HIGHWAY CONSTRUCTION FACTORS GROUP
ATTACHMENT 9
CRITICAL PATH METHOD (CPM) SCHEDULE
BRIDGE 9340 COLLAPSE
MINNEAPOLIS, MN. ;8/1/07
HWY-07-MH024

SA PRO BASELINE CHECKER

Version 3.48

BASELINE: BL35 Analysis Date: 07-17-2007 at 15:37:57

Project computes durations in Days.

ACTIVITIES

There are a total of 49 activities in this schedule.
Listed by category type, the totals are;

- Fixed Duration CPM Activity:
  - Tasks = 47
- Resource-driven Duration CPM Activities:
  - Independent = 0
  - Meeting = 0
- Zero Duration Mileposts:
  - Start Milestones = 1
  - Finish Milestones = 1
  - Start Flags = 0
  - Finish Flags = 0
- Summary (Non-CPM) Duration Activities:
  - Hammocks = 0
  - WBS = 0

MnDOT CPM

CAUTION: Many contracts specify the maximum or minimum number of activities allowed in the schedule. For this purpose, the first two categories above are usually totaled = 47 activities.

CRITICAL ACTIVITIES: Many specifications limit the percentage of activitiesthat can be critical or near-critical in the Baseline Schedule. A typical upper limit is a maximum of 30% critical and 50% critical or near-critical.

Critical Activities = 27.66%
Critical and Near-Critical Activities = 82.98% (based upon Total Float less than 11 .)

ACTIVITIES ON THE LONGEST PATH

ACT	CALENDAR	FLOAT	TITLE
1000	1	0	Start Project
1010	1	0	Outside 35W Lanes - Bridge Milling
1050	1	0	Outside 35W Lanes - Remove Slab 1/3
1080	1	0	Outside 35W Lanes - Bridge Overlay
1090	1	0	Br 9340 Outside Lanes 35W Anti-icing System
1440	3	0	Outside 35W Lanes - Overlay Cure Time
1140	1	0	NB & SB Inside 35W Lanes - Removals
1240	1	0	BR 27903 & 27880 Repair
1390	1	0	BR 27880A Repair
1400	1	0	BR 27874 Repair
1410	1	0	BR 27873 & 27879A Repair
1420	1	0	BR 27902 Repair
1340	1	0	Complete Project

13 activities were on the Longest Path.
NOTE: The most crtical float for this project is 0.

CAUTION: Some of the activities on the above Longest Path have different calendars from the others. This will often cause the Total Float value to be dissimilar. This is normal. Float values should be the same for activities with the same calendar. If not, then look for constraints at the changes.
Key to Calendars:

49 activities out of 49 had numeric Activity IDs.
NOTE: Many experienced Schedulers tend to not use numeric Activity IDs but use a combination of letters and numbers. P3 automatically right-justifies numbers (by padding the left with blanks.) Any IDs added with letters are left-justified, making a confusing and jumbled look to any listing. Recommend that you begin IDs with a letter.
Of the 47 CPM-type activities in the schedule,
Average duration of these activities was 8.23 Days.
Mean of the durations was 12.50 Days.
Standard Deviation of the difference was 6.18 Days.

ACTIVITY DURATION HISTOGRAM (excluding Milestones)

DURATION	COUNT	GRAPH
0	0	
1-5	22	##
6-10	10	##########################
11-15	7	##################
16-20	7	##################
21-25	1	###

47 of Tasks and Resource Activities (Non-Milestone) are represented above.
19 activities are 1 to 3 Days long.
The shortest duration is 2 Days.
The longest duration is 23 Days.
NOTE: Many contracts specify the minimum or maximum allowable durations of activities included in the schedule. It is best to not consider milestones or summary activities when qualifying durations. The analysis above only considers Task, Independent, and Meeting type activities and excludes all others.

ACTIVITY DURATIONS GREATER THAN 20

ACT	DURATION	FLOAT	ACT TYPE	TITLE
1120	23	11	Task	NB & SB Outside 35W Lanes - Concrete

1 activities had long durations.
CAUTION: Many specifications require activities to be defined with durations less than a set number. The intent of this requirement is to allow for better monitoring and control of the work described by the activity. Typically, the reviewer is allowed to wave this requirement in the case of Hammocks or deliveries, etc.

SUSPICIOUS ACTIVITY DURATIONS

ACT	DURATION	FLOAT	TITLE
1050	18	0	Outside 35W Lanes - Remove Slab 1/3
1080	11	0	Outside 35W Lanes - Bridge Overlay
1090	12	0	Br 9340 Outside Lanes 35W Anti-icing System
1100	12	0	SB 35W Concrete Pvmt Repair (Weekends)
1110	12	0	NB 35W Lanes-Concrete Pvmt Repair (Weekends)
1120	23	11	NB & SB Outside 35W Lanes - Concrete Pvmt Repair
1280	8	4	Barrier Wall
1300	8	3	Pier Protection (4th & University)
1360	12	10	Inside 35W Lanes - Remove Slab 1/3
1370	11	10	Inside 35W Lanes - Bridge Overlay
1380	12	10	Br 9340 Inside 35W Lanes - Anti-icing System
1420	8	0	BR 27902 Repair
1460	18	5	NB & SB Outside 35W Lanes - Planing
1470	18	12	NB & SB Inside 35W Lanes - Planing

14 activities had suspicious activity durations.
CAUTION: Some schedulers arbitrarily modify activity durations to make various near-critical logic chains match total durations exactly, thus artificially producing multiple critical paths. The above listed activities have 'odd' durations, which should be investigated further, especially if they are critical.

0 activities have percent completes different from duration estimates.

0 activities had 'NOTICE TO PROCEED' in their descriptions.
CAUTION: There does not appear to be a Notice To Proceed in this schedule. All projects run under the concept of"Time Is Of The Essence" require a formal declaration of the start of the project.

0 activities had 'MOBILIZE' in their descriptions.
CAUTION: There does not appear to be a Mobilization in this schedule. It is often required by specification, or specifically called out as a pay item, and can be important legal point in delay disputes.

0 activities had 'SUBSTANTIAL COMPLETION' in their descriptions.
CAUTION: There does not appear to be a Substantial Completion in this schedule. Regardless of whether it is called out by specification, it is widely recognized legally as the termination point for the assessment of Liquidated Damages and thus should be included.

0 REVIEW or APPROVAL activities appear to exist.
CAUTION: It is in the Owner's and Contractor's best interests to include all significant submittals in the schedule. It serves as a checklist, helping the Contractor to remember this important task. More importantly, the Submittal-Review-Deliver process frequently impacts the critical path of projects with major items to install.
CAUTION: You may have submittal activities but they do not say 'SUBMIT.' Sometimes the schedule will just say, 'HVAC DRAWINGS'. This is not enough as it may or may not include the review period. Suggest that you require 'SUBMIT' and 'REVIEW' as separate and distinct acts.

BASELINE MILESTONES

ACT ID	TYPE	DATE	TITLE
1000	Milestone	18JUN07	Start Project
1340	Milestone	28SEP07	Complete Project

2 milestones found.
NOTE: The only milestones that should be in a Baseline Schedule are contractually required ones. Verify that the above list is reasonable and inclusive.

ACTIVITY CODE ANALYSIS

Activity Code Check:

No Activity ID Fields exist.
NOTE: Activity ID Fields are reserved parts of the Activity ID that can be used to group related activities. Typically, Alpha/Numeric ID is used and the first 1 or 2 spaces are used to define Areas, Phases, etc. This older technique is now less favored than the use of more versatile Activity Codes.

0 account codes are reserved by P3 and should not be used.
ERROR: Internal software failure. File TEMPFILE.SAF not created.
Suggest you delete unused Code Field "Milestone".

Suggest you delete unused Code Field "Item Name".

Suggest you delete unused Code Field "Location".

Suggest you delete unused Code Field "Step".

BLANK ACTIVITY CODES

ACT	CODE FIELD	ACTIVITY TITLE
1000	Responsibility	Start Project
1340	Responsibility	Complete Project
1000	Area/Departmen	Start Project
1340	Area/Departmen	Complete Project

4 blank codes exist in this project.
ERROR: It is easy to miss entering a code field when building a schedule. It is important that all activities have a code so that they won't be overlooked in reports, filters, and views. Suggest that you look for a similar activity and use the code found there. If no code applies, consider 'GENERAL' or 'OVERVIEW.'
NOTE: Any Activty Code Fields that are complety unused will not be reported upon in the above listing.
EXPANDED ACTIVITY CODE FIELD LAYOUT (# Activities):
Responsibility
(1) Diamond Surface
(0) High Five
(2) Insituform
(3) Killmer Electric
(0) Midwest land Survey

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(    2) North Valley
(   37) Progressive Contractors, Inc.
(    0) Terra Services
(    2) Timme
(    0) United Rentals
Area/Department
(    5) Stage 2
(   23) Stage 3
(   17) Stage 4
(    1) Stage 5
(    1) Stage 6
```

NOTE: Look through the above list for under-represented codes. This might indicate missing activities or a lack of proper detail. Nearly identical descriptions might be in error and will lead to confusion. Missing codes may indicate missing work.

WBS Code Check:

No Work Breakdown (WBS) Assignments exist.

NOTE: Use of WBS assignments is becoming increasingly more prevalent, especially in large, enterprise scheduling situations. It has the built-in ability to summarize groups of activities without adding additional logical relationships, such as required by hammocks.

RELATIONSHIPS

This project has a total of 65 relationships.

0 relationships are bogus.

ACTIVITIES WITHOUT PREDECESSORS

ACT	START	FLOAT	TITLE
1000	18JUN07	0	Start Project

1 activities were found without logical predecessors.

ACTIVITIES WITHOUT SUCCESSORS

ACT	FINISH	FLOAT	TITLE
1340	28SEP07	0	Complete Project

1 activities were found without logical successors.

MULTIPLE NEAR-CRITICAL PATH ACTIVITIES

ACT	# PATHS	FLOAT	TITLE
1010	2	0	Outside 35W Lanes - Bridge Milling
1020	3	3	Outside 35W Lanes - Mill Bituminous Shoulder
1030	3	3	NB & SB Outside 35W Lane - Removals
1040	4	4	NB & SB Outside 35W Lanes - Expansion Joints
1050	5	0	Outside 35W Lanes - Remove Slab 1/3
1060	3	3	Outside 35W Lanes - Concrete End Posts
1070	3	3	Outside 35W Lanes - Reconstruct Curb

MULTIPLE NEAR-CRITICAL PATH ACTIVITIES

ACT	# PATHS	FLOAT	TITLE
1080	4	0	Outside 35W Lanes - Bridge Overlay
1090	4	0	Br 9340 Outside Lanes 35W Anti-icing System
1100	4	0	SB 35W Concrete Pvmt Repair (Weekends)
1110	6	0	NB 35W Lanes-Concrete Pvmt Repair (Weekends)
1130	4	5	Outside 35W Lanes - Pour Bituminous Shoulders
1140	3	0	NB & SB Inside 35W Lanes - Removals
1150	5	10	Inside 35W Lanes - Expansion Joints
1160	7	10	Inside 35W Lanes - Drill & Grout Anchors
1180	6	10	Inside 35W Lanes - Reseal E-8's, Slope Paving
1200	6	10	Inside 35W Lanes - Mill & Patch
1220	6	10	Concrete Surface Repair (Edge of Deck)
1230	9	4	NB & SB Inside 35W Lanes - Concrete Pvmt Repair
1240	5	0	BR 27903 & 27880 Repair
1250	4	7	Pipe Removals
1260	4	7	Grading
1270	10	7	Pipe Work in Median
1280	6	4	Barrier Wall
1290	2	5	Inside 35W Lanes - Pour Bituminous Shoulders
1300	4	3	Pier Protection (4th & University)
1320	4	3	Outside 35W Lanes - Slip Rail
1330	2	4	Inside 35W Lanes - Guardrail
1350	2	7	NB & SB Inside 35W Lanes - Milling
1360	8	10	Inside 35W Lanes - Remove Slab 1/3

*** REMAINING LIST OF ACTIVITIES TERMINATED DUE TO LENGTH ***

More than 31 multiple, independent near-critical activities found.
NOTE: Project Critical Float is 0 and any activity with a float value within 10 of this was considered as near-critical.
As this is a Baseline Schedule, A Project Critical Float of 0 was used.
CAUTION: CPM networks should not have multiple critical paths without through justification. Some Contractors adjust durations, logic, and lead times so as to artificially create multiple paths. This increases the number of critical activities which increases the potential that any Owner-caused delay will look like a delay to the project. Detail analysis of the above activities is recommended.
0 out of a possible of 0 relationship chains are interruptible.
0 multiple relationships are found.
0 apparent odd relationships found.

ODD LAGS OR LEADS USED

PRED ACT	SUCC ACT	LAG	REL	TITLE
1010				Outside 35W Lanes - Bridge Milling
	1050	2	FS	Outside 35W Lanes - Remove Slab 1/3
1050				Outside 35W Lanes - Remove Slab 1/3
	1090	3	FS	Br 9340 Outside Lanes 35W Anti-icing System
1130				Outside 35W Lanes - Pour Bituminous Shoulde
	1460	2	FS	NB & SB Outside 35W Lanes - Planing

ODD LAGS OR LEADS USED

PRED ACT	SUCC ACT	LAG	REL	TITLE
1300				Pier Protection (4th & University)
	1320	2	FS	Outside 35W Lanes - Slip Rail
1350				NB & SB Inside 35W Lanes - Milling
	1470	5	FS	NB & SB Inside 35W Lanes - Planing
1440				Outside 35W Lanes - Overlay Cure Time
	1140	2	FS	NB & SB Inside 35W Lanes - Removals

6 odd lags are listed above.

NOTE: Lags and Leads are time intervals imposed between two activities. They are legitimately used to describe linked activities which are staggered or to represent a time interval, say for curing concrete.

NOTE: Lags and leads can be also used to 'hide' float or otherwise artificially expand a project schedule without being visible on plots or in most reports. Negative lags can hide an unworkable project schedule by shortening it without changing activity durations.

CAUTION: It is highly unusual for Finish-to-Start (FS) relationships to have positive lags. Recommend that you have the creator of the schedule document what that lead represents.

CAUTION: You must consider the calendar when using lags. Lags use the calendar of the proceeding act. In the case of concrete curing (a 7-day/week event,) the lag would use the calendar of the concrete pour, which is probably a 5-day/week event. Just expanding the length by 7/5 does not fully consider where in the week it falls.

CAUTION: Lags make for poor long-lead times. You cannot status a lag or periodically review its progress. For lags of long duration (such as the delivery of a major piece of equipment,) it would be better to create an activity that would show-up on reports and would need to be statused every update.

ALL OTHER LAGS OR LEADS (OTHER THAN ODD) USED

PRED ACT	SUCC ACT	LAG	REL	TITLE
1030				NB & SB Outside 35W Lane - Removals
	1020	-2	FS	Outside 35W Lanes - Mill Bituminous Shoulde
1220				Concrete Surface Repair (Edge of Deck)
	1380	-1	FS	Br 9340 Inside 35W Lanes - Anti-icing Syste

2 'standard' lags were found.

NOTE: While usually considered acceptable for use in schedules, lags and leads should always be reviewed for reasonableness. In other words, there should be a reason for having each lag. If that reason is not apparent to you, then you should ask for it.

0 non-overlapping Lags found.

ACTIVITIES WITHOUT A FINISH RELATIONSHIP

ACT	FLOAT	TITLE
1190	26	Inside 35W Lanes - End Posts, Seal Cracks
1210	24	Inside 35W Lanes - Clean & Seal Joints

2 Activities are missing Finish Relationships.

NOTE: The above activities do not have any constraint on completion, other than perhaps their start day. With the existing configuration a shortening or lengthing of the activity's duration will have no effect on project completion. Confirm that no succeeding activity is limited by this completion of this activity or add a FS or FF relationship to the appropriate activity.

CONSTRAINTS

0 constraints are bogus.

BASELINE SCHEDULE CONSTRAINTS

ACT	C-TYPE	DATE	TITLE
1100	SNET	22JUN07	SB 35W Concrete Pvmt Repair (Weekends)
1110	SNET	27JUL07	NB 35W Lanes-Concrete Pvmt Repair (Weekends)

2 constraints were found in the project.

CAUTION: Baseline Schedules should only contain constraints that are specifically called out in the plans and specifications. Otherwise, this can be thought of as the Contractor is "reserving float" (which is typically not allowed.)

NOTE: If the Contractor resists removing non-contractual constraints, from the Baseline Schedule, the prudent Scheduler will note each such constraint in the review of the baseline and state that the Owner reserves the right to temporarily delete any such constraint when evaluating the effects of delays.

0 activities were coded for Zero Free Float.
0 Zero Total Float constraints were found in the project.
0 active Expected Finish constraints were found in the project.
0 improper Expected Finish constraints were found in the project.
0 Mandatory Start/Finish constraints were found in the project.
0 active START ON constraints were found in the project.

COST CHECKS

There are no cost accounts in this project to check.

LOG CHECKS

No Logs were found in the schedule.

END OF REPORT

Analysis complete at 15:45:28.

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Total Float	Predecessors	Successors
TH 35W from TH 94 to Stinson Blvd							
1000	Start Project	0	18JUN07		0		1010*, 1030*, 1100*, 1310*
1030	NB & SB Outside 35W Lane - Removals	5	18JUN07	22JUN07	0	1000*	1120*, 1460*
1010	Outside 35W Lanes - Bridge Milling	3	18JUN07	20JUN07	1	1000*	1050*
1120	NB & SB Outside 35W Lanes - Concrete Pvmt Repair	23	18JUN07	17JUL07	15	1030*	1490 1460?
1310	Outside 35W Roadway Lighting	20	18JUN07	13JUL07	18	1000*	1490
1100	SB 35W Concrete Pvmt Repair (Weekends)	12	22JUN07*	09JUL07	0	1000*	1110*
1460	NB & SB Outside 35W Lanes - Planing	18	23JUN07	17JUL07	0	1030* 1120?	1020*
1050	Outside 35W Lanes - Remove Slab 1/3	18	23JUN07	17JUL07	1	1010*	1040*, 1080*
1040	NB & SB Outside 35W Lanes - Expansion Joints	10	23JUN07	06JUL07	8	1050*	1320*
1320	Outside 35W Lanes - Slip Rail	3	07JUL07	10JUL07	8	1040*	1070*
1070	Outside 35W Lanes - Reconstruct Curb	10	11JUL07	23JUL07	8	1320*	1060*
1020	Outside 35W Lanes - Mill Bituminous Shoulder	3	18JUL07	20JUL07	0	1460*	1300*, 1430*
1080	Outside 35W Lanes - Bridge Overlay	11	18JUL07	31JUL07	1	1050*	1090*, 1440*
1090	Br 9340 Outside Lanes 35W Anti-icing System	12	20JUL07	03AUG07	1	1080*	1490
1430	Outside 35W Lanes - Guardrail	12	21JUL07	04AUG07	0	1020*	1490*
1300	Pier Protection (4th & University)	8	21JUL07	31JUL07	1	1020*	1130*
1060	Outside 35W Lanes - Concrete End Posts	2	25JUL07	26JUL07	8	1070*	1490
1110	NB 35W Lanes-Concrete Pvmt Repair (Weekends)	12	27JUL07*	20AUG07	0	1100*	1340
1130	Outside 35W Lanes - Pour Bituminous Shoulders	3	01AUG07	03AUG07	1	1300*	1490
1440	Outside 35W Lanes - Overlay Cure Time	4	01AUG07	04AUG07	1	1080*	1490*
1490	Switch Traffic	2	06AUG07	07AUG07	0	1060, 1090, 1120, 1130, 1310, 1430*, 1440*	1140*, 1350*
1140	NB & SB Inside 35W Lanes - Removals	5	09AUG07	14AUG07	0	1490*	1230*, 1240*, 1470
1350	NB & SB Inside 35W Lanes - Milling	3	09AUG07	11AUG07	6	1490*	1250*, 1360*
1250	Pipe Removals	3	13AUG07	15AUG07	6	1350*	1270*, 1480*
1150	Inside 35W Lanes - Expansion Joints	4	13AUG07	16AUG07	11	1360*	1160*
1360	Inside 35W Lanes - Remove Slab 1/3	12	13AUG07	27AUG07	11	1350*	1150*, 1370*
1240	BR 27903 & 27880 Repair	6	15AUG07	21AUG07	0	1140*	1390*
1230	NB & SB Inside 35W Lanes - Concrete Pvmt Repair	20	15AUG07	08SEP07	4	1140*	1280* 1470?
1270	Pipe Work in Median	20	16AUG07	10SEP07	6	1250*	1260*
1480	Pipe Lining	20	16AUG07	10SEP07	6	1250*	1260*
1160	Inside 35W Lanes - Drill & Grout Anchors	2	17AUG07	18AUG07	11	1150*	1170*, 1180*