Montana Department of Transportation

Contract Time Determination Procedures

September
2021

Table of Contents

Introduction

According to 23 Code of Federal Regulations 635.121, State Transportation Agencies should have adequate written procedures for the determination of contract time. With increasing traffic volumes and an increase in the number of projects constructed under traffic, there are greater impacts to traffic by construction activities as well as more visibility by the traveling public. Contract time procedures are needed to aid in uniformly and appropriately selecting the method for the assessment of contract time and determining the required amount of time to promote contractor efficiency and reduced impacts to traffic.

MDT's contract time determination procedure is based on the following process framework: creating standard production rates, identification of major project tasks, applying production rates to project tasks, sequencing tasks, and the review/adjustment of contract time.

Comments or suggestions on this process should be sent to the Construction Administration Services Engineer or Highways Engineer.

Contract Time Definitions

Contract time is the maximum time allowed for the completion of all work described in the contract documents. The contract time is incorporated into the contract and is signed and agreed to by the contractor. Liquidated damage rates are calculated biannually based on historical daily average construction engineering costs for different size projects, and they are established at the time of the award and included in the contract. Liquidated damages are assessed when the contract time is exceeded.

There are three types of contract time typically used by MDT:

- Working Day. All days are considered working days except Saturdays, Sundays, holidays, days on which the contractor is specifically required by the contract to suspend operations, and all days during the period of November 16 and April 15 (winter shutdown). As of April 2006, the contractor is charged a working day during the winter shutdown period only if they choose to perform work that impacts the travelling public. This is especially important for bridge contractors. During the remaining part of the year, the contractor is not charged on weekends and holidays unless they choose to perform work. Working day is the most common type of contract time specified.
- Calendar Day. A calendar day is every day shown on the calendar beginning and ending at midnight. For this type of contract, the number of calendar days is tracked, but the days are not assessed as chargeable or non-chargeable. There are no exceptions made for weather, holidays, etc. unless specifically indicated in the contract (e.g. perform no work on Sundays).
- Completion Date. The fixed calendar date that all work on the project must be complete. The calendar date is specified in the contract, and uses the same definitions as a calendar day contract.

Different types of contract time can be used on the same contract. This is usually the case for projects with alternative contract administration techniques, such as A+B bidding and incentive/disincentive contracts. For example, calendar days or a completion date will be specified for a portion of the work, with working days allowed for the remaining work. These types of contracts have been successfully used by MDT to accelerate construction activities, but can place additional workload on contractor and Department personnel. These types of contracts should be identified and defined early in the project development, and coordinated with the Construction Administration Services Bureau.

The contractor is to begin work on the effective date stated in the "Notice to Proceed". For working day or calendar day contracts, this is when the time assessment begins. The Construction Administration Services Bureau issues this document when the contract is awarded by the Commission. The effective date in the "Notice to Proceed" is typically set approximately 20 working days from the award date. A Preconstruction Conference must be held before the contractor can proceed with the work, at which time introductions are made and a work schedule is given to the Project Manager.

The time between the award and the effective date of the Notice to Proceed is for the contractor to acquire approval from the resource agencies and the MDT of detours and work bridges. This time is also to begin acquiring materials and submitting the required documents specified in the contract.

Production Rates

Average production rates were established based on input from multiple sources and reviewed by the contract time determination committee. These rates were selected based on previous experience and judgment (see Appendix A).

A research project conducted by Iowa State University delivered an Excel program called PRET ("Production Rate Estimating Tool"). PRET can help the user determine production rates based on a variety of project attributes. The tool uses information extracted from past projects through daily work reports logged in SiteManager/AASHTOWare. This tool is a useful source for determining production rates on a project-specific level. Production rates generated from PRET can be entered into the Contract Time Calculation (CTC) spreadsheet described in Appendix B.

Production rates will be reviewed and maintained by the Construction Administration Services Bureau and should be reviewed at least every two years at a District Construction Engineers meeting.

Tasks and Sequencing

During the design phase of the project, or at least prior to the Plan In Hand (PIH) review, the project designer or consultant will take the lead in creating and maintaining a contract time estimate.
The research project with Texas A&M also produced several construction sequence logics. These logics, as well as others developed internally, have been used to create contract time

templates for major project work types. These templates provide major project work items and the general sequence in which the work is performed. These templates provide a starting point for the user and save considerable time in data entry.

Appendix C includes general guidelines for calculating contract time for the road portion of the contract. The estimate will consist of at least a listing of major work activities and production rates. If the designer has difficulty creating a draft calendar or sequencing of the work activities, one can be drafted at the PIH.

All individuals at the PIH will review the schedule of items and production rates. As a tool for determining contract time, designers are encouraged to use a contract time production calendar (Bar/Gantt Chart) to show sequencing and workflow (see Appendix B). All time constraints should be noted; they include such things as environmental restrictions, local events, etc. All potential time considerations should be documented since the letting date could change. The designer or consultant is responsible for determining and documenting the appropriate contract time estimate, but controversial or questionable rates should be noted.

If during the PIH, substantial difficulty arises in determining contract time, a separate Sequencing Coordination Meeting should be scheduled to better focus on sequencing and contract time issues. Projects that may require a Sequencing Coordination Meeting are likely large projects with either urban areas or major reconstruction. Likely members of a Sequencing Coordination Meeting are the designer or consultant, district construction, and construction services bureaus, with environmental or bridge members as needed.

The Bridge Bureau uses an internal bureau procedure (see Appendix D) to determine a contract time estimate for bridge work. The lead bridge designer will provide input to the road designer or consultant to assist in determining contract time and sequencing. For projects with primarily bridge work or where bridge work will dictate the sequencing schedule, the bridge designer will create and maintain the overall contract time estimate. If there is uncertainty about the controlling work, both the bridge designer and road designer or consultant will coordinate to determine who has the lead.

One alternative to using the bar chart shown in Appendix B is to generate the schedule using Microsoft Project. The list of activities and durations are still determined as described above. Microsoft Project must be approved by a supervisor and obtained through the Information Services Division. If Microsoft Project is used, set the working times to show the actual anticipated working days, adjusting the winter shutdown period based on realistic expectations (e.g., if bridge work will occur in the winter) and showing required shutdown periods (e.g., mandatory shutdown periods due to environmental restrictions or weather restrictions). This illustrates when the contractor will likely work, and can aid in determining the relationships of activities that are weather and/or date specific. An example of a schedule created using Microsoft Project is shown in Appendix G.

Review and Adjustments

The designer or consultant will forward the contract time estimate and documentation when the design packet is sent to the Contract Plans Bureau.

The Contract Board of Review, consisting of Contract Plans, Highways, Materials, and Construction representatives, meets once a month to review projects to be advertised. At this time, they will review the contract time estimate and determine the amount of contract time to put in the contract. They will consider other factors affecting construction production such as the type of construction, bad weather days, complexity, cost, traffic volumes, length, permit issues/restrictions, and seasonal limitations when finalizing the contract time. All adjustments will be documented using the Contract Time Adjustment Factors worksheet (see Appendix E).

Final Contract Time

Contract time is set once the contract is advertised. It is not advised, but the contract time can be changed through an addendum. The final contract time is included in the contract upon award.

Any change after the project is awarded requires a change order.

Appendix A: Average Production Rates
Appendix B: Contract Time Calculation Sheets (Activity List and Bar Chart)
Appendix C: Road Contract Time Determination Procedure
Appendix D: Bridge Contract Time Determination Procedure
Appendix E: Contract Time Adjustment Factors
Appendix F: Example Contract Time Calculation
Appendix G: Example Bar Chart Using Microsoft Project

Appendix A
Average Production Rates

			Metric Production		English Production	
Average Production Rates						April 2008
Work Activity		Type	Rate	Unit	Rate	Unit
Moblilization	Size method	Small (seal coat)	2	days min	2	days min
		Medium (< $2mil)	5	days	5	days
		Large (> $2mil)	8	days	8	days
		Extra Large (> $10mil)	15	days	15	days
BMP (or include in mob)	Size method	Small (seal coat)	2	days	2	days
		Medium (< $2mil)	4	days	4	days
		Large (> $2mil)	6	days	6	days
Earthwork (per vehicle)	Topsoil	Small (shoulder work)	600	m^3/day	750	yd^3/day
		Medium (or truck work)	1500	m^3/day	2000	yd^3/day
		Large (or scraper work)	3000	m^3/day	4000	yd^3/day
	Excavation	Small (shoulder work)	1000	m^3/day	1300	yd^3/day
		Medium (or truck work)	3000	m^3/day	4000	yd^3/day
		Large (or scraper work)	4500	m^3/day	6000	yd^3/day
	Borrow	Truck	3000	m^3/day	4000	yd^3/day
		Scraper	4500	m^3/day	6000	yd^3/day
	Rock - Blasting	Small	500	m^3/day	650	yd^3/day
		Large	1500	m^3/day	2000	yd^3/day
	Muck Exc.		500	m^3/day	650	yd^3/day
	Street Exc.		500	m^3/day	650	yd^3/day
Aggregate	Base Course	Small (tonnage)	1800	tons/day	2000	tons/day
		Medium (volume)	2000	m^3/day	2600	yd^3/day
		Large	3000	m^3/day	4000	yd^3/day
	Pulverization		15000	m^2/day	18000	yd^2/day
	CTB		1000	m^3/day	1300	yd^3/day
Drainage	Culverts	≤ 18"	90	m/day	300	ft/day
		= 24"	60	m/day	200	ft/day
		> 24"	45	m/day	150	ft/day
		RCB	10	m/day	30	ft/day
	Storm Drain	Pipe (avg. depth, 6-8 ft; conventional backfill)	100	m/day	330	ft/day
		Manholes/Inlets	4	each/day	4	each/day
Plant Mix	Cold Milling	Mainline	30000	m^2/day	35000	yd^2/day
		Taper	250	m^2/day	300	yd^2/day
	Cold Recycle		3	lane km/day	2	lane mi/day
	PMS		3000	tons/day	3300	tons/day
	PMS Urban		2000	tons/day	2200	tons/day
	Seal & Cover		12	lane km/day	7.5	lane mi/day
	Rumble Strips		8	lane km/day	5	lane mi/day
Concrete Paving	PCCP	Uniform Width	8300	m^2/day	10000	yd^2/day
		Non-uniform Width	1600	m^2/day	2000	yd^2/day
	Repair	Grinding	3000	m^2/day	3500	yd^2/day
		Joint Sealing	3000	m/day	10000	ft/day
Pavement Markings	Epoxy	Small	2	days	2	days
		Large	4	days	4	days
		Words & Symbols	additional 1-2	days	additional 1-2	days
	Thermoplastic	Intersection	3	days	3	days
Miscellaneous	Curb & Gutter		300	m/day	1000	ft/day
	Sidewalk		250	m^2/day	300	yd^2/day
	Fencing	Woven wire/Barbwire	300	m/day	1000	ft/day
		Chain Link	200	m/day	600	ft/day
	Guardrail	Concrete	365	m/day	1200	ft/day
		Steel	225	m/day	750	ft/day
	Vegetation	Seeding	5	ha/day	12	acre/day
		Sodding	3000	m^2/day	3500	yd^2/day

Appendix B
<u>Contract Time Calculation Sheets</u>
Activity List

CONTRACT TIME CALCULATION
Preliminary Estimate

Project ID ______________________ UPN/Unit ____________ Designer ______________
Description ______________________ Length ____________ mi. Date ______________
Type ______________________

Activity No.	Work Activity			Production		Duration		Preceeding Activities
	Item	Quantity	Unit	Rate	Unit	Work	Other	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Key Dates: ______________________

Comments: ______________________

Appendix B

<u>Contract Time Calculation Sheets</u>

Bar Chart (second page not shown)

CONTRACT TIME CALCULATION
Preliminary Estimate

Project ID ____________ UPN/Unit ____________ Designer ____________
Description ____________ Length ____________ mi. Date ____________
Type ____________

Act. No.	Pre. Act.	Day	5	10	15	20	30	40	50	60	70	80	90	100	110	120	130
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

Working Days:	* 1.1 =	1.1
	Use	

Page 2

Appendix C

Road Contract Time Determination Procedure

Use the following guidelines and process to help determine contract time. Consult with Helena and District construction personnel regularly about any item in question.

General Procedures

The following outlines the general process that is used to make the initial estimate of contract time.

1. Develop a list of major construction activities that will take place on the project.
   - Begin with a review of the plans and special provisions.
   - The summaries provide a list of the items of work. Items to consider include major work items and items that will affect the critical path of the project. Small items or those that will be performed in conjunction with other items of work are considered incidental to the contract time.
   - The quantities give a good indication of the amount of work that needs to be done for each item.
   - Special provisions provide information about the sequence of work, specialized equipment that may be needed, and which work will not be measured for payment. The time it takes to do an item of work needs to be considered even if the work is not measured for payment.

2. Determine the duration of activities using the standard production rates. The production rates may be modified based on known project specific information, but should be documented. Factors that may affect the rate of production include:
   - Regional differences – grading in mountainous terrain will be slower than on the prairie.
   - Construction in restricted areas (urban, limited R/W) may require more time.
   - The need and availability of specialized construction equipment.
   - Installing pipe in a live stream is more difficult than in a dry wash.
   - Construction under traffic will require more time than construction that is not impeded by traffic. It should also be noted that the greater the traffic volumes the greater the delays.

3. Determine the sequence of the major work items. The following factors must be considered in determining the sequence:
   - Determine which things must be done in order (sequentially) and which can be done concurrently. This is essentially a critical path evaluation.
   - Timing restrictions – environmental commitments, commercial limitations (tourist season, fairs, other local events), irrigation season, weather/seasonal factors (spring runoff).
   - Limitations on specific activities – placement of CTB or chip seals, concrete curing time – pay particular attention to items of work that have method specifications.

- Sequenced construction for specific items - digouts, part-width construction, installation of large culverts, detours.
- Where there are detailed sequences for specific segments of the project, particularly for developed/urban areas, contract time might have to be calculated separately for each segment in the sequence (for example – all work must be completed through placement of the plant mix on 1st Street through 5th Street before beginning any work on 6th Street through 9th Street).

4. Miscellaneous Factors
   - Bridges may have sequencing requirements that affect other items of work. Once the bridge contract time is calculated by the Bridge Engineer, it can be determined whether the bridge work will be critical (and affect the contract time) or occur in conjunction with the road work.
   - Utilities relocations done as part of or in conjunction with the contract can affect standard production rates.
   - Providing access and maintaining traffic can affect production rates.

The designer should be able to identify the major activities necessary to calculate contract time, and the time requirements using average production rates. For straightforward projects, and as designers become increasingly familiar with typical construction sequencing, a draft bar chart can be created. This information is to be distributed at the Plan-in-Hand. At that time, all information will be reviewed and modified. If additional time is required to develop the bar chart, or if the project is too complex to finalize at that time, the decision will be made at the Plan-in-Hand to schedule a Sequencing Coordination Meeting.

Construction Sequence

The work activities typically follow the general process summarized below:

1. Mobilization - this always comes first

   Crushing aggregate is typically not a factor in determining contract time because it can begin before the Notice to Proceed. However, if there are restrictions on crushing operations described in the special provisions, a duration may need to be included.

2. Fencing

   This typically occurs at the beginning of projects with major grading activities and new right-of-way. If there is little or no new r/w or fencing, this activity may not be on the critical path. If grading activities interfere with new fence installation, it may be that only a portion of the fencing activities will occur at the beginning, while the remaining fence will occur later in the project in conjunction with other work items.

3. Topsoil Salvage

   This is generally substantially completed before grading operations begin as it is done by the same operators/equipment.

4. Detours, Median Crossovers

   For bridge detours, this time must also be included in the bridge contract time. This item may or may not be critical to the contract time.

5. Culvert Installation

   Mainline culverts are usually installed concurrently with the fencing and topsoil activities, so only a portion of the pipe work will be on the critical path (enough to get ahead of the grading crew). However, the culvert installation time should be calculated to ensure that it can be completed before these activities are done. The sequence needs to be considered, especially if there are a lot of large pipes or pipe installations in high fills. The culvert installation time may be a factor and occur somewhere else in the construction sequence if, for example, part-width installations are used or there are timing restrictions on installations.

6. Unclassified Excavation or Embankment

   If the grading involves truck haul, the production rates may be reduced. Sequences involving the placement of base course and plant mix may be tied to the grading sequence and need to be consistent with the sequence of operations specified in the contract. Maintaining traffic on the PTW may also affect the grading operations.

7. Unclassified Borrow & Special Borrow

   This work is performed in conjunction with unclassified excavation. Consequently, the time required for these activities is combined with unclassified excavation on the bar chart. It is typically truck haul, so the production rates will be different than unclassified excavation.

8. Approach Culverts

   The approach culverts may be installed after or concurrent to the grading activities, depending on the quantities.

9. Crushed Aggregate Course & Cement-Treated Base

   This is tied to the grading sequence of operations. If Crushed Top Surfacing is used, placement begins after the CBC placement is complete – it is the same crew and can be a fast operation.

10. Plant Mix Surfacing

    Contractors prefer to do this as a single uninterrupted operation. Therefore, it should not begin until the gravel placement is nearly complete. If cold milling is included in the project, its sequence may be tied to the placement of plant mix.

11. Guardrail

    Guardrail installation begins as soon as the plant mix is completed and before the placement of seal and cover begins.

12. Rumble Strips

    This activity can begin as soon as plant mix is complete.

13. Seal & Cover

This begins as soon as the rumble strips are placed.

14. Striping – Interim

This begins immediately upon completion of the seal & cover operations.

15. Striping – Final

The final striping is delayed 30 to 45 days after the seal and cover is applied.

16. Vegetation

This is a quick and very rough way to figure the time needed for topsoil placement, seeding (all areas), fertilizer, and condition seedbed as a single activity. It begins after the grading is complete and approach culverts are installed. However, this activity may begin after the grading is only partially completed. This activity will usually follow a separate line from the plant mix, guardrail, seal & cover, and striping operations to determine which one is critical for contract time.

17. Cleanup

This is generally 5 days, to allow time for the final activities..

When the bar chart is complete, the chart will show the resulting working days. For calendar day or completion date contracts, the days must converted from a five-day work week to a six or seven day work-week, depending on the requirements of the contract. For rural projects, add a 10% contingency factor to the contract time. For urban projects, add a 20% contingency factor. Any time adjustments must be documented.

Appendix D
Bridge Contract Time Determination Procedure

The following is taken from the Bridge Manual, section 7.2.1.8 Determination of Contract Time.

The individual preparing the Engineer's Estimate is responsible for determining appropriate contract duration. Contract duration is based on workdays. Two methods are presented:

Construction Sequencing

A good way is to visualize how the project will be built. No attempt has been made to account for shop drawing reviews and fabrication.

Note, cure times are taken into account. Typically, there is other work being performed while these cures are taking place (either other bridge work or road work). Even though contract time is not charged during cure times, there is usually other work occurring for which contract time is charged. This is an issue that the bridge designer needs to take into account while calculating the required amount of contract time. If the scope of the project or the sequencing of the project is such that no other work will occur during the cure times, the contract time needs to be adjusted to take this into account.

As a guide use the following construction sequence and durations for specific construction elements:

1. If the contractor gets the permits but there are in-stream work restrictions then certainly there is only a limited amount of work that can occur. The contractor would probably be charged contract days until he reached a point in the project where no further work could be done until in-stream work restrictions no longer apply.
2. Work Bridge and site work - 10 days. This is work to just get up and running, and to have something to construct.
3. Cofferdam – 5 days to get a cofferdam enclosed and excavated to plan grade. Additional cofferdams would add 5 days each.
4. Test Pile – 2 days per test pile to get pile driver operational, move machine around and allow state inspectors to mark and observe pile installation
5. Service Piles – 4 days to get up to 10 piles installed. If there are more than 10 service piles the contractor can get a rhythm going and *additional* piles go in at something like 4 per day.
6. Drilled Shafts. Assume submittals/approvals do not delay project. 4 days per drilled shaft for nominal 2-meter shafts not extending a great depth into formation material. After the first shaft the contractor must wait for CSL evaluation.
7. Drilled Shaft CSL evaluation – one time delay of 10 days.
8. Form End and Intermediate Bent Caps – 3 days each

9. Cast and Cure Caps – 15 days for the project. Because caps need to be at or above 80% of the design f'_c (Montana Spec Book - Table 552-1) there is an inherent delay to the project between the time the last cap is cast and the beams can be set.
10. Set Beams/Girders – 1 day per span
11. Adjust Steel Girders to Grade – 3 days. For bridges longer than 120 meters add 1 day per 40 meters.
12. HS bolting – 3 days per line of splices (not per line of girder)
13. Forming deck and placing steel – 20 days up to 90 meters. For bridges longer then 90 meters add 1 day for every additional 5 meters. Increase duration 15% for flared projects.
14. Cast Deck – 1 day for bridges up to 90 meters. For longer bridges use 2 days.
15. Wet Cure – 14 days
16. Install rail and sawcut. 10 days for T101 rail. 20 days for barrier rail.
17. Cleanup – 5 days per project.
18. Round to nearest 10 days.

This method is a very rational method that to some degree mimics the contractor operation and would probably hold up under close scrutiny and work well for new, "clean" construction. The predictive method is problematic for deck overlays and other types of rehabilitation projects where a lot depends on the expertise and ingenuity of the contractor.

Contract Value

Another way to estimate how long it will take a contractor to complete a project is to assume that a contractor's crew on the long haul generates about the same billable revenue for the contractor day in and day out. The bigger the project, the longer it will take to do it, but it isn't linear because on large jobs there will be a bigger crew and more equipment resources.

Looking at "Bridge Only" items as reported by the Bureau to the FHWA (this information is extractable from the Engineer's Estimate. Do not include mobilization, traffic, erosion control, bridge survey or Construction Engineering) a general trend line shows a correlation between how big a project is and how long we thought it would take to get it done. Curve fitting subroutines quantified that relationship as approximately:

Contract Duration=38*Ln(x) – 100
Where "x" is the value of the bridge items in 1000's (i.e. enter 500,000 as 500)

Round to the nearest 10 days

Any number of considerations could drive the recommended value from the number calculated. Among those considerations are:

- Desire to complete in a single construction season (or before the next season). A construction season runs from April 16 to November 15 and has 150 chargeable days. Some workdays are not chargeable if the contractor cannot work because of weather or if the contractor has applied for, but is waiting for, permits. Any work that the contractor can perform from November 16 to April 15 is not charged to the allotted workdays. When determining contract duration do not assume any contractor operations between November 16 and April 15.

- Phase construction that at times effectively forces the contractor to construct two or more bridges, one after the other.
- Work restrictions imposed by resource agencies
- Repair projects that have a very high priority

Appendix E
Contract Time Adjustment Factors

CONTRACT TIME CALCULATION
Contract Time Adjustment Factors

Project ID ____________________ Specialist ____________________
Description ____________________ Date ____________________
UPN/Unit ____________________

Contract Time from Design [ ]

Adjustment Factors	Affected Work Activities	Days Adjusted
Restriction on time of operation		
Local school, business, civic, etc. events		
Climatic regions		
Coordination with utilities		
High traffic volumes		
Environmental concerns		
Permits or licenses		
Irrigation season		
Review time for shop drawings		
Review time for mix designs		
Fabrication time		
Sole source or specialized materials		
Contractor workload		

Revised Contract Time [ ]

Comments: ____________________

Appendix F
Example Contract Time Calculation
Activity List

CONTRACT TIME CALCULATION
Preliminary Estimate

Project ID	STPS 203-1(16)4	UPN/Unit	6138000	Designer	J. Jenks
Description	North of Stevensville - North	Length	5.9 mi.	Date	November 20, 2020
Type	Reconstruct				

Activity No.	Work Activity			Production		Duration		Preceeding
	Item	Quantity	Unit	Rate	Unit	Work	Other	Activities
1	Mobilization					12		
2	BMP					6		1
3	Clearing & Grubbing					7		2
4	Topsoil Salvage	29966	cyd	3500	cyd/day	9		2
5	Uncl. Excavation/Borrow	220541	cyd	5000	cyd/day	44		4
6	Remove Culvert	3897.3	ft	500	ft/day	8		5
7	Culvert =< 24"	9243	ft	230	ft/day	40		6
8	Culvert > 24"	800	ft	100	ft/day	8		6
9	RCB Culvert	254	ft	70	ft/day	4		6
10	Riprap	186.9	cyd	50	cyd/day	4		8
11	CAC	50380	cyd	3000	cyd/day	17		7
12	PMS GR S-1/2"	38952	tons	2500	tons/day	16		11
13	Interim Pavement Markings					2		12
14	PMS GR S-MISC	2913	tons	625	tons/day	5		12
15	Rumble Strips	14.3	miles	5	lane mi/day	3		13
16	Seal & Cover	17.7	lane miles	7.5	lane mi/day	2		15
17	Fog Seal	17.7	lane miles	7.5	lane mi/day	2		16
18	Guardrail	2675	ft	750	ft/day	4		14
19	Topsoil, Fertilizer, Mulch and Seeding	56.1	acres	7	acre/day	8		18
20	Signing & Delineation					4		18
21	Fence					0		19
22	Striping					6		17

Key Dates:

Comments:

Page 1

Appendix F

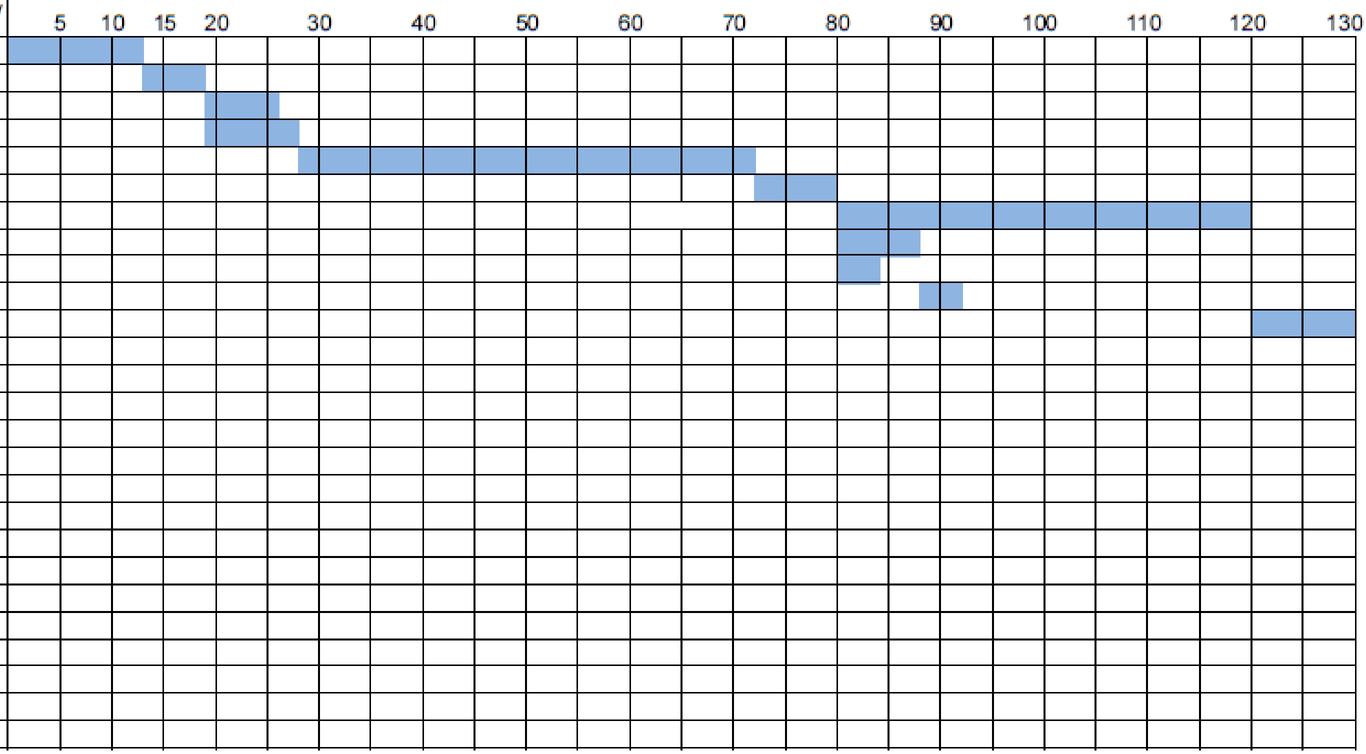
Example Contract Time Calculation

Bar Chart

CONTRACT TIME CALCULATION
Preliminary Estimate

Project ID	STPS 203-1(16)4	UPN/Unit	6138000
Description	North of Stevensville - North	Length	5.9 mi.
Type	Reconstruct	Designer	J. Jenks
		Date	November 20, 2020

Act. No.	Pre. Act.	Day
1		12
2	1	6
3	2	7
4	2	9
5	4	44
6	5	8
7	6	40
8	6	8
9	6	4
10	8	4
11	7	17
12	11	16
13	12	2
14	12	5
15	13	3
16	15	2
17	16	2
18	14	4
19	18	8
20	18	4
21	19	0
22	17	6



Working Days:	170	* 1.1 =	187
		Use	190

Page 2

Appendix F

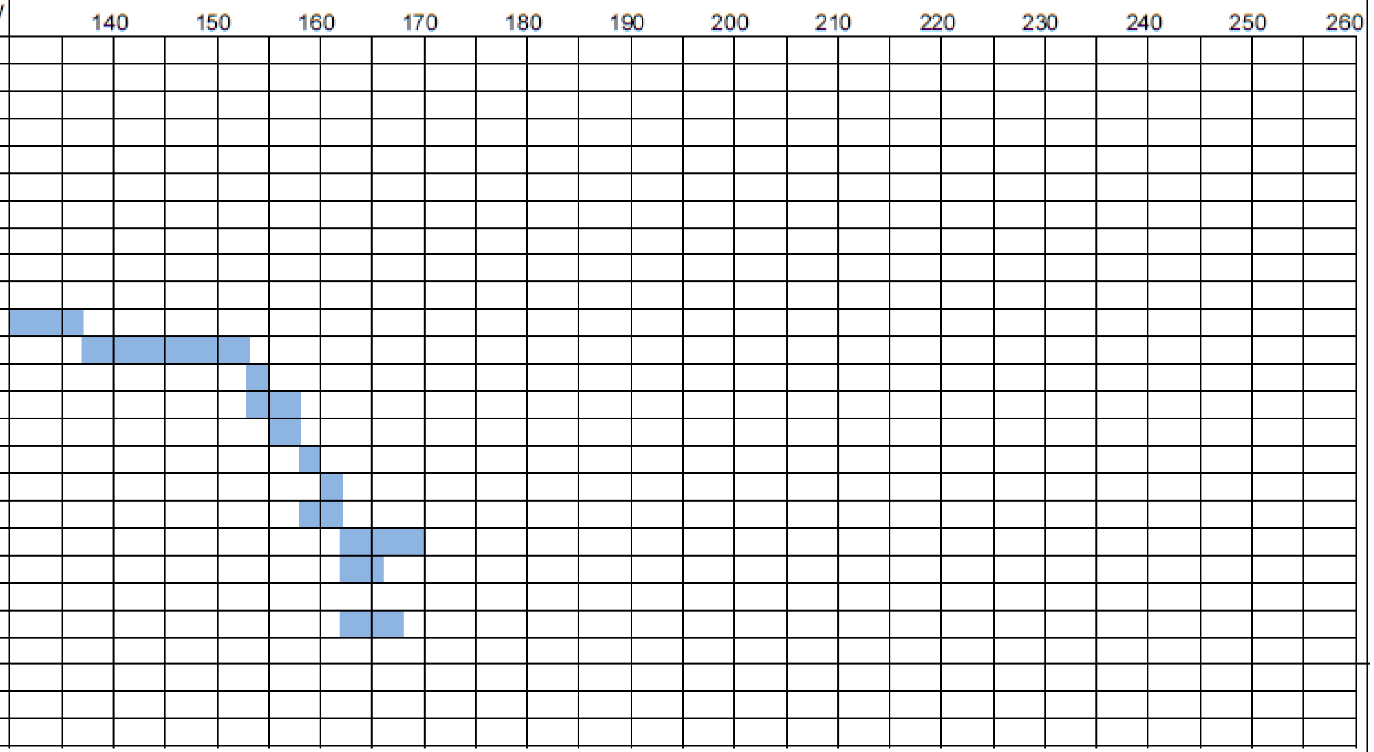
Example Contract Time Calculation

Bar Chart (cont.)

CONTRACT TIME CALCULATION
Preliminary Estimate

Project ID	STPS 203-1(16)4	UPN/Unit	6138000	Designer	J. Jenks
Description	North of Stevensville - North	Length	5.9 mi.	Date	November 20, 2020
Type	Reconstruct				

Act. No.	Pre. Act.	Day
1		12
2	1	6
3	2	7
4	2	9
5	4	44
6	5	8
7	6	40
8	6	8
9	6	4
10	8	4
11	7	17
12	11	16
13	12	2
14	12	5
15	13	3
16	15	2
17	16	2
18	14	4
19	18	8
20	18	4
21	19	0
22	17	6



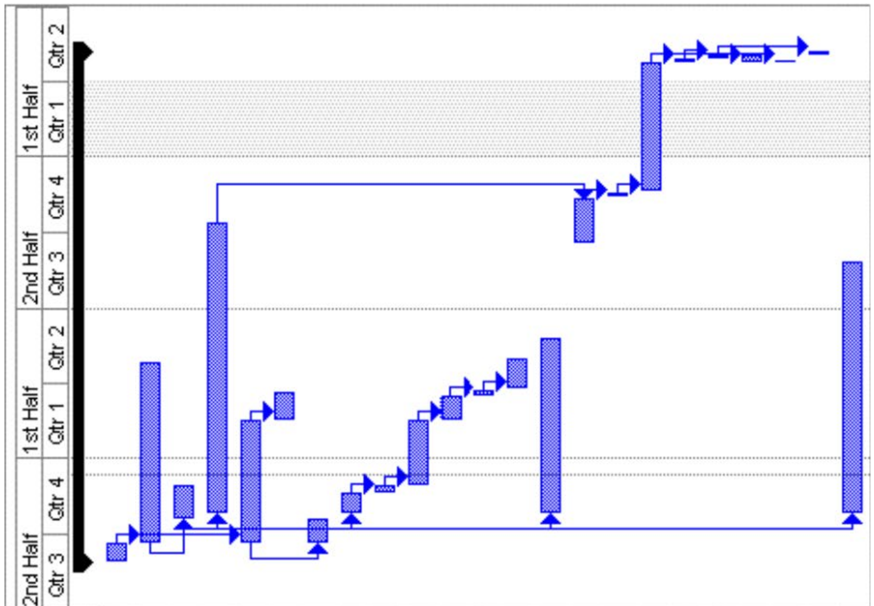
Page 3

Appendix G

Example Bar Chart Using Microsoft Project

Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Columbus - South**	**279 days**	**Mon 8/29/05**	**Mon 5/7/07**	
2	mobilization	15 days	Mon 8/29/05	Mon 9/19/05	
3	fencing	100 days	Tue 9/20/05	Wed 4/26/06	2
4	topsoil salvaging	26 days	Wed 10/19/05	Mon 11/28/05	3SS+20 days
5	grading	191 days	Wed 10/26/05	Wed 10/11/06	4SS+5 days
6	culverts <= 600	50 days	Tue 9/20/05	Tue 2/14/06	2
7	culverts > 600 mm	23 days	Wed 2/15/06	Mon 3/20/06	6
8	box culverts	20 days	Tue 9/20/05	Tue 10/18/05	6SS
9	irr piplelines (PVC)	17 days	Wed 10/26/05	Fri 11/18/05	15SS
10	irr piplelines <= 600 mm (RCP)	4 days	Mon 11/21/05	Mon 11/28/05	9
11	irr pipelines > 600 mm (RCP)	5 days	Tue 11/29/05	Wed 2/15/06	10
12	lined irr canals	20 days	Thu 2/16/06	Thu 3/16/06	11
13	irr ch ch - type A/B	6 days	Fri 3/17/06	Fri 3/24/06	12
14	irr ch ch - gated pipes	26 days	Mon 3/27/06	Mon 5/1/06	13
15	irr structures (57)	95 days	Wed 10/26/05	Wed 5/24/06	5SS
16	CTB	36 days	Tue 9/19/06	Thu 11/9/06	5FF+20 days
17	CAC	5 days	Mon 11/13/06	Fri 11/17/06	16
18	PMS	13 days	Mon 11/20/06	Mon 4/23/07	17
19	rumble strips	4 days	Tue 4/24/07	Fri 4/27/07	18
20	seal and cover	3 days	Mon 4/30/07	Wed 5/2/07	19
21	guardrail	7 days	Tue 4/24/07	Wed 5/2/07	18
22	striping - interim	3 days	Tue 4/24/07	Thu 4/26/07	18
23	striping - epoxy	3 days	Thu 5/3/07	Mon 5/7/07	20
24	bridges	160 days	Wed 10/26/05	Fri 8/25/06	5SS



Alternative accessible formats of this document will be provided upon request. For further information please contact 444-0453 (TTY 444-7696 or TTY 1-800-335-7592).