Australian Government
Department of Infrastructure, Transport,
Regional Development, Communications and the Arts

INFRASTRUCTURE GROUP / INFRASTRUCTURE GROUP ASSURANCE AND ADVISORY BRANCH / INFRASTRUCTURE PROJECT ASSURANCE

Guidance Note 2 – Base cost estimation

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1. Introduction

1.1. Context

The Department of Infrastructure, Transport, Regional Development, Communications and the Arts (the department) provides and maintains cost estimation guidance intended to inform and assist proponents in improving and establishing cost estimation practices for land transport infrastructure projects, the suite comprises the following volumes:

- Guidance Note – Overview
- Guidance Note 1 — Project Scope
- **Guidance Note 2 — Base Cost Estimation**
- Guidance Note 3A – Probabilistic Contingency Estimation
- Supplementary Guidance Note to 3A
- Guidance Note 3B – Deterministic Contingency Estimation
- Guidance Note 4 – Escalation

Additional useful guidance on cost estimation practices, to the extent that they do not contradict the guidance provided by the department, may be found in individual agency cost estimation guidance or manuals, and in the guidance provided by professional associations e.g. Project Management Institute, Australian Institute of Quantity Surveyors, Royal Institution of Chartered Surveyors, or AACE© International. For further information on this suite please refer to '**Guidance Note – Overview**' of this suite.

1.2. Objective and scope

The objective of this Guidance Note is to foster an improvement in the way in which base estimates for land transport infrastructure projects are prepared and presented. This guidance aims not to be prescriptive, but rather provides the methodology of how to develop a robust base cost estimate as well as providing broad descriptions of the typical elements of a base cost estimate for road and rail infrastructure projects.

The guidance covers the following topics:

- Definition of a base cost estimate – description of the key components of a base cost estimate.
- Elements of a base cost estimate – an overview and broad description of the components of a base estimate.
- Base cost estimate preparation: guidance on the methodology and tools used to develop a base cost estimate.
- Work Breakdown Structures (WBS) and use of the department's Project Cost Breakdown (PCB) template – guidance on developing a WBS and its relationship to the department's PCB and associated template.

This guidance note is for base cost estimation practices expected to be utilised in major or high-risk projects. However, the principles apply generally to projects of all sizes. It applies only to capital cost estimating and does not consider Operation and Maintenance (O&M) costs. While determination of O&M costs may be required for other financial and economic analyses, such as Cost Benefit Analysis (CBA), it does not form any part of the subject matter of this guidance note.

It is expected that the primary users of this document will be jurisdictional public sector organisations (agencies), including Local Government authorities that prepare submissions for funding through the Infrastructure Investment Program (IIP). However, the guidance may also be relevant to contractors and members of the public with an interest in major infrastructure projects.

1.3. Cost estimating challenges

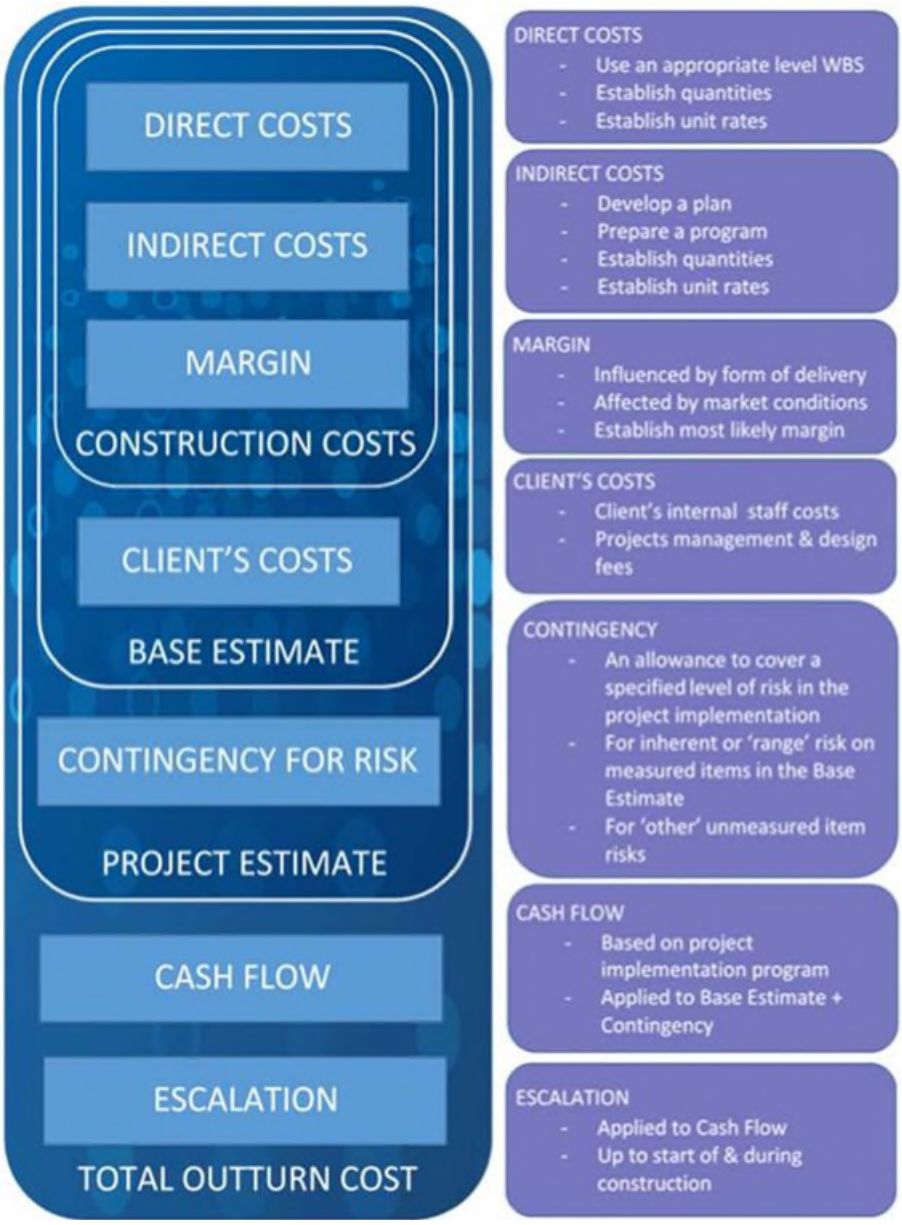
Developing a robust base estimate requires a well-defined scope, access to detailed documentation and historical data, and well-trained and experienced cost analysts. Even in ideal circumstances cost estimating is difficult and requires the application of both science and judgment. The cost estimator typically faces many challenges which may lead to suboptimal estimates. That is, estimates that contain poorly defined and unrealistic assumptions, have limited or no supporting evidence, are characterised by inadequate data and inappropriate estimating methodologies, or can show limited or no defined process for generating the estimate. Some of the challenges a cost estimator may face on road and rail projects are:

- Not having access to historical cost databases.
- Adapting to new processes and technology.
- Unreasonable program baselines.
- Set funding envelopes.
- A vague or incomplete scope.
- Unknown ground conditions or other site conditions.
- Uncertainty around (rail) possessions.

2. The base estimate

At the highest level, the project's base estimate is the sum of the client costs and the construction costs. The base estimate generally includes all phases of the project, including sunk costs. The base estimate should be prepared using the estimator's best assessment of the quantities and the current market rates that will be required for a given scope of work. Allowances for contingency (inherent and contingent risks) or escalation do not form part of the base estimate and should not be considered at this point of the estimating process.

Figure 1: Indicates schematically where the base estimate fits into the overall structure of an outturn cost estimate.



2.1. Overview of estimating methods

The aim of any estimating process is to generate the most accurate cost reflection of the known project scope at the time the estimate is prepared. For that reason, the most appropriate cost estimating methodology may change as a project moves through its life cycle and the scope is refined or changed. For example, there is unlikely to be enough information available at the project identification phase to justify committing the

resources required to prepare a detailed first principles estimate, and where a higher level of confidence in the estimate may be achieved through the application of an order of magnitude estimate.

The common methods used in the preparation of estimates are briefly outlined below. To meet the department's requirements for estimate reliability for projects seeking federal funding that have an anticipated total outturn cost of over $25 million, it is expected that a first principles estimate is undertaken at the development and delivery phases of the project.

Global estimating

Global (or order of magnitude) estimating is a method of estimating involving the use of 'all in' or 'global' composite rates such as road cost per kilometre. As such the estimate may be considered to consist of one element only.

Composite estimating

Composite estimating is a more refined method than using global rates as it involves the use of rates that include the combination of a number of work items to construct a single element of the project. The estimate is generally considered as having a small number of estimating elements only such as: drainage, environmental works, or traffic management costs per km, or bridge costs per square metre of deck area.

Unit rates estimating (based on historic rates)

Unit rate estimating calculates the cost of each item of the project by multiplying the quantity of work by historical unit rates. The project cost is then determined by the sum of the elemental costs. Unit rates are typically obtained from previous tenders for similar rate and are commonly selling rates that include indirect costs, contractor contingencies, margins and allowances.

First principles estimating

The first principles method involves the calculation of project-specific costs based on a detailed study of the resources required (Plant, Labour, Material and Subcontract) to accomplish each activity of work contained within the project's work breakdown structure (WBS). Productivity assumptions are applied to all labour and plant costs with adjustments made to account for unique or unusual site characteristics. Refer to Section 3.0 Work breakdown structure for more information.

Hybrid (unit rates/first principles) estimating

The hybrid method uses some features of the unit rate method and some of first principles estimating which can result in an increased accuracy of estimate over that of the unit rate method without requiring the resource investment required of a full first principles estimate. This can make the cost estimation process more efficient particularly when unit rates are applied to items that have only small price variation between projects.

2.2. Estimate preparation

The first step in estimate preparation is determining the purpose and level of accuracy required, this will influence the choice of methodology. Factors such as insufficient attention to the quality of inputs as well as the approach taken in preparing the estimates, may lead to unreliable results. Generally, the main issue underlying the reliability of any cost estimate is the ability to appropriately define the project scope. The scope description defines project inclusions/exclusions and is the starting point for any base estimate (see 'Project Scope' section in **Guidance Note 1** for further information). Significant inaccuracies in base cost estimates are usually due to poor scope definition thus, a reasonable and consistent level of scope definition is vital in managing project budgets.

Important aspects to consider when preparing estimates are:

- Purpose of the estimate (feasibility estimate, scoping estimate, detailed estimate).
- Using appropriately qualified and experienced staff e.g. trained Quantity Surveyors or specialist estimators.
- Using an appropriate WBS.
- The project scope definition and requirements.
- The reliability and appropriateness of the estimate's inputs.
- Using appropriate software tools to assist in developing and presenting the base estimate.
- Using applicable benchmarking and cost databases where available to validate cost estimates.
- Reviews of methodology, inputs, and overall estimate by experienced people.

Additional costs may be incurred due to unapproved project additions/changes after the scope has already been defined (scope creep), therefore underrepresenting the original cost estimate based on the defined scope. For example, McKinsey & Company[1] found that with bridge replacements, changes made by owners to the scope of projects tend to be the biggest cause of cost and schedule overruns.

An estimate should identify costs for the entire scope to the maximum extent possible with the currently available information. Assumptions made to prepare the base estimate (due to the lack of information) should be noted appropriately. Where missing information becomes available, assumptions should be removed or adjusted accordingly.

As well as noting the assumptions embedded in an estimate, we recommend explicit mention of the way each part of an estimate has been developed, some examples are:

- Plug numbers (placeholder numbers).
- Factored cost from another job.
- Based on quotes from contractors.
- Built up from first principles with material take-off.
- Parametric or other methods.

This information is usually noted in the details of an estimate but it is useful to provide a summary of the approaches used and the effects that this could have on the total cost. This will greatly assist in understanding how much confidence can be placed in each element of an estimate and provides valuable qualitative information for contingency determination.

It is expected that the accuracy of a project estimate will increase as the project progresses through its different phases. Cost estimates can benefit from refinement during the course of a project to reflect the additional detail available. An example of an estimate checklist and a design maturity matrix, which are applicable to the road sector can be seen in **Appendix A - Estimate checklist and design maturity matrix**. This (or similar) is a useful indicator of the suggested level of input information that should be available by the end of each phase of a project.

2.3. Estimating construction costs

Construction Costs are the costs required to complete the activities or tasks associated with the construction elements of a project, in an estimate they are generally prepared by one of two methods or a combination of both where appropriate which are:

- unit rate estimating (based on historic rates); or

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[1] Mckinsey & Company, How We Help Clients, Road and bridge benchmarking, accessed 19 October 2022, <https://www.mckinsey.com/capabilities/operations/how-we-help-clients/capital-excellence/road-and-bridge-benchmarking>

- first principles

Unit rate estimating at the direct cost level uses rates for the activity in isolation and requires the addition of the contractor's indirect costs and margin at the cost summary level. The "all up" rates uses a "gross" rate that includes the on-costs.

Unit rate estimating calculates the cost of each element of the project by multiplying the quantity of work by historical unit rates to obtain a price. While a relatively quick method of estimating, one disadvantage is in the interpretation of what is included in the unit rate. Additionally, this approach does not consider resources, the underlying construction methodology, or any site-specific conditions hence adjustments must be made to account for the differences between projects. Significant discrepancies in project conditions such as staging, scale of work, location of material supplies and other site conditions, may result in variation in historic unit rates compared to the current project. For example, if your project has cut to fill areas that are adjacent, a pair of scrapers could be sufficient, if cut and fill areas are separated by larger distances, additional earthworks resources will be required. This could include truck and dog to haul fill, excavator to load fill, dozer to spread fill, traffic control for the haul route etc. Understanding the makeup of historical unit rates is critical.

Supporting data for 'all up' rates is generally only available from tender schedules of past projects and as a result, can be unreliable because it often relates to a project from a different context, location and risk profile. Gathering accurate information on all up rates and rates for direct costs, indirect costs and margin is difficult for agencies and requires careful analysis from well-structured tender schedules. However, well maintained historical cost data is useful in benchmarking estimates to highlight potential omissions through sensitivity testing and to achieve a level of confidence in the overall pricing levels.

The more transparent forms of contract (e.g. Alliance, Cost Plus etc.) provide details of contractor costs broken up by direct costs, indirect costs, risk allowances and margin, thereby providing greater access to the detail. The benefit of splitting the estimate into direct and indirect costs, and using first principles estimating methods is that the estimated cost of the work reflects the methodology required to perform the work, the construction program and the resources required.

The first principles method involves building up an estimate for each item in the WBS using its most basic resources. To do this each element in the WBS is examined and costed at its lowest level of detail, the resources required to complete each element of work are determined, which could include the quantity and type of plant, labour, materials and subcontractors. Productivity assumptions are applied to all labour and plant costs with adjustments made to account for specific site characteristics or restrictions, this allows the determination of plant and labour hours required for the task. All activities are included in the base estimate, including temporary works and staging.

Direct cost rates are applied to each resource (which could include quotes from subcontractors) to determine the direct cost rate for each element of the WBS which can then be applied to the quantities of each element to make the base estimate.

To properly apply first principles estimating, productivity-based historical rates and knowledge is required, which includes:

- Production rates for equipment (excavators, pavement machines, tunnel boring machines and the like).
- Use of consumables such as fuel.
- Wastage factors.
- Labour productivity, crew size and crew mix.
- Knowledge of working hours, shifts and down time.
- Availability of labour.
- Availability of material and plant.
- Employment awards (such as Enterprise Bargaining Agreements if applicable) and rate calculations.
- Legislative or standard changes that affect historical rates.

An example of a first principles build up for laying 100 metres of pipe is shown in **Figure 2** below. Note that notional details, quantities and rates have been used in the table which is for illustrative purposes only.

Figure 2: Example of first principles build up to calculate the cost of laying polyethylene pipe

Example of first principles estimating methodology - civil works						
Item	**Description**	**Unit**	**Quantity**	**Number**	**Rate**	**Total**
1.0						
	Activity: Installation of 100m of DN200 PE pipe					
	Estimating Notes and Assumptions:					
	Estimate based on 10 hours shift					
	Assume 5% wastage of pipe					
	Inputs					
	Length of pipe	m	100			
	Trench Depth	m	1			
	Trench Width	m	0.5			
	Total volume of excavated material	m^3	50			
	Production rate	m per shift	50			
	Duration	shifts	2			
	Calculations:					
	Labour					
	Supervisor	shift	2	1	$700	$1,400
	Machine Driver	shift	2	2	$550	$2,200
	Labourers	shift	2	3	$550	$3,300
	Plant					
	Excavator - 20t	shift	2	1	$800	$1,600
	Tipper - 15t	shift	2	1	$450	$900
	Ute	shift	2	1	$200	$400
	Materials					
	200mm pipe inc. 5% wastage	m	105		$37	$3,885
	Bedding and backfill material	m^3	50		$30	$1,500
	Subcontract					
	Disposal of unsuitable material (Provisional Quantity as directed)	m^3	10		$45	$450
	Total Cost of Activity - lay 100m of pipe	**$**				**$15,635.00**
	Total Cost - rate per metre	**m**	**100**			**$156.35**
	Note: all values in this table are for illustrative purposes only					

Additional advantages of the first principles method include[2]:

- It is an intuitive method for experienced practitioners.
- It is defensible and re-creatable.
- Credibility is provided by visibility into the basis of estimate for each cost element.
- It is easily audited to determine exactly what the estimate includes and whether anything was overlooked.
- With greater granularity through first principles, the entire estimate is less compromised by the miscalculation of an individual cost element.
- It provides excellent insight into major cost contributors.

Based on the variable results experienced with historic cost estimating methods, the first principles method is the preferred method to identify and assess construction costs and it is recommended that it be used wherever possible.

What constitutes the direct and indirect cost portions of an estimate can be subject to interpretation between estimators. Sections 4.4 and 4.5 provide broad guidance around which project elements should be categorised as direct or indirect costs on road or rail projects (also see **Appendix B - Indirect costs checklist**).

All construction costs should be calculated as being effective at a specific date or month/year, i.e. the estimate base date. Note that for the purposes of escalation calculation, escalation is calculated from the Base Quarter (e.g. the September Quarter comprising July, August and September) that corresponds to the estimate base date.

Construction costs for road projects

The key components of road projects are bulk earthworks, structures and pavement(s). Drainage may also be a significant component depending upon the topography and prevailing climate. A large component of the project cost is driven by the location, preliminary works (demolition of existing structure or relocation of public utilities surround) and geotechnical factors which require the application of productivity rates to properly take into account the design and effort to construct the works. There is not a significant level of proprietary or manufactured items in above ground road projects (except for items such as bridge beams, drainage and road furniture items) as most materials are sourced as locally as possible. Investigation of the availability of materials and labour should be undertaken and prices should be confirmed through local sources to properly estimate project costs.

Construction costs for rail projects

Rail projects, unless they are large greenfield projects tend to be major upgrades, duplications, or enlargements to existing rail infrastructure. Unlike roads, there tends to be a higher level of manufactured items of a proprietary nature such as turnouts, signalling, communications, power equipment, rolling stock, track, and sleepers, in rail projects.

Rail construction work within operating rail networks has to be planned and estimated around “possessions” i.e. those windows of time when normal train operations shut down and site access is provided to enable construction work to take place.

The influence of planning around possessions makes rail construction cost estimating different to cost estimating for road construction and arguably more variable. Examples of some of the factors that require special attention when costing rail projects are:

- Costing must be based around the constraints imposed by the operating rail and safety requirements.

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[2] NASA (2015), Cost Estimating Handbook, Version 4.0, accessed 19 October 2022, <https://www.nasa.gov/pdf/263676main_2008-NASA-Cost-Handbook-FINAL_v6.pdf>

- Working at night, or during weekends, is common practice, and needs to be factored into any cost estimate where labour cost wage can increase substantially for those shifts.
- Costing of rail systems such as signalling and communications requires specialist knowledge and needs to consider the interim staging and commissioning of the works.
- Work done in narrow sites (rail reserves) with limited physical access and specific rail safety requirements tends to result in extended program duration, resulting in a significant proportion of indirect costs compared with a road project.

Contractor overhead costs

Overheads are the costs associated with running a business, they are a cost or expense that incurred by the business but not by any individual project. In construction they can include things such as:

- Business improvement costs such as obtaining International Organisation for Standardisation (ISO) certifications.
- The cost of unsuccessful tender activities.
- Business accounting costs
- Business vehicles
- Office rent
- Wages that are not directly associated to a project.
- Legal expenses
- Plant and equipment maintenance and depreciation costs.
- Etc.

As these costs are not directly associated to a specific project, they are allocated across projects on some arbitrary basis believed to be equitable, or handled as a business expense independent of the volume of production. In some cases it is quite simple, such as if a company works on two projects in a year they may split the overheads equally between them.

Spread

Spread is concerned with how contractor overheads are spread throughout or assigned to a project. The overheads may be proportionally distributed to each cost item for simplicity or a business might choose to identify how overhead costs are incurred and assign them to relevant items. Defining spread can be useful for business analysis and will also affect cash flow projections. For example, the overhead cost of plant maintenance may be applied to activities using plant rather than spread across all site activities.

Contractor margins

Contractor margins are the differences between the direct project costs of the contractor and the price they charge to do the work. Contractor margins include the contractor overhead costs associated to the project and the profit margin.

Sales price (tender price) = Direct project cost + Project overhead costs + Project profit margin

Contractor margins = Project overhead costs + Project profit margin

2.4. Client costs

Agency guidance notes and estimating manuals should explain the makeup of client costs, including whether internal staff costs are included in project costs or covered elsewhere in their agency's overhead costing.

For the purposes of presentation of cost estimates in funding submissions, the department's standard PCB templates for road and rail projects (refer to Section 4), requires that client costs are broken up by project phases into the broad categories of:

- Project management: which includes the management of commercial, procurement, legal, environmental, planning and other project issues.
- Design and investigation: which includes geotechnical investigation, site survey, concept and detail design.

Property and land acquisition costs are a subset of client's costs and should also be assessed at the same base date as the estimate and should include all associated costs such as agent's fees, valuations, legal costs, compensation etc. Note that sometimes the terms "Owner's" or "Principal's" costs are used instead of "Client" costs. In this guidance note "Owner's" costs are recommended to be included as a subset of "Client" costs in circumstances where the client or delivery agency is not the end owner (refer Section 4.3).

2.5. Estimate validation

A competent, unbiased team should validate the base cost estimate. Estimates on very large projects are complex and may be subject to perceptions of being inappropriately manipulated. A second, independent review of the estimate will allow decision makers an opportunity to capture different perspectives or at least a second opinion[3]. Note that as part of its process of considering submissions for Australian Government funding for road and rail infrastructure projects, the department will review and assess the associated cost estimates (see **Guidance Note- Overview**).

Peer review

The formality and depth of review will depend on the type of project and its complexity. A peer review involves a line by line review by an estimator other than the original estimator. This may be someone with the necessary qualifications and experience from the same agency, however at times it may be appropriate to seek these services from an independent, external professional cost estimation service provider. A peer review may focus on such aspects as:

- computational checking
- review of estimating method used
- review of the quantities and rates used to build the estimate
- review of the schedule
- reproducibility of the estimate
- review of the scope to determine whether it achieves the project objectives and whether the assumptions, inclusions and exclusions are valid.

An engineering solution review may also be undertaken which assesses the appropriateness of the proposed engineering solution underpinning the cost estimate.

Revalidation of estimates

Conditions and underlying assumptions for original and subsequent estimates often change, thus estimates need to be refreshed to account for these changes. Additionally, if changes to the scope of the project have occurred, the base estimate must be revised to reflect the change. Note that the department generally requires estimates for projects for which Australian Government funding is sought to be updated at each project phase.

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[3] US Department of Transportation, Federal Highway Administration (2007), Major Project Program Cost Estimating Guidance, updated 27 June 2017, accessed 19 October 2022, <https://www.fhwa.dot.gov/majorprojects/cost_estimating/guidance.cfm>

Post completion analysis

Completion of a thorough review of infrastructure projects after completion is highly recommended and is critical for continual improvement of cost estimation and project delivery.

Post completion analysis allows for lessons learnt from past projects to be incorporated into current projects. Post-completion reviews can provide a robust dataset for improving forecasts and cost estimates of current and future projects. By assessing the factors that lead to issues such as scope creep, scheduling overruns and project cost increases or decreases and incorporating lessons learnt, new cost estimates can become more accurate. Analysis also allows for making cost adjustments for risks that may otherwise be mis-evaluated.

3. Work Breakdown Structure

A standard Work Breakdown Structure (WBS) provides the structure to guide the disciplined preparation and presentation of capital cost estimates. While WBS' are likely to vary from one jurisdiction or agency to another, it would be expected that each agency would have a standard documented WBS.

A work breakdown structure is the cornerstone of an estimate because it defines in detail the work necessary to accomplish the end goal. A WBS helps break down large project elements (e.g. earthworks) into the smallest components possible. Large project elements are usually deconstructed into four levels, as illustrated below:

- Level 1 Element level
- Level 2 Heading level
- Level 3 Item level
- Level 4 Rate build up level

Figure 3: Example extract of a Work Breakdown Structure

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Element	**Heading**	**Main Item**	**Sub-item or price build-up**
EARTHWORKS	**Earthworks Preparation**	Clearing and Grubbing	Dozer, Type x
			Tipper
			Loader
			Labourers x 4
		Strip Topsoil	(Rate make up generally as above)
	Bulk Excavation	Bulk Excavation (other than rock), cut to fill	(Rate make up generally as above)
		Excavate and dispose of unsuitable material	
	Bulk Filling	Imported bulk filling to embankment, compacted	Supply imported filling
			Grader, Type x
			Compaction roller
			Water truck
			Labourers x 4
	Subgrade	Subgrade in cuttings	(Rate make up generally as above)
		Geotextile	Geotextile supply
			Geotextile lay
DRAINAGE	**Removal / Demolition**	Remove culverts	(Detailed make-up)

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	Culverts	Concrete Pipe Culverts (by size)	(Supply, install rate make-up)
		Concrete Box Culverts (by size)	(Supply, install rate make-up)
		Steel, corrugated culverts (by size)	(Supply, install rate make-up)
	Pavement Drainage		
	Subsurface Drainage		

Not all estimates will use all four levels for all items at once. A scoping phase estimate might use Levels 1, 2 and 3 with some Level 4 supporting information, while a development phase estimate may use Levels 1 to 4, with a significant detail at Level 4 (unit rate build-up). The detailed estimates prepared by agencies should generally contain Level 4 rate build up detail (which can be viewed in supplementary estimate reports in most estimating systems).

The WBS also follows the 100 percent rule, where items listed in each level add up to the corresponding parent level item (e.g. The sum of earthworks preparation, bulk excavation, bulk filling and subgrade must equal Earthworks and the sum of clearing and grubbing and strip topsoil must equal Earthworks Preparation, and so on). Through this, the WBS ensures that each element is accounted for and all activities are included.

Projects are generally made up of logical components or sub-projects, which may for example, be functionally or geographically defined. Components of sub-projects should be rolled up into the WBS and defined. Examples of sub-projects include the breakdown of rail or road projects into logical sections of chainage, or a stabling yard which forms part of a larger rail project. This level of breakdown is at the discretion of the agency and what is best for the project.

Some of the benefits of a standard WBS include:

- Clearer delineation of major cost items contained in project funding proposals through defined elements, leading to more efficient evaluation of proposals.
- Clearer identification of variances in elemental cost summaries between project milestones.
- Providing a structure which could inform a quantitative risk assessment.
- Enabling collection and analysis of key cost data and global rates for purposes of relativities and benchmarking of major projects.
- Provides the ability to “roll up” subordinate items into a high-level summary only. Agencies are more readily able to comply with departmental requirements and achieve a more strategic overview of project costs.

3.1. Using the appropriate level of detail in an estimate

The amount of detail (unit, quantity and rate) that can be generated in an estimate is related to the amount of design and other documentation available. The level of detail required in regard to both quantities and rates increases during the project life cycle, commencing with a concise strategic estimate (at pre-tender estimate just prior to the delivery phase) and finishing with a large detailed estimate.

To meet departmental requirements for reliable estimates, the table below sets out the appropriate level of supporting detail that is required for an estimate at each project phase.

Figure 4: Recommended level of detail at each project phase

Estimate Content	Project Identification	Project Phase		
		Project Scoping	Project Development	Project Delivery
Construction cost & base estimate report	Report based on WBS level 1	Report based on WBS level 1	Report based on WBS level 1	Report based on WBS level 1
Estimating approach	Global estimate, composite rates, historical rates	First principles, historical unit rates	First principles, historical unit rates	First principles, historical unit rates
WBS levels used	WBS 2 supported by level 3 items	WBS 1, 2, 3 with some Level 4 rate build up	WBS 1, 2, 3 & 4 used throughout	WBS 1, 2, 3 & 4 used throughout

In summary, the use of Global (order of magnitude) and / or historical rates that may be used to develop the cost estimate at the project identification phase, however is not sufficient in the project delivery phase, which require a first principles build up.

4. Project Cost Breakdown (PCB) template

The department has developed spreadsheet-based road and rail PCB templates which reflect the principles of estimate preparation and presentation described in this guidance material. The PCB templates are described in more detail in **Appendix C - Road and Rail PCB Template** to this document and in the overview component of the department's cost estimation guidance. Microsoft Excel versions of the PCB templates are available from State and Territory infrastructure delivery agencies.

The PCB templates were developed in consultation with state jurisdictions, to achieve improved consistency in presentation of cost estimates included in submissions for Australian Government funding for road and rail infrastructure projects. Over time, collection of cost data, as reported in the PCB templates, will enable the department to create a dataset from which strategic level benchmarking of road and rail projects can be undertaken.

As outlined in the Notes on Administration for Land Transport Infrastructure Projects 2019-2024 (NoA), the department requires that all estimates included in Project Proposal Reports (PPR) for projects with an Australian Government contribution above $7.5 million be accompanied by a completed PCB template. The structure of the PCB reflects the project phases namely the Scoping Phase, Development Phase and Delivery Phase.

Within each phase, a limited breakdown of costs is identified within the PCB template. This approach enables the early project development costs and agency costs to be separately identified from the main construction costs.

The department's PCB template is not a replacement of the WBS used by agencies. The PCB template is a high-level summary key cost data and is not an appropriate tool to develop a detailed base cost estimate. It is expected that the data required to populate the PCB template would draw from the same data used to develop the project's base estimate. The PCB template required fields should be readily available within an agency's WBS allowing data to be mapped between the two. State and territory agencies have confirmed that

they can map data from their existing WBS or comparable structure into the PCB format, noting that in the PCB templates has detailed definition of each cost element.

Agencies are encouraged to maintain a standard WBS with relevant levels of detail applicable to each project phase using a structure that will ensure consistent preparation, review, and comparison of project estimates. There are many resources such as computer databases and software available to assist with the preparation of estimates. Agencies may prefer certain software and are likely to have databases of costs and unit rates from completed projects. However, caution is needed when considering the appropriateness and applicability of information in these databases, and how the project may be different from past projects[4].

4.1. Road and Rail PCB template differences

The overall structures for both road and rail PCB templates are very similar. As much as possible, the same terminology has been used in both, each with additional unique items.

The construction costs for road and rail differ only in the areas unique to each sector, otherwise common civil construction works are under the same WBS headings, for example:

- The Road PCB template identifies elements for pavements, traffic management, traffic signals, etc.
- The Rail PCB template identifies elements for rolling stock, rail systems, transport stations, trackwork, etc.

The Road and Rail PCB templates use different escalation indices to calculate total escalation for the projects annual cash flow forecast.

4.2. WBS and PCB element content

The elements that make up a WBS, particularly at levels one and two, should be high level and designed to be obvious to permit easy categorisation.

In the PCB templates, the estimated Client Costs have been rationalised to collect all project costs that are not part of the estimated Construction Cost (except for the identified contingency and escalation allowances). Sections 4.4 through to 4.5 provide broad guidance as to the content contained within client costs, contractor's direct costs, contractor's indirect costs, and client supplied materials and services, respectively. Every project is unique and may involve activities and/or cost elements not shown and the list of cost elements and the activities within each are not to be considered exhaustive.

An agency estimating manual would be expected to contain a highly detailed reference guide defining the type of activities/tasks and materials that need to be considered in the base estimate build-up. In addition, a cost estimation manual or procedure should clearly define the content of components contained in a WBS in a way such that is easy to follow with little difficulty to understand its application. For example, it may not be clear whether an item such as concrete includes only supply and delivery, or whether it is an all up rate which includes formwork, reinforcement, placing, finishing, etc. To avoid misinterpretation such items should be broken down through successive WBS levels as necessary.

Conversely, a project specific WBS, although likely derived from a standard template, should be populated only with the elements appropriate to the project.

4.3. Client costs in the PCB template

- Project Management includes the costs incurred by the agency (including in-house staff or externally sourced staff) for:

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[4] Letts, P., Mackay, C., & Casey, E. (2014). *Guide to project delivery part 2: planning and control* (No. AGPD02/14).

  - project management in managing the work
  - contract management and administration
  - procurement of the construction works, most notably where there are reimbursable costs for tendering (Alliance, Early Contractor Involvement, Public-Private Partnership)
  - obtaining consents and approvals
  - cost planning and cost advisory services
  - stakeholder consultation and communication
  - on-costs related to the above services (e.g. offices, IT, etc.)
  - agency corporate overhead (if applicable)
- Design and Investigation includes the technical support performed or engaged by the agency for:
  - project planning (i.e., route selection, operational requirements, and track layout, etc.)
  - design, including concept, preliminary and detailed design
  - design verification
  - site investigation including site geotechnical or other technical studies, survey, environmental studies etc.
- Client supplied Insurances, Fees and Levies contains costs for items which are not provided by the Contractor. It is possible that the procurement process may transfer this responsibility to the Contractor, in which case the relevant costs are also transferred in a revised estimate summary.
- Property Acquisition
  - purchase price (purchase price of property or access rights)
  - transaction and other costs (legal, stamp duty, property valuation, surveys, etc.)
  - business compensation (business and/or personal compensation, relocation costs of owners or tenants)
  - environmental offsets (purchase of offset land, development/planting of land under an environmental offset)

While they do not form part of the department's PCB, the following additional client costs may be experienced on some projects and reasonable judgement should be applied to allocate cost elements not identified:

- Integrated Testing and Commissioning is generally unique to rail projects and includes the costs incurred by the Owner and delivery agency in the commissioning and acceptance of the completed works.
- Possession and Bussing is generally unique to rail projects and includes the cost of temporarily suspending rail operations (Possessions) and supplying alternative temporary travel arrangements for passengers (Bussing) while critical construction work is undertaken. It is common practice for the asset owner or operating entity (e.g., RailCorp in NSW) to arrange these services.
- Owners' costs occurs when the delivery agency is not the end owner. For example, in New South Wales, RailCorp is the entity that ultimately owns the asset that is constructed by the delivery agency. The owner incurs costs through reviewing and approving the proposed design in accordance with its own standards and requirements.

4.4. Contractor's direct costs

Tables 1 and 2 on the following pages provide broad guidance only to the content contained within elemental level components of direct costs. The department's PCB templates provide a more detailed explanation of the items and activities contained within each element. Reasonable judgment should be applied to allocate cost items not identified.

4.5. Contractor's indirect costs

- Preliminaries and supervision contains the contractors site establishment and site running costs, along with the management and supervision required to manage the works.
- Other, there may be agreed, or estimated costs associated with developing the contractor's scope and price proposal depending on the form of contract (e.g. early contractor involvement or alliance). In these cases, the cost of developing the construction delivery proposal is shown in this element.

4.6. Client supplied materials and services

This element contains the costs for items which are part of the construction works scope and which are supplied by the client. These items would generally not attract a mark-up by the contractor. Materials commonly supplied by clients include rail, rail sleepers, special systems, and technology while Services may extend to the installation of special components by the client's own resources.

Table 1: Content of road project elements

Road Projects - Elements	Content
Environmental Works	Environmental measures for temporary environmental works during construction such as erosion control, waste disposal, soil contamination, dust control, treatment of heritage, and fauna and flora requirements.
Temporary works / traffic management	Temporary works and services to support staging and traffic management.
Public Utilities adjustments	Utility adjustments, including relocation, diversion, protection, or replacement.
Bulk earthworks	Bulk earthworks including disposal of spoil, soil contamination treatment and foundation treatment.
Retaining walls	All types of retaining walls including reinforced earth, cantilever, crib or interlocking, post and panel, and diaphragm walls.
Drainage	Corridor related drainage, including longitudinal, cross, sub-soil, detention basins, box and pipe culverts, headwalls, gully pits, kerbs and water treatment.
Bridges	All bridge construction activities including excavation, foundations systems and abutment structures.
Tunnels	Civil works and tunnel services excluding pavement (egress ways, mechanical, electrical, drainage, fire protection etc.).
Pavements	All sub grades, base courses (layer) and wearing courses, including upgrades to existing pavements.
Finishing works	Line markings, road barriers, bus stops, footpaths, cycleways, fencing, landscaping, etc.
Traffic signage, signals and controls	Signals, permanent traffic signage, Intelligent Traffic Systems (Smart Roads) including information and monitoring systems.

Road Projects - Elements	Content
Design (if by contractor)	Design undertaken by the contractor where a design, construction planning and construction services are undertaken.
Supplementary Items	Items that cannot be classified above (e.g., buildings, control centres, transport modal interchanges, new construction technologies etc.).

Table 2: Content of rail project elements

Rail Projects - Elements	Content
Environmental works	Environmental measures for temporary environmental works during construction such as erosion control, waste disposal, soil contamination, dust control, treatment of heritage, and fauna and flora requirements.
Temporary works / traffic management	Temporary works and services to support staging and traffic management.
Public utilities adjustments	Utility adjustments, including relocation, diversion, protection or replacement. Does not include rail systems such as signalling, communications and traction power etc. (refer respective elements).
Bulk earthworks	Bulk earthworks including disposal of spoil and soil contamination treatment Includes capping layer.
Retaining walls	All types of retaining walls including reinforced earth, cantilever, crib or interlocking, post and panel, and diaphragm walls.
Drainage	Box and pipe culverts, track related drainage, detention basins and water treatment.
Bridges	Bridges and viaducts, including excavation, foundations systems and abutment structures.
Tunnels	Civil works and tunnel services including mechanical, electrical, drainage and fire services excluding trackwork and rail systems.
Roadwork and landscaping	External works required as part of the project.
Trackwork	Trackwork including track slabs, turnouts, crossovers etc.
Rail systems – overhead wiring (OHW)	OHW structures, wiring, and return bonds.
Rail systems – power supply and distribution	Power supply, substations, sectioning, switch rooms, traction power distribution.
Rail systems - signalling	Structures, fittings, cabling, trenching, signalling controls, and software.
Rail systems – rail communications	Rail communications systems, including radio, passenger information and Supervisory Control and Data Acquisition (SCADA).
Rail systems – combined services route	Excavation, backfilling, conduits, pits and markers.
Transport stations, interchanges, buildings, stations, stabling and maintenance buildings	Above and below ground stations, transport interchanges, carparks, stabling buildings and maintenance facilities.
Commissioning and handover	Testing and commissioning, accreditation costs.
Design (if by Contractor)	Design undertaken by the contractor where a design, construction planning and construction service is undertaken.

Rail Projects - Elements	Content
Rolling Stock	Design, procurement, commissioning and delivery of rolling stock (locomotives, carriages, wagons, or another vehicle used on a railway).
Supplementary Items	Items that cannot be classified above.

5. Conclusion

This guidance note – Base cost estimation:

- Defined and described the base cost estimate.
- Described the methodology to develop a base cost estimate.
- Provided an overview and broad description of the typical components of a base cost estimate.
- Explained the value and use of a standard WBS and the relationship between a WBS and the department's PCB template.

Application of the principles and framework outlined in this guidance note will assist estimators to develop base cost estimates that are consistent, realistic, traceable, and appropriate at each phase of the project life cycle.

Appendix A – Estimate checklist and design maturity matrix

The schedule below suggests the level of input that should be provided by the end of each phase of project development for a typical road project. For consistency, the Engineering Documentation categories in the first column aligns with the Construction Cost categories of the PCB template. This approach is an example only and the matrix should be adapted as required to suit different applications. The amount of detailed input at the development phase will be influenced by the procurement strategy (e.g. design & construct would not require a detailed reference design). This matrix only lists inputs for three projects phases. From the client's perspective, once a project has entered the delivery phase, no further input is required as contracts will have been signed and further cost estimation is will be unnecessary.

General Project Data	Project Identification	Project Scoping Phase	Project Development Phase
General			
Performance and functionality requirements	General description	Definition of key requirements	Fully defined
Project scope description	General description	Preliminary scope of works	Fully defined
Alignment - horizontal	Assumed (e.g. on photo map)	Initial alignment	Confirmed alignment
Alignment - vertical	Assumptions described	Initial alignment	Confirmed alignment
Property requirements	Major requirements and assumptions noted	Preliminary schedule of properties prepared	Complete schedule of properties
Geotechnical	Regional data / knowledge	Limited investigation	Detailed investigation
Survey	Maps / cadastral boundaries overlaid on photomaps	Preliminary survey, identify problem areas	Detailed survey
Environmental	Assumptions, key issues	Preliminary studies	Detailed studies
Community consultation	Assumptions, key issues	Preliminary studies and consultation	Full consultation and requirements identified
Noise studies	Assumptions, key issues	Preliminary studies and consultation	Full consultation
Escalation	Apply factors at overall level	Preliminary cashflow using agency factors	Developed cashflow using agency factors
Work Breakdown Structure (WBS)	Level 1-2	Levels 1-3	Levels 1-4
Contracting strategy	Assumption	Assumed strategy	Strategy reflected in the estimate
Engineering documentation			
Environmental works	Assumption only, key issues identified	Preliminary scope	Detailed scope
Traffic management and temporary works	Assumptions, key requirements identified	Preliminary requirements documented	Confirmed requirements and staging plans
Public utilities adjustments	Assumptions and desktop research for major issues	Limited research (Dial Before You Dig)	Detailed research and documentation
Bulk earthworks	Assumptions, based on experience	Preliminary cut and fill quantities, key sections	Confirmed cut and fill quantities, all sections
Retaining walls	Major locations identified, otherwise assumptions	Preliminary locations and extent, assumed types	Confirmed locations and extent, assumed types
Drainage	Key areas identified, otherwise assumptions	Preliminary layout, sizing of major items	Detailed layout, sizing of all items
Bridges	Locations identified (typical solutions assumed)	Assumed solutions, sizes of key elements	Confirmed solutions, sizes of most elements
Tunnels	Locations identified (typical solutions assumed)	Assumed solution and key parameters	Confirmed solution
Pavements	Preliminary types identified	Assumed types and extent	Confirmed types and extent
Finishing works	Assumption only, key issues identified	Preliminary scope	Detailed scope
Traffic signage, signals and controls	Assumed locations	Preliminary extent	Detailed scope and extent shown

Appendix B – Indirect costs checklist

Main Heading	Sub-Heading (not exhaustive)	Alternatively incl in Direct Costs	Establish & Dis-establish Costs	Recurring Costs
PRELIMINARIES				
Authority Fees & Charges				
	Council Permits and Fees			
	Long Service Levy			
Project Insurances				
	Public Liability			
	Professional Indemnity			
	Contract Works			
	Difference in Conditions			
Bank Guarantee Charges				
	Bank Guarantees			
	Performance Bonds/Securities			
	Retention			
Survey Fees				
	Survey Crew	Alt in DCs		
Temporary Sheds				
	Contractor's Offices			
	Contractor's Change and Amenities Sheds			
	First Aid Sheds			
	Storage Sheds			
	Sub-Contractor's Sheds (if provided by Main)			
Hoardings & Fencing				
	Temporary hoardings and gantries			
	Temporary fencing			
Notice Boards & Signs				
	Site sign board			
	Site signage			
Temporary Roads, Bridges				
	Temporary site roads			
	Temporary site bridges and access			
	Making good to Council footpaths			
Site Communication				
	Computer and IT costs			
	Plan Printing and Photocopying			
	Telephone, faxes			
	Radios			
	Couriers			
	Stationary			
Temporary Electrical				
	Establish Temp connections			
	Power usage charges			
	Maintain and adjust power distribution			
Temporary Hydraulics				
	Establish Temp connections			
	Water usage charges			
	Maintain and adjust water distribution			
Security				
	Site security patrols			
	Watchman			
Site Safety				
	Protective clothing			
	Barriers, Lighting, Safety Signage			
	Safety Precautions			
	Safety Inductions and Training			
	Medicals			
	Nurse call			
Environmental Monitoring				
	Noise	Alt in DCs		
	Hazardous materials	Alt in DCs		
	Sedimentation basins and treatment	Alt in DCs		
Plant and Equipment				
	Forklifts			
	General Site Equipment	Alt in DCs		
	Man and Material Hoists	Alt in DCs		
	Small Tools			
	Site Vehicles			
Craneage				
	Fixed craneage (dry or wet hire)	Alt in DCs		
	Mobile craneage (to run the site compound)	Alt in DCs		
Scaffolding				
	General Scaffolding	Alt in DCs		
	Access Stairs and Walkways	Alt in DCs		
Testing				
	Testing	Alt in DCs		

Main Heading	Sub-Heading (not exhaustive)	Alternatively incl in Direct Costs	Establish & Dis-establish Costs	Recurring Costs
Sundry Operating Expenses				
	Sundry Expenses			
	Petty Cash			
	Freight and Transport	Alt in DCs		
	Carparking			
	Entertainment			
	Training and Development			
Cleaning				
	Maintenance of Site establishment			
	Interim site clean ups	Alt in DCs		
	Final clean	Alt in DCs		
Maintenance Period				
	Attendant Labour	Alt in DCs		
	Consumables	Alt in DCs		
LABOUR AND SUPERVISION				
Labour				
	Gateman			
	First Aider			
	Nipper			
	Storeman			
	General site labour (non-direct)			
Labour Accommodation				
	Labour Camp			
	Per diem accommodation rates			
	Other labour expenses			
	Relocation costs			
	LAFHA			
Labour Travel				
	Allowance (for above)			
	Travel Costs			
	R&R Trips			
	Vehicles			
Supervision				
	Project Director			
	Project Managers			
	Engineers			
	Planners			
	Contract/Commercial/Admin			
	Safety Managers			
	Quality Assurance			
	Specialist Engineers/Environmental/Community			
	General Foreman			
	Foreman			
	Superintendent			
Supervision Accommodation				
	Supervision Camp			
	Per diem accommodation rates			
	Other supervision expenses			
	Relocation costs			
	LAFHA			
Supervision Travel				
	Allowance (for above)			
	Travel Costs			
	R&R Trips			
	Vehicles			

Appendix C – Road and Rail PCB template

PCB Level 1	PCB Level 2	PCB Level 3
Client Management & Oversight Cost		
	SCOPING	
		Project Management-Scoping
		Design & Investigation-Scoping
	DEVELOPMENT	
		Project Management-Development
		Design & Investigation-Development
	DELIVERY	
		Project Management-Delivery
		Design & Investigation-Delivery
		Client supplied Insurances, Fees, Levies - Delivery
	PROPERTY ACQUISITION	
		Purchase Price
		Transactional Cost & Other costs
		Business Compensation
		Environmental Offsets
Construction Cost		
	CONTRACTOR	
		Environmental Works
		Traffic Management and Temporary Works
		Public Utilities Adjustments
		Bulk Earthworks
		Retaining Walls
		Drainage
		Bridges
		Tunnels
		Pavements
		Finishing Works
		Traffic Signage, Signals and Controls
		Design (if by contractor)
		Supplementary Items
	CLIENT	
		Client supplied Materials and Construction Services - Delivery
TOTALS		

PCB Level 1	PCB Level 2	PCB Level 3
Client Management & Oversight Cost		
	SCOPING	
		Project Management-Scoping
		Design & Investigation-Scoping
	DEVELOPMENT	
		Project Management-Development
		Design & Investigation-Development
	DELIVERY	
		Project Management-Delivery
		Design & Investigation-Delivery
		Other Clients Costs
	PROPERTY ACQUISITION	
		Purchase Price
		Transactional Cost & Other costs
		Business Compensation
		Environmental Offsets
Construction Cost		
	CONTRACTOR	
		Environmental Works
		Traffic Management and Temporary Works
		Public Utilities Adjustments
		Bulk Earthworks
		Retaining Walls
		Drainage
		Bridges
		Tunnels
		Rolling Stock
		Rail Systems - Overhead wiring
		Rail Systems - Power Supply and Distribution
		Rail Systems - Signalling
		Rail Systems -Rail Communications
		Rail Systems - Combined Services Route
		Roadworks, Landscaping, Fencing
		Transport Stations, Interchanges, Buildings, Stations,
		Trackwork
		Commissioning and Handover
		Design (if by contractor)
		Supplementary Items
	CLIENT	
		Client supplied Materials and Construction Services
TOTALS		

Appendix D – Definitions and abbreviations

Term	Definition
Agency	A state or territory government body that is generally responsible for delivering land transport infrastructure project.
Assumption	A documented, cost-related factor that, for the purpose of developing a base cost estimate is considered to be true, real or certain.
Base Date	The reference date from which changes in conditions, (including rates and standards) can be assessed. In the context of a base estimate, it is the date for which the rates included in the cost estimate reflect current market conditions.
Base Estimate	The sum of the construction costs and client's costs at the applicable base date. It represents the best prediction of the quantities and current rates which are likely to be associated with the delivery of a given scope of work. It should not include any allowance for risk (contingency) or escalation.
BCR	The Benefit Cost Ratio (BCR) is the ratio that represents the benefits over costs and is represented as a single number. Further guidance on BCR can be found on the Australian Transport Assessment and Planning (ATAP) website.
Client Costs	In this guidance note, 'client' is the project proponent. Client costs are the costs incurred by the proponent (e.g. public sector delivery agency) to develop and deliver a project.
Construction Costs	The costs required to complete the activities or tasks associated with the construction elements of a project.
Contingency	An amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs[5]. This does not include escalation. As per Appendix B of NoA: *"The component of a Project's cost in excess of the Project Base Estimate that accounts for, or reflects, risk*". For further information on contingency refer to **Guidance Notes 3A and 3B.**
Contractor Direct Costs	All contractor's costs directly attributable to a project element including, but not limited to, plant, equipment, materials, and labour.
Contractor Indirect Costs	Costs incurred by a contractor to perform work that are not directly attributable to a project element. These generally include costs such as preliminaries, supervision, and general and administrative costs.
Escalation	The component of a project's total cost at any point in time that reflects changes in prices and costs since the base cost estimate date. Escalation is added to the project cost to obtain the outturn cost. Escalation aspects do not

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[5] AACE International, Recommended Practice 10S-90, Cost Engineering Terminology, accessed 19 October 2022 <https://web.aacei.org/docs/default-source/rps/10s-90.pdf>

Term	Definition
	form part of the scope of this document. For further information refer to **Guidance Note 4 - Escalation.**
Escalation Rate	The department derives escalation rates from actual or forecast composite index series that reflect the characteristics of infrastructure projects, where the escalation rate in any financial year is calculated from the average of the composite quarterly indexes for that financial year divided by the average of the composite quarterly indexes for the previous financial year.
Estimator	The person or organisation that prepares a cost estimate.
First Principles Estimate	The method of preparing a cost estimate by breaking down the project into a work breakdown structure and determining rates and quantities for each component. The cost estimate is the summation of each component.
Jurisdiction	An Australian state or territory.
Labour	Effort expended by people for wages or salary.
Margin	An allowance that includes the construction contractor's corporate overheads and profit.
Material	An article, material, or supply brought to a construction site by the contractor or a subcontractor for incorporation into the work. Also includes any items brought to the site preassembled from articles, materials or supplies.
NoA	The Notes on Administration for Land Transport Infrastructure Projects 2019-2024 (NoA), provide administrative detail to support the National Partnership Agreement (NPA) and apply to all Projects funded, or proposed to be funded under Part 3 (Investment Projects) and Part 7 (Black Spot Projects) of the National Land Transport Act 2014 (NLT Act).
NPA	National Partnership Agreement on Land Transport Infrastructure Projects (NPA). The NPA supports the delivery of infrastructure projects and sets out how the Australian Government and states will work together to deliver infrastructure projects for the benefit and wellbeing of Australians. The NPA covers projects administered under the National Land Transport Act 2014 (NLT Act) each state has a separately agreed schedule to the NPA which indicate the levels of funding the Australian Government intends to provide for land transport infrastructure investments. These schedules are updated following the Federal Budget each year, and as required.
Outturn Cost	Outturn cost is the summation of the base cost, contingency and the total escalation (it is the nominal total project cost). The department's Project Cost Breakdown (PCB) template can be used to calculate escalation and outturn costs. In economic terms, non-escalated costs are often referred to as real costs while outturn costs are often referred to as nominal costs.
Overhead(s)	A cost or expense inherent in the performing of an operation, (e.g. engineering, construction, operating, or manufacturing) which cannot be charged or identified with a part of the work, product or asset and, therefore, must be allocated on some arbitrary basis believed to be equitable, or handled as a

Term	Definition
	business expense independent of the volume of production. These costs are considered when determining the cost of business. (e.g. machine maintenance, company accounting costs etc.)
Project Cost Breakdown (PCB) Template	The PCB template is provided by the department and is updated annually to reflect the latest escalation rates for road and rail projects.
Project Cost	The base estimate cost plus an allowance for contingency and generally prefixed by P50 or P90 to represent the level of contingency included. The project cost reflects costs as of the base estimate date. This does not include escalation.
Plant	All machines, motor vehicles, appliances and things (for example, scaffolding and formwork) used or in use in the execution of the work, but not materials, plant, equipment intended to form part of the final work.
Project Proposal Report (PPR)	A statement detailing the scope and benefits of the project submitted by proponents as part of the project approval process for funding under the Infrastructure Investment Program (IIP).
Project Scope	The work that must be performed to deliver a product, service or result with the specified features and functions.
Subcontractor	A contractor that enters into a subcontract and assumes some of the obligations of the primary contractor.
Sunk Costs	Costs which have already been incurred, such as investigation, research, and design costs. Sunk costs are included in an outturn cost.
Work Breakdown Structure (WBS)	A way of organising a project using a hierarchical breakdown of the activities required to complete the project. The WBS organises and defines the total scope of the project.