PROJECT MANAGEMENT Quick Start

How to Get Up and Running in No Time

Victor Hunt

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About the Author

After earning a Master's Degree in engineering at the University of Twenthe in the Netherlands, Victor Hunt applied his expertise into the project departments of Exxon, Akzo Nobel, (a chemical multinational), and a utility company. He has over 30 years of project management experience.

In 2000, Mr. Hunt began consulting, writing and teaching project management courses. He has contributed into the Project Management Institute's *Practice Standard for Scheduling and the Construction Extension* 2ND Ed.

He recently started VictorHuntConsulting.com , an online project management consultancy, with the following vision and mission statements:

Vision: to use his 32+ years of experience in project management to help other project managers advance and excel in their careers and businesses.

Mission: achieve his vision by providing

- Onsite training
- Online consulting to project managers in all areas of project management.
- eBooks on project management
- Project Management Consulting services

Victor loves nature and the outdoors; hiking and white water rafting in the mountains of North Carolina whenever possible. He currently resides in beautiful Aruba.

Acknowledgments

Contributors

- Gloria Thomas, BSc, MBA for reviewing, commenting and providing input.
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Introduction

Why this eBook?

This eBook was written for the purpose of getting aspiring project managers with little or no experience up and running fast. It is aligned with the Project Management Institute PMBOK, which is the international standard for project management. However, the PMBOK is an extensive and excellent description of project management processes, and is not a project management method. The PMBOK can be seen as the description of the fundamental building blocks of every project.

I have noticed that certified project managers know the PMBOK, but need a project management *method* to work from. That is the reason I wrote Project Management Quick Start. It translates PMI's PMBOK into an easy to follow step-by-step method, giving someone just starting in project management a basic and practical understanding of project management. It is based on my own proven best practices, gained during my 32+ years' experience in project management.

This real life project management method uses the Project Life Cycle, which are the chronological steps a project goes through from beginning to end. This method is easy to follow for both beginning and experienced project managers. It is not extensive, but covers just a little more than needed to get you up and running FAST. I have been using this method since 1999 and it has proven to be a best practice. It has also been used in project management seminars I taught for many years.

The terminology used throughout this eBook is based on the glossary of project management terms included in PMI's PMBOK 5th Ed.

Through this eBook I am making this method available to the next generation project managers.

What is a Project?

The word project in being used more and more. Often correctly used and sometimes incorrectly. The Project Management Institute defines a project as a temporary endeavor undertaken to create a unique product or service.

- So a project is temporary to start with. This means that a project has a definite beginning and end. Baking bread in a bakery is not a project, because the bake bread all the time. But installing a new oven in a bakery is a project.
- A project creates a unique product or service. An airline flying a routine destination is not a project, since it is routine business. Setting up a new destination is a project.

A project is a temporary endeavor undertaken to create a unique product or service.

Doing projects is not a new thing. The Egyptians undertook temporary endeavors to build pyramids. We do projects at home and at work all the time, but we often do not recognize them as projects. Going to the grocery store is a project. So we do little projects all the time. What is new is calling them projects to distinguish them from routine work.

What also is new is the availability of well documented tools and techniques to help us do projects. We also have thousands of books on project management.

What is a Successful Project?

During the execution of a project, the project team will receive many comments from stakeholders and non-stakeholders. Some comments will be positive, some will be negative. In order to determine if a project is successful or not, there must be a way of judging if the project is successful or not. The success of any project can be judged by looking at the following factors:

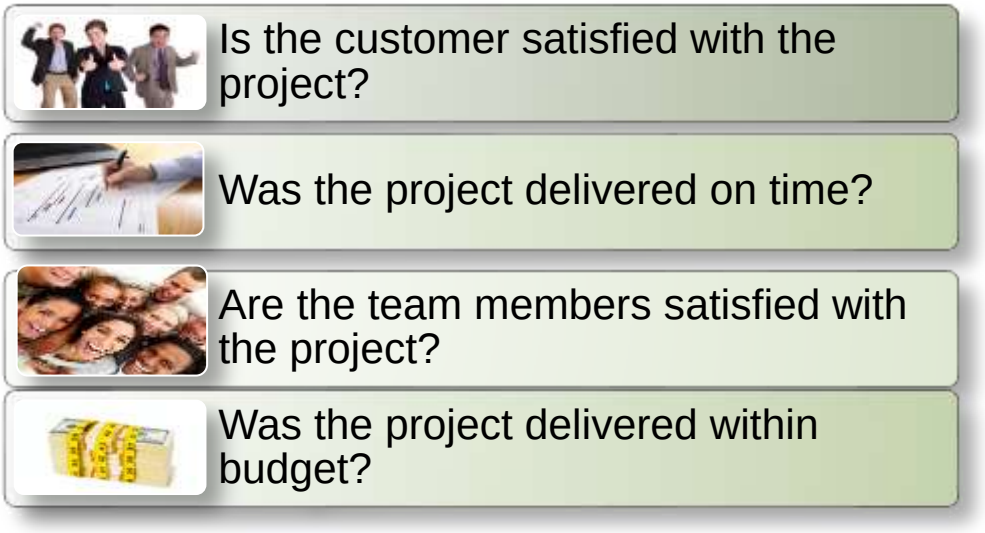


Figure 1: What is a Successful Project?

Customer satisfaction is the most important one of the abovementioned points. When the customer is satisfied, all other problems such as time and budget overruns will be "overlooked". On the other hand, if the project is delivered on time and within budget, but the customer is not satisfied, you will have a problem for the "rest of your life".

Successful projects require management by an effective project team. One of the roles of the project manager is to develop high-performance project teams if the project is to be successful.

What is Project Management?

The Project Management Institute defines project management as the application of knowledge, tools, techniques and skills to a project to meet the requirements of the stakeholders.

Project management is the application of knowledge, tools, techniques and skills to a project to meet the requirements of the stakeholders.

What are the requirements of the stakeholders?

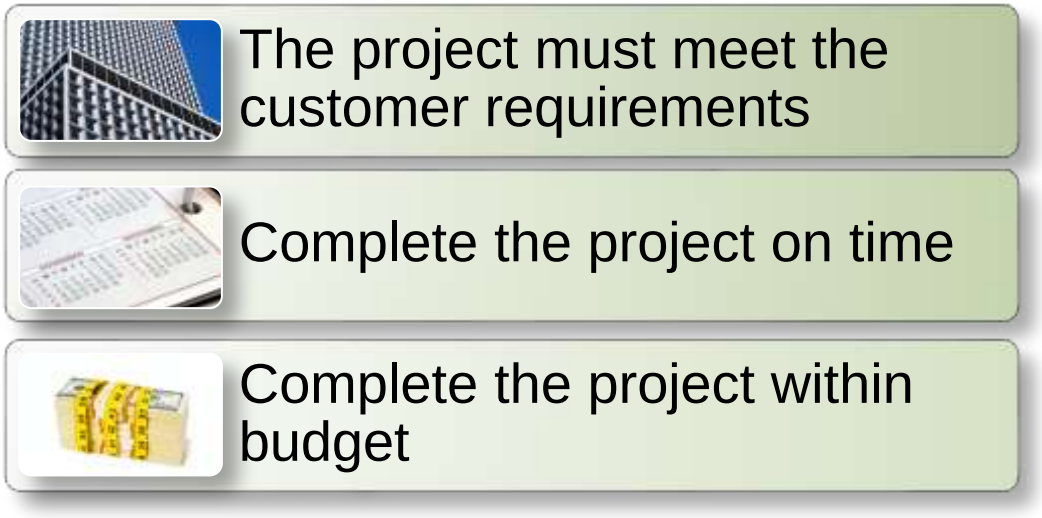


Figure 2: Stakeholder Requirements

The above mentioned requirements for managing projects are valid for managing both large and small projects. See appendix B for a more detailed explanation.

Why do we Manage Projects?

Critical factors in managing any project are managing the scope, the schedule, the budget and the quality.

- Not managing the scope will result in what we call scope-creep. Scope creep means that you keep adding to the original scope in an uncontrolled way. This will result in unnecessary additions that end up costing you money.
- Poor management of the schedule means that you will have a schedule overrun. If the project was to generate a million dollars a month, any schedule overrun will end up costing the company money.
- Not managing the budget always means that you will be over budget. Being over budget means that the company will be spending more money for the same deliverable. This is losing money.
- Though quality management might look innocent at the beginning of the project, but claims after the project has been completed are costly for all stake holders. Try changing the foundation of a building that the customer has rejected at the

end of the project. Claims involving lawyers are even more costly and most of the money ends up for the lawyers. This is the worst way to lose money.

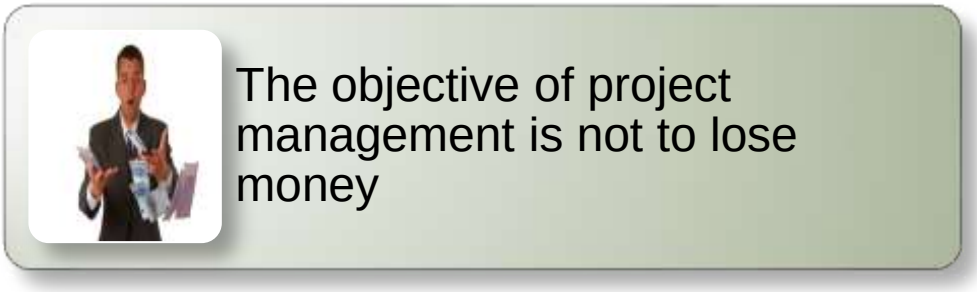


Figure 3: The Objective of Project Management

The Project Life Cycle

As the definition of a project implies, the project is a temporary endeavor, so it has a beginning and an end. This means that a project takes place in steps or phases, as depicted below. The process of going through these phases, from project initiation to planning execution and closing is called the project life cycle.

Figure 4: Project Life Cycle

The Project life cycle should not be confused with the process groups as explained in paragraph 2.4 of PMI's PMBOK 5th edition.

Project Initiation

Figure 5: Project Life Cycle – Initiation Phase

During the initiation phase of the project, we develop the project charter, we identify project stakeholders and we start composing our project team.

Develop Project Charter, Identify Stakeholders and Compose Project Team are called project management processes.

Develop Project Charter

A project always starts with someone identifying the need to have a certain product or service. Once that need has been identified, it is presented to the project sponsor in the form of a project charter for review and approval. The project charter should always include a brief description of what is needed, the reason it is needed and a rough estimate of the costs. In real life there will be more needs (and wants) than there is money and manpower to do the requested projects. So the project sponsor must have a way to select which projects will be done and which ones not. Some selections are obvious, while others cause lengthy discussions. An effective way of structuring this selection process, is by putting all request on a list. The list is then reviewed by all stakeholders, and a selection is made. The selection must always be in line with corporate goals, and can be based on the following factors: safety, environmental, customer satisfaction, reliability, social factors, economics or other factors.

Following is an example of the content of a project charter:

- Project Need
- Project Objectives
- Alternatives looked at
- Justification of the Project
- Final Deliverable
- Project Cost (rough estimate)

- Schedule

A template for a project charter is included with this eBook

Once the project charter is approved, you can move on to the next processes in the initiation phase, which is identify your stakeholders

Identify Stakeholders

One of the first tasks of the project manager is to identify and manage all stakeholders involved in the project. The first stakeholders you have to identify are the project sponsor and the customer. As the project progresses you may have to identify other stakeholders.

Composing Your Team

When a company decides to do a project, they will usually appoint a project manager to handle the project. One of the first things you should do as a project manager is start forming your team.

Depending on the size of the project, you will have a project management consultant (PMC) assist you with managing the project. For a smaller project you may not need a project management consultancy to help you do the project.

Next, together with the consultancy you will select a contractor to actually deliver the product or service that is wanted.

Both the contractor and the project management consultancy make up the team members for the project.

Now remember that a project is done to produce a product or service. This product or service is for someone in the organization. This someone is the customer.

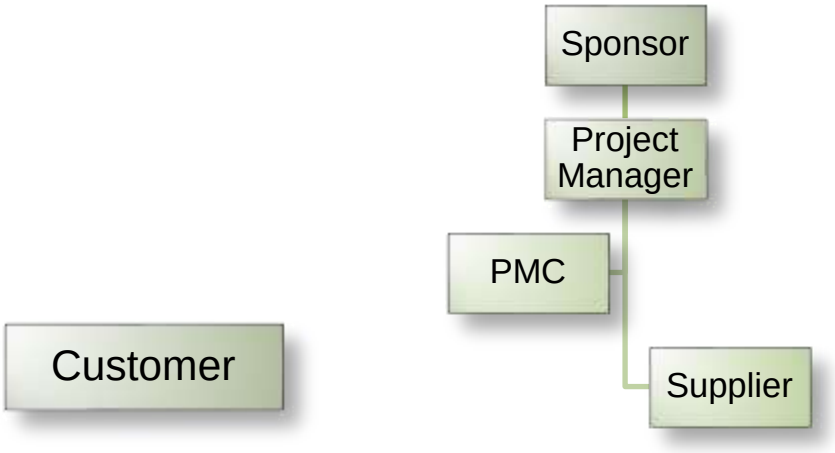


Figure 6: Project Team

Note that the customer is NOT part of the project team, since the client is not the one creating the product or service. The role of the client is to ensure that the product or service is delivered as requested. Because of this, it is good practice to involve the customer in a very early stage of the project.

The Project Sponsor

The project sponsor is usually the entity that finances the project.

The Project Manager

As a project manager, you have many roles in managing your project including, but never limited to:

- Managing all stakeholders
- Facilitating your project team
- Ensure customer involvement in the project
- Ensure team involvement in planning, executing and closing the project
- Give positive feedback for accomplishments of the team
- Manage and report the progress of the project

The Skills of the Project Manager

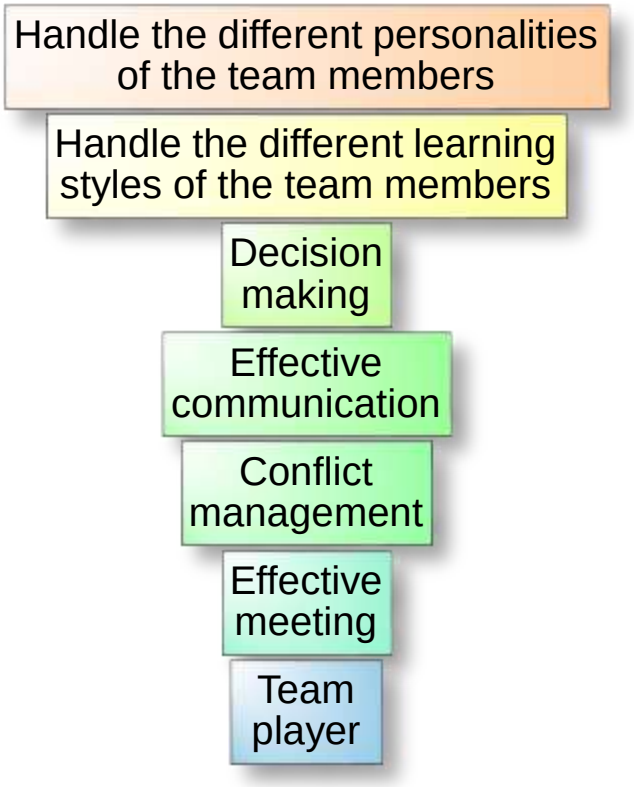


Figure 7: Skills of the Project Manager

The Role of the Project Management Consultancy

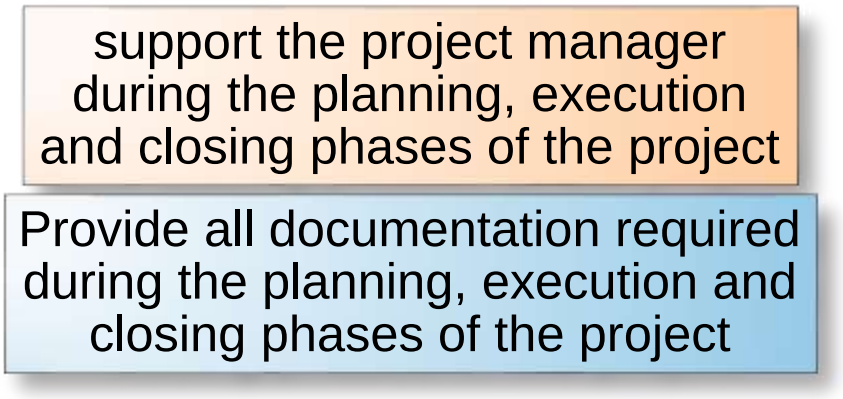


Figure 8: Role of the Project Management Consultancy

The Role of the Customer

The customer will be the end user of the product or service the project will provide. The role of the customer is to give feedback on the progress of the project. It is the role of the project manager to promote feedback from the customer.

The Key to Project Success

The key to a successful project is hidden in the way we manage the project.

One way of managing a project is not involving the customer in the project: the project manager writes and gets approval for the project plan without involving the customer. Sometimes the project plan is even written before the customer and other stakeholders are even identified. The project manager then executes the project with the project team and expects the customer to accept the product or service.

The result of this way of managing a project is very poor for several reasons: the project plan is often not complete because the project manager was not aware of all the problems and the customers will not be motivated to

The key to project success: customer-involvement

accept the product because they were not involved in the project. Even if the product is good, the customer will not be satisfied because they were not fully involved with creating the project.

A better and more successful way of managing a project is based on **customer involvement.** This way of managing a project involves the customer in ALL phases of the project. The customer gets to have a say during the initiation and planning phase of the project. During the execution phase the customer verifies that the product complies with what was agreed upon in the planning phase. By managing a project in this manner, the customer is motivated because they were involved and supports the project and final product.

People own what they participate in creating

If you neglect to involve your customer, they will be reluctant to accept the final deliverable, no matter how good it may be. On the other extreme, an involved customer will be willing to help you as the project manager to correct any short comings in the final deliverable.

Does this customer involvement way of managing projects mean that the project manager should accept all wishes of the customer? No, it does not. The role of the project manager here is to give the customer a say **within** the scope of the project.

Project Planning

Figure 9: Project Life Cycle - Planning Phase

The planning phase of a project is a very important phase of any project. During this phase you set the basis for the outcome of the rest of the project.

During the planning phase of a project you prepare your project plan, the main document for managing any project. The estimates for schedule and budget included in this plan must be realistic. Once the project plan is approved, you are bound to it. Anything you forget in the planning phase will show up in the execution phase of the project as an annoying and often costly problem. Proper project planning takes a lot of time, sometimes more than time to execute the project. Never be tempted to cut corners in project planning. It will come back and get you.

The Carpenter's Rule

As described in the introduction, PMI's PMBOK 5th edition is a comprehensive description of project management processes. There are a total of forty seven project management processes, divided over five process groups.

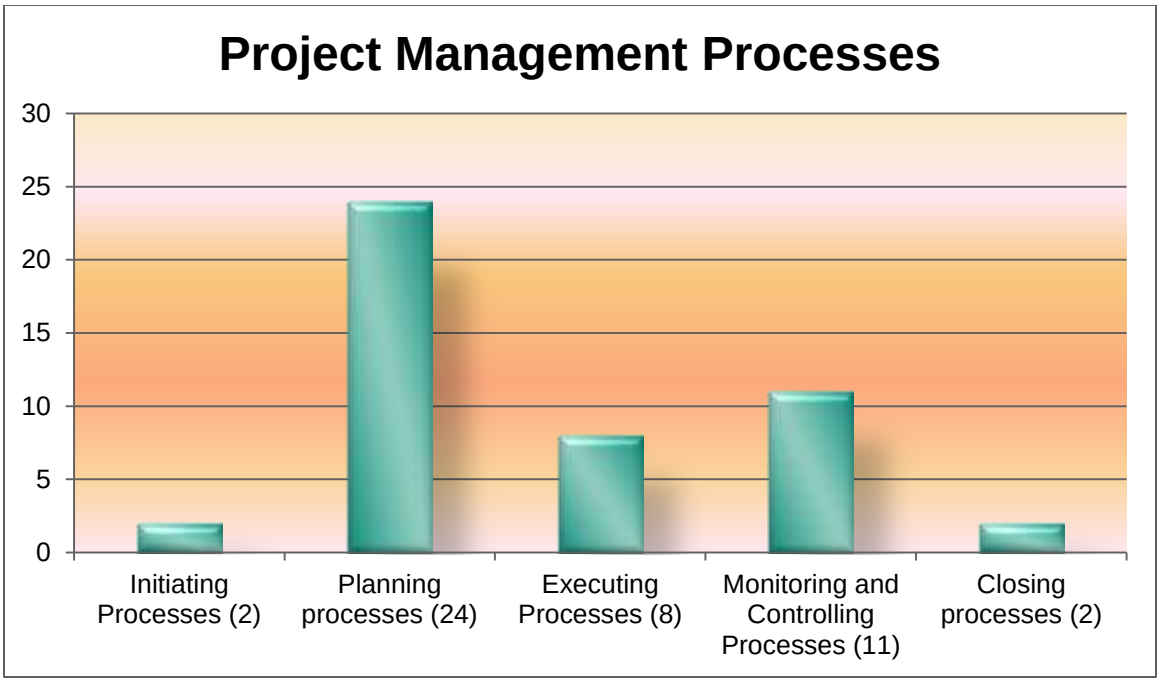


Figure 10: Project Management Processes

As, you can see above, the planning process group is the largest group.

This means that you should spend a lot of time planning your project. This is what I call the Carpenter's Rule for project management: plan twice, execute once.

PLAN TWICE,

EXECUTE ONCE

Similar to the rule carpenters use: measure twice, cut once.

My father was a carpenter.

Project Management Knowledge Areas

Managing a project requires knowledge in the following project management knowledge areas:

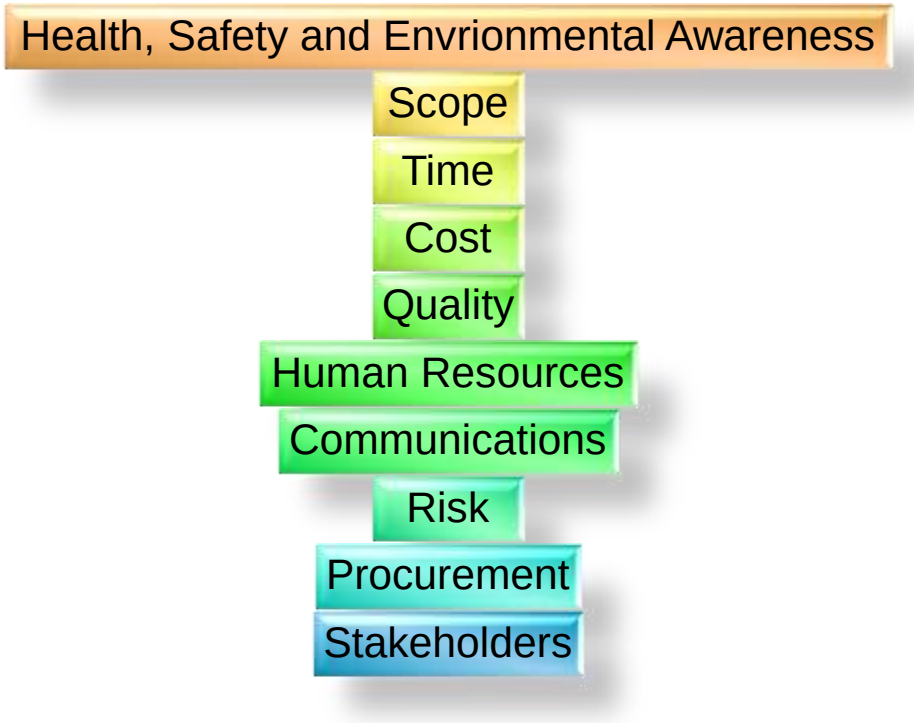


Figure 11: Project Management Knowledge Areas

These knowledge areas have to be managed during the several phases of the project life cycle.

Example

Throughout the rest of this eBook we will construct a highway as an example to illustrate the steps to be taken in managing a project

Process, not Content

When working with the highway example, look at steps taken, the process and not so much the numbers used. So it is about the process, not the content.

It is about the processes of the example, not the content.

Define Scope

The scope definition is a high level statement of what has to done. It is high level, so it should be concise. However, it is the basis for all subsequent project documents, so it has to also be clear. Here is the scope for our highway example.

"C*onstruct a 10 mile 4 lane asphalted road. For the purpose of electricity, water, telephone, cable etc., there shall be 12 inch conduits under the road every 1000 feet. Light poles are to be installed every 200 feet."*

Create Work Breakdown Structure

In order for you to have a good overview of the work that has to be done to complete the project, the scope is broken down into smaller components and described in a Work Breakdown Structure (WBS). The WBS-component should be tangible deliverables, things that the stakeholders (and everyone) else can see. The WBS is one of the most important documents in project planning, because it gives you a complete overview of all of the work that has to be done to complete the project. It is also the basis for creating your schedule and budget.

The WBS, the schedule and the budget are the three most important documents in the project plan.

A WBS can have the form of an inverted tree or the form of an outline. Here is the WBS for our highway example in both forms

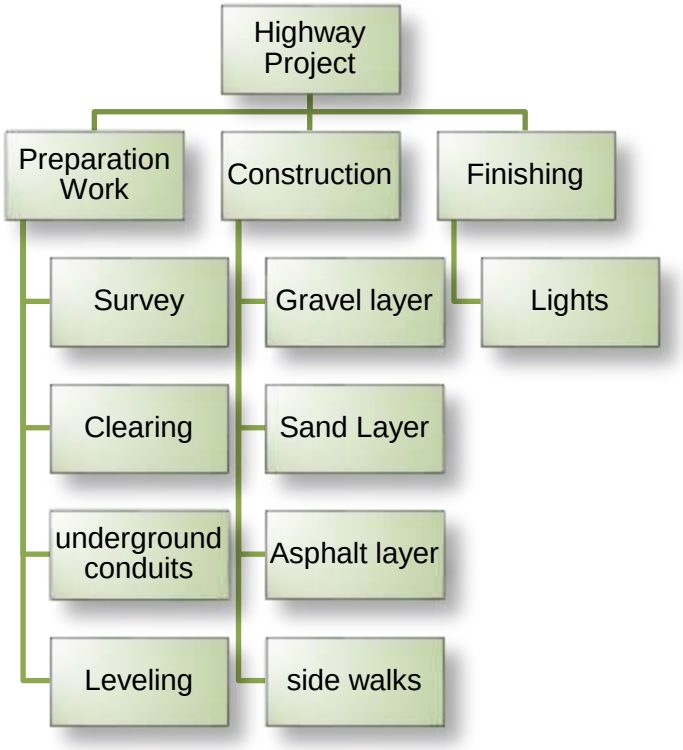


Figure 12: Inverted Tree WBS for Your Highway Example

The inverted tree is very popular, but becomes cumbersome for larger projects, where you would need more than one page.

A WBS template is included with this eBook

1. Preparation Work
   1.1. Survey
   1.2. Clearing
   1.3. Underground conduits
   1.4. Leveling

2. Construction

2.1. Gravel layer
2.2. Sand layer
2.3. Asphalt layer
2.4. Sidewalks

3. Finishing
   3.1. Lights

The outline format (above) is my preferred format, since it is not limited to one page. It also can be directly imported into my scheduling program.

Verify Scope

It is good practice to verify the scope with the customer after you have made your WBS. The WBS is easy to follow and the customer can comment on it. It is a good tool to verify that you have understood what the customer stated.

Develop Schedule

As mentioned before, the project schedule is one of the key documents in any project. The sponsor and customers always want to know when the project will be finished and how much it will cost. The schedule is developed from the WBS. What you do is transfer all WBS components to your scheduling program as high level schedule activities. Under these high level schedule activities, all activities needed to create the deliverable (= WBS component) are then added, including non-tangible activities such as reviews, approvals, milestones etc. Add only non-tangible activities if they have influence on the schedule. This means that every schedule activity should be related to a WBS component.

Once you have the activities in your schedule, you move to estimating the duration of each activity.

Next you set your dependencies and calendar. That should give you a working schedule.

Here is the schedule for our highway example.

	WBS	Task Name	Duration	Start	Finish
0		**Toatal Project**	**170 days**	**Mon 1/14/13**	**Fri 9/6/13**
1	**1**	**Preparation Work**	**80 days**	**Mon 1/14/13**	**Fri 5/3/13**
2	1.1	Survey	1 mon	Mon 1/14/13	Fri 2/8/13
3	1.2	Clearing	1 mon	Mon 2/11/13	Fri 3/8/13
4	1.3	UG Conduits	1 mon	Mon 3/11/13	Fri 4/5/13
5	1.4	Leveling	1 mon	Mon 4/8/13	Fri 5/3/13
6	**2**	**Construction**	**85 days**	**Mon 4/15/13**	**Fri 8/9/13**
7	2.1	Gravel Layer	2 mons	Mon 4/15/13	Fri 6/7/13
8	2.2	Sand Layer	2 mons	Mon 5/6/13	Fri 6/28/13
9	2.3	Sidewalks	1 mon	Mon 6/17/13	Fri 7/12/13
10	2.4	Asphalt Layer	1 mon	Mon 7/15/13	Fri 8/9/13
11	**3**	**Finishing**	**20 days**	**Mon 8/12/13**	**Fri 9/6/13**
12	3.1	Lighting	1 mon	Mon 8/12/13	Fri 9/6/13

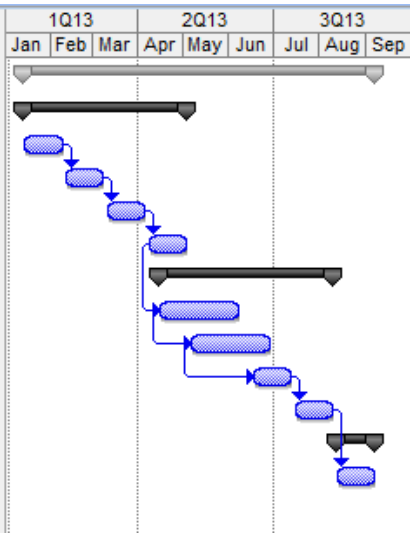


Figure 13: Schedule for Your Highway Example

The durations I used (1 month, 2 months etc.) are just illustrative for our example.

A schedule can be simple or very complex and fancy. However, the following components of a schedule are essential and must be in every schedule:

- Activities to be related to the WBS
- Activity durations
- Dependencies
- Calendar

A template of the above schedule is included with this eBook

Once your schedule is approved (as part of the project plan), it becomes the baseline schedule to which you are committed.

Critical Activity and Critical Path

A critical activity is any activity that if delayed one day, the project will be delayed one day.

The critical path is the path through the schedule of all the critical activities. Using the Critical Path Method (CPM), the project manager knows which activities are critical and need the most attention.

Determine Budget

Now that you have your schedule, you move to determining your budget.

Determining the project budget is very similar to preparing the project schedule: transfer all schedule activities to a cost estimating sheet as high-level cost estimating activities. You may breakdown the high-level schedule activities to lower-level activities for estimating the cost of that activity.

Estimate Costs

Estimate the cost of the activities in your schedule. The cost of each activity consists of material, labor, supervision, equipment and other costs such as software, permits etc.

You should always add some cost contingency for each activity. The amount of contingency depends on the amount of risk you see in that activity. If you are pretty sure what an item should cost, your contingency could be as low as 2-5%. With high risk activities such as software development or excavating, your contingency could be as high as 25%.

Determine Your Budget

Adding up all the estimated cost of all the activities, gives you your project budget. This is called bottom up estimating.

Below is the budgeting sheet for our high way example. You may have to enlarge this page to see the details of the budget. I have also hidden the “supervision column” so that the budget will fit across the page.

The cost of each activity can consist of human resources, material, equipment and other costs such as software, permits etc.

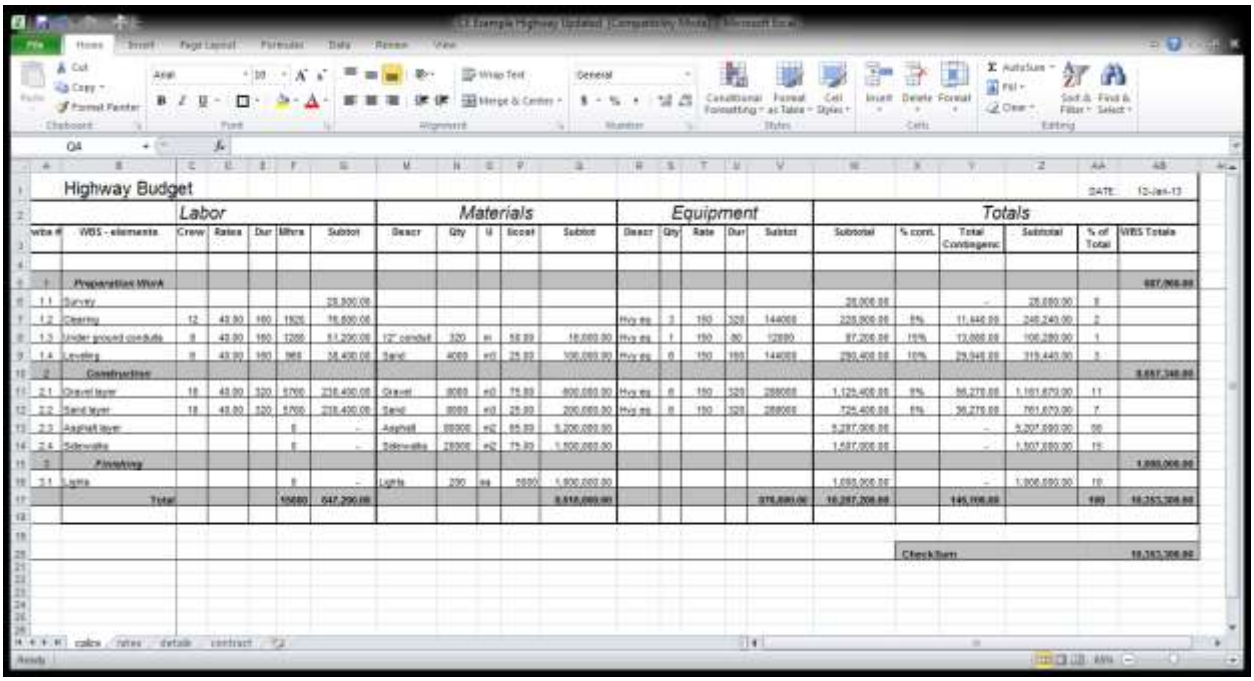


Figure 14: Budget for Your Highway Example

The complete budget is included as a template with this eBook. I will repeat the totals below for you:

WBS #	WBS-Element	WBS Sub Totals	WBS Totals
1	Preparation work		687,960.00
1.1	Survey	28,000.00	
1.2	Clearing	240,240.00	
1.3	Conduits	100,280.00	
1.4	Leveling	319,440.00	
2	Construction		8,657,340.00
2.1	Gravel Layer	1,181,670.00	
2.2	Sand Layer	761,670.00	
2.3	Asphalt Layer	5,207,000.00	
2.4	Side Walks	1,507,000.00	
3	Finishing		1,008,000
3.1	Lights	1,008,000.00	
Total			**10,353,300.00**

Table 1: Estimates for Your WBS-components

The estimates that I used are only illustrative to our example.

The labor, supervision and equipment cost all depend on the durations for that activity in the schedule. This is why you need your schedule before you can determine your budget.

It is important, very important to note that your scope, WBS, schedule and budget are all tied together as shown below.

Figure 15: Steps from Scope to Budget

Project statistics show that poor budgets are a major contributor to project failure. So to ensure that you have a good budget, you must make sure your scope, WBS, schedule and estimating are accurate. It is good practice to make use of a project management consultancy with budgeting expertise to assist you with your project.

One of the most tempting and most often made mistakes in project management is giving a cost or schedule before the scope has been set. This s very poor project management and in the long run will damage your reputation as a project manager.

In real life you sometimes have to produce a budget before the scope is completely defined. This would be the case during the initiation phase of a project. In this situation you produce a Rough Order of Magnitude budget which is based on a preliminary scope. These budgets are no better than +50, - 25%.

If you are pressured to give a cost on a very short notice, you can do the following: draw up a very preliminary scope, get some costs from similar projects and clearly indicate that it is a very preliminary (+50, -25%) budget based on a very preliminary scope.

The Accuracy of Your Project Budget

The budget is the most discussed topic on every project. The most important thing to remember about the budget is that it has to be accurate enough to serve its purpose.

First it is used to get approval of the project. Once approved, you are committed to it.

Next it will be used during the procurement of material and services. The budget has to be accurate enough so that you can confidently enter into contract negotiations. Keep in mind that contractors are very seasoned and skilled negotiators.

Finally your budget will be used for your cost control. If your budget is not good, you will not be able to have an effective cost control.

For project approval I try to achieve an accuracy of +10, -5%. To reach this level of accuracy you need to follow the steps above in preparing your scope, WBS, schedule and budget. The accuracy of your budget is determined by the accuracy of the information you have. Asking for budget prices is a good source of budgeting information if you have not done a similar project in the past.

When documenting your project budget always mention the accuracy of it and always have supporting documentation at hand of how you arrived at your budget.

The best way to get an accurate budget is to use the method and budgeting sheet discussed in this eBook. I have been using this method for many years.

Plan Procurements

In this chapter of your project plan, you document how you are planning on executing the project.

Make or Buy Decisions

Figure 16: Make or Buy Decisions

To execute the project you may need services, material, equipment, facilities etc.

Make or buy decisions is deciding what you are going to do in-house and what you are going to contract out. Are you going to need a PMC to help you? Will you need a supplier?

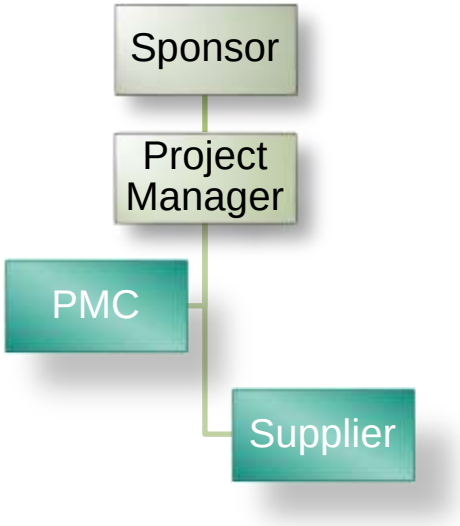


Figure 17: Support Services

The answer to these questions depends on how big the project is and or how many in-house resources you have.

Develop Project Plan

At this point you have prepared all the essential parts (scope, schedule and budget) in planning a project. The next step is to combine them in your project plan

The project plan contains all the information needed to manage the project. Following is an example of the contents of a project plan:

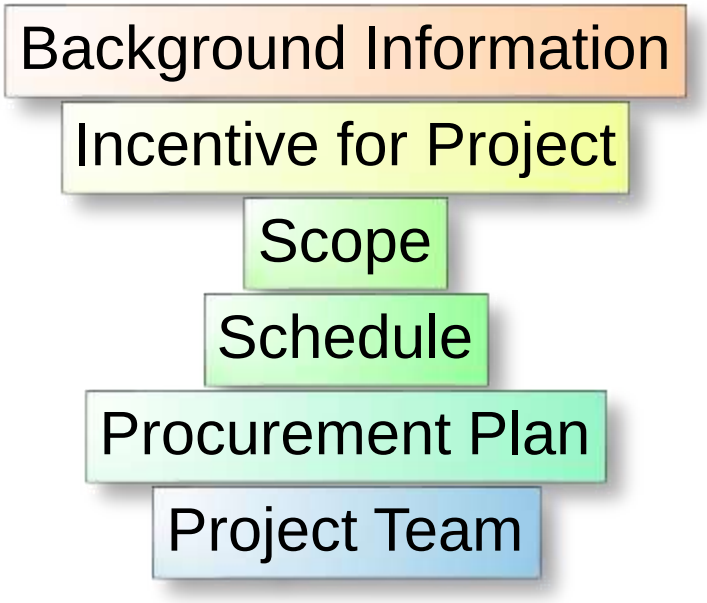


Figure 18: Contents of a Project Plan

Approve Plan

In most organizations the project plan needs formal approval before the project can be executed. The project plan is used to monitor the performance of the project, since it contains all the baseline information of the project.

Other Project Costs

Normally there will be some other costs to be incurred for the project such as the cost for a project management consultancy and of course your cost as project manager.

Management Reserve

The budget you prepared is for the contractor to build the highway. To start, the accuracy of your budget is -5% to +10%, at best. There will also be some risk involved with the project. Therefor it is good practice to add a management reserve to your budget to cover any costs that is within the accuracy range of your project and the risk involved in the project. For a project like this involving public civil works I would suggest a management reserve of about 15%. Let's say that taking all this in account, you and your sponsor agree to budget the project for $12 million.

Keep in mind that the budget for the contractor to build the highway remains $10,350,200.00. See table 1.

After your project plan has been approved, you are committed to it. You are now off to executing your project. All the best!

Project Execution

Figure 19: Project Life Cycle - Execution Phase

Once your project plan is approved, it is time to start executing the project. Executing the project means creating the project deliverables according to scope, within schedule and budget.

Conduct Procurement

If you decided to procure resources (services and or material) for your project then procurement is the first thing that has to be done. Procurement starts with the setting up of contracts for the services and materials you will need for the project.

Contracting Methods

In the planning phase you determined what has to be procured. Now you have to determine what contracting method you will use for your project.

Are you going to specify everything you need, and then go out for bids to do the job? In the case of our highway project, the engineers from public works would design the highway and then go out for bids from qualified contractors. The selected contractor will then build the highway.

Or are you going to ask experienced suppliers to use their experience to specify what you need and make you an offer for what you need? This method is called Turn-Key method. In our highway example, The Public Works Agency will approach construction firms specialized in highway construction. The selected firm will then design and build the highway.

Note that in both cases, the owner (the Public Works Agency per our example) could be supported by a Project Management Consultancy (PMC).

Depending on your project situation, you have to make a choice of what contracting method best suites your situation.

Contract Types

There are two types of contracts:

1. Fixed-Price Contracts
2. Cost-Reimbursable Contracts

Fixed-Price contracts are often preferred, because both parties know what the contract price is from the beginning of the contract. Additions and/or deletions to fixed-price contracts are possible based on change requests.

Cost-Reimbursable contracts are used in the following cases:

- When there is no time for a formal procurement process
- When the scope of the work is not clear, while the work has to start.

Main Contracts in a Project

1. If you decided to use a PMC then the contract between your company and the PMC is the first contract you have to set up and sign.
2. If a supplier/contractor will be needed, then the PMC can help you set up the supplier's contract.

Your Contractor's Contract

During the project planning phase you determined the project budget using the following steps.

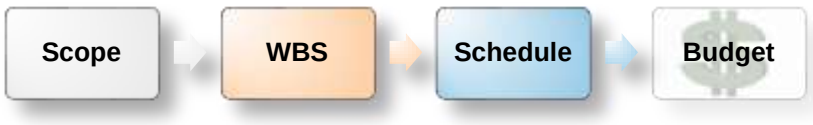


Figure 20: Steps from Scope to Budget

Now you are at the point where you have to arrange a contract using the budget you have determined in the planning phase.

You do that by taking the following steps:

Figure 21: Steps from RFQ to Contract Award

The **RFQ** (Request for Quotation) contains the required scope, the WBS, the required time for completion. The RFQ will also include other instructions and information needed for the potential supplier to make a valid bid. One of the instructions should be related to deadlines. The bids have to be submitted before a certain date and hour

Once the RFQ's have been sent out to the potential suppliers, you go through a **bidding process**. This process may include a bidder's conference during which the potential suppliers have the opportunity to ask detailed questions about the project.

After the bids have been received, they have to be **evaluated** and a selection made.

Next you have to sit with the selected supplier and negotiate a contract schedule and price.

Contractual Schedule

Your project plan contains the over-all project schedule. During the contract negotiations, you will usually agree on a schedule for the contract. This schedule becomes your contractual schedule and may be slightly different than the schedule in your project plan. One reason for this is a later starting date for the construction than anticipated in your project plan.

Contract Price

The contract price is the final price you agree upon with the supplier after negotiating a contract. This price will be slightly different than what you had in your budget. The difference should be accommodated by the management reserve you agreed upon with your sponsor. Remember that your budget is not better than about - 5 to +10%

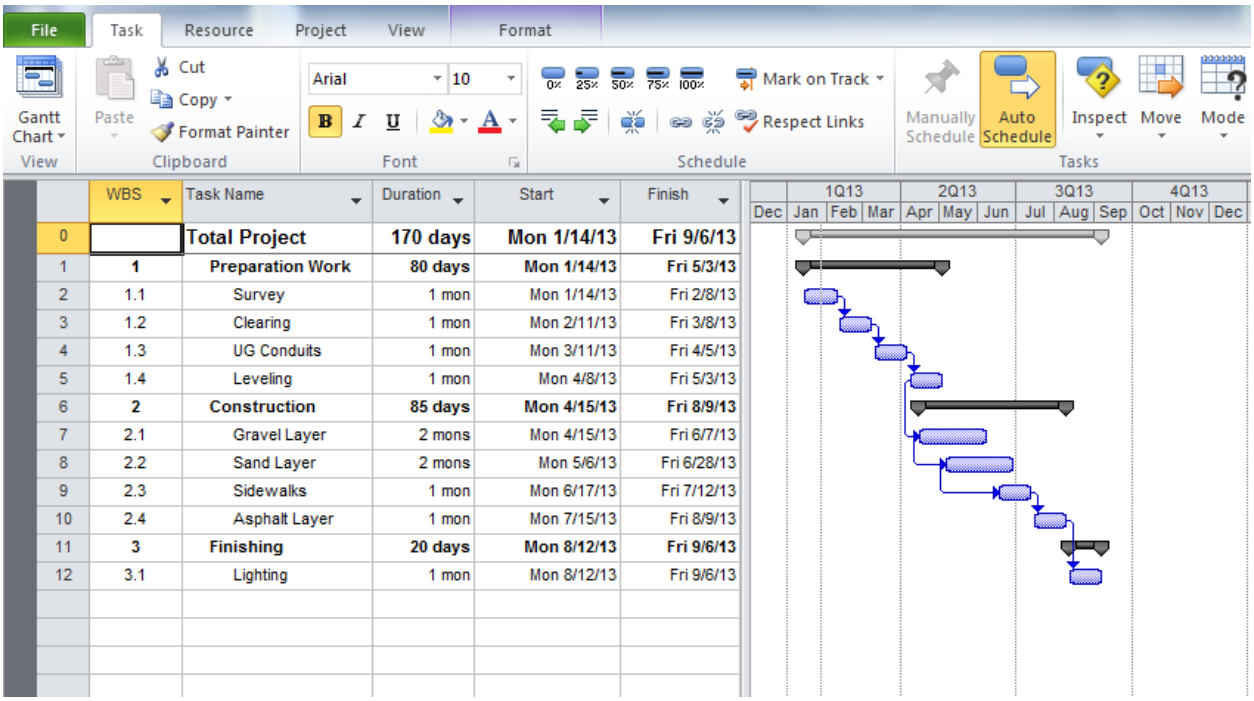
Contract Award

Contracts vary in complexity. However, there are some basic parts that every contract should contain:

Figure 22: Contents of a Contract

Let's say that the closest complete bid you received was $11,500,000.00. Your management reserves allow you to go up to $12,000,000.00. However, your budget for this project is $10,350,200.00. So you have to sit with this contractor to negotiate a contract.

After negotiating with the contractor you reach to agreement on a contractual schedule of 170 working days (same as you had planned) and a contract price of $11,000,000.00.



	WBS	Task Name	Duration	Start	Finish
0		**Total Project**	**170 days**	**Mon 1/14/13**	**Fri 9/6/13**
1	**1**	**Preparation Work**	**80 days**	**Mon 1/14/13**	**Fri 5/3/13**
2	1.1	Survey	1 mon	Mon 1/14/13	Fri 2/8/13
3	1.2	Clearing	1 mon	Mon 2/11/13	Fri 3/8/13
4	1.3	UG Conduits	1 mon	Mon 3/11/13	Fri 4/5/13
5	1.4	Leveling	1 mon	Mon 4/8/13	Fri 5/3/13
6	**2**	**Construction**	**85 days**	**Mon 4/15/13**	**Fri 8/9/13**
7	2.1	Gravel Layer	2 mons	Mon 4/15/13	Fri 6/7/13
8	2.2	Sand Layer	2 mons	Mon 5/6/13	Fri 6/28/13
9	2.3	Sidewalks	1 mon	Mon 6/17/13	Fri 7/12/13
10	2.4	Asphalt Layer	1 mon	Mon 7/15/13	Fri 8/9/13
11	**3**	**Finishing**	**20 days**	**Mon 8/12/13**	**Fri 9/6/13**
12	3.1	Lighting	1 mon	Mon 8/12/13	Fri 9/6/13

Figure 23: Contractual Schedule

Now that you have agreed on a contract price (and signed the contract) you have to update the budget you made in the planning phase to reflect the contract price. The adjusted budget is what you will use to control the cost of your project.

During contract negotiations, cost details are almost never discussed. All you agree upon is the total price ($11,000,000.00 in our case). The budget you determined was $10,353,300.00. What you can do to convert your budget WBS sub totals to contractual sub totals is to prorate the sub totals you had in the table you used in planning phase. That is to multiply all the WBS sub totals you had in the planning phase by 11,000,000/10,353,300. That will give you the contractual budget. See below.

WBS #	WBS-element	WBS Sub Totals	WBS Totals
1	Preparation work		$730,932.17
1.1	Survey	$29,748.97	
1.2	Clearing	$255,246.15	
1.3	Conduits	$106,543.81	
1.4	Leveling	$339,393.24	
2	Construction		$9,198,104.95
2.1	Gravel Layer	$1,255,480.86	
2.2	Sand Layer	$809,246.33	
2.3	Asphalt Layer	$5,532,245.76	
2.4	Side Walks	$1,601,132.01	
3	Finishing		$1,070,962.88
3.1	Lights	$1,070,962.88	
Total			**$11,000,000.00**

Table 2: Contractual Budget

Payment Schedule

One of the things you also have to settle before signing the contract is a payment schedule. This has to be discussed and agreed upon with the contractor. Payments are to be made upon completion of the milestones. One thing to remember is to retain a final payment until all minor defects have been corrected. This final payment is usually between 5 and 10% of the contract price. One way of achieving your payment schedule is to subtract an amount from each budgeted amount and using round numbers. I have no exact formula for doing this. It has to be discussed and agreed upon with the contractor. Below is a payment schedule for our example.

Milestone	Contractual Budget	Payment Schedule
Survey	$29,748.97	$30,000.00
Clearing	$255,246.15	$250,000.00
Conduits	$106,543.81	$100,000.00
Leveling	$339,393.24	$300,000.00
Gravel Layer	$1,255,480.86	$1,200,000.00
Sand Layer	$809,246.33	$800,000.00
Asphalt Layer	$5,532,245.76	$5,000,000.00
Side Walks	$1,601,132.01	$1,500,000.00
Lights	$1,070,962.88	$1,000,000.00
Final Payment		$820,000.00
	$11,000,000.00	**$11,000,000.00**

Table 3: Contractual Payment Schedule

Manage Execution

Now that you have signed your contracts, you are ready to start realizing the deliverables.

Following are the main things you should focus on during the execution phase of the project:

People Skills versus Technical Skills

Most of the problems that occur on projects are “people” problems, compared to “technical” problems. This means that to be a successful project manager, it is essential to have good “people” skills.

Manage All Stakeholders

The stakeholders in a project are at least:

Figure 24: Stakeholders

One of your tasks as a project manager is to manage ALL the stake holders of the project. Neglecting one or more stake holders can mean project failure, even though the final deliverable is excellent. Stake holders want to be involved. Stake holders have to be managed.

The **sponsor** needs to be informed on a regular basis of the progress of the project. The information for the sponsor should be at the highest level. Involve sponsors in all high level decisions that have to be made.

The **customer** is particular interested in the quality of the deliverable. Constantly give the customer the opportunity to comment on the quality of the deliverable. Be open to your customer. Also know when and how to say “no” to your customer. Be careful not to let your project become a free-for-all for your customer. The best way to achieve this is to involve your customer from day one in the project. Keep your customer involved with the project.

Managing your **project team** means that you should involve them in all phases and decisions of the project. The best way to get committed team members is by team involvement. Providing guidance and support where and when needed is essential in keeping the team performing. Since the team members are usually not accustomed to working with each other, come from different disciplines and have different ways of working, conflicts are to be expected. Conflict recognition, mitigation and resolution are important parts of managing your team. Also remember to assume responsibility for the mistakes made by your team members. The key factor to remember when managing a team is that you are a team and not opponents.

Manage Safety

Together with your team **give safety the highest priority**

Team involvement should also be applied to safety. Safety should not be seen as something imposed from above. Safety should be a team-based agreement. I agree that this is easier said than done. Some people see safety as an extra burden on the project that should only be complied with when the safety inspector is around. These individuals that will not comply with safety regulations should be disciplined and ultimately removed from the project. Doing this will protect them and others from injury.

Monitoring and reporting safety performance is just as important as monitoring and reporting the time and money performance of the project.

Control Scope

The scope of the project is documented in the project plan. Only items that are in the approved project plan may be part of the scope during execution of the project.

It often happens that something has been overlooked during the planning phase of the project, or that something shows up during the execution phase of the project, that has to be included in the project.

Anything that is not in the approved scope has to be approved as a scope change. Since scope changes have influence on the entire project (scope, schedule, budget, documents etc.), there must be a well-defined **change request** procedure. It is a best practice to include in your contract that change requests must be approved before the work is started.

> It is a best practice to include in your contract that change requests must be approved before the work is

A change request must be discussed, judged and then approved or disapproved by your project team. If the effect of the change request exceeds your project budget or schedule, then the change request has to be approved by the sponsor as well.

A mistake often made is not realizing that a scope change in one area often has an effect on other areas of the project. For instance adding an extra room to a building will not only have an effect on the civil drawings but also on the electrical drawings and calculations.

Another frequent made mistake is not documenting if the change requested change will influence the completion date of the project. The effect of the change should be discussed and documented when approving the change request to avoid discussion about what the actual completion date of the project is at the end of the project.

A change request approval form should be used to document the complete impact of the scope change. It should contain at least the following:

CHANGE REQUEST APPROVAL FORM <PROJECT NAME>	
CHANGE REQUEST NO.	
DESCRIPTION OF CHANGE REQUEST	
REQUESTED BY	
EFFECT ON DOCUMENT(S)	
EFFECT ON COMPLETION DATE	
COST CONSEQUENCES	
CONTRACTOR'S SIGNATURE	
OWNER'S SIGNATURE	
DATE APPROVED	

Figure 25: Change Request Approval Form

A change request template is included with this eBook

Control Schedule

Controlling your scope starts with a realistic schedule. See Develop Schedule.

The best way to control your schedule is to use Earned Value Management (EVM). One of the basic project performance indicators is the Schedule Variance. This indicator will show how your project is performing schedule wise. See Appendix C for a detailed explanation of Earned Value Management.

Control Costs

Similar as with controlling your schedule, controlling costs starts with a good budget. Can you control your costs if your budget is not estimated properly?

Also as with controlling your schedule, Earned Value Management is a very efficient way of controlling your costs. Cost Variance is the second basic project performance indicator. This indicator will show how your project is performing cost-wise.

I believe that Earned Value Management is the most powerful project management tool ever developed

Earned Value Management

To be a successful project manager you have to skillfully manage your project scope, schedule and cost.

Earned Value Management (EVM) is a project management tool that allows you to manage your scope, schedule and cost with one reporting system.

Conventional cost control systems will show you how your actual cost compares with your budget. However, a conventional cost control system will not show you what you have received for the money you spent.

EVM will compare your project progress (earned value) with the money you have spent at any point throughout the project. EVM will also show you the project past, present and future status. A single EVM report will give you a clear and easy to understand picture of your schedule and cost health of your project. This report tells you how your project is performing schedule-wise and cost-wise compared to the planned schedule and cost. Thus providing an effective way of controlling your project. EVM is the most powerful project management tool ever developed.

Here is how it works:

Earned Value Management is based on three variables:

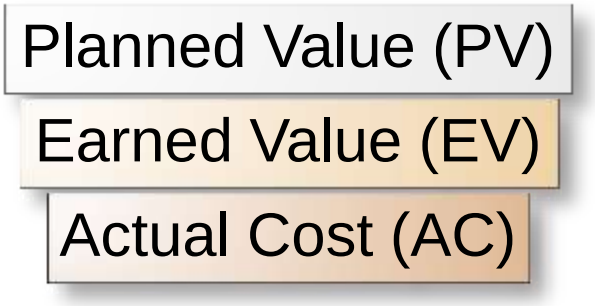


Figure 26: EVM Variables

Planned Value (PV)

The contract scope, schedule and price are documented in your contract. Each of the deliverables in the schedule has their cost and scheduled time of delivery. If you plot the cumulative costs of the deliverables versus the time they should be delivered, you get what is called the planned value curve. The planned value curve shows you what cumulative monetary value has to be delivered as you go from beginning to the end of the project. So the curve starts at zero and ends at the contract value. Here is the Planned Value curve for our highway example:

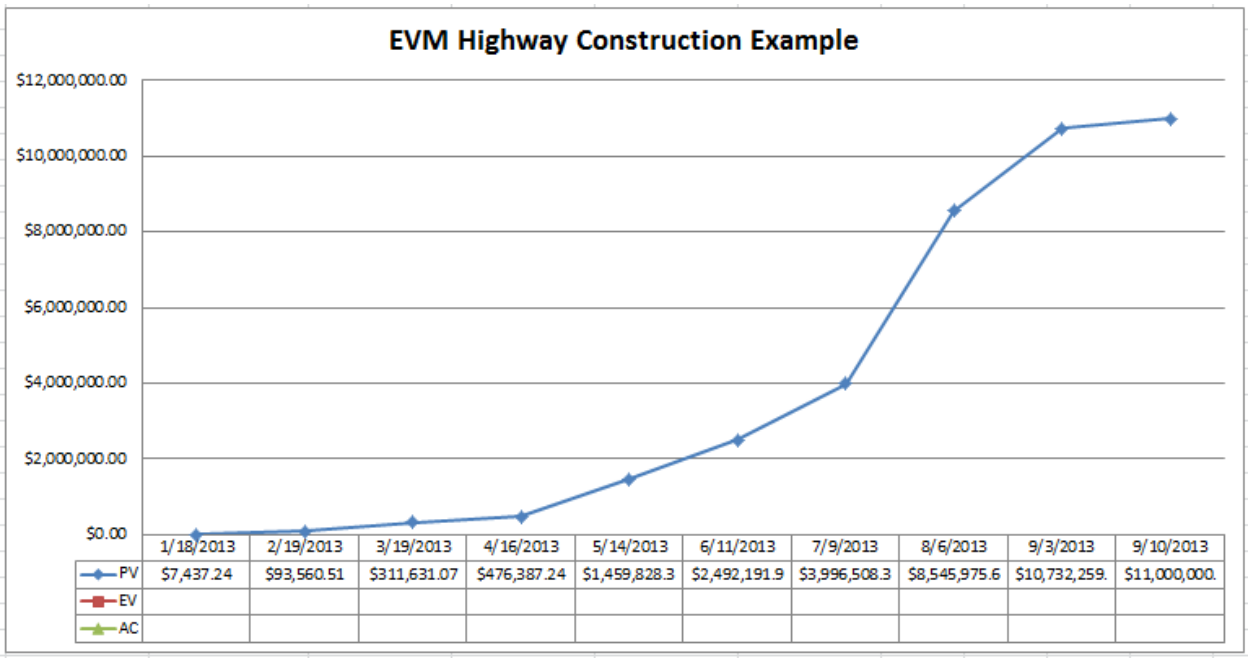


Figure 27: Planned Value Curve

Note: See appendix C for a more detailed description on how to set up your Earned Value Management system.

Earned Value (EV)

The Earned Value is the monetary value of the work actually completed at a certain time during the execution of the project. Earned Value is measured at the end of every measuring period, for example every week throughout the project.

There are several ways to determine the Earned Value. The most popular way is the percent complete method.

With the percent completed method, an estimate is made of the percentage of the work completed for each activity in the schedule. The percentage complete times the value of that activity equals the Earned Value for that activity. This is done for each activity in the schedule at the end of a measuring period.

The Earned Value for all the activities for that measuring period are then added up to give the Earned Value for that period. The Earned Value (red) is also plotted cumulatively as you progress through the execution of the project.

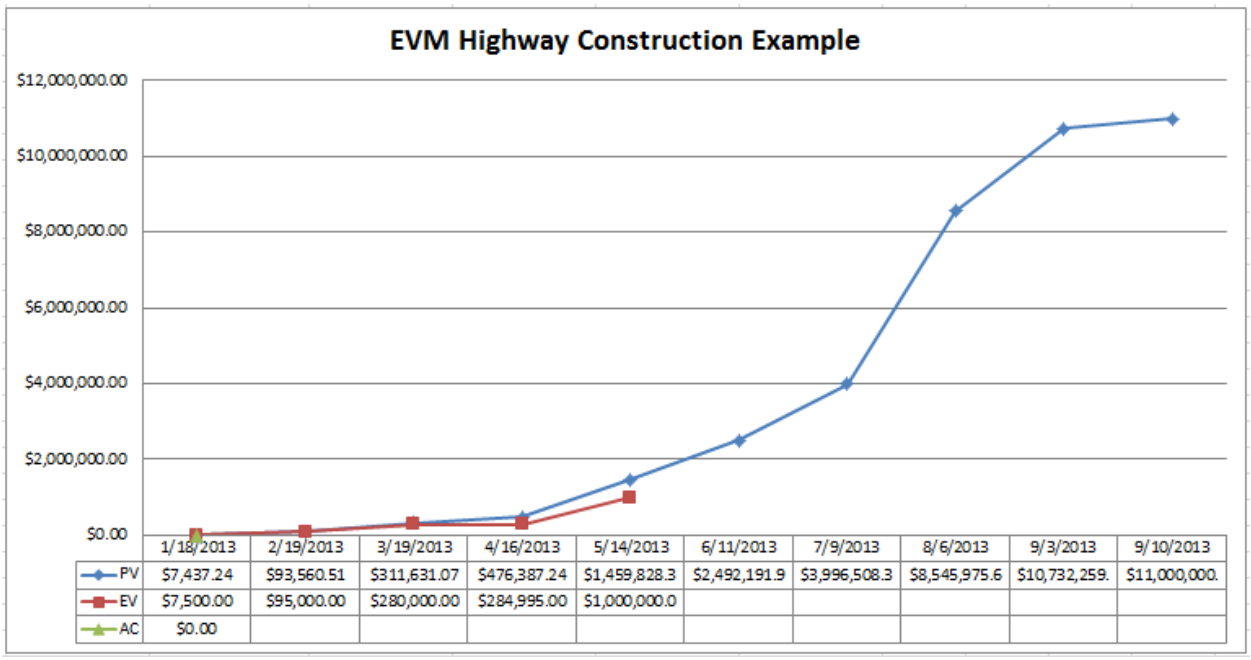
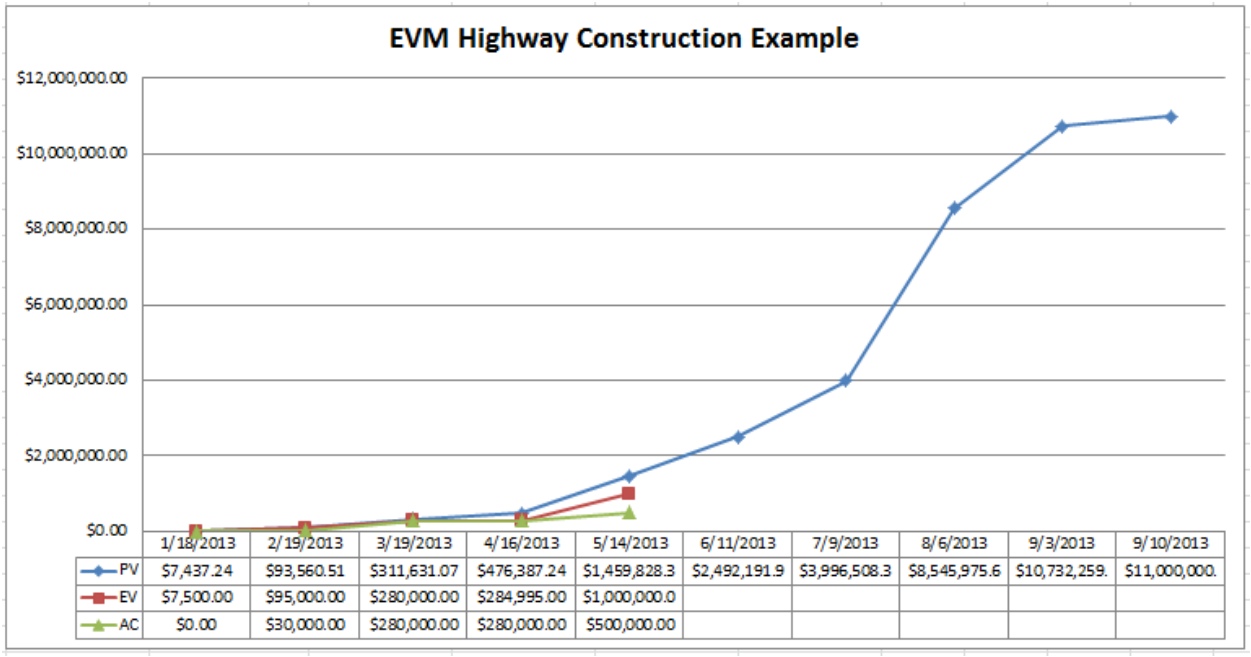


Figure 28: Planned Value and Earned Value Curves

Actual Cost (AC)

The Actual Cost is the cumulative amount of money actually paid to the contractor at a certain time during the execution of the project. The Actual Cost is also plotted in the same graph as the Planned Value and Earned Value.



	1/18/2013	2/19/2013	3/19/2013	4/16/2013	5/14/2013	6/11/2013	7/9/2013	8/6/2013	9/3/2013	9/10/2013
PV	$7,437.24	$93,560.51	$311,631.07	$476,387.24	$1,459,828.3	$2,492,191.9	$3,996,508.3	$8,545,975.6	$10,732,259.	$11,000,000.
EV	$7,500.00	$95,000.00	$280,000.00	$284,995.00	$1,000,000.0					
AC	$0.00	$30,000.00	$280,000.00	$280,000.00	$500,000.00					

Figure 29: Planned Value, Earned Value and Actual Costs Curves

Performance Indicators

The three variables (PV, EV and AC) are then used to calculate two basic EVM performance indicators:

1. The Schedule Variance (SV)
2. The Cost Variance (CV)

Schedule Variance

The Schedule Variance is the difference between the Earned Value and the Planned Value at any point during the execution of the project.

$$SV = EV – PV$$

For reporting date May 14th, the Schedule Variance would be:

$$SV= EV – PV = \$1,000,000.00 - \$1,459,828.39 = -\$459,828.39$$

So you would be behind of schedule! You can clearly see this in the graph: the red marker (EV) is below the blue marker (PV) for reporting date May 14th.

Cost Variance

The Cost Variance is the difference between the Earned Value and Actual Cost at any point during the execution of the project.

$$CV = EV – AC$$

For reporting date May 10th, the Cost Variance would be:

CV= EV – AC = $1,000,000.00 - $500,000.00 = $500,000.00

So you have paid less that has been realized! The green marker (AC) is below the red marker (EV) for reporting date May 14th.

For practical reasons I only use the EVM system to manage the major contract(s) in my projects. That is where the highest financial risks are.

Earned Value Management is called

"Project Management with the lights on"

Manage Risks

When managing projects, you run into all types of risks on a daily basis. Risk is defined as the probability that something will happen multiplied by the impact it will have on your project:

$$RISK = PROBABILITY \times IMPACT$$

There are risks that can impact your schedule, your budget or the quality of a deliverable of the project.

If your team considers a certain risk to be high, then you have to reduce either the probability or the impact.

Managing certain risks that appear on projects fairly easy up is a no-brainer. However, managing other risks require a more analytical approach.

Appendix A is a detailed description of how to analyze project risks.

Perform Quality Assurance

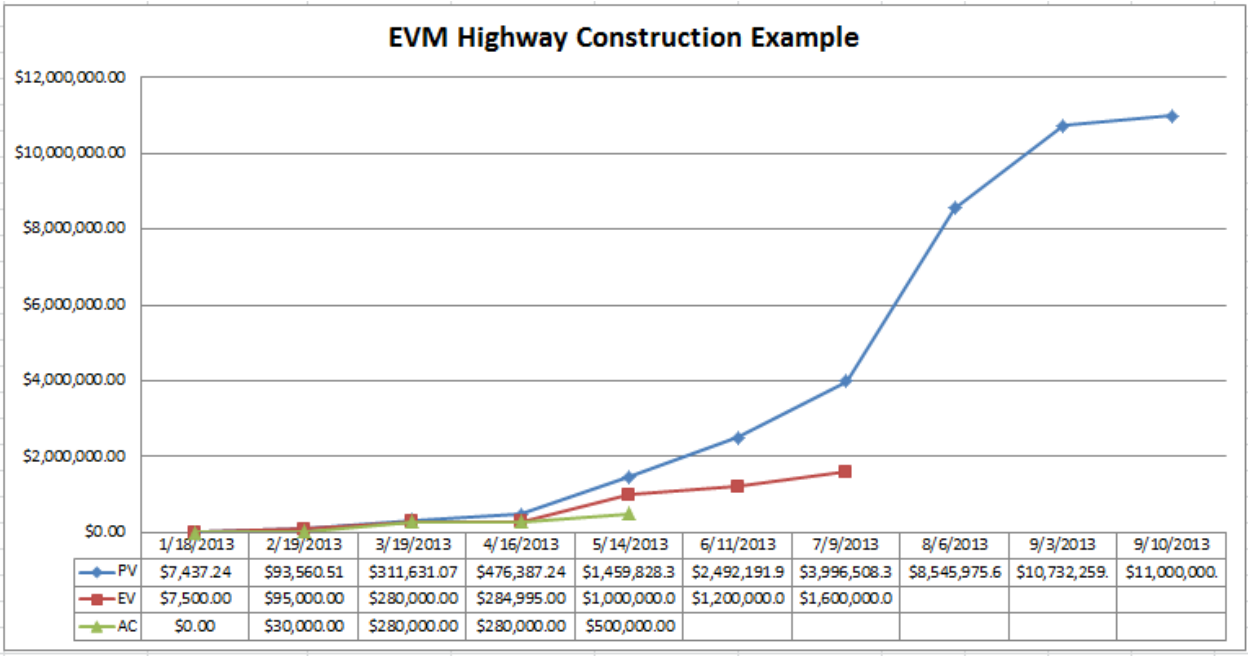
When setting up your Request for Quotation (RFQ) you will often want to include some quality specifications for the materials to be used and or delivered. It is good practice to involve the customer when setting these standards.

It is also important to involve the customer when verifying the quality requested or when discussing quality deviations.

Customer involvement is key to quality assurance.

Manage Contracts

The best way to manage the major contracts on your project is to use Earned Value Management (EVM). Basic EVM gives you a very good insight on what is going on with your major contracts. Because you have your Planned Value curve from the day you sign the contract, EVM will signal problems before they get beyond recovery. EVM is a good early warning system. See example below. The legend is at the bottom left.



	1/18/2013	2/19/2013	3/19/2013	4/16/2013	5/14/2013	6/11/2013	7/9/2013	8/6/2013	9/3/2013	9/10/2013
PV	$7,437.24	$93,560.51	$311,631.07	$476,387.24	$1,459,828.3	$2,492,191.9	$3,996,508.3	$8,545,975.6	$10,732,259.	$11,000,000.
EV	$7,500.00	$95,000.00	$280,000.00	$284,995.00	$1,000,000.0	$1,200,000.0	$1,600,000.0			
AC	$0.00	$30,000.00	$280,000.00	$280,000.00	$500,000.00					

Figure 30: A Project in Trouble

From the EVVM report above, you see that as of July 9th your earned value is only 1.6 million, while it should have been close to 4 million: big trouble

Distribute Information

Keep your stakeholders up to date on the progress of the project on a regular basis. Set-up a distribution matrix (which stakeholder gets which information) at the beginning of the project and update it as needed. Report any issues and deviations, especially related to schedule and budget.

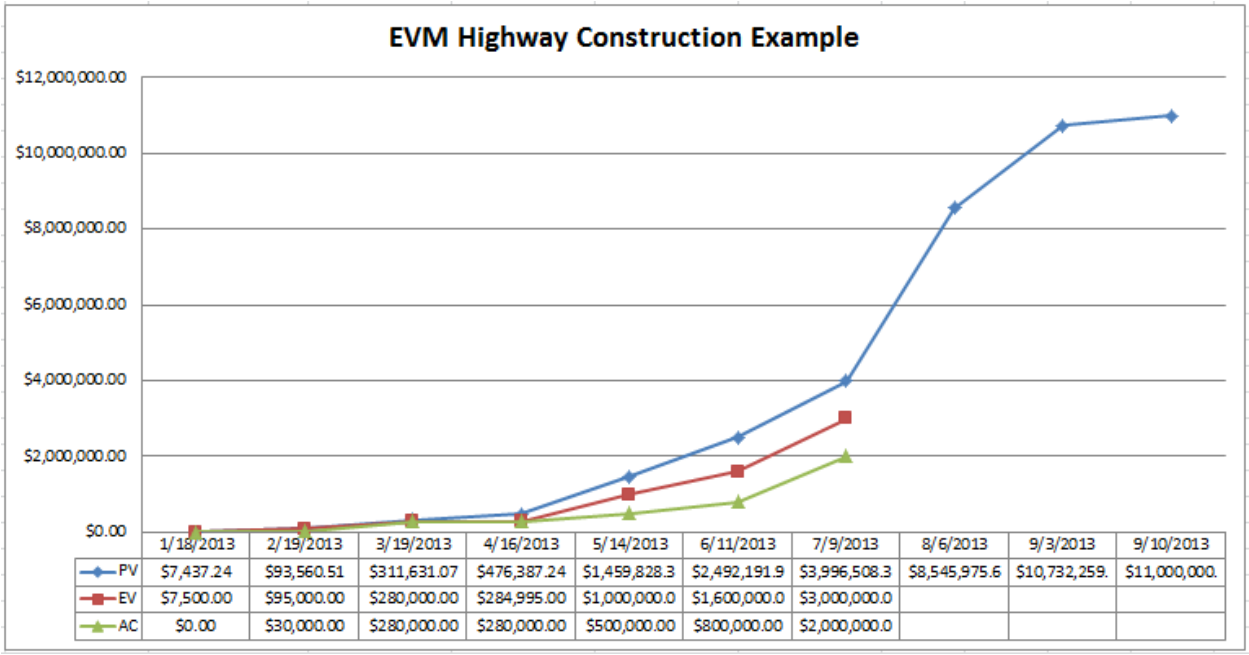
Report Performance

The project sponsor is particularly interested in the cost and schedule performance of the project. Here again, Earned Value Management reports are the most effective way to report these performance indicators of your project.

You might have to give your sponsor a brief explanation of what EVM is and why it is such a powerful project management tool. A good way to do this is as follows:

1. Explain to the sponsor what the Planned Value curve represents (not how you arrived at it)
2. Explain the Earned Value curve
3. Explain what Schedule Variance and Cost Variance is

A one-page graphic report is the best for reporting your project performance to the project sponsor. This one-page report shows the past, present and future of the cost and schedule performance of your project. See example below.



	1/18/2013	2/19/2013	3/19/2013	4/16/2013	5/14/2013	6/11/2013	7/9/2013	8/6/2013	9/3/2013	9/10/2013
PV	$7,437.24	$93,560.51	$311,631.07	$476,387.24	$1,459,828.3	$2,492,191.9	$3,996,508.3	$8,545,975.6	$10,732,259.	$11,000,000.
EV	$7,500.00	$95,000.00	$280,000.00	$284,995.00	$1,000,000.0	$1,600,000.0	$3,000,000.0			
AC	$0.00	$30,000.00	$280,000.00	$280,000.00	$500,000.00	$800,000.00	$2,000,000.0			

Figure 31: One Sheet EVM Report

Project Closing

Figure 32: Project Life Cycle - Closing Phase

Close Project

Closing your project usually takes three steps, acceptance, close contracts and documentation

Acceptance

Acceptance is the step in which you have the customer verify that the project deliverables have met their requirements. I use a sign-off sheet for this, which I call the Customer Acceptance Form.

CUSTOMER ACCEPTANCE FORM <PROJECT NAME>					
CUSTOMERS	**NAME**	**SIGNATURE**	**DATE**	**MINOR DEFECTS (Y/N)**	**REMARKS**
PROJECT MANAGER					
CUSTOMER 1					
CUSTOMER 2					
CUSTOMER 3					
CUSTOMER 4 etc.					

Figure 33: Customer Acceptance Form

Note that the form has a column to indicate if a customer has a list of minor defects. Minor defects should be solved within a predetermined time, say three months depending on your industry and project.

Major defects should be solved before presenting the customer with the Acceptance Form for sign-off.

Close Contracts

Once the Customer Acceptance Form is signed off by all customers, you are ready to start closing the contracts.

Make sure that all minor defects are resolved before making the final payment on your contracts.

Never close the contracts before the TOC is completely signed-off! If you do, you run the risk of not being able to hand over the deliverables to the customers because of defects, while the contractors have already been paid.

Documentation

The last step in closing out the project is the documentation of your project in a final report. I usually include the following in my final reports:

- The safety record
- A list of all who contributed
- The quality records
- The EVM records
- A milestone schedule
- Documentation of the deliverables
- Contacts for operating and maintaining the deliverables
- Pictures taken during the execution of the project
- Lessons learned during the project.

Summary

If you forget everything that is written in this book, please remember that a project takes place in the following four phases, called the project life cycle. It will save you a lot of headaches.

Figure 34: Project Life Cycle

Also keep in mind that I used the construction of a highway as an example in this eBook. What you have to remember is the process, the steps taken to complete the project. Do not focus on the content of the example. Do you know how to construct a high way? I don't. However, as project managers we should be able to handle the project.

It is the process (the steps to take) of doing the project that you should remember.

Understand the process of the example used in this eBook.

How to Continue

For this book to be of any value to you, you have to use it for your project management work.

As mentioned in the introduction, this book is not extensive. It covers just enough to get you up and running fast.

The main things to remember are:

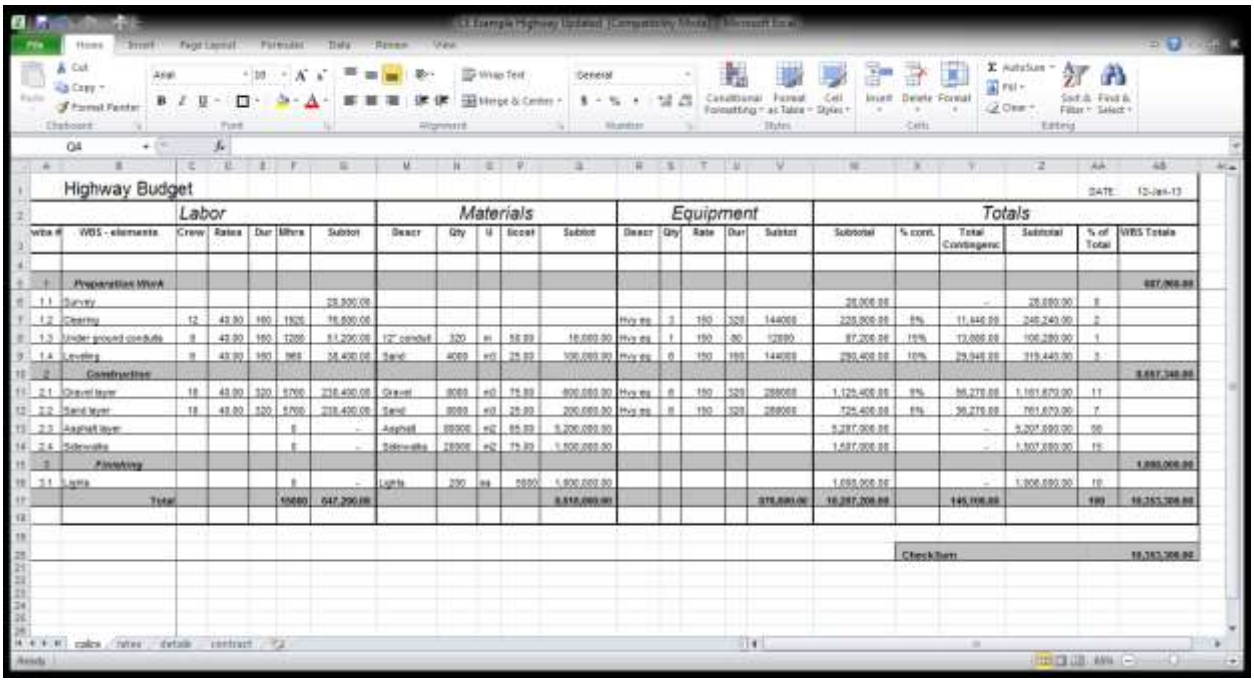
1. The project life cycle

Figure 35: Project Life Cycle

2. The steps in determining your budget. They are all linked together.

Figure 36: Steps from Scope to Budget

3. Use the budgeting spread sheet (included) as a template to calculate your budget. It really helps you not to forget anything.



Highway Budget

wbs #	WBS - elements	Labor					Materials					Equipment					Totals					
		Crew	Rates	Dur	Mhrs	Subtot	Descr	Qty	U	$cost	Subtot	Descr	Qty	Rate	Dur	Subtot	Subtotal	% cont.	Total Contingenc	Subtotal	% of Total	WBS Totals
1	Preparation Work																					
1.1	Survey					28,000.00											28,000.00		-	28,000.00	8	
1.2	Clearing	12	40.00	160	1920	76,800.00						Hvy eq	3	150	320	144000	220,800.00	5%	11,040.00	240,240.00	2	
1.3	Underground conduits	8	40.00	160	1280	51,200.00	12" conduit	320	m	50.00	16,000.00	Hvy eq	1	150	80	12000	87,200.00	15%	13,080.00	100,280.00	1	
1.4	Leveling	8	40.00	160	960	38,400.00	Sand	4000	m3	25.00	100,000.00	Hvy eq	6	150	160	144000	282,400.00	10%	28,240.00	310,640.00	3	
2	Construction																					5,617,340.00
2.1	Gravel layer	18	40.00	320	5760	230,400.00	Gravel	8000	m3	75.00	600,000.00	Hvy eq	6	150	320	288000	1,125,400.00	5%	56,270.00	1,181,670.00	11	
2.2	Sand layer	18	40.00	320	5760	230,400.00	Sand	8000	m3	25.00	200,000.00	Hvy eq	6	150	320	288000	725,400.00	5%	36,270.00	761,670.00	7	
2.3	Asphalt layer				0	-	Asphalt	88000	m2	85.00	5,280,000.00						5,280,000.00		-	5,280,000.00	66	
2.4	Sidewalks				0	-	Sidewalks	28000	m2	75.00	1,500,000.00						1,500,000.00		-	1,500,000.00	19	
3	Finishing																					1,000,000.00
3.1	Lights				0	-	Lights	200	ea	5000	1,000,000.00						1,000,000.00		-	1,000,000.00	13	
	Total				10080	647,200.00					8,510,000.00					376,800.00	10,287,200.00		145,100.00		100	10,263,200.00
																			Check Sum			10,263,200.00

Figure 37: Budgeting Spreadsheet

Appendix A

Managing Project Risk

While managing your project, “what if” questions always come up and need to be answered.

An example would be that the contractor proposes to use PVC underground conduits instead of the concrete conduits your team had in mind. Can you accept the PVC conduits or not?

Project risk management is a good method to answer this question.

PMI’s PMBOK discusses this method in great detail.

Following is a simplified method that has worked for most projects.

Quantifying Risks

Risk is defined as the probability (P) that something will occur multiplied by the impact (I) of the occurrence on your project.

$$R = P \times I$$

Probability

The probability that something will happen is expressed as a percentage. Use a range from 10% to 90%.

Impact

The impact that the occurrence will have on a project objective is categorized from very low impact (0.05) to very high impact (0.8). The project objective can be scope, schedule, budget, quality etc.

Very low	0.05
Low	0.1
Moderate	0.2
High	0.4
Very High	0.8

Table 4: Impact Scales Table

Risk Rating

Once you and your team have determined the probability and impact of an occurrence, you are ready to determine the risk you are looking at. Do that by using the formula mentioned above: R x I.

The risk you and your team come up with can be rated using the table below. Risks can be rated as low (green area), moderate (orange area) or high (red area).

Impact	0.05	0.1	0.2	0.4	0.8
10%	0.01	0.01	0.02	0.04	0.08
20%	0.01	0.02	0.04	0.08	0.16
30%	0.02	0.03	0.06	0.12	0.24
40%	0.02	0.04	0.08	0.16	0.32
50%	0.03	0.05	0.10	0.20	0.40
60%	0.03	0.06	0.12	0.24	0.48
70%	0.04	0.07	0.14	0.28	0.56
80%	0.04	0.08	0.16	0.32	0.64
90%	0.05	0.09	0.18	0.36	0.72

Table 5: Risk Rating Table

What is considered low, moderate or high risk, is something you and your team should determine.

Plan Risk Response

Once you have rated the risk, you and your team have to determine how to respond to that risk.

Let's look at our example of the PVC underground conduit:

The identified risk is that the underground conduit will collapse while the highway is in use.

Risk Management Example

Probability: PVC underground conduits for highway construction have been in use for many years and have proven to be reliable for highway construction. So let's say that the chance of collapsing is 10%

Impact: the collapse of one of the conduits would require a highway shutdown. This can be considered as high impact, so a 0.4 on the impact scale

Risk: the risk can then be calculated as 10% x 0.4 =0.04

Risk Rating: 0.04 is rated according to our table as low risk (green area)

Risk Response: since the risk is rated as low, the response would be to accept this risk.

Note that this is just an example of how risk management can be applied on a project. This example is not about the numbers, but about the process of using risk management.

Appendix B

Managing Small Projects

PMBOK and Small Projects

PMI's PMBOK addresses project management and projects in general and does not make any distinction between big projects and small projects.

Definition of a Small Project

How do you define a small project? Some companies use a certain investment level to distinguish between big and small projects. This is not an objective criteria, since a $100,000 might be a big investment for one company, but not for a large multi-national. Also note that as mentioned before, PMI's PMBOK does not define a small project.

This eBook and Small Projects

In alignment with PMI's PMBOK, this eBook discusses project management in general, without any distinction between big projects and small projects.

However, I do realize that a distinction between big and small projects is often requested. For this reason, I decided to include a chapter on managing small projects.

Minimum Requirement for Managing Projects

Following is a list of what I see as minimum requirements for managing any project:

- Initiation Phase
  - Identify Stakeholders
  - A Project Team
- Planning Phase
  - Scope
  - Schedule
  - Budget
- Execution Phase
  - Manage Safety
  - Manage Stakeholders
  - Control Scope
  - Control Schedule
  - Control Budget
  - Quality Assurance
  - Distribute Information
  - Report Performance
- Closing Phase
  - Close Project

Difference between Small and Big Projects

As you see from the list above, the amount of project management processes needed for small projects does not differ much from that of a big project. So there is not a significant difference in the amount of processes

The difference between a small project and a big project lies in the content of each process: the content for a small project is less than for a big project. Small projects have smaller scopes, shorter schedules (sometimes) and smaller budgets.

Appendix C

Doing Your Earned Value Management

Introduction

I believe that Earned Value Management (EVM) is the most powerful project management tool ever. It is called project management with the lights on. Unfortunately it is often not used, because it is not well understood, it also takes some time to set up.

Here I will explain what the requirements are to do EVM and why EVM can be used on EVERY project.

EVM is a project management tool to keep track of the progress of your project. Conventional methods use the schedule to report progress. EVM looks at the monetary value of what was realized at a given time during the project. The monetary value of what was realized is called the earned value (EV). This EV is then compared to the monetary value of what was planned to be realized at that time. The monetary value of what was planned to be realized at that time is called the planned value (PV). The EV is also compared to the actual cost (AC) made on the project at that time.

The easiest way to set up your EVM is to use scheduling software with EVM capability. You can set it up yourself or you can ask the scheduler on your team to do it for you. All you need is the schedule of the project and cost of the activities in the schedule. The scheduling software will then generate the planned value for your project.

The advantage of using EVM is that it shows you the monetary value what you have realized (earned) on the project, compared to what you had planned and what you have spent on the project. Conventional methods will show you schedule and budget wise how you stand, but not what you have earned for the money spent on your project.

The disadvantage of EVM is that many people find it difficult to set up. My experience is that setting up EVM for the first time does take some time. But once you have it set up, you have a powerful tool that will generate one page overviews of your entire project and much more.

I once heard someone say that EVM is only for certain types of projects. Let's see if that's so:

1. Does EVERY project have a schedule?
2. Does EVERY project have a budget?

The answer to both questions is yes. So EVM can be used on EVERY project, since all you need to set up your EVM is a schedule and the cost of the activities.

Earned Value Management can be used on EVERY project

Requirements to do EVM

As explained above, all you need to do your Earned Value Management is a schedule and a budget:

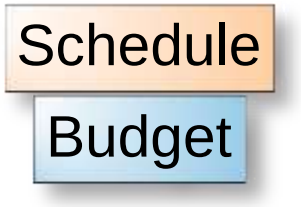


Figure 38: EVM Requirements

Setting up Your EVM

As stated above, all you need to do your EVM is a schedule and a budget

So let's get started by getting the schedule and budget for our highway example. Here you need the contractual schedule and contractual budget since you will be using EVM to control you're the cost of your (major) contract.

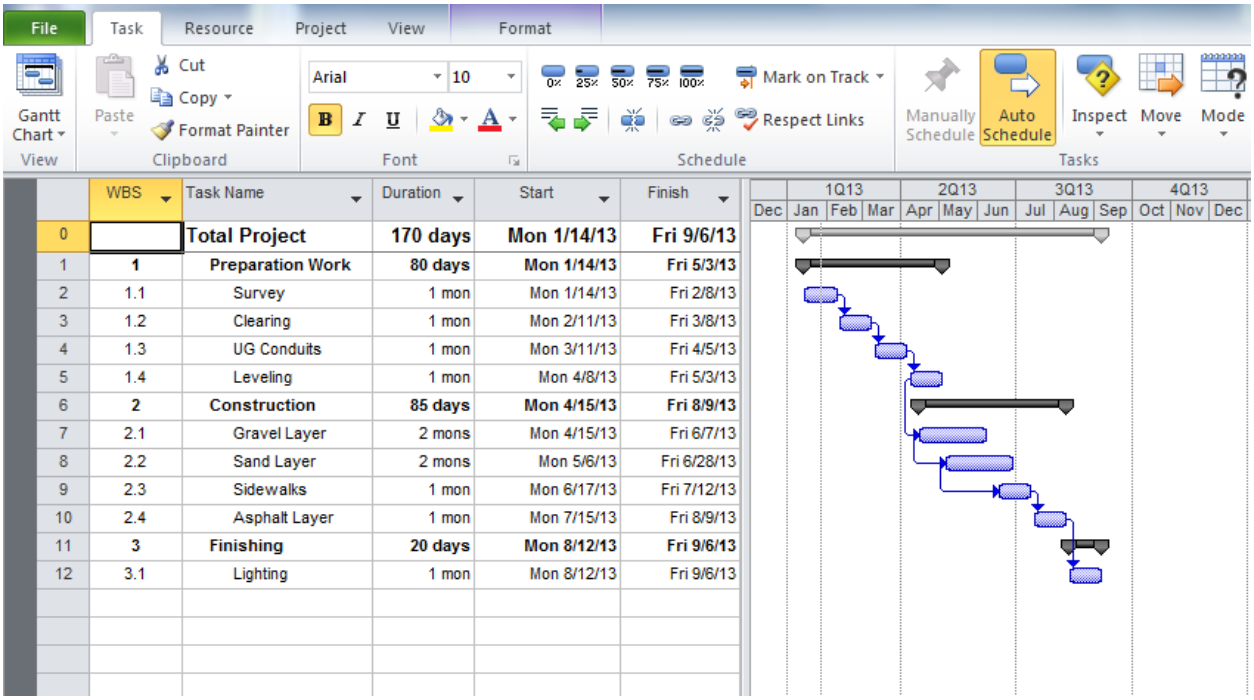


Figure 39: Contractual Schedule

WBS #	WBS-element	WBS Sub Totals	WBS Totals
1	Preparation work		$730,932.17
1.1	Survey	$29,748.97	
1.2	Clearing	$255,246.15	
1.3	Conduits	$106,543.81	
1.4	Leveling	$339,393.24	
2	Construction		$9,198,104.95
2.1	Gravel Layer	$1,255,480.86	
2.2	Sand Layer	$809,246.33	
2.3	Asphalt Layer	$5,532,245.76	
2.4	Side Walks	$1,601,132.01	
3	Finishing		$1,070,962.88
3.1	Lights	$1,070,962.88	
Total			**$11,000,000.00**

Table 6: Contractual Budget

EVM can be presented in two ways: as a table or as a graph. I prefer the graphical presentation since it is easier for the stakeholders to understand.

As mentioned above, the easiest way to perform EVM is to use scheduling software with EVM capability. For this example we will use Microsoft Project.

We will present the graph using the graphical capabilities of Microsoft Excel.

Setting up your EVM in graphical form is a five step process:

1. Set up a table in Excel with a corresponding chart.
2. Use Microsoft Project to calculate your Planned Value and transfer your calculated Planned Value to the table you created in Excel.
3. Use Microsoft Project to calculate your Earned Value and transfer your calculated Earned Value to the table you created in Excel as your project progresses.
4. Input your actual costs (AC) as you make payments as your project progresses.
5. Do your performance analysis

The next step after having your contractual schedule and budget in front of you is to transfer the amount for each WBS-component from your budget to the scheduling program.

Note that Microsoft Project 2010 has the capability of producing both the EVM table and graph. I prefer using Excel for the graph, it gives me more control.

Step 1: set up table and chart: set up the following table in Excel (I used Excel 2010, earlier versions are similar):

Date	PV	EV	AC	SV=EV-PV	CV=EV-AC	% COMPLETE
1/18/2013						
2/19/2013						
3/19/2013						
4/16/2013						
5/14/2013						
6/11/2013						
7/9/2013						
8/6/2013						
9/3/2013						
9/10/2013						

Table 7: EVM Reporting Dates

The date column contains the dates you will like to report the status of your project. Let's report every four weeks for our example from project start date to project end date.

Next select the Date, PV, EV and AC part of the table and insert a chart in your sheet (Insert tab>line (Charts group)>2D line with markers). Then choose a chart layout for example layout 5 (Design tab>Chart Layouts group>layout 5) and a chart style (Chart Styles group) of your choice. After giving your chart a title it should be looking as follows now:

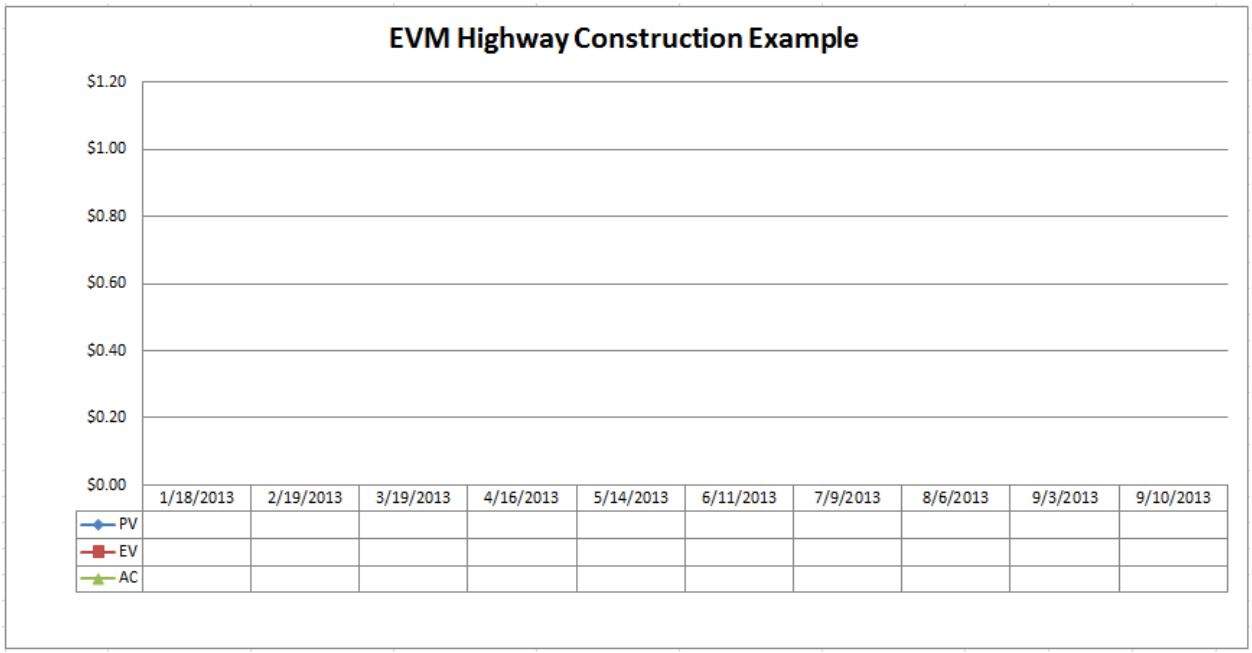
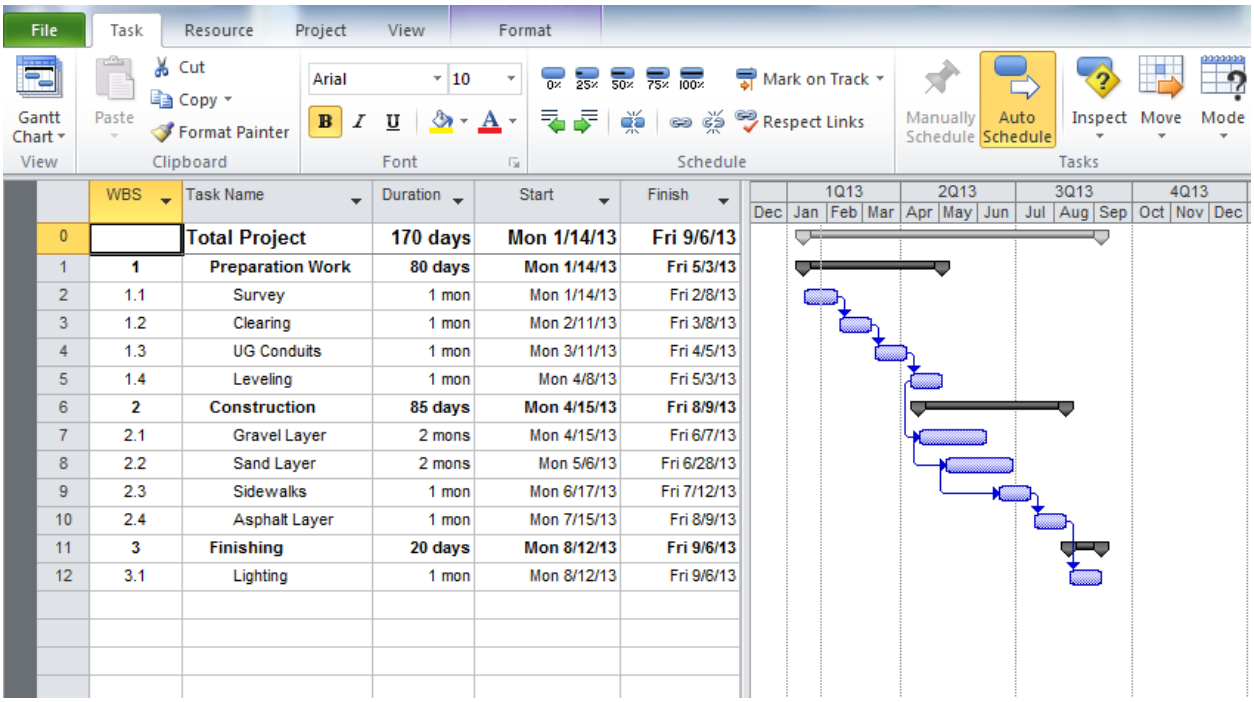


Table 8: EVM Report - Dates Only

Step 2: calculate your Planned Values. Use Microsoft Project to calculate your Planned Value and transfer it to the table you created in Excel. Take the following steps in Microsoft Project 2010 to calculate your Planned Value (earlier versions of Microsoft project are similar):

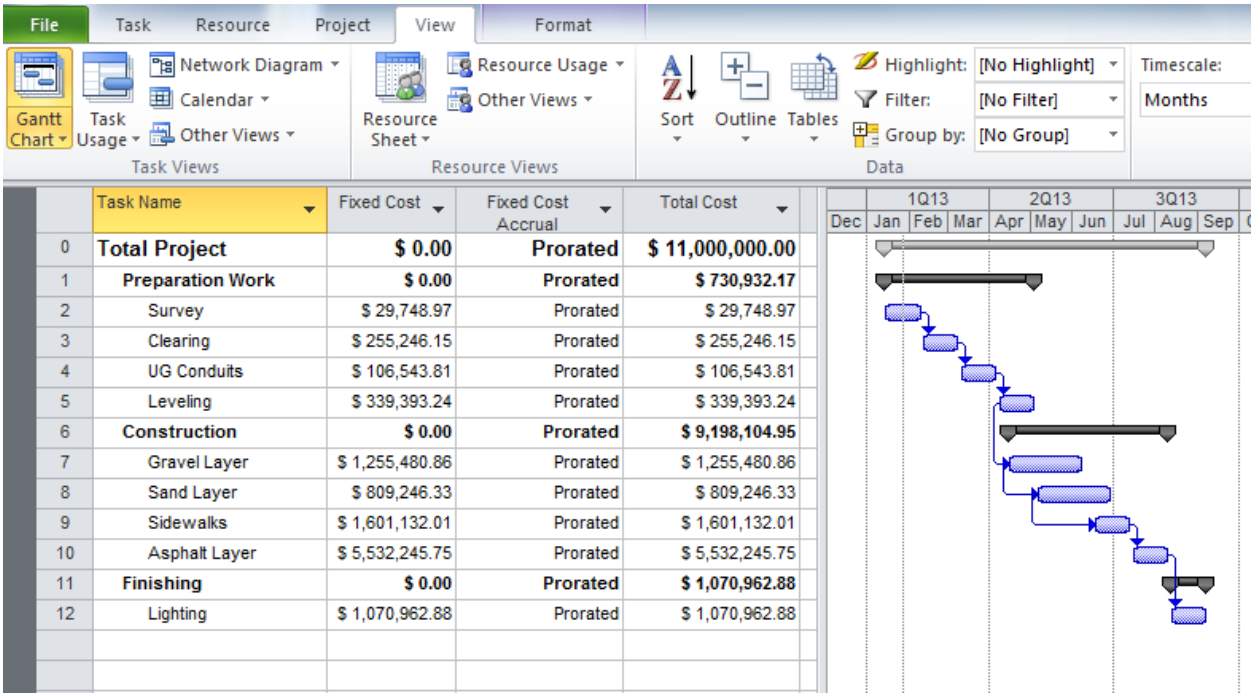
a) Schedule your project in Microsoft Project
b) Load your Cost Table (View tab>Tables (Data group)>Cost), fixed cost column
c) Save Cost Table as Base Line (Project Tab>Set Baseline (Schedule group)>Click ok
d) Save your file

e) Set Status Date (Project Tab>Project Information(Properties group)>Status date)
f) Go to your EVM view (View Tab> Tables (Data group)>More Tables>Earned Value>Click apply). BCWS=Planned Value
g) Repeat steps 5 and 6 for each Status Date wanted.



	WBS	Task Name	Duration	Start	Finish
0		**Total Project**	**170 days**	**Mon 1/14/13**	**Fri 9/6/13**
1	**1**	**Preparation Work**	**80 days**	**Mon 1/14/13**	**Fri 5/3/13**
2	1.1	Survey	1 mon	Mon 1/14/13	Fri 2/8/13
3	1.2	Clearing	1 mon	Mon 2/11/13	Fri 3/8/13
4	1.3	UG Conduits	1 mon	Mon 3/11/13	Fri 4/5/13
5	1.4	Leveling	1 mon	Mon 4/8/13	Fri 5/3/13
6	**2**	**Construction**	**85 days**	**Mon 4/15/13**	**Fri 8/9/13**
7	2.1	Gravel Layer	2 mons	Mon 4/15/13	Fri 6/7/13
8	2.2	Sand Layer	2 mons	Mon 5/6/13	Fri 6/28/13
9	2.3	Sidewalks	1 mon	Mon 6/17/13	Fri 7/12/13
10	2.4	Asphalt Layer	1 mon	Mon 7/15/13	Fri 8/9/13
11	**3**	**Finishing**	**20 days**	**Mon 8/12/13**	**Fri 9/6/13**
12	3.1	Lighting	1 mon	Mon 8/12/13	Fri 9/6/13

Figure 40: Project Schedule



	Task Name	Fixed Cost	Fixed Cost Accrual	Total Cost
0	**Total Project**	**$ 0.00**	**Prorated**	**$ 11,000,000.00**
1	**Preparation Work**	**$ 0.00**	**Prorated**	**$ 730,932.17**
2	Survey	$ 29,748.97	Prorated	$ 29,748.97
3	Clearing	$ 255,246.15	Prorated	$ 255,246.15
4	UG Conduits	$ 106,543.81	Prorated	$ 106,543.81
5	Leveling	$ 339,393.24	Prorated	$ 339,393.24
6	**Construction**	**$ 0.00**	**Prorated**	**$ 9,198,104.95**
7	Gravel Layer	$ 1,255,480.86	Prorated	$ 1,255,480.86
8	Sand Layer	$ 809,246.33	Prorated	$ 809,246.33
9	Sidewalks	$ 1,601,132.01	Prorated	$ 1,601,132.01
10	Asphalt Layer	$ 5,532,245.75	Prorated	$ 5,532,245.75
11	**Finishing**	**$ 0.00**	**Prorated**	**$ 1,070,962.88**
12	Lighting	$ 1,070,962.88	Prorated	$ 1,070,962.88

Figure 41: Cost Loaded Schedule

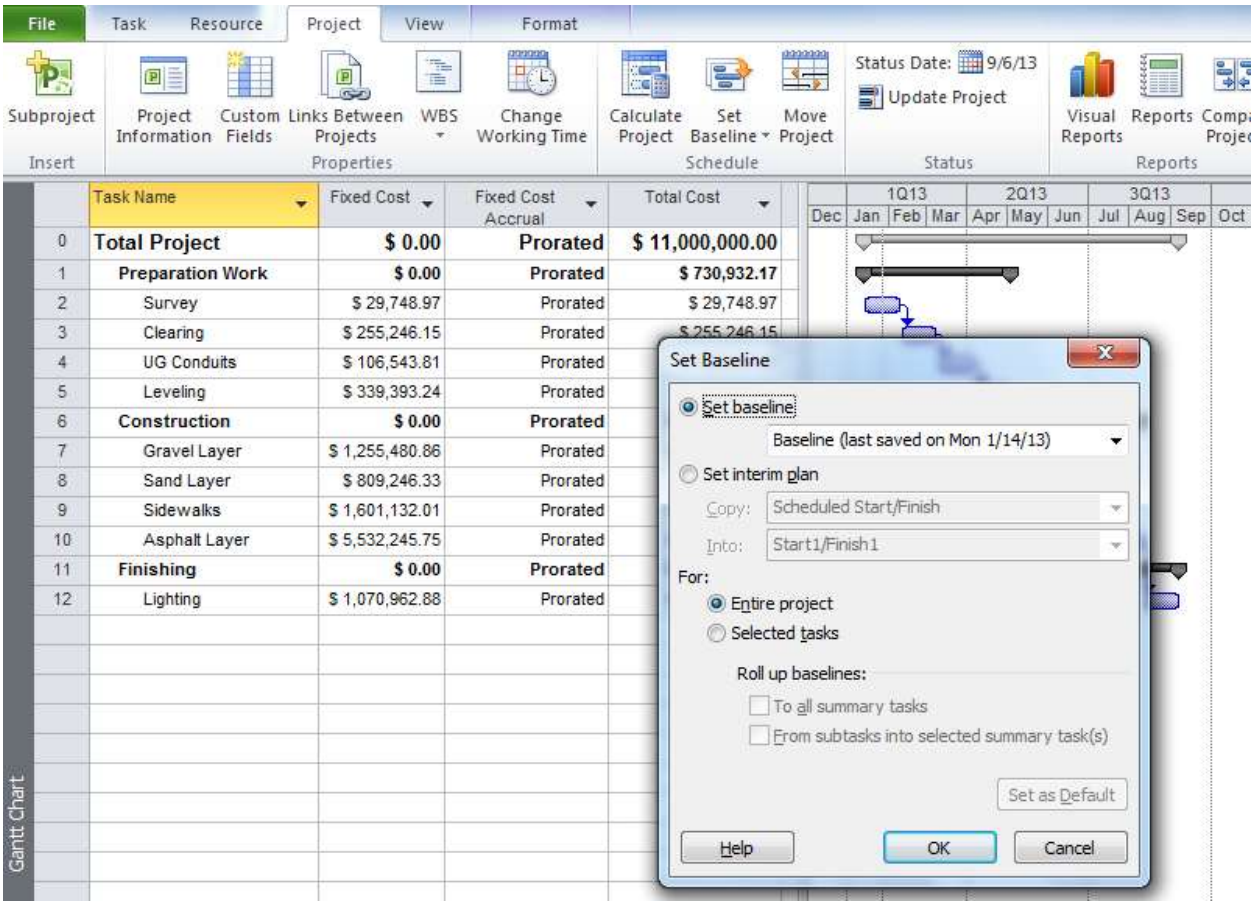


Figure 42: Set Baseline

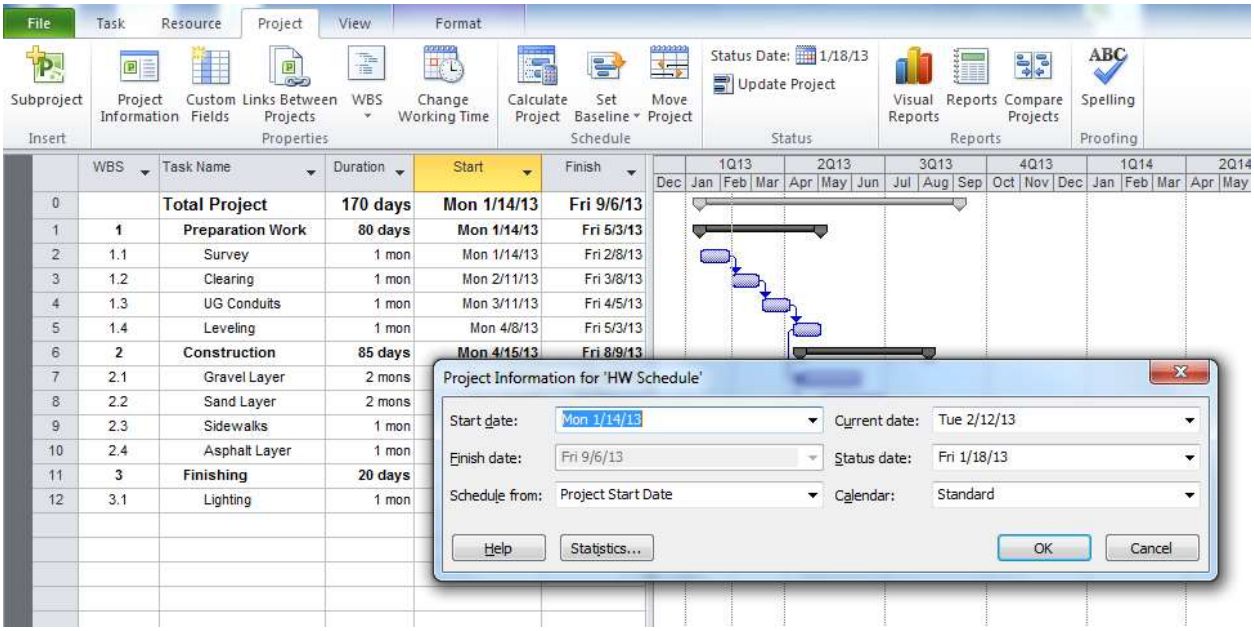


Figure 43: Set Status Date

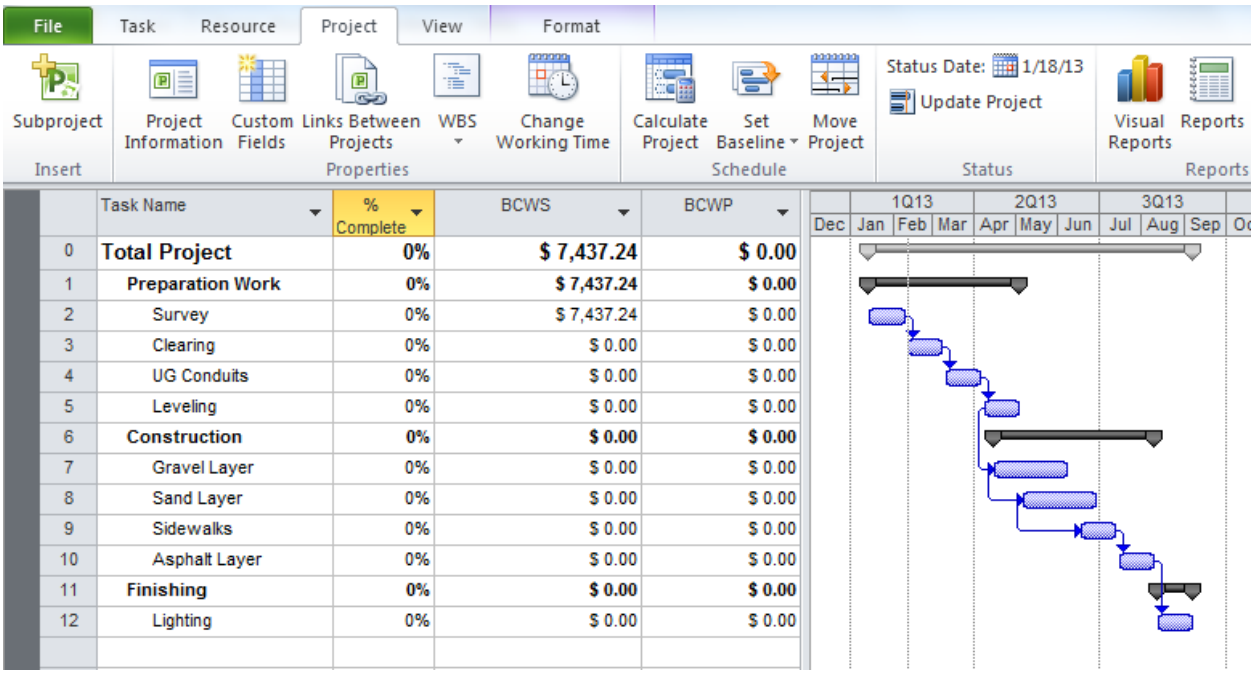


Figure 44: Planned Value Calculation

Your table and chart should look like this now:

Date	PV	EV	AC	SV=EV-PV	CV=EV-AC	% COMPLETE
1/18/2013	$7,437.24					
2/19/2013	$93,560.51					
3/19/2013	$311,631.07					
4/16/2013	$476,387.24					
5/14/2013	$1,459,828.39					
6/11/2013	$2,492,191.99					
7/9/2013	$3,996,508.37					
8/6/2013	$8,545,975.68					
9/3/2013	$10,732,259.28					
9/10/2013	$11,000,000.00					

Table 9: Planned Value Table

Note that the Planned Values are entered as accumulated values. The Earned Value and Actual Cost will also be entered as accumulated values.

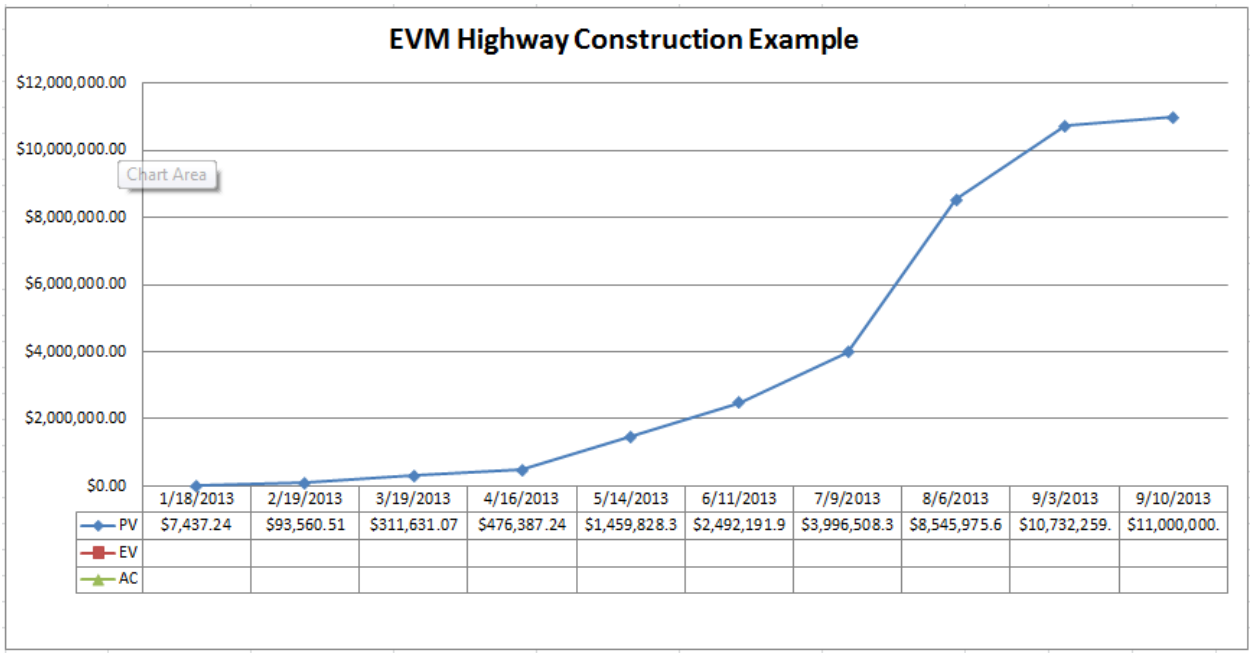
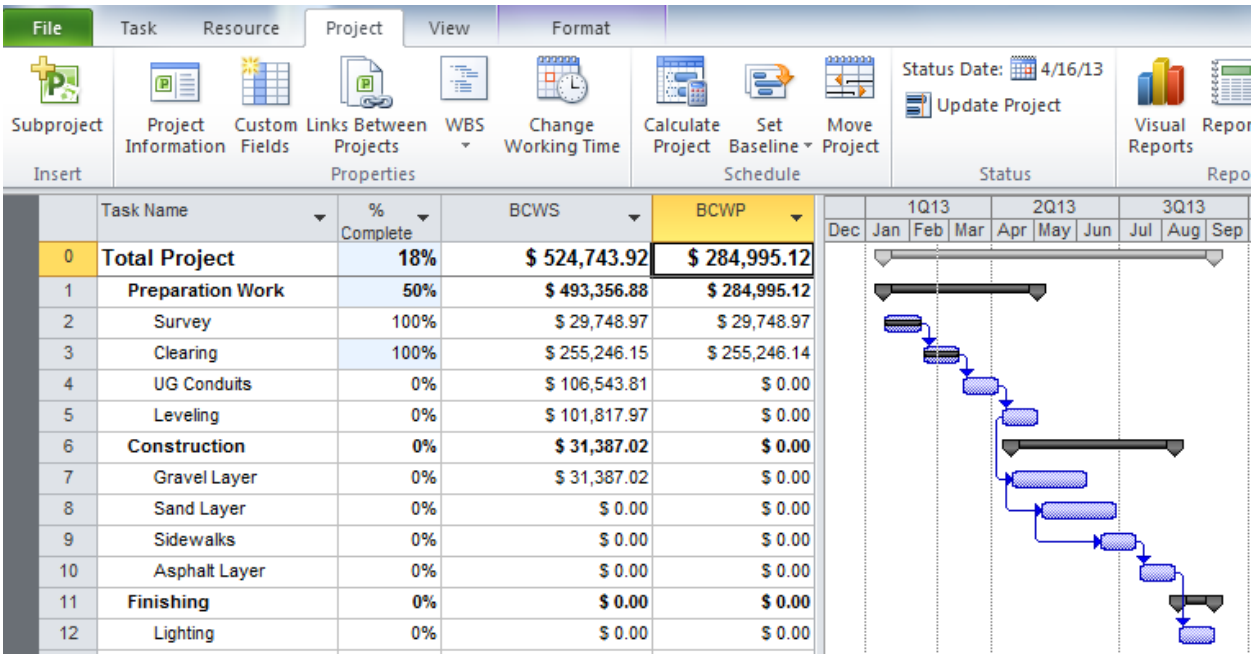


Figure 45: Planned Value Curve

Step 3: calculate your Earned Values. Use Microsoft Project to calculate your Earned Value and transfer it to the table you created in Excel. Take the following steps in Microsoft project 2010 to calculate your Earned Value (earlier versions of Microsoft Project are similar):

1. Go to your EVM view (View Tab> Tables (Data group)>More Tables>Earned Value>Click apply)
2. Select the BCWS column
3. Right click>insert column>%complete (open the dropdown list and then type "%")
4. Fill in your % complete for each reporting date as your project progresses
5. Set your status date for each reporting date.
6. Transfer EV (=BCWP) to your Excel table

Remark: the screenshots below are for reporting date 4/16/2013 and assuming that the underground conduits are delayed and not on site, surveying and clearing are 100% complete, but underground conduits and leveling could not start as planned.



	Task Name	% Complete	BCWS	BCWP
0	**Total Project**	**18%**	**$ 524,743.92**	**$ 284,995.12**
1	**Preparation Work**	**50%**	**$ 493,356.88**	**$ 284,995.12**
2	Survey	100%	$ 29,748.97	$ 29,748.97
3	Clearing	100%	$ 255,246.15	$ 255,246.14
4	UG Conduits	0%	$ 106,543.81	$ 0.00
5	Leveling	0%	$ 101,817.97	$ 0.00
6	**Construction**	**0%**	**$ 31,387.02**	**$ 0.00**
7	Gravel Layer	0%	$ 31,387.02	$ 0.00
8	Sand Layer	0%	$ 0.00	$ 0.00
9	Sidewalks	0%	$ 0.00	$ 0.00
10	Asphalt Layer	0%	$ 0.00	$ 0.00
11	**Finishing**	**0%**	**$ 0.00**	**$ 0.00**
12	Lighting	0%	$ 0.00	$ 0.00

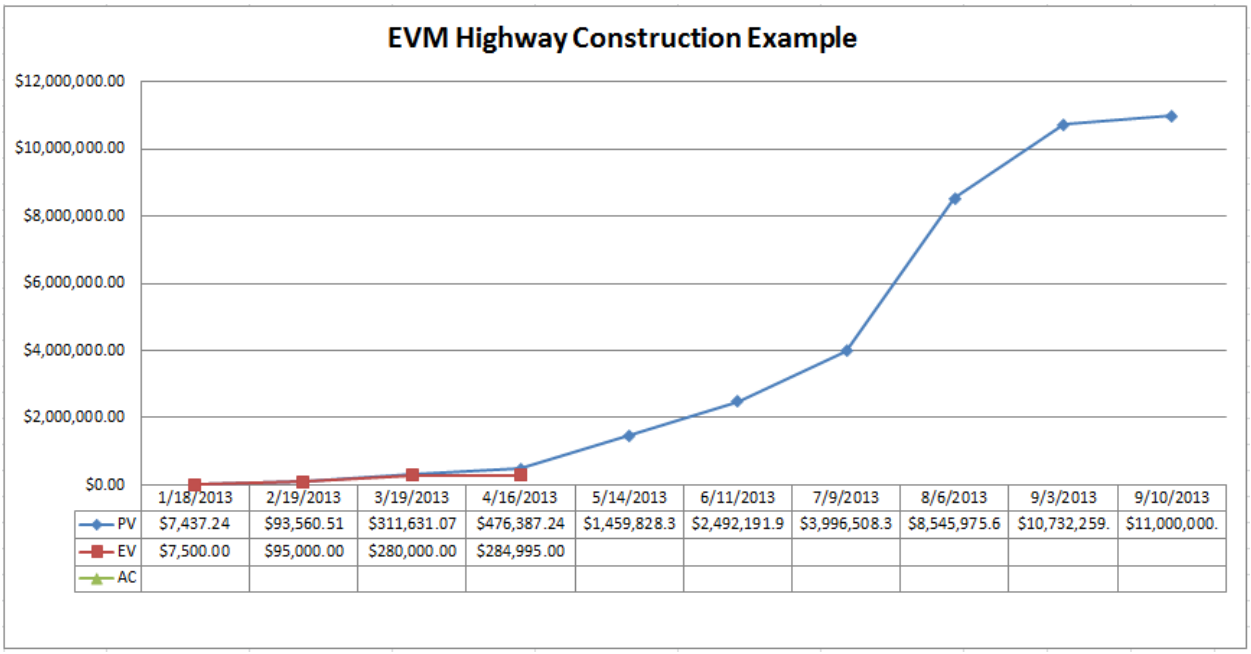
Figure 46: Earned Value Calculation

Your EVM table and graph should look like this now:

Date	PV	EV	AC	SV=EV-PV	CV=EV-AC	% COMPLETE
1/18/2013	$7,437.24	$7,500.00				
2/19/2013	$93,560.51	$95,000.00				
3/19/2013	$311,631.07	$280,000.00				
4/16/2013	$476,387.24	$284,995.00				
5/14/2013	$1,459,828.39					
6/11/2013	$2,492,191.99					
7/9/2013	$3,996,508.37					
8/6/2013	$8,545,975.68					
9/3/2013	$10,732,259.28					
9/10/2013	$11,000,000.00					

Table 10: Earned Values as of April 16th, 2013

Remark: the Earned Values for January 18th, February 19th and March 19th are entered as examples directly into the table. The Earned Value for April 16th was determined using Microsoft Project.



	1/18/2013	2/19/2013	3/19/2013	4/16/2013	5/14/2013	6/11/2013	7/9/2013	8/6/2013	9/3/2013	9/10/2013
PV	$7,437.24	$93,560.51	$311,631.07	$476,387.24	$1,459,828.3	$2,492,191.9	$3,996,508.3	$8,545,975.6	$10,732,259.	$11,000,000.
EV	$7,500.00	$95,000.00	$280,000.00	$284,995.00						
AC										

Figure 47: Planned Value and Earned Value Curves

Step 4: Input your Actual Cost. Input your payments as actual costs (AC) as your project progresses. In our example the survey and clearing have been completed as planned, so the milestones have been paid according to the contractual payment schedule.

Milestone	Contractual Budget	Payment Schedule
Survey	$29,748.97	$30,000.00
Clearing	$255,246.15	$250,000.00
Conduits	$106,543.81	$100,000.00
Leveling	$339,393.24	$300,000.00
Gravel Layer	$1,255,480.86	$1,200,000.00
Sand Layer	$809,246.33	$800,000.00
Asphalt Layer	$5,532,245.76	$5,000,000.00
Side Walks	$1,601,132.01	$1,500,000.00
Lights	$1,070,962.88	$1,000,000.00
Final Payment		$820,000.00
	$11,000,000.00	**$11,000,000.00**

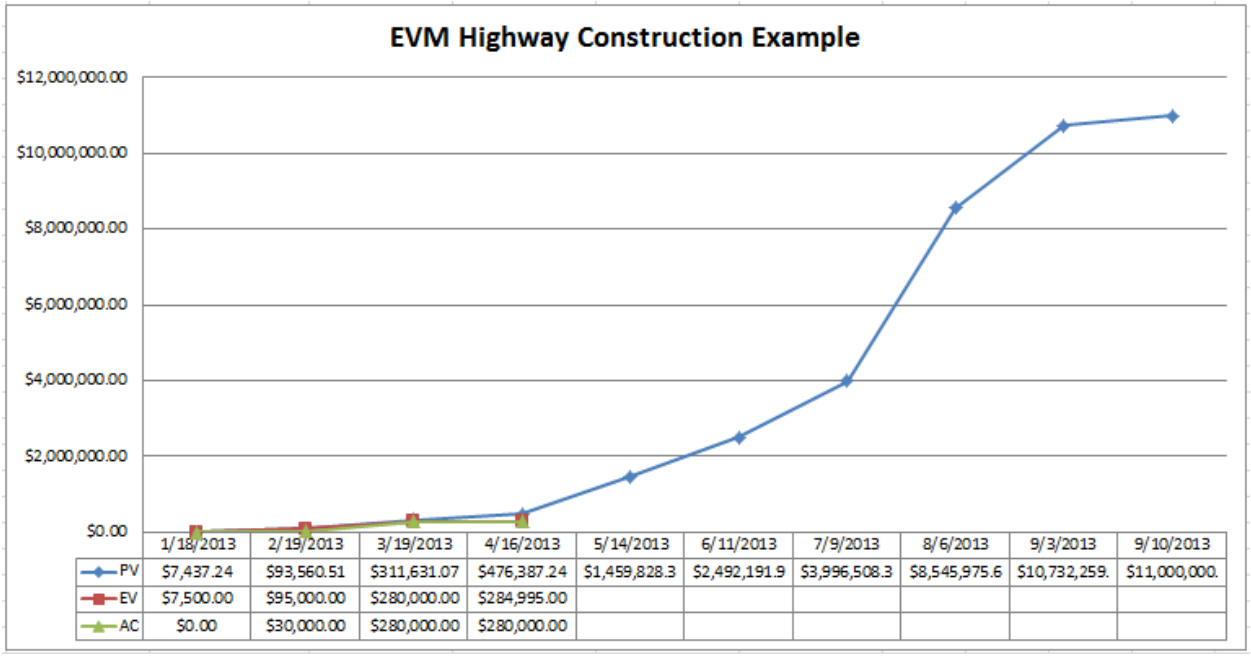
Table 11: Contractual Payment Schedule

The underground conduits are delayed. They were scheduled for completion on April 5th, 2013. They are not paid for as of our reporting date of April 16th, 2013. Your table and graph should look like this now:

Date	PV	EV	AC	SV=EV-PV	CV=EV-AC	% COMPLETE
1/18/2013	$7,437.24	$7,500.00	$0.00			
2/19/2013	$93,560.51	$95,000.00	$30,000.00			
3/19/2013	$311,631.07	$280,000.00	$280,000.00			
4/16/2013	$476,387.24	$284,995.00	$280,000.00			
5/14/2013	$1,459,828.39					
6/11/2013	$2,492,191.99					
7/9/2013	$3,996,508.37					
8/6/2013	$8,545,975.68					
9/3/2013	$10,732,259.28					
9/10/2013	$11,000,000.00					

Table 12: EVM Table as of April 16th, 2013

Note that PV, EV and AC are all entered as accumulated values.



	1/18/2013	2/19/2013	3/19/2013	4/16/2013	5/14/2013	6/11/2013	7/9/2013	8/6/2013	9/3/2013	9/10/2013
PV	$7,437.24	$93,560.51	$311,631.07	$476,387.24	$1,459,828.3	$2,492,191.9	$3,996,508.3	$8,545,975.6	$10,732,259.	$11,000,000.
EV	$7,500.00	$95,000.00	$280,000.00	$284,995.00						
AC	$0.00	$30,000.00	$280,000.00	$280,000.00						

Figure 48: EVM graph as of April 16th, 2013

Performance Analysis

Use your table to calculate your performance indicators as your project progresses.

- Your Schedule Variance is calculated as SV=EV-PV. A positive SV means that you are ahead of schedule
- Your Cost Variance is calculated as CV=EV-AC. A positive CV means that your money spent is well accounted for.

SV = EV - PV

CV = EV - AC

Date	PV	EV	AC	SV=EV-PV	CV=EV-AC
1/18/2013	$7,437.24	$7,500.00	$0.00	$62.76	$7,500.00
2/19/2013	$93,560.51	$95,000.00	$30,000.00	$1,439.49	$65,000.00
3/19/2013	$311,631.07	$280,000.00	$280,000.00	-$31,631.07	$0.00
4/16/2013	$476,387.24	$284,995.00	$280,000.00	-$191,392.24	$4,995.00
5/14/2013	$1,459,828.39				
6/11/2013	$2,492,191.99				
7/9/2013	$3,996,508.37				
8/6/2013	$8,545,975.68				
9/3/2013	$10,732,259.28				
9/10/2013	$11,000,000.00				

Figure 49 Performance Indicators (SV, CV)

From the table we see that as of April 16th, 2013, schedule wise we are not doing so good (negative schedule variance), but money wise we are ok (positive cost variance).

Presenting Your EVM

As mentioned before, I prefer to present EVM in graphical form because it is easier for the stakeholders to understand compared to the table. People are graphical beings.

Take your Excel graph and transfer it to your PowerPoint presentation for your stakeholders. You can use the Insert>Screen Shot function in PowerPoint 2010.

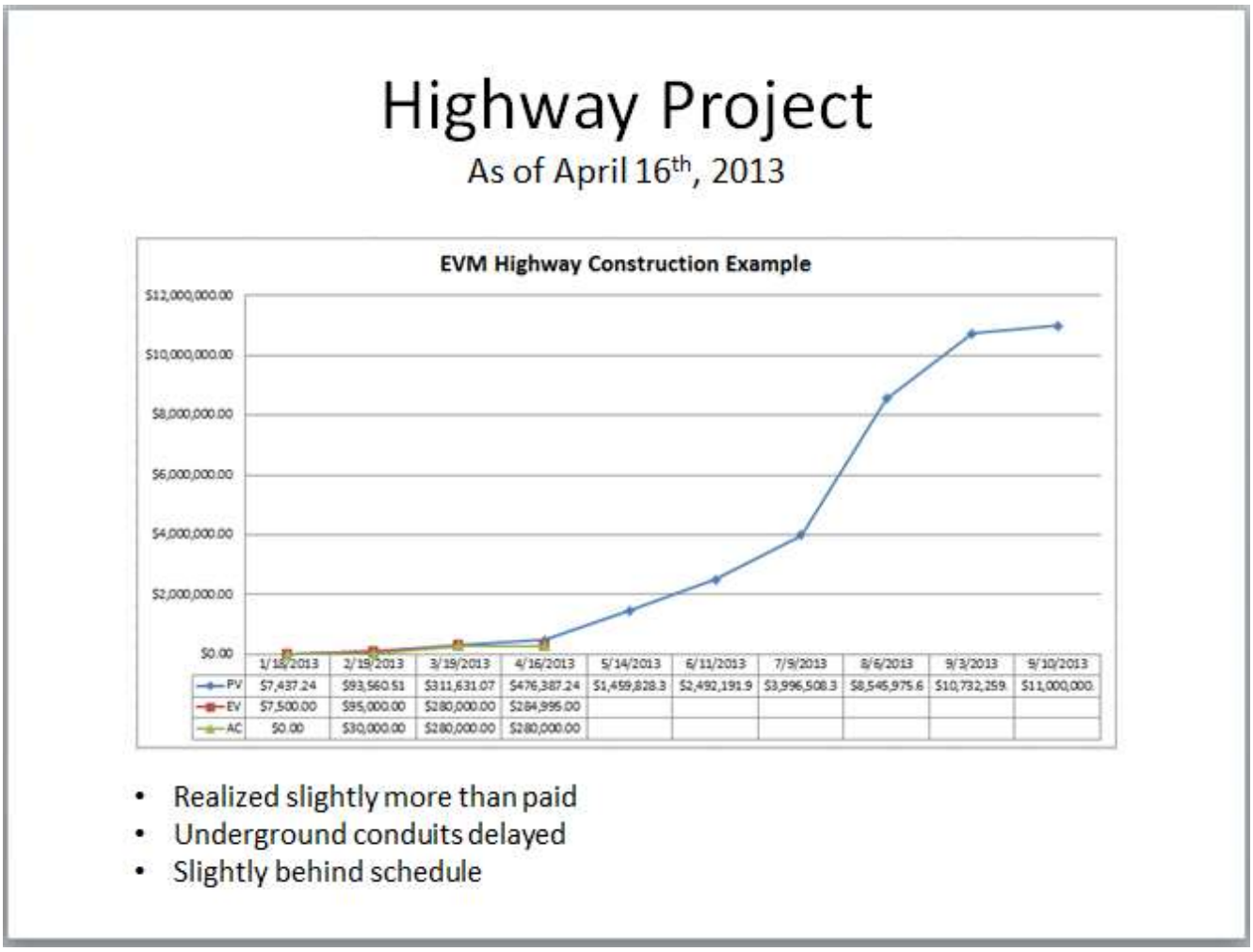


Figure 50: Presenting EVM

Contact me at victor@victorhuntconsulting.com for assistance with your Earned Value Management for your specific case.

We also offer an EVM service to do your EVM for you at a nominal charge. Contact me for an offer.

Templates

HINT: save all original templates and make working copies whenever you need a template.

The following templates should be included with this eBook:

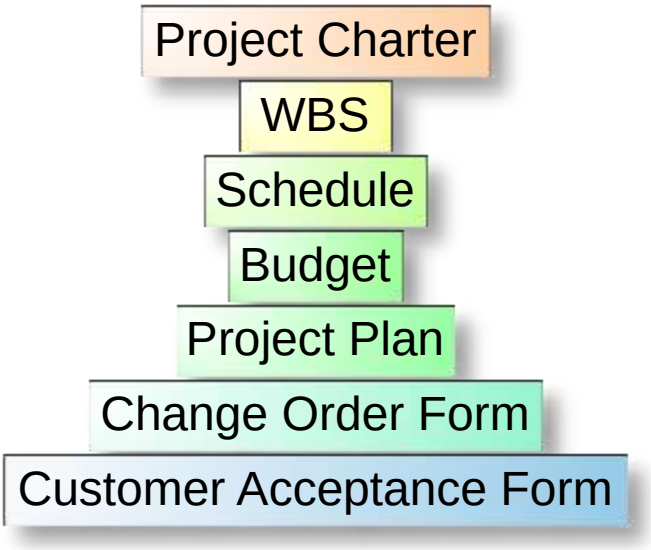


Figure 51: Included Templates