed for occupancy	These should be defined in detail
88	war	Obtain warranties	
89	fpv/pou	Owner punch out project and issue punch list for correction	
90	cel	Plan grand opening and other celebration activities as required	These are for the owner, the subs, the workmen and others
91	tra	Plan systems orientation and training programs as required	
92	omm	Prepare & distribute operating and maintenance manuals and instructions for review & approval	
93	fpv/omm	Prepare & distribute operating and maintenance manuals to owner and user	Owner may require different set of omm than operator -
94	act/fyp	Prepare & issue final change order covering revisions to final costs of the project not previously covered	
95	coa	Prepare & issue glossary of closing out definitions	
96	ppc/tra	Prepare & publish as appropriate, post project critique comments, analyses and recommendations	
97	pou	Prepare & publish project punch out plan of work and procedures	
98	fpv/gua	Prepare & submit all guarantees for project	
99	fpv/war	Prepare & submit all warranties for project	
100	arc/crd	Prepare & submit construction record documents	formerly called as built (see rjs ho 323 item 31 for
101	act/fyp	Prepare & submit final accounting statement to owner & architect/engineer of record	
102	cls	Prepare & submit project close out action plan	
103	cls	Prepare & submit project close out procedures	
104	pou	Prepare & submit project punch out plan of work & suggested procedures	Should include the duties of all parties to the project
105	cls/coa	Prepare a time table of key dates for all close out activities	
106	fco/tco/tov	Provide all keys and keying schedules	
107	fup	Provide mementos to key project staff	
108	fco/tco	Provide owner & occupant all releases needed for occupancy of facility	These should be defined in detail

listed in alphabetical order



	subject coding	action	remarks
109	tov	Provide owner a certification of building areas including gross square footage, leasable & leaseable square footage	
110	fpv/omm	Provide owner complete list of contractors & vendors participating in job, indicating their installation responsibilities	This list may receive wide distribution
111	fco/tco	Provide small scale floor plans in fire command room	
112	tco	Provide small scale floor plans in fire command room	
113	fco/isp/tco	Provide written certification to Fire Marshall that the fire alarm system has been properly installed & tested	
114	fco/isp/tco	Provide written certification to Fire Marshall that the fire alarm system has been properly installed & tested	
115	fup	Publish newspaper thank you at grand opening (project team & contractors)	
116	cls/coa/tra	Publish project close out procedures	
117	tco	Receive and install lock box & instructions at building exterior - note: especially for additional elevator keys)	
118	act	Reconcile allowances	
119	fyp	Release retention to base building general contractor	
120	fpv	Release retention to subcontractors	
121	act/pou	Relinquish or otherwise account for all client owned tools, spare parts, and material the property of owner	
122	coa	Remove claims & disputed claims by general contractor	
123	csc/isp	Request a/e of record to make inspections for granting certificate of substantial completion	
124	csc	Request issuance of certificate of substantial completion	
125	fco/isp	Request issuance of final certificate of occupancy	
126	tco	Request issuance of temporary certificate of occupancy	
127	omm	Review & approve operating and maintenance manuals	Those who must approve should be identified early
128	coa	Review & approve project close out procedures	
129	pou	Review & approve project punch out plan of work and suggested procedures	Should be approved by owner, contractors, designers &
130	fpv/pou	Review & approve punch out procedures	
131	sur/tra	Review consent of surety requirements and publish information as appropriate	
132	cls/ctr/gua/isp/omm/pou/war	Review drawings, specifications and other contract documents for full closing out requirements	
133	omm	Revise maintenance manuals as required	
134	arc	Send data bases & subcontractor design documents to archives	
135	arc	Send latest issue of logic diagrams and bar charts to archives	
136	arc	Send shop drawings and other submittals to archives	
137	fup	Send sincere thank you letters as appropriate to owner, design teams, contractors and other participants	
138	act/fpv/sur	Submit consent of surety to final payment if required	
139	act/pou	Submit final billing to owner containing a list of all incomplete items & a proper cost assigned for their completion	
140	coa/doc	Submit tabulation of all insurance changes over existing or past requirements or dates to owner	
141	coa	Tabulate all insurance changes over existing or past requirements or dates	
142	act/csc/tov	Take & submit final meter readings for utilities and measured records of stored fuel at time of substantial completion	
143	ctr/isp/tco	Test & make operational all fire systems elements	
144	fco/isp/tco	Test & make operational all fire systems elements	

listed in alphabetical order

	subject coding	action	remarks
145	fco/tco/tov	Transfer security requirements for areas to owner	
146	to	Turn over project to occupant	
147	to	Turn over project to owner	
148	act/fyp	Verify subcontract final price (independent from pm)	
149	fco/pou/tco	Video tape conditions subject to multiple use	
150	fco/pou/tco	Video tape conditions subject to owner only use	
151	tco/fco	Video tape conditions subject to public access	
152	pou	Video tape conditions subject to site restoration	

**Ralph J. Stephenson PE PC  
Consulting Engineer**

**Closing Out A Construction Project**

**A random summary of close out  
guidelines for owners, architects,  
engineers and contractors**

The process of closing out a construction project has emerged as one of the most important sequences of events a project team may encounter during the course of the project. Reasons for this are:

- The close out process usually results in a formal and legal acceptance of the facility by the owner or occupant. Thus responsibility for the correctness of the work passes from the design and construction team to the owner. The transition must be clear and indisputable to avoid contested claims and residual obligations.
- The conditions imposed by the warranties on workmanship, systems and equipment must be clearly defined and accepted by all concerned if adequate guarantees of performance are to be placed in force.
- The design and construction team must have a definitive point in time where their contractual obligations have been fulfilled and they can consider their legal relations closed out so far as project design and construction administration and operations are concerned.
- The owner must have a specific point in time where he can consider the project legally his without any hang over potential encumbrances from the design or construction team.
- The design and construction team must be able to use the project as a facility which they have no hesitation in describing or showing to prospects and current clients.
- A well closed project is insurance of future good relations with specialty contractors on the job as subcontractors of the prime contractors.
- The properly closed project makes no unreasonable or unpredictable demands on the design and construction staff subsequent to the close out.

The close out process does not start as the construction phase is being completed but long before. Closing out is an ongoing action. Throughout all phases of the job the experienced construction team studies the documents and the work so as to set how each element can best be turned over to the owner in accordance with the contract.

Some of the many steps to be taken to properly close out a project are given below. The list is for all parties to the contract, since most are involved in the close out phase. Parties indicated in ( ) are those most concerned with the item. Where multiple parties are indicated it does not necessarily indicate the parties must participate together in the action.

**Ralph J. Stephenson PE PC  
Consulting Engineer**

The list is at random. (Note: This list will be arranged by categories as it is added to)

1. Prepare a construction record package. This set of documents was formerly called the as built drawing set. (contractor)
2. Obtain, where appropriate, a certificate of occupancy, or equivalent document, from the local building department, or other regulatory and enforcement agency. (owner, architect/engineer, contractor)
3. Prepare, distribute and have approved by the owner, the architect/engineer and the contractors, a punch out procedure. (contractor, architect/engineer, owner)
4. Punch out the project and complete the punch list requirements within an agreed upon time frame. (architect/engineer, contractor, owner)
5. Prepare, submit and accept the operating and maintenance manuals for the total project. (contractor, owner)
6. Clear final payments on the project and obtain proper waivers of lien. (contractor, owner)
7. Provide the owner with a proper set of construction documents for reference use. (contractor, owner)
8. Collect and store job logs, diaries, daily reports, test reports and all other documentation generated by the job activities. (contractor, owner, architect/engineer)
9. Bring all meeting minutes and record files up to date so as to permit easy use and retrieval of needed information. (contractor, owner, architect/engineer)
10. Collect and bind all official and unofficial project photos. (contractor, owner, architect/engineer)
11. Collect and record all project network plans, schedules and bar charts by issue number, subject and date. (contractor, owner)
12. Close out and store all correspondence and other record files. (contractor, owner, architect/engineer)
13. Assemble and properly store all shop drawings and other job related submittals. (contractor, owner, architect/engineer)
14. Request the architect/engineer of record to make an inspection resulting in the granting of a certificate of substantial completion. This may be required to obtain a certificate of occupancy. (contractor, owner)
15. Plan and implement grand opening or preview festivities for major team members, company principals and others contributing to the planning, design and construction of the facility. (owner, contractor)

**Ralph J. Stephenson PE PC  
Consulting Engineer**

- 16.** Each party should conduct their own job critique during which responsible parties to the project meet and identify points of strength and weaknesses in carrying out the job. One major product of this critique should be a set of recommendations for improvement of future performance, and documentation of the problems encountered and how they were resolved. (contractor, owner, architect/engineer)
- 17.** Relinquish, or account for, all client owned tools, spare parts, and extra stocks of materials, rightfully the property of the owner. (contractor, owner)
- 18.** Provide the owner copies of all releases, including final inspection certificates, occupancy permits, operating certificates, health department approvals and permits, and all other similar documents to allow the owner to occupy the building under full understanding of the conditions of the turnover. (contractor, owner, architect/engineer)
- 19.** Label all electrical panel boxes, plumbing lines, valves and equipment as required for proper operation and maintenance. (contractor)
- 20.** Provide all keys and keying schedules. (contractor, owner)
- 21.** Submit a final statement of accounting, as required, to the owner and the architect/engineer. (owner, contractor, architect/engineer)
- 22.** Obtain, prepare or issue a final change order reflecting adjustments to the contract sums not previously made by change orders. (contractor, architect/engineer, owner)
- 23.** Send sincere thank you letters as appropriate to the owner, to the design team and to various contractors involved on the job. (contractor, architect/engineer)
- 24.** Provide the owner a complete list of contractors and vendors participating in the job and indicating their installation responsibilities. (contractor)
- 25.** Insure the owner is placed on the marketing call list, mailing list and other action tickler files as appropriate. (contractor, architect/engineer)
- 26.** Arrange for such open house activities as may be desired or required (owner, contractor, architect/engineer)
- 27.** Insure that your company identification is shown somewhere in the building if permitted. (owner, a/e and contractor)
- 28.** Insure the project is as clean or better than called for in the specifications when your staff moves off the job. Don't lose the good will of the owner by leaving him a dirty job. (contractor)

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**29.** Properly train and turn over the facility to the owner's representatives. Depending on the size and complexity of the project, the training process should begin from one to three months before occupancy. (owner, contractor)

**30.** Establish and approve the start of all warranty and guarantee periods for all material and equipment on the job prior to owner making the facility operative. (owner, contractor, architect/engineer)

**31.** Prepare and submit to the owner a Construction Record Package. This package should contain the following: (contractor)

- a. The construction record set referred to above.
- b. Specific warranties required by the specifications
- c. Workmanship or maintenance bonds required
- d. Maintenance agreements called for by the specifications
- e. Damage and settlement surveys of the site and the facilities
- f. Final property surveys of the site.

**32.** Submit a final billing to the owner containing a list of all incomplete items and a properly assigned cost to each item. (contractor)

**33.** Advise the owner of any insurance changes over existing or past requirements or dates. (contractor, architect/engineer)

**34.** Complete all pre start up testing, run in and instruction along with submission of operating and maintenance manuals. (contractor, owner)

**Note:** All pre start up and start up requirements should be fully described in the contract documents and clearly referenced to the warranty period.

**35.** Submit final meter readings for utilities, and measured records of stored fuel at the time of substantial completion. (contractor)

**36.** Submit to owner, the consent of surety to final payment if required. (contractor)

**37.** Have final inspection made by an experienced exterminator to rid the job of rodents, insects or other pests. (contractor, owner)

**38.** Read the full contract document requirements (drawings, specifications, and contract) for closing out the job. (contractor, owner, architect/engineer)

**39.** Provide the owner a certification as to the building area calculations including gross square footage, leasable square footage, and area use assignments.

record types and their us

	document	record action	record suptv action	record opin	record chngs	record dec & agrmts	record appvls						
1	Appraisals		x	x									
2	Bulletins				x							x	
3	Certificates of completion					x						x	
4	Certificates of occupancy					x						x	
5	Change orders				x	x						x	
6	Check lists			x									
7	Claim notification letters	x	x	x	x	x							
8	Clarifications		x	x	x								
9	Color coded network models	x		x								x	
10	Construction record drawings	x				x	x	x			x	x	x
11	Construction site plan	x	x										
12	Consultant lists		x								x		
13	Contract document sign offs	x				x	x					x	x
14	Contract drawings				x	x	x		x				x
15	Contract specifications				x	x	x		x				x
16	Contractor lists		x								x		
17	Contracts	x	x		x	x	x		x				x
18	Cost estimates		x	x	x		x	x	x	x			x
19	Cost reports		x		x		x	x	x	x	x	x	x
20	Diaries	x	x	x	x	x	x	x				x	x
21	Document control files										x		x
22	Equipment data tabulations							x			x		
23	Expense reports		x						x		x		
24	Field orders	x			x	x	x						x
25	Field reports	x			x	x	x	x			x		x
26	Guarantees		x										
27	Impact reports	x	x	x	x	x		x	x				x
28	Interoffice memos (IOC)	x		x	x		x						
29	Isoquant line comparisons						x	x	x		x		
30	Letters	x		x								x	
31	Logs	x	x	x	x	x	x	x	x			x	x
32	Maintenance manuals											x	
33	Meeting minutes	x	x	x	x	x	x	x	x			x	x
34	Money flow curves		x					x	x		x		x
35	Monitoring reports	x		x	x	x	x	x	x				x
36	Operation manuals										x		
37	Performance evaluations	x		x		x	x						x
38	Permits		x			x	x	x				x	x
39	Phone records and logs	x	x	x	x		x	x					x
40	Photos	x			x	x		x	x				x

C

listed alphabetically by type

record types and their uses

	document	record action	record suptv action	record opin	record chngs	record dec & agrmts	record appvls	record progrs	record reerce flow	record data	record doc proceg	record results
4 1	Post job critiques	x		x	x		x	x	x		x	x
4 2	Pro forma financial analyses		x			x			x	x		
4 3	Project directories									x		
4 4	Project histories	x			x		x	x	x	x	x	x
4 5	Project network plans			x	x	x	x	x	x			
4 6	Project schedules			x	x	x	x	x	x	x		
4 7	Proposal spread sheets		x							x		x
4 8	Punch lists	x		x	x	x	x	x		x		x
4 9	Purchase orders		x			x	x		x			
5 0	Quantity takeoffs		x						x	x		
5 1	Requests for change orders	x	x		x	x	x		x			
5 2	Requests for information		x		x		x					
5 3	Requests for payment	x	x				x	x	x			x
5 4	Requests for proposals		x									
5 5	Resource histograms								x	x		
5 6	Risk management data		x									
5 7	Sample logs	x	x		x				x	x	x	x
5 8	Schedules of values				x				x	x	x	
5 9	Shop drawing logs				x			x	x	x	x	x
6 0	Site evaluation data sheet	x	x	x								x
6 1	Specifications					x						
6 2	Testing reports		x	x	x					x		x
6 3	Time cards	x						x	x	x		x
6 4	To do lists	x						x				x
6 5	Transmittals	x			x	x	x	x	x		x	x
6 6	Waivers	x				x						x
6 7	Warranties					x						
6 8	Work orders	x			x	x	x					x

listed alphabetically by type