Project Managed Change Program

WORK PROGRAM GUIDELINES

JABATAN KERJA RAYA MALAYSIA

Cawangan Pengurusan Projek Kompleks

(PROKOM)

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Document Ownership

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PREFACE

This guideline is based on Project Management Book of Knowledge (PMBoK) and the Practice Standard for Scheduling by the Project Management Institute (PMI), USA. It is adapted to the introduction and development of Work Program particularly in Jabatan Kerja Raya Malaysia.

This guideline is to serve project planner/scheduler in:-

- Developing a work scheduling used in conjunction with Microsoft Project.

- Evaluating the work program that has been submitted by the contractors/consultants.

This guide contains the:

- Steps involved in developing a work program;

- Format of work program during submission of accepted program.

- Microsoft Work program components and items that needs to be included in a work program;

- Checklist for assessing work program submitted by contractors/consultant during planning, progress and revision stage.

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1.0   Introduction to Work Program Guideline

Project management is one of JKR core business. In this aspect, JKR promised to deliver the projects on time, within budget and with the specified quality. To achieve this, project management best practices is being inculcated within JKR working environment.

Project time management is the core function of project management whereby any changes in time will affect the success of the project. Project time management includes the processes required to accomplish timely completion of the project. One of the tools being used to achieve this objective is Work Program.

Work Program describes what the work is to be done, who will undertake the work (resources) and when it should be done. The benefits of having a work program are:

- project planning and strategic analysis;
- encourages detailed thinking and planning force;
- improves communication;
- provides a goal;
- gives indication when you are off track;
- reduces delivery time;
- reduces cost;
- increases productivity;
- detects problems at early stage – to prevent, minimize and/or mitigate the impact of schedule problems on the completion of the project and
- Enables project manager to control the project instead of the project having control of them.

2.0   Overview on Work Program

The purpose of the work program is to provide a useful 'road map' that can be used by the project manager and the project team to:

- Plan, monitor, and control the timely execution of the work, from the day the project commences through each of its phases to successful completion;
- Track and monitor the progress of the project;
- Manage resources more smoothly;
- Identify and monitor dependencies and constraints between tasks to avert preventable delays; and
- Communicate more frequently and effectively with stakeholders.

Establishing a realistic and achievable work program is one of the critical initial actions in setting up a project.

The work program provides a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration and deadlines. The work program should be detailed enough to show each Work Breakdown Structure (WBS) task to be performed, the name of the person responsible for completing the task, the start and end date of each task, and the expected duration of the task.

Failure to meet schedule goals is most often due to unrealistic deadlines, passive project execution, unforeseen problems, or things overlooked in the plan.

3.0   Elements Of Developing Work Program

A Work program consists of a table of activities with their scheduled dates when activities and milestones are to take place. In the project management profession, Work programs are used to guide the execution of the project as well as to communicate to all participants and contributors to the project when certain activities and events are expected to happen.

Successful completion of a project is heavily dependent on effective planning. A project plan allows you to complete a project within a specified timeline and a

No.	Process	Description
1.	Define the Project Scope Charter	Obtain a clear picture of what the scope, deliverables and tasks of the project.
2.	Create WBS and Capture All Deliverables	Subdividing the major project deliverables and project work into smaller and more manageable components.
3.	Define Activities	Identifying the specific schedule activities that need to be performed to produce the various project deliverables inclusive of risk mitigation measures. It should have enough detail to reduce the risk of forgetting important steps.
4.	Define Sequence of Activities	Put the tasks into order. Identify and document the logical relationships among schedule activities.
5.	Estimate Resources for All Activities	Estimating the type and quantities of resources required to perform each schedule activity.
6.	Estimate Activity Duration	Estimating the time needed to complete individual schedule activities (based on production rates and quantity or work).
7.	Develop the Schedule	Analyzing activity sequences, durations, resource requirements, and schedule constraints to create the work program.
8.	Cost estimate and budget	Estimating and distributing the cost to WBS according to the BQ from project contract sum.

specified budget. The work program provides an outline structure to the project.

 In short, a work program tells us how much time a project or any part of it will take.

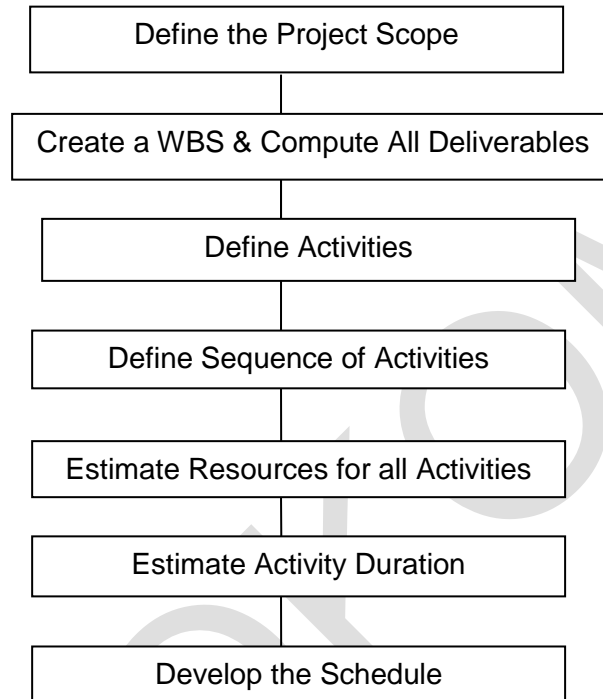The main steps in developing a work program are as below:

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┌─────────────────────────────────────────┐
│         Define the Project Scope         │
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┌─────────────────────────────────────────┐
│   Create a WBS & Compute All Deliverables │
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                    │
┌─────────────────────────────────────────┐
│            Define Activities             │
└─────────────────────────────────────────┘
                    │
┌─────────────────────────────────────────┐
│        Define Sequence of Activities      │
└─────────────────────────────────────────┘
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┌─────────────────────────────────────────┐
│      Estimate Resources for all Activities │
└─────────────────────────────────────────┘
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┌─────────────────────────────────────────┐
│         Estimate Activity Duration        │
└─────────────────────────────────────────┘
                    │
┌─────────────────────────────────────────┐
│           Develop the Schedule            │
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Table 1 : Description of Process

4.0   Schedule Components

The schedule component provides a detailed categorized list of the potential components of a scheduling. Based on Microsoft Project, not all components are required for all projects.

Some guidance is given on those components that are required for JKR projects but the project manager may add more components if the need arises, please refer to Appendix A.

5.0   Guidelines On The Format Of Work Program For Submission Of Accepted Program

For all JKR projects, Work program submitted in Microsoft Project (soft and hard copy) should consist of the followings items:

MS Project components	Items To Be Included
Gantt Table	ID, Indicators, WBS Code/ID, Task Name, Duration (days), Start Date, Finish Date, Predecessor, Resource name, Cost, Total Float
Gantt bar	Bar, link, resource name, milestone
Identification of Critical Activities (critical activities should be in red color)	<u>Gantt Table</u> ID, Indicator, WBS, Task name, Duration, Start Date, Finish Date, Predecessor, Total Float/Slack <u>Gantt Bar</u> Bar, Link, Resource name <u>Network Diagram</u> Critical activities, critical path, relationship.

Table 2: Format Of Work program Submission

6.0   Schedule Conformance Assessment

6.1   Assessing Work program – Planning Stage

Assessment of the work program during the planning stage is where the successful contractor/consultant will submit the work program for approval.

Appendix B indicates the items that need to be assessed to ensure the work program is complete and can be used to monitor the project later. Once approved, the work program will be the baseline program on which the monitoring and control of the project is based on.

Generation of the financial and physical S-curve for the project must be from the approved baseline program.

6.2   Assessing Work program – Progress Stage

At this stage the contractor will submit the work program showing the progress of the work.

Assessment by project manager is to verify the schedule submitted by the contractor/consultant for progress report is correct and reasonable.

The guide is as in **Appendix C.**

6.3   Assessing Work program – Revision Stage

Many of projects managed by JKR experience change in scope or face constraints that require Extension of Time (EOT). Once the changes in scope or constraint is recognized and approved by the project manager, then the contractor/consultant must revise the work program to reflect the changes.

Once approved, the work program will become the new baseline program on which the monitoring and control of the project is based on.

Project manager then need to assess the revised work program to justify the quantum of the EOT.

The guide is as in **Appendix D.**

APPENDIX A – SCHEDULING COMPONENTS

Category	Components	Required/Optional	Remark
Calendar	Activity Calendar	Optional	Project Calendar for JKR project must be based on the Government working days.
	Project Calendar	Required	
	Resource Calendar	Optional	
Constraint	Expected Finish	Optional	
	Finish Not Earlier Than	Optional	
	Finish Not Later Than	Optional	
	Finish On	Optional	
	Mandatory Finish Date	Optional	
	Mandatory Start Date	Optional	**Not allowed** unless with prior approval from SO/PD. Constraint in the program does not reflect the true situation of the project.
	Project Start Constraint	Optional	
	Project Finish Constraint	Optional	
	Start Not Earlier Than	Optional	
	Start Not Later Than	Optional	
	Start On	Optional	

Category	Components	Required/Optional	Remark
Duration	Activity Actual Duration	Required	
	Activity Baseline Duration	Required	
	Activity Remaining Duration	Optional	
	Project Actual Duration	Required	Tasks shall be less than one month (20 working days) in duration.
	Project Baseline Duration	Required	
	Project Remaining Duration	Optional	
	Project Target Duration	Optional	
	Project Total Duration	Optional	
Finish Date	Activity Actual Finish Date	Required	
	Activity Baseline Finish Date	Required	
	Activity Early Finish Date	Required	
	Activity Late Finish Date	Required	
	Activity Resource Levelled Finish Date	Optional	
	Activity Target	Optional	

Category	Components	Required/Optional	Remark
	Finish Date		
	Project Actual Finish Date	Required	
	Project Baseline Finish Date	Required	
	Project Early Finish Date	Required	
	Project Late Finish Date	Required	
	Project Resource Leveled Finish Date	Optional	
	Project Target Finish Date	Optional	
Percent Complete	Activity Duration Percent Complete	Optional	
	Activity Physical Percent Complete	Required	
	Project Duration Percent Complete	Optional	
	Project Physical Percent Complete	Required	

Category	Components	Required/Optional	Remark
Relationship	Finish to Finish	Optional	1. Based on the method statement and method of construction proposed.
	Finish to Start	Required	
	Start to Finish	Optional	
	Start to Start	Optional	2. There will be no loose ends in the scheduling logic (every task and milestone will have a predecessor except the project start milestone; every task and milestone will have a successor except the project end milestone.
			Any of use of start-to-start, start-to-finish, and finish-to-finish scheduling logic will be accompanied by an explanation; generally this logic is discouraged.

Category	Components	Required/Optional	Remark
Resource	Driving Resources	Required	1. For construction scheduling, the resources should be determined by the contractor, but JKR project managers must check to ensure resources are adequate to meet project requirements.
	Resource Assignment	Required	
	Resource Availability	Optional	
	Resource Description	Optional	
	Resource ID	Optional	
	Resource Lag	Optional	
	Resource Leveling	Optional	
	Resource Library\Dictionary	Optional	2. Resources, work and scheduling logic shall never be associated with summary elements in the WBS; they shall be tied to tasks and milestones only.
	Resource Rates/Prices	Optional	
	Resource Type	Optional	
Start Date	Activity Actual Start Date	Required	
	Activity Baseline Start Date	Required	
	Project Actual Start Date	Required	
	Project Baseline Start Date	Required	

Category	Components	Required/Optional	Remark
Miscellaneous	Activity Code	Optional	
	Activity Cost Component	Optional	
	Activity Cost Estimate	Optional	
	Activity Effort	Optional	
	Activity ID	Required	
	Activity Label	Optional	
	Activity Scope Definition	Optional	
	Assigned Quantity	Optional	
	Baseline Data Date	Optional	
	Critical Path	Required	More than one critical path indicates that the work program needs to be re-planned.
	Custom Field	Optional	
	Data Date	Optional	
	Earned Value	Optional	
	Estimate at Completion (EAC)	Optional	
	Estimate to Complete (ETC)	Optional	
	Lag	Optional	
	Lead	Optional	
	Level	Optional	
	Milestone	Required	

Category	Components	Required/Optional	Remark
	Project Description	Optional	
	Project Manager	Optional	
	Project Name	Required	
	Work program ID	Optional	
	Project Version	Optional	The two required Milestone for JKR is the Start and Finish date as in Contract.
	Summary Activity	Optional	
	Unit of Measure	Required	
	Update Cycle	Required	
	WBS ID	Required	Duration unit to be decided by SO/PD
			Ensure the contractor to update at least once in every two weeks to detect task slippage early.
			1. Every project deliverable should appear by name in the Work Breakdown Structure (WBS).
			2. The WBS will be hierarchical, with each level of the hierarchy generally containing between three and seven child items.

Category	Components	Required/Optional	Remark
			3. The primary goal of the WBS will be to organize the work so it is clear to stakeholders and completely defined, not to sequence the work; phases and deliverables may be overlapping in time.
Float / Slack	Free Float / Slack	Required	Float /slack should be used to check the critical activities.
	Total Float/Slack	Required	

Checklist for Assessing Work program – Planning Stage

Project Management Process	Elements	What To Look For / best practice
Scope Definition	Project Name	The project name should be the same name used in the contract
	Project Start Date or Finish Date	Start and finish date must be the same as in the contract date.
	Scheduling Pattern	Check whether Forward or Backward Scheduling – Ensure forward scheduling is used. This will determine the way of scheduling and planning.
	Project File Name, Folder Name, Revision No.	Project file name should contain Project Name for ease of documentation and search. Revision numbering to be agreed between JKR and contractor and should include date revised.
	Type of Software and version to run the file	JKR projects usually use Microsoft Project Office - ensure the version is compatible with the version owned by project team members.
Create WBS	WBS List	Deliverables should be broken down to a minimum of Level 4 (task level).
	WBS Level	
	Every single group of work	

Project Management Process	Elements	What To Look For / best practice
	(summary task) will have different level of WBS	
	WBS Coding System	
	WBS has been created completely by expanding all sub-tasks	
	Work Package	Acceptance Criteria for the lowest level of each WBS must be measurable and manageable, i.e. duration, cost and resource can be easily assigned to the work package.
	Work Attributes	There are generally two categories: • Physical (Contribute to the progress of works); • Supporting or Level of Effort (LOE) [Contribute financially, but would not affect the progress of works] e.g. maintenance, preliminary
	Total work package = Works defined in the Contract Documents	Check this to ensure no work is left out.

	WBS Attributes can be classified as:
	
	    • Summary Tasks
	    • Sub-Tasks
		Ensure:
		
		 • Milestone has zero duration.
		
		 • External dependencies such as Relocation of services and

Project Management Process	Elements	What To Look For / best practice
	• Milestones (has zero duration) • Recurring Tasks • Tasks with the Split • Tasks with the Constraints	Land Acquisition to be identified and can be created as milestone. • Identify Recurring tasks such as monthly site meeting and monthly progress report. • Split task is not allowed for JKR projects. If not, justification is needed. • Any constraints on task shall not be allowed by JKR
	Long Lead Items: • Proposal • Approval • Design • Fabrication • Supply • Testing (Factory Acceptance Testing) • Delivery/Installation • Testing & Commissioning • Preliminary, Provision Sum, Design Elements – Identify the WBS level	JKR to decide whether procurement components to be included or not, depending on how it affect the progress of work. This may apply to Equipment, Material, Tools, Machinery and etc.
Activity Sequencing	Method Statement Method of Construction Shop Drawing Work Procedures	JKR to ensure all the documents are submitted. These documents indicate the contractors plan to carry out the Project Works. It should be the basis to check for

Project Management Process	Elements	What To Look For / best practice
		completeness and logic of activity sequencing.
	Predecessors Successors	Every task must have a predecessor, except the Project Start and recurring tasks. Every task must have a successor, except the Project Finish Date and recurring tasks.
	Link Type: Finish-Start (FS), Start-Start (SS), Finish-Finish (FF), Start-Finish (SF)	Check the logic of sequencing and realistic duration of lead/lag time.
	Task Constraints	• Check for constraints imposed on certain work (indicators column). • Query on constraints and take appropriate action.
	Network Diagram	Check continuity of linkages from Project Start to Project Finish to ensure true Critical Paths.
	Linking Pattern: sub-task to sub-task, sub-task to summary task, sub-task to milestones and etc.	Ensure there is **NO** linking to summary tasks. Ensure all links pattern are logic.
Activity Resource Planning	Resource List (Type, Group, Maximum Numbers in project, job functions)	Check contractor's resource plan for adequacy of resource allocation, realistic productivity rates, etc. This is meant to check for Activity

Project Management Process	Elements	What To Look For / best practice
		Duration Estimate only.
	Resource Allocation (Assign resource to the task)	Use resource allocation to estimate the duration of work, to determine the resource's responsibility and cost estimation for that particular work. Only assign resource to task (work package level)
	Effort Driven Scheduling (EDS) EDS→Duration = Quantity / Production Rate	To be agreed with the SO/PD.
Activity Duration Estimate	Activity Duration Estimate (ADE) table: a. Quantity of work b. Risk identification at Work Package level c. Duration entry only to Sub-Task level d. In default, it means: → 1 Day = 8 hours → 1 week = 5 days → 1 month = 20 days	• Contractor/ consultant should be able to explain the basis of the estimate submitted. • Check quantity of work is as in Bill of Quantities. • Risk includes time lapse needed for test result etc. • It is best to standardize unit of duration to 'day'. Duration in 'weeks' may result in different finish date due to different interpretation of working days.

Project Management Process	Elements	What To Look For / best practice
	Milestones	• Check to ensure no tasks other than milestones or external dependencies is assigned with 'zero duration'. Important to indicate dates
	Duration for Summary Task will be gathered from the sub-tasks underneath.	Duration for summary task should not be 'typed in'. It is automatically calculated by the program if the WBS level is done correctly.
	Length of Working Duration	• Length of working duration should not exceed one reporting period (for example, 30 days – for monthly reporting). • This rule may not be applicable to the Supporting Works such as Maintenance, Supervision, Insurance Coverage, etc.
	Define Calendar a) Working Time (it can be Standard (8 hours working + 1 hour lunch), Night shift, 24 hours working, or else determined by the Contractor) b) Working Day and Non-Working Day including Public Holiday,	• Working time should be the standard working time. • Check to ensure contractor has allowed all public holidays and other possible non-working days such as floods seasons in the east coast.

Project Management Process	Elements	What To Look For / best practice
	Monsoon season and etc. (which was unable to work) c) Assumption (calendar days in distant years ahead)	
Schedule Development	a) Initial Work Program b) Accepted Work Program c) Updated Work Program (tracking or forecasting)	Ensure program contains the required information as in Appendix A.
	Presentation Format – Gantt Chart (Gantt Table + Gantt Bar)	Printed copy should include information of project, such as: a) Project Name b) Revision Number c) Legend d) File Name e) Initial/Accepted/Updated Program Softcopy shall be submitted to SO
	Information in Gantt Table area	Ensure the table has the following items: ID; Indicator ; WBS Code ; Task Name; Duration ; Start ; Finish ; Predecessors; Cost / Contract Sum ; Total Slack; Notes (Special Remarks)
	Information in Gantt Bar area	Ensure the information in Gantt Bar area are as follow: Summary Task ; Sub-Task ;

Project Management Process	Elements	What To Look For / best practice
		Milestones; Critical / Non-Critical ; Resource Name; Critical Activities Summary (Program Filtered for only Critical Tasks)
	Working Logic	Check that tasks must be connected from Project Start to Project Finish unless there is external Dependency appeared in the Project.
	Supporting Details	Check Total Float / Slack. Ensure no negative float.
	Negative Float in Work Program	• Negative float means the contractor does not have enough time to finish the works and therefore is **NOT** accepted.
	Program review	• Review of Work Program need to be carried out before the approval.
Cost Budgeting	Cost Estimating	• Total cost estimate for the whole project must equal to project's contract sum. • Cost to be entered in fixed cost column (not at total cost column) at the task level. • No cost estimation for milestone and external dependency.

Project Management Process	Elements	What To Look For / best practice
	Financial S-Curve (x axis → time, y axis → cost (or converted to percentage)	• Ensure that the Financial S-curve is generated from the Accepted Program.
	Study and analyze the Financial S-Curve to ensure the followings at high level (Overall Management): i. Logic ii. Workability iii. Continuity (work contour) iv. Manageable and track able	• 10% planned for the 1st half of the project, 90% at 2nd half – is it logic/acceptable? • Equipment installation at the beginning of project to increase the planned value – can claim more at the beginning of the project. Is it workable? • Work and Resources are arranged appropriately and logically (follow work contour)

Appendix C

Checklist for Assessing Work program – Progress Stage

Project Management Process	Elements	What To Look For / best practice
Project Monitoring	Baseline	Check whether the baseline is as per accepted baseline.
	Status Date	Check the status date whether it is as per request.
	Scheduled Progress (Financial, Physical, Work)	- Check the schedule progress based on the status date. - Shall be updated based on accepted baseline. - Additional columns shall be created to store schedule data.
	Actual Progress Tracking (Financial, Physical)	- Ensure actual start and finish dates are updated after updating % complete. - Shall be verified by the Supervision Team.
	Identify Variances (Financial, Physical, Finish)	- Check cost variance (financial) - Check duration variance (physical) - Check finish variance (Project finish date)
	Gantt Chart view (all 6 columns are mandatory for monitoring of progress)	- Actual Start - Actual Finish - Schedule % - Actual % - Schedule Cost - Actual Cost

Checklist for Assessing Work program – Revision Stage

Project Management Process	Elements	What To Look For / best practice
Revision of Work Program	Revision due to change in scope	• Ensure correction, improvement & re-planning of schedule is carried out, the process shall be repeated as in Appendix C. • Program to be saved as new baseline.
	Revision due to change in project duration.	• Contractors shall propose based upon approved EOT. • Program to be saved as new baseline.
	Revision due to contractor's delay (Recovery Plan).	• Check for schedule compression (fast tracking & crashing) and overtime. • Program to be saved as an extension to the existing baseline (eg. Baseline 1_1)