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Source of Time and Cost Over-runs in Roadworks Projects – Pilot Study

SRI LANKA

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All those who provided assistance from the World Bank, RDA, PRP, their consultants, contractors and DAB members etc. are gratefully acknowledged for sharing their information and knowledge. Since impossible to provide a complete picture of each contribution in such a pilot study report, it is hoped that the summarized observations presented herein are a reasonable representation and useful consolidation of the collective experiences gathered from the targeted project samples.

Particular thanks are due to Senior Procurement Specialist Haider Raza for his guidance, support and advice in the data collection and also kindly improving the format and presentation of this report.

About Professor Mohan Kumaraswamy

Professor Mohan Kumaraswamy is now an Honorary Professor of The University of Hong Kong, having taught and researched there from 1992 to 2013. His B.Eng. (Civil) is from Peradeniya, Sri Lanka. He later obtained an MSc in Construction Management, a PhD on 'evaluating the management of construction projects' and more recently, a DSc from Loughborough University, UK. His DSc was based on 'Construction Industry Development'.

He worked on designs, construction and construction management in Sri Lanka and Nigeria, was a Construction Manager and then a Director of the pioneering construction project management company in Sri Lanka. He led many innovative projects and internationally funded consultancies before leaving for Hong Kong. He is presently carrying out a study for the World Bank in Colombo.

While based in Hong Kong, he also led many inter-University research projects and won international awards for publications, as well as University Outstanding Research Student Supervisor Award in 2010. He has also been a Visiting Professor at the National University of Singapore and more recently at Curtin University, Australia, and an External Examiner at many overseas Universities.

Mohan has also been active in professional bodies, including the Institution of Engineers Sri Lanka, the Chartered Institute of Building (CIOB), where he was the Sri Lanka representative until 1992, and a Vice Chairman of CIOB Hong Kong in 1996-97 and the Hong Kong Institution of Engineers, where he was Chairman of the Civil Division in 1997-98. He has also served in committees of industry development bodies such as the Hong Kong Construction Industry Council.

He is the Founding Director of the 'Centre for Infrastructure & Construction Industry Development' (CICID) based at the University of Hong Kong. He is also a Joint Co-ordinator of the international Task Force TG72 on Public Private Partnerships of the CIB - International Council for Research and Innovation in Building and Construction. He is on the editorial boards of many international journals and is Editor-in-Chief of the journal of 'Built Environment Project and Asset Management' (BEPAM).

ACRONYMS

ADB – Asian Development Bank

BOQ – Bill of Quantities

DAB – Dispute Adjudication Board

EOT - Extension of Time

GOSL – Government of Sri Lanka

ICTAD - Institute for Construction Training and Development

IDA – International Development Association

JICA – Japan International Cooperation Agency

LKR – Sri Lanka Rupees

MPC - Ministry Procurement Committee

PRP – Provincial Roads Project

RDA – Road Development Authority

RSAP - Road Sector Assistance Project

SAC – Statement at Completion

VAT – Value Added Tax

WB – World Bank

WB.SBD.PW - World Bank Standard Bidding Documents for Procurement of Works

WB.SBD.PSW - World Bank Standard Bidding Documents for Procurement of Small Works

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
1 BACKDROP, AIM, SCOPE AND METHODOLOGY	5
1.1 BACKDROP.....	5
1.2 AIM.....	5
1.3 SCOPE	5
1.3.1 <i>Base-line for 'Over-runs'</i>	5
1.3.2 <i>Data Sources</i>	6
1.3.3 <i>Limitations</i>	6
1.4 METHODOLOGY	6
1.4.1 <i>Strategy</i>	6
1.4.2 <i>Methods Summary</i>	6
1.4.2.1 Interviews	6
1.4.2.2 Documents Review	6
2 BACKGROUND TO TIME AND COST OVER-RUNS IN ROADWORKS	7
2.1 GLOBAL SCENARIO - SAMPLES OF SOURCES, CAUSES AND SUGGESTIONS.....	7
2.2 SRI LANKAN BACKDROP – INDUSTRY BACKGROUND: RELEVANT OVERVIEW.....	10
2.3 SRI LANKAN SCENARIO – EXAMPLES FROM PREVIOUS SAMPLES	11
3 EXAMPLES OF OVER-RUNS AND DOCUMENTED REASONS	13
3.1 PREAMBLE	13
3.2 PRP - PROVINCIAL ROADS PROJECT	13
3.3 RSAP - ROAD SECTOR ASSISTANCE PROJECT.....	15
4 INTERVIEWS	18
4.1 INTERVIEW TARGETS AND FORMATS	18
4.1.1 <i>Objectives, strategy, structure and formats:</i>	18
4.1.2 <i>Schedule of Main Interviews:</i>	19
4.2 SAMPLE EXTRACTS FROM EXPERIENTIAL OBSERVATIONS	19
4.2.1 <i>Sample observations from Employers (RDA & PRP) and Funding Agency personnel & consultants</i>	20
4.2.2 <i>Sample observations from Consultants</i>	22
4.2.3 <i>Sample observations from Contractors</i>	23
4.2.3.1 General:	23
4.2.3.2 Employer:.....	24
4.2.3.3 Engineer:.....	24
4.2.3.4 Contractor	24
4.2.4 <i>Sample observations from DAB members.</i>	24
5 POTENTIAL SOURCES, POSSIBLE CAUSES AND POINTERS TO IMPROVEMENT AREAS.....	26
5.1 IDENTIFIED COMMON SOURCES AND POSSIBLE CAUSES OF TIME AND COST-OVER-RUNS	26
5.1.1 <i>Preamble</i>	26
5.1.2 <i>Principal Common Sources and apparent Causes of Over-runs identified from this pilot study</i>	26
5.2 POINTERS TO A SAMPLE OF 'POTENTIAL AREAS FOR IMPROVEMENT'	31

5.2.1	<i>Preamble</i>	31
5.2.2	<i>Sample of ‘Important Issues’ with ‘suggested areas for improvement’</i>	31
5.3	EXAMPLES OF FOCUS AREAS FOR IN-DEPTH INVESTIGATION	34
5.3.1	<i>Focus area examples</i>	34
5.3.2	<i>Preliminary suggestions on strategies for In-depth Investigation and follow-up Implementation</i>	34
REFERENCES, BIBLIOGRAPHY AND ACKNOWLEDGEMENTS		36
APPENDICES AND TABLES		40
APPENDIX 1: PREVIOUS EXAMPLE FROM ELSEWHERE (HONG KONG) OF A ‘CASUAL HIERARCHY’ OF CONSTRUCTION CLAIMS		41
APPENDIX 2 (A): PREVIOUS EXAMPLE FROM ELSEWHERE (HONG KONG) OF A SAMPLE PROFILE OF TIME OVER-RUNS		42
APPENDIX 2 (B): PREVIOUS EXAMPLE FROM ELSEWHERE (HONG KONG) OF A SAMPLE PROFILE OF COST OVER-RUNS		43
TABLE 1: PRP - MAY 2014 SUMMARY OF RECOMMENDED EOT		44
TABLE 2A: PRP ‘APPROVED COSTS’ AND ‘% INCREASES’ STATUS SUMMARY – UVA PROVINCE		45
TABLE 2B: PRP ‘APPROVED COSTS’ AND ‘% INCREASES’ STATUS SUMMARY – EASTERN PROVINCE		47
TABLE 2C: ‘APPROVED COSTS’ AND ‘% INCREASES’ STATUS SUMMARY - PRP - NORTHERN PROVINCE		48
TABLE 3: RSAP -1: ‘APPROVED COSTS’ AND ‘% INCREASES’ STATUS SUMMARY		49
TABLE 4: ROAD SECTOR ASSISTANCE PROJECT I: TIME OVER-RUNS & COMPARISON.....		50
TABLE 5: EOT ON RSAP PHASE 2_K-T SECTION		51
TABLE 6: EOT ON RSAP RURAL ROADS.....		52

EXECUTIVE SUMMARY

While time and cost over-runs seem almost endemic in physical infrastructure projects in many countries, they were perceived to be reaching substantial levels in some roadworks contracts in Sri Lanka. This pilot study was formulated to identify any common sources of such over-runs and to discern any patterns. The aim was to assess a sample of recent contracts, to identify typical levels of over-runs and any general patterns, any common sources of over-runs, any common ‘causes’ that trigger over-runs from such sources, as well as any potential areas for further investigation.

Data was sampled as planned, from two World Bank funded projects – the ‘Road Sector Assistance Project’ (RSAP) and the Provincial Roads Project (PRP). Apart from comparing with previous studies of related aspects in other countries and Sri Lanka, the main research methods in this pilot study comprised: (a) document review & analyses; and (b) interviews of a cross-sectional sample of stakeholders.

An over-run is taken here, to be the percentage increase above the contracted ‘period’ or ‘price excluding contingencies’ on each contract. While over-runs arising from common causes such as design and contract document errors, omissions and ambiguities had reduced over time in a few jurisdictions, the general levels in many countries are still substantial. For example, major over-runs are often attributed to rework and to variations or change-orders due to scope changes or site conditions, apart from design/documentation shortcomings. Many other common causes are evident worldwide, including for example, adverse repercussions from unrealistically low prices in some cases. For example, one recent study in Sri Lanka, on delays based on a sample of 24 projects funded by WB, ADB and JICA, indicated an average delay of 69%, while variations/ extra work accounted for 56% of these delays.

The following samples from the current exercise are only indicative, since both the PRP and RSAP projects are ongoing and many claims, evaluations and settlements even on completed contracts are pending.

1. Provincial Road Project (PRP)

- 1.1 the EOT against time claims evaluated so far over 11 contracts, range from 7.5% to 48.6% with an average of 28.8%, the main contributor being EOT related to ‘quantity increases’; and.
- 1.2 the cost over-runs on quantity increases evaluated so far, average out at only 0.8%, apparently due to ‘minuses’ on some contracts compensating for ‘pluses’ on others (the lowest being -38.1%). Variations so far averaged 19.5%, the highest on a contract being 53.0%. ‘Price escalations’ so far averaged out at 12.8%. However, 6 major claims sources are still pending.

2. Road Sector Assistance Project (RSAP)

- 2.1 the EOT granted so far on Phase 1, averaged 69.8%, ranging from 7.6% to 180.7% over 12 contracts;
- 2.2 the cost over-runs so far on Phase 1, averaged 86.5%, ranging from 51.5% to 132.4%;
- 2.3 in the eastern section of Phase 2 comprising 4 contracts, the EOT varied from 15.0% to 28.6%;

2.4 in the ‘rural roads pilot’ segment, the average EOT was 47.6% and the average increase in contract prices was 28.3%. One of the general observations was that the evaluated Liquidated Damages for delays appeared to be not always applied in the settlements by the borrower.

A host of ‘**common sources**’ and possible underlying causes of over-runs was unearthed, based on analyses of the detailed data obtained and the in-depth interviews with a representative range of the main project participants. Examples of common sources include:

1. inadequate site investigations;
2. incomplete and/or delayed and/or inaccurate designs;
3. ambiguities within contract documents;
4. discrepancies between contract documents;
5. sub-standard performance - of contractors and/or consultants;
6. delays from overall contract administration;
7. excessive rework;
8. major variations to meet public/ political needs;
9. inadequate dispute avoidance and/or resolution strategies and mechanisms;
10. high price adjustment (escalation) assessments
11. lack of standard methodologies for evaluating EOT etc.

Possible ‘**underlying causes**’, meriting further investigation included among others:

1. inadequate time and/or budget for design and for design review; and/or
2. shortfalls in design team capacities / experience;
3. inadequate upfront public engagement;
4. misinterpretations and misuse of Quality Assurance/ Control expectations;
5. ambiguities and loop-holes in contract documents;
6. lack of tangible deterrents to discourage non-compliance e.g. if not submitting realistic programmes with resource loadings, method statements, etc.

Improvements could arise from addressing:

1. all the unveiled possible common causes of over-runs; and
2. overall project governance with stronger ‘employer’/ client oversight in general.

Also, examples of specific ‘potential improvement areas’ include

3. consultant and contractor selection and management, e.g. with higher weightings for potential performance predictors, tangible deterrents/credits for non-compliance/good performance e.g. to impact future tender opportunities and scores;
4. demarcation of responsibilities for designs, design reviews, working drawings, approvals etc.;

5. cost increase thresholds for applying ‘no objections’ on price rises against total ‘contract price *less* contingencies’, as well as on specific critical items - e.g. to revisit and revise current thresholds (to remove any contingencies ‘cushion’) and to introduce new ones;
6. identified contractual ambiguities and shortfalls e.g. in contract clauses on - price adjustments, increase in quantities, EOT evaluation – e.g. to improve EOT evaluation capacities and develop standard protocols to be trialed and recommended/ required.

All potential improvement areas, in turn merit ‘**in-depth investigation**’, as indeed do the possible common causes of over-runs, since identifying and addressing the underlying root causes should be the goal. Such an in-depth study may also prioritize what needs addressing in: (a) a road map to the desired destination of ‘reduced time and cost over-runs’ with target milestones e.g. on start and finish dates for tasks such as ‘rationalization / upgrades of standard contract clauses linked to over-runs etc.’; and (b) a preliminary but well structured ‘action plan’ for any urgent upgrades.

Identified system shortcomings will need systemic solutions that address root causes. Pilot study outcomes indicate needs for revamping both hard and soft systems e.g. with a ‘culture’ shift that embeds imperatives and evokes commitment for both comprehensive planning and rigorous controls. Excellent change management will also be needed. However, ‘in-depth investigation’ of some areas are needed before embarking on such major transformations.

Examples of areas for ‘**in-depth investigation**’ before launching major transformational improvements are:

- A. on injecting cut-off milestones into a project programme, so that, subject to exceptional circumstances and with ‘top level’ approvals, there will be milestones to ‘freeze’ and ‘sign-off’ at high levels: (A1) the design brief; (A2) the design; and (A3) the BOQs, specifications and other contract documents. To make such requirements more viable and acceptable, it may be considered to simultaneously introduce: [i] Value Engineering reviews before freezing designs, and [ii] ‘carrot/stick’ incentives for the ‘signing off’ teams, e.g. with special recognition including for career advancement, when their outputs fare better (trigger less problems downstream) and *vice versa*.
- B. on improving dispute minimization and dispute resolution protocols and mechanisms e.g. with stock-taking of current strengths/ weaknesses and potential of Dispute Adjudication Boards in both contractual provisions and practice. A well-structured industry forum involving a cross-section of stake-holders, could be a starting point to drill into underlying issues and brainstorm possible ways forward.
- C. on examining the feasibility of developing a management aid like a ‘Over-run Hotspots Dashboard’ (or ‘Over-runs Alert Indicator’) – to help top management to anticipate and hence, better control potential ‘over-run hotspots’. While certain techniques may turn out to be similar to some of those in risk appraisals, dynamic databases of over-runs on previous similar contracts, could be designed and codified to spotlight sources and causes that commonly spark over-runs of higher (1) magnitude,

(2) frequency and (3) avoidability. Color-codes and relative-ratings could provide a quick-menu interface.

This would necessarily be a dynamic system, since new hotspots would supersede those that have been successfully minimized etc., but overall magnitudes and frequencies would hopefully decrease with time and effort.

- D. on prioritizing the areas for improvement; then selecting higher priority initial recommendations to be 'trialed' in 'pilot' projects or contracts. Indeed, recent experience elsewhere indicates that, if reasonably confident of the value and viability of the systems and practices being trialed, publicizing these as 'demonstration' projects/ contracts and deploying capable and committed teams on these, increases the chances of success of such 'pilot' exercises, followed by smoother implementation thereafter.

1 BACKDROP, AIM, SCOPE AND METHODOLOGY

1.1 BACKDROP

Built infrastructure projects worldwide, are often vulnerable to various performance shortfalls unless carefully planned and controlled from the outset. Apart from quality, environmental and/or health & safety shortfalls, roadworks projects seem particularly prone to time and cost over-runs. Such over-runs can be substantial if not overwhelming, from a base-line of a 'decision to proceed' that is based on initial estimates of cost and time, to final hand-over and accounts (Flyvbjerg et al., 2002). Indeed these over-runs can be significant, even from a base-line of the signed construction contract i.e. based on agreed contract price and duration.

The sources of such time and cost over-runs could be diverse, ranging broadly for example, from inappropriate procurement strategies and protocols, through incomplete and/or unsuitable designs, sub-optimal tenderer-contractor planning and/or estimating, to poor construction management and/or contract administration (Kumaraswamy, 1997a; Park and Papadopolou, 2012; Rosenfield, 2014; Love et al., 2014 a).

1.2 AIM

Growing apprehensions of excessive time and cost over-runs in roadworks projects in Sri Lanka, led to launching this independent pilot study (a) to assess to what extent such concerns are justified in terms of time and cost over-run levels and any general patterns, based on two sample projects (RSAP and PRP); and to identify (b) likely common sources of such shortfalls; and (c) focus areas for a more extensive and in-depth study to identify root causes for specific attention. The findings are also expected to provide pointers to potential areas for improvement.

It is expected that stakeholders such as the Government of Sri Lanka, the World Bank, other development partners and implementation agencies, could benefit from the pilot study findings, as well as the envisaged follow-up exercises, that would spotlight areas needing closer attention to elicit better time and cost performance levels and thereby enhanced value for money, in the planning and implementation of roadworks projects in Sri Lanka.

Apart from the above direct benefits, it is also expected that the unearthed sources and possible common causes may also provide useful pointers to some generic underlying issues, for example arising from similar contract documents and/or operational protocols that could adversely affect similar projects elsewhere.

1.3 SCOPE

1.3.1 Base-line for 'Over-runs'

The base-line against which over-runs are assessed for this pilot study is the signed construction contract so that any increases are against agreed contract price and duration. Setting an earlier base-line e.g. at project appraisal stage would probably highlight higher over-runs, but it would have blurred the focus by shifting attention to necessarily less accurate upstream estimates of time and cost. The current starting point, enables the required focus on the performance of the selected contract teams, including the consultants, contractors and contract administrators on each package.

1.3.2 Data Sources

Given the time-frame of the study, and the confidentiality of sensitive issues, hence limited access to details of this type of data in general, as well as the need to assess reasonably similar and recent samples, two recent World Bank supported roadworks projects, namely: (i) the Road Sector Assistance Project (**RSAP**) and (ii) the Provincial Roads Project (**PRP**) were identified for sampling.

1.3.3 Limitations

This was formulated as a ‘pilot study’, hence the time-frame and data sources were limited, but considered appropriate. Correspondingly, the findings should be considered in this context and cannot be generalized. While providing reasonable first order conclusions on common over-run sources in similar projects, and further pointers as targeted in the above ‘Aim’, the findings, interim conclusions and suggestions, merit testing and verification against larger samples, more quantitative data, consequential further analysis, consolidation and validation before they could be developed into definitive conclusions and recommendations.

1.4 METHODOLOGY

1.4.1 Strategy

This was formulated to discern any common sources and perceived general patterns in terms of frequencies and relative magnitudes of the time and cost over-runs under different ‘claims/ compensation heads’ (and/or arising from different sources) in roadworks projects in the RSAP and PRP projects. The data and hence findings are primarily based on (A) interviews and discussions with relevant parties and (B) available documents, as received from the Colombo offices of the World Bank, the RDA RSAP project office and the PRP project office.

1.4.2 Methods Summary

1.4.2.1 Interviews

in two stages - (I) to probe and extract (prior to structuring, consolidating and prioritizing) the relevant experiential knowledge of at least one representative each of the major stakeholders (relevant World Bank team, implementing agencies, employers, consultants and contractors) and at least one ‘external’/ independent expert (in this case, DAB members), *after the start of the document survey*; and (II) to obtain initial feedback from *some of* the same major stakeholders on specific relevant aspects of the preliminary findings and related questions that arose, in terms of perceived general common sources of time and cost over-runs.

1.4.2.2 Documents Review

of relevant documents as made available for this study from the Colombo offices of the World Bank, the RDA RSAP project office and the PRP project office These comprised mainly of procurement plans, contract documents, progress reports and summary statements and breakdowns where available.

2 BACKGROUND TO TIME AND COST OVER-RUNS IN ROADWORKS

2.1 GLOBAL SCENARIO - SAMPLES OF SOURCES, CAUSES AND SUGGESTIONS

Time and cost ‘creep’ throughout a project cycle is common in many countries with roadworks projects being particularly vulnerable, arguably given more variables across more extensive terrains than some other forms of built infrastructure. This is to some extent understandable before construction contracts are signed, for instance arising from potentially significant changes in requirements / priorities, hence in finally chosen options, e.g., on both physical and procurement routes. However, after such fundamental choices and even after detailed designs, the over-runs from the point after the construction contract is signed, have attracted attention but often defied initiatives to control them in many jurisdictions.

This has triggered many studies such as the current one, to identify the common sources or causes, so that these may be addressed more carefully. The following summarizes some relevant examples from a random sample, in turn derived from a cross-section of some such recent studies, that this consultant has come across recently.

Love et al. (2014b) cited a number of previous investigations worldwide, including one that had found excessive increases due to ‘rework’ alone, others finding ‘scope changes’ to be responsible for large over-runs e.g. one finding ‘change orders’ accounting for 50 % of cost over-runs and 20% of late delivery, while interestingly, ‘errors and omissions in contract documentation’ were found to range from between 5% to 20% of a project’s contract value. They also cited previous suggestions for mitigating over-runs e.g., enhanced performance monitoring, reporting and information sharing; enhanced accountability and responsibility for overruns against benchmarks, enhanced staff capacities, state-of-the art forecasting, as well as increased completeness and rigor of early plans.

Refreshingly, not all scenarios are consistently negative, e.g. Love et al. (2014a) cited a 2011-published study of road and bridge projects in Massachusetts, USA where nearly 50% were over-budget and 33% were over-run. This implies that it had been possible to control the others. They also cited a 2011-published study of Australian infrastructure projects which found that less than 48% of the sample were delivered on time, budget and to the required quality. This too indicates that it is not impossible to control time and cost. However their own survey of 58 transportation projects in Australia revealed mean rework costs of 11.2%, cost over-runs of 13.3% and schedule over-runs of 8.91%.

Earlier and in the USA again, Bordat et al. (2004) after a detailed analysis of Indiana Department of Transportation projects between 1996 and 2001, found that cost over-runs averaged 4.5% and were found in 55% of the projects, while 12% of the projects incurred delays. However, assessing the total quantum of the cost over-run to represent about 9% of the budget available for contracts, they recommended measures to reduce this, e.g.; with a ‘Change-Order Management process’ and annual reports reviewing the performance of consultants, and ‘assigning grades’, also taking into account the value and frequency of ‘preventable change orders attributable’ to them.

A worldwide cross-section would of course include special situations where over-runs may be unsurprisingly much higher, for example as reported by Enshassi et al. (2009) with related recommendations. Rosenfield (2014) on the other hand identified 146 potential causes of construction cost over-runs derived from a range of international literature and local experts, based on which he filtered and ranked 15 ‘independent universal root causes’. The top three, were (i) premature tender documents, (ii) too many changes in owners’ requirements or definitions and (iii) unrealistically low tender-winning prices (suicide tendering). Of course these are not universally applicable, e.g. one would think that the third ranked root cause depends on the ‘market’, e.g. is less applicable when there are plenty of contracts available compared to those eligible to bid for them e.g., as in Sri Lanka now. Apart from the root cause analysis, Rosenfield (2014) provides a useful recent summary review of the international literature from which he extracted the 146 potential causes.

One set of studies drawn upon in the above paper, was based in Hong Kong. Based on a series of surveys and project data analyses, Kumaraswamy (1997a) developed a hierarchy, comprising: (a) ‘*common categories*’ of claims heads such as ‘ambiguities in contract documents’, (b) ‘*common proximate causes*’ such as inappropriate contract forms, derived from the above ‘*common categories*’, and (c) ‘*common root causes*’ such as ‘unclear risk allocation’ in turn based on the ‘*common proximate causes*’. This basic Hong Kong based *hierarchy* is in *Appendix 1*.

While remedies were explored, e.g. in more ‘appropriate appraisal and apportionment of megaproject risks’ (Kumaraswamy, 1997b), more in-depth analyses were conducted e.g. on the use and abuse of claims, while profiles of both relative magnitudes and frequencies of both time and cost over-runs from the Hong Kong samples were presented (Kumaraswamy, 1997a,b) as in *Appendix 2* which contains two examples.

Parallel research exercises in Hong Kong helped triangulate the findings. These included studies on ‘contributors to construction delays’ (Kumaraswamy and Chan, 1998) and on ‘contributors to time and cost performance in building projects’ (Dissanayake and Kumaraswamy, 1999). Drilling deeper below specific ‘hotspots’ that generated disputes arising from divergent interpretations, Kumaraswamy and Yogeswaran (1999) expanded on principles and practices in ‘evaluating time extension entitlements’; while Palaneeswaran and Kumaraswamy (2008) developed on this to develop an ‘integrated Decision Support System for dealing with time extension entitlements’. In addition, from a more holistic and ‘prevention better than cure’ perspective, Kumaraswamy and Yogeswaran (1998) developed a ‘claims focus indicator’ based on three chosen dimensions of relative magnitude, relative frequency and ‘avoidability’ to anticipate and thereby address in advance, the ‘significant sources of construction claims’ in specific contractual regimes. For example, such prior knowledge could guide top management of employers, funding bodies and consultants to focus their best efforts and high-end resources e.g. top management time, on minimizing the more ‘avoidable’, more frequent and/or usually higher value claims.

Recent studies convey insights into examples from other Asian scenarios. For example, Park and Papadopolou (2012) identified 27 causes of cost over-runs and assessed their severity and frequency based on data from 35 transportation projects completed between 1983 and 2010 across 12 South Asian and East Asian countries. They concluded that ‘awarding contracts to the lowest bidder’ was the most significant cause of

cost over-run in their sample, while also linking lump sum contracts to the ‘greatest occurrence’ of such over-runs. Shehu et al. (2014) focusing on Malaysia, examined factors contributing to both time and cost over-run and concluded that delays there were mostly attributable to contractors, with their financial factors, specifically ‘cash flow problems’ being the major culprit.

Of course various specific causes (whether ‘proximate’ or ‘root’ cases) may dominate to differing degrees in different jurisdictions. However, one generic approach to reducing disputes and the consequential waste of resources and time (which parties may in turn attempt to recover through further claims and counter-claims) has been to encourage structured co-operation between contracting parties and their agents, including consultants, sub-contractors etc. Collaborative project delivery modalities such as ‘partnering’ have been strongly encouraged in high powered industry reports such as in the UK (Latham, 1994, Egan, 1998) and Hong Kong (CIRC, 2001). Industry, finding merit in these recommendations has developed contractual formats and practices that have progressed from non-contractual to contractual partnering (e.g. using the New Engineering Contract of the Institution of Engineers UK, also used outside the UK e.g. in Hong Kong), alliancing, as in Australia and ‘integrated project delivery’, as in the USA. These practices are based on the principles of ‘relational contracting’ which makes allowance for ‘incomplete contracts’, i.e. acknowledging that all eventualities cannot be clearly defined in black and white, hence contracting parties should co-operate to handle unforeseen risks in the best win-win approach, rather than waste resources ‘passing the buck’ to each other.

Caveats are of course in order, e.g., on where to ‘draw the line’, so that ‘partnering’ is not abused and/or does not degenerate into collusion, as well as on relevant legal implications (Kumaraswamy, 2006). On the other hand, the lack of good relationships could by itself, lead to ‘cost growth’ (Dada, 2014), while the potential benefits from co-operation across project teams are almost axiomatic and a host of studies and experiences in different jurisdictions testify to this e.g. (a) in a general comparison of ‘multi-country perspectives of relational contracting and integrated project teams’ (Rahman and Kumaraswamy, 2012); and (b) with longer-term ‘Relationally Integrated Value Frameworks’ formulated for ‘supercharging supply chains’ toward increased value for all stakeholders in general (Kumaraswamy et al., 2010), while retaining competitive elements within networks, targeting ‘co-opetition’ i.e co-operating to form competitive teams that can achieve much higher overall value for money.

On the other hand, when failures to settle issues at the lowest possible level, escalate into avoidable claims and disputes involving top management, these tend to snowball with or without the potential personality clashes, dragging in secondary issues that may have otherwise been amicably dealt with upstream. A recent survey of the causes of disputes by a leading international project management and consultancy firm (E.H. Harris/ Arcadis, 2014), revealed the following top five causes of disputes, ranked from 1 (most frequent) to 5: (1) Failure to properly administer the contract; (2) Failure to understand and/or comply with its contractual obligations by the Employer/ Contractor/ Subcontractor; (3) Incomplete Design Information or Employer requirements; (4) Failure to make interim awards on extensions of time and compensation; (5) poorly drafted or incomplete and unsubstantiated claims. It should be noted that the above are based on a sample limited to disputes that this particular international group has been involved with, but the unveiled causes, whatever their ranking, would sound familiar in many countries including Sri Lanka, and are thus relevant to the current study.

2.2 SRI LANKAN BACKDROP – INDUSTRY BACKGROUND: RELEVANT OVERVIEW

Sri Lanka's rich heritage of infrastructure megaprojects can be traced back well over two millennia, ranging from well-planned and skillfully designed and built infrastructure megaprojects, including complex irrigation works, comprising systems of reservoirs, canals and village tanks, religious super-structures etc. In more recent times from about half a century ago, the construction industry was subjected to stop-go work demand fluctuations that took a toll on its developed resources and capacities. However, the recent upsurge in construction activities has stretched the domestic industry again, opening doors to more overseas contractors, given the limited numbers of local contractors with the expected track records on megaprojects. On the other hand some local contractors are handling jobs overseas.

Acknowledging that significant top-down improvements are needed, even that the 'Sri Lankan Construction Industry needs a resurrection on properly formed policies which are guiding tracks of a Master Plan', a 'Roadmap Towards Construction Industry Master Plan' was recently issued by the Ministry of Construction, Engineering Services, Housing & Common Amenities (2013).

The above may also reflect a resurgence of concerns that have triggered industry improvement initiatives in the past too. As in many other countries where reports on their construction industries have from time to time sought to address certain shortfalls, reinvent their structures, trigger desired 'culture-shifts' e.g. towards collaborative modes, (Latham, 1994; Egan, 1998, CIRC, 2001), and thereby improve their industry performance levels and industry development trajectories, Sri Lanka has also identified and targeted reforms at various stages, whether at an industry-wide level or in certain sub-sectors. For example, at a national and industry-wide level, the Cabinet of Ministers approved a detailed Memorandum on the 'Development of Domestic Construction Contractors' in 1988, which was soon followed by a handbook of implementation procedures (ICTAD, 1988). An example at a sub-sector level, was the set of Reports submitted in 1992 (ICTAD, 1992) - on the World Bank sponsored Study on the 'Domestic Construction Industry in the Roads Sub-Sector', prepared by a team assembled by ICTAD and submitted to the Road Development Authority and the World Bank. The Final Report included an action plan for uplifting the domestic roadworks contractors. Most of the recommendations were implemented to a large extent, with the outcomes being evident in the increased participation of domestic contractors in major road projects, even where international competitive bidding is used.

ICTAD itself was set up by the Government of Sri Lanka in the 1986 to develop the construction industry on various fronts, after a precursor 'Construction Industry Training Project'. ICTAD was initially funded by the World Bank but now relies on Government funding and self-generated income from its training programmes and other services (ICTAD, 2014). Apart from training at all levels of the industry, including workers, equipment operators and construction managers, ICTAD has 'development' and 'advisory services' divisions, that for example develop standard documents and other useful publications for the industry, including standard bidding documents, specifications, bulletins of construction statistics, price indices etc.; while also providing services such as maintaining a system of registered contractors in different grades (ICTAD, 2008).

Another relevant organization, albeit not construction-specific that was established with Word Bank support was the National Procurement Agency, established in 2005, but closed a few years later. This agency carried

out a comprehensive revision of governmental procurement guidelines; consultancy guidelines and standard bidding documents for goods; and ICTAD revised the standard bidding documents for the construction industry to align with these general procurement guidelines.

2.3 SRI LANKAN SCENARIO – EXAMPLES FROM PREVIOUS SAMPLES

The focus of this pilot study on time and cost over-runs in roadworks projects is fully justified, given that roadworks currently constitute the most extensive and expensive built infrastructure assets being developed in Sri Lanka. Moreover, road networks merit special attention, since they are being developed and improved with objectives such as lowering transportation costs, boosting efficiencies and important connectivities and thereby economic and social development.

A few previous study exercises have examined delays and cost over-runs in Sri Lanka, with a couple focusing on roadworks too. For example, Wijekoon and Uduweiriya (2012) examined a sample of delayed projects in the Sri Lankan water sub-sector and identified overall delay factors in both the pre-construction phase and construction phase. While the current study focuses on the latter phase, both sets are indicated here, since a sub-optimal pre-construction phase would also adversely affect the construction phase. The factors seem somewhat generic and ranked in order of frequency (starting with 1 being highest frequency) they were:

- A. ***(A) for the pre-construction phase:*** (1) Evaluation of Bid documents by Employer, (2) Reviewing and approving of Bid documents and Designs by Employer, (3) Acquisition of Land, (4) Errors in Bid documents, (5) Delay in decision making by Engineer; and
- B. ***(B) for the construction phase:*** (1) Procurement delays in imported materials, (2) Variation orders, (3) Shortage of Skilled Labor, (4) Poor planning and scheduling, ... and six more factors.

It may be noted that the first factor pertaining to imported materials may not be as important in the roads sub-sector as in the water sub-sector. Another study by Wijekoon (2011) although focusing on the Sri Lankan roads sub-sector, sought factors affecting overall project performance including time, cost and quality. 35 factors were identified from this broader perspective.

Focusing specifically on cost over-runs on road construction projects in Sri Lanka, Wijekoon and Attananayake (2012) identified from their sample and ranked in descending order of importance, the following **cost overrun factors:** (1) payment delays, (2) delays in shifting existing utilities, (3) cost escalation, (4) design changes during construction, (5) issues in land acquisition.

Jeyakanthan and Jayawardane (2012) reported on their analysis of project delays in donor funded road projects in Sri Lanka, based on data from 24 road projects funded by ADB, JICA and WB, related interviews and various related documents. They found an **overall delay of 69%** at the project implementation stage on average; and also that **variation/ extra work had caused 56% of the delays**, while **8% of the delays** were attributed to **errors in tender drawings**. In this context, they cite an ADB report that indicates a requirement “to prepare detailed engineering designs to enable construction quantities to be calculated with reasonable accuracy of 5%”. Also, errors and omissions in detail designs, changes in scope and specifications were the most prevalent sources of quantity increases. Based on such findings, their recommendations included design

constructability reviews, capacity building, a ‘lessons learnt’ document and a more rigorous approach by the executing agency.

From a broader perspective, if linking sources and causes of over-runs to risks, one could also compare some findings from a study to enhance risk management in Sri Lankan road construction projects. For this, Perera et al. (2014) conducted a Delphi survey with 33 Sri Lankan experts. Although one finding identifies ‘delays in payment by the client’ as the most critical risk factor in the construction stage, one may wonder if this could depend on the funding sources in the particular experience of the surveyed sample. On the other hand, the authors highlight **‘design errors by the consultant’** since they note that it ranks high in three of the four stages into which they divided the project life cycle i.e. (i) conceptual stage, (ii) design stage (2nd most severe risk identified here), (iii) construction stage (2nd most severe risk identified here too) and (iv) operations stage (2nd most severe risk identified here as well). Furthermore, **‘delays in client decision-making process’** and **‘errors in estimated cost and construction period’** are collectively concluded by the surveyed experts, to be severe risks in both design and construction phases. The construction stage is considered the most critical in terms of severe risks. It may be considered apt that this critical ‘construction stage’ is the focus of the current study, given that over-runs are considered against the contracted project durations and prices of the construction contractors. However, as indicated above, risks that are not effectively managed in the preceding two stages i.e., conceptual and design, could well impact significantly on this already critical construction stage.

3 EXAMPLES OF OVER-RUNS AND DOCUMENTED REASONS

3.1 PREAMBLE

This section contains snapshots of common time and cost over-runs with any corresponding documented reasons, with the objective of providing a perspective of both the scale of the problem and a flavor of the underlying issues. It draws on extracts from data made available from the RSAP and PRP projects as planned. Being a pilot study, it does not purport to convey a comprehensive summary nor an accurate quantitative/statistical overview. Another inherent limitation is in that some contract packages have not yet been finalized, either being under construction and/or with some major items under review or in dispute. However, the areas, issues and items highlighted are not random, but attracted attention through an iterative and interactive process of document reviews and interviews which unveiled specifics to be examined, of which many merited highlighting as below. The important *caveat* is therefore that the following is not intended as a fully representative cross-section, leave alone comprehensive review of the over-runs and documented reasons.

3.2 PRP - PROVINCIAL ROADS PROJECT

Briefly, the original credit of US 105 million equivalent on IDA Credit CE-4630-LK was to be disbursed over the project time-line set from the WB Board approval date of 17 Dec. 2009, ‘effectiveness date’ of 02 April 2010 and original project ‘closing date’ of 31 March 2015. Focusing on the roads rehabilitation component in the three selected provinces only, i.e. excluding the maintenance, implementation support and capacity building: 4 of 6 roads in the Uva province and 4 of 5 in the Eastern province have been physically completed, while 2 of 4 are completed in the Northern Province. The other 2 had to be re-awarded in the Northern Province, given which it may also be noted that any actual over-runs on the new contracts would not reflect the over-runs from the dates of award of the precursor contracts. Generalizing such experiences, reminds one of the need for careful selection of contractors, with extra attention to their potential performance, apart from tender price. Moreover, from another angle, the Auditor General’s Report dated 30 June 2013 for the year ended 31 Dec. 2012, included negative comments on the supervising consultant in terms of contracts being ‘poorly managed’ and inadequate ‘capacity’ and ‘lack of professional commitment’. In this case relating to works in the Northern Province, the team leader was replaced, based on Employer’s recommendation. It may be noted that similar observations regarding the capacity and/or commitment of some consultant staff, apart from shortfalls in some contractor capacities, resource levels and attitudes have surfaced during interviews on both PRP and non-PRP roadworks projects

In terms of time over-runs, a snapshot of the current approximate EOT (Extension of Time) assessment of the PRP roads is in **Table 1**. It should be emphasized that some of the ‘EOT’ assessments have not been agreed, with these disputes under adjudication in some contracts, while one has been ‘noticed’ for arbitration on this EOT disagreement itself and another has been noticed for arbitration on costs related to an agreed EOT. Therefore allowing for such future shifts in the current picture, the present profile indicates an average contract EOT of 28.8 %, with the highest being 48.6 % so far and the lowest being 7.5 % over the 11 projects

where EOT has been claimed and assessed. Breaking this down to main sources, one notes a major source in ‘quantity increase’ related EOT, averaging 19.7 %, with the highest being 39.9 % so far and the lowest 5.5%. The second major source of EOT, is adverse weather, averaging 4.6 %, with the highest being 12.7% so far and the lowest being 0 i.e. zero claimed under this particular category (on 2 contracts) so far.

In terms of cost over-runs, **Table 2** conveys a consolidated summary, of the current approximate assessments on the 11 PRP roads assessed so far. Here it should be stressed that many of the claims have not been assessed, leave alone agreed, so this is only an indicative ‘in advance’ profile. Secondly, there are 6 major sources of claims, labelled as Cl. 1 to Cl. 6 in *Table 2*, where substantial claims have been recently submitted but are still being assessed, so this advance profile is only a ‘part-profile’ in reflecting 3 of 8 potentially substantial claim sources on this project. However, it may be argued that Cl. 1 termed ‘change of input %’ should be combined with the category above that in the table termed ‘Price escalation’ since it relates to that same source, the difference being that the ‘Price adjustment’ is computed directly based on the relevant formula in the contract, whereas the ‘change of input %’ is based on another clause (13.8 in these contracts), that provides for adjusting input percentages if the weightings have been rendered unreasonable, unbalanced or inapplicable. Some other claims such as those labelled as Cl. 2 on ‘prolongation’ could be substantial, while the Cl. 3 on ‘VAT on bitumen’ arose when the Government removed the VAT (Value Added Tax) on bitumen and simultaneously raised the selling price, so that contractors had to pay the same net price. Although not able to claim for a price escalation, such claims are based on contractors allegedly losing the financial benefit of this VAT recovery against their own purchases.

Subject to the above limitations, what is available to date, indicates the following ‘cost over-runs as a % against original contract price’ (a) on ‘BOQ items’ (representing ‘changes in quantities’ in general) a current average of 0.77 %, the highest so far being 14.37 % and the lowest being – 38.13 %; (b) on ‘variations’ – a current average of 19.46 %, the highest so far being 53.00 %; (c) on ‘Price Escalations’ – a current average of 12.77 %, the highest so far being 17.21%; with the potential for substantial increases after evaluating the above-mentioned Cl. 3 on ‘VAT on bitumen’ and the Cl. 1 on change of input % (both of which relate to ‘Price Escalations’ i.e. ‘Price Adjustments’ in general).

An interesting facet noted on this PRP project, is that the net cost over-runs could have been much higher, if not for savings that had set off some of the increases. For example, reduced cross-sectional dimensions, based on engineer re-design of a drain where the ground conditions were better than those envisaged in the standard design tendered upon, compensated for the extra length of drain in some contracts. Also, in some other terrains, one drain side was reportedly designed to ‘double-up’ as a mini- retaining wall on the embankment side, effecting further savings. Such examples may presumably be linked to vigilance / good practices of the relevant supervision consultants and employer’s representatives in the central Project Co-ordination Unit and/or the provincial Project Implementation Unit /designated Road Development Department. However these ‘pluses and minuses’ may not be directly evident in specific items e.g. the item (a) above on ‘BOQ items’ (mainly representing ‘changes in quantities’) could reflect the lower length of drain corresponding to lengths where the cross-section was reduced, but payments for lengths with reduced cross-sections may have had to be made under ‘variations’ since this was interpreted as a new item meriting a new rate. A clear example is in the EP05 contract, where an apparent saving in quantities reflected in the 38.13 %

'saving' on BOQ items; masks the ground reality of a need to replace a substantial length of drains with cover slabs of lower design strength, with drains able to sustain the higher loadings in that heavily populated area, thereby contributing substantially to the overall 'variation' of 53.00 %.

3.3 RSAP - ROAD SECTOR ASSISTANCE PROJECT

In summary, the original credit of US 100 million approved on the WB 'Board date' of 15 December 2005 on IDA Credit Cr-4138 effective 16 March 2006, was supplemented by a First Additional Credit Cr-4429 of USD 98.1 million effective 12 December 2008 and a Second Additional Credit Cr-4906 of USD 100 million effective 02 June 2011, with a project 'closing date' of 30 September 2014. The total base value of the RSAP is thus USD 298.1 million, if based on a summation of the relative USD values of the credits as at their respective effectiveness dates, although the current USD value is correspondingly more.

The focus required in this pilot study is on the roads rehabilitation and improvements construction contracts only, i.e. in the case of this RSAP project: excluding the road maintenance contracts, Road Maintenance Trust Fund, Asset Management system development and other institutional strengthening components. 12 contract packages were awarded and completed in the 'parent project', which was also supplemented by the first additional finance due to special conditions. However, all contract accounts have not been finalized by the GOSL e.g. given an ongoing arbitration on one contract. In addition, 4 contract packages were awarded and completed under Phase 1 of the second additional finance, while 4 packages are ongoing, following changes to the planned road sections in Phase 2.

In addition to the 'maintenance and rehabilitation of national roads' that involved improvements and resurfacing in certain provinces, the RSAP includes components for technical assistance, institutional strengthening, technical audit and some goods and equipment for the above which are all in Part A. Part B being on the 'Maintenance and Rehabilitation of Rural Roads Pilot', includes strengthening of the rural road management and maintenance system of the local units (Pradeshiya Sabhas) and rehabilitation and maintenance of specified rural roads, training, technical assistance, institutional strengthening, technical audit and some goods and equipment as in Part A. Part C is on technical assistance in establishing the Road Maintenance Trust Fund.

Table 3 presents a status summary of the 'Approved Costs', as well as the '% Increases' over and above the original contracted prices, of the 12 contract packages in RSAP Phase 1, one of 13 original packages having been deleted from this project at the outset. The 'approvals' column on the left extreme, juxtaposes the WB approvals against those of the GOSL cabinet or the Cabinet appointed Procurement Committee (CAPC) or in one case he Ministry Procurement Committee (MPC). While no major deviations are evident between the WB and GOSL approvals on costs, it seems that the WB recommended Liquidated Damages had not been applied in many cases, at least up to the time of preparation of this summary on 22 May 2013. One may note that, whether the non-enforcement of Liquidated Damages results from some global settlement or otherwise, industry awareness of such precedents and possibilities could undermine an important deterrent against delays.

The bottom-most row of figures in **Table 3** projects an overall profile over the 12 contracts so far (noting that an arbitration is pending), of the cost over-run in term of ‘% rise’ over the base contract price (without contingency) datum. Given the chosen breakdown ‘heads’, the ‘% rise’ is highest under ‘price adjustment’ at 53.97 %, while variations at 17.21 % are considerable. Although the ‘quantity changes’ may have been expected to have yielded more than the 3.92 % seen here, it is possible that the quantity increases due to road width expansion etc. were off-set by some omissions or even variations. For example, the quantity reduction in one road package accounts for reducing almost a third of the price, whereas the variations adds back much more than that reduced - over 70 % more in this case. The other drawback in this type of ‘plus-minus’ scenario is that the rates applied to variations may be higher than the contracted base rates if the contractor can justify an increase, as had happened in the above example, even when similar works were removed and then added back at reportedly short notice.

The highlighted column of ‘% Cost Over-run’ in **Table 3** projects the ‘**Total Increase in project cost**’ - ‘**Base Contract Price (without contingency)**’ as a % of the ‘**Base Contract Price (without contingency)**’. The base figures in *Table 3* are those with RDA and WB, the only computations for this Report being the ‘% Cost Over-run’ column and the bottom row on ‘% Rise on BANK approved costs’. Assuming the base figures have been computed as indicated in the original column heads, **it may be noted that the cost over-runs will not appear as high against the actual contract prices which do in fact, include physical and price contingencies**, although for the purposes of this report too, it is prudent to follow what was in the base figures as given, in order to project the true extent of deviations e.g. of quantities, prices etc. Another *caveat* is that some figures are pending finalization e.g. with one contract under arbitration, although the WB figures are not expected to change. The **% Cost Over-runs range from 51.49 to 132.41** in this project, with an **arithmetic mean of 86.46** representing the average over-run in a contract. This needs to be differentiated from the parallel figure of **75.58 %** in the bottom-most row of figures, since the latter shows the **‘% Rise’ over base contract prices without contingencies for the whole RSAP 1 project**.

Revisiting the breakdown of cost increases in the highlighted bottom row, a higher average ‘% rise’ was expected under ‘claims’, based on a small sample of some of the original claims and EOT granted e.g. on ‘unavailability of points of reference issued by the Engineer’ and ‘unavailability of drawings that required Engineer to design based on surveys done by the contractor’ and ‘entrusting the contractor to draft these drawings’. However, the absence of financial compensation for such apparent lapses, may perhaps be considered alongside the lower than expected liquidated damages in general, given the magnitudes of the time over-runs.

The significance of any such overall ‘% rise’ in project cost so far of almost 80 % (78.67 %), may in general, only be alleviated by any justifications of increase in value e.g. with increased road width . However, the fact that the bulk of the cost over-run appears to arise from price adjustments, underlines the imperatives for reducing the time over-runs.

The time over-run profile in RSAP Phase 1 contracts is seen in **Table 4**, ranging from 7.62 % to 180.70 %. However both these values seem to be ‘outliers’/ extremes, the next highest and lowest being 105.23 and 26.61 respectively, while the arithmetic mean at present is 69.77 % or 70 %. It should be noted that the EOTs

granted (or under dispute) are not shown here, the time over-run being directly based on the completion date - start date, as compared with the contract period, as obtained from the RSAP office.

Table 5 conveys a snapshot of the EOT granted on the four contract packages in the RSAP Phase 2 – Kantalai-Trincomalee segment. While generally less significant than many contracts in Phase 1, EOT based on quantity revisions (EOT category ‘2’ in this table) seem high, ranging from 65 to 82 days, compared to the contract periods (each being 15 months). Also, one contract incurred additional delays (40 days EOT) due to some special utility line issues. The lowest and highest overall time over-runs are 15.0 % and 28.6 % respectively.

The other segment of RSAP Phase 2 is ongoing and given the substantial works remaining it is premature to comment on over-runs, although interviews of consultant personnel and DAB members on these contracts provided useful ‘live’ pictures of both generic and specific issues. For example, it seems that the original contract durations may be argued to be unrealistic, give this type of dense urban arteries leading into the capital city. Other issues such as allegedly inadequate design preparation and review time-frames, substantial deviations from the tender (base) drawings, shortfalls in contractor planning and resource levels etc. also decelerate progress, so much so, that the ‘physical progress % (**estimated**)’ in the four package ‘Lots’ as of 30 April 2014, was **28.50, 17.40, 30.00** and **20.50**; against ‘planned progress % (financial)’ of **79.38, 78.55, 87.05** and **83.67** respectively. It may be noted that relatively substantial EOT and financial claims are being received on this project.

Moving to a completed segment of the RSAP, **Table 6** summarizes the EOT granted on the suite of contracts for the ‘Maintenance and Rehabilitation of **Rural Roads Pilot**’, the **average EOT** is **47.6 %**. Issues leading to EOT and extra costs include road width increases, issues with house access provisions, structure improvements, unplanned retaining walls and box culverts, base improvements and causeways. The **increases in the contract prices**, as compiled by relevant project staff (not reproduced here), taken together e.g. covering variations and changes of quantities, **averaged out at 28.32 %** of the original contract prices – again excluding contingencies, hence not appearing so high if compared against overall full contract prices. There were net ‘minuses’ in some contracts (presumably due to deletion of some work items in some contracts) that reduced the ‘pluses’ in other contracts. For example, the increase in one contract was 90.2%, the next highest being 62.9 %, then 48.8 % while the three most negative were – 24.0 %, – 15.1 % and -15.0 %. Indeed there were only four contracts with net contract price ‘minuses’ in this sample. One could assume that there were such ‘minuses’ and ‘pluses’ **within** contracts too (i.e. in various work items), as in other samples which were examined in more detail, being bigger contract packages.

4 INTERVIEWS

4.1 INTERVIEW TARGETS AND FORMATS

4.1.1 Objectives, strategy, structure and formats:

The objectives and associated strategy, as indicated in the 'Methods Summary' in 1.4.2.1, were for interviews to be planned and conducted in two stages - (I) for 'knowledge-mining' of relevant experiential knowledge from a cross-section of the major stakeholders and independent experts (in this case, DAB members) in parallel with, although starting after the document survey; and (II) to obtain initial feedback from some of these major stakeholders on specific relevant aspects of the initial findings on apparently typical sources of time and cost over-runs, information gaps, and related questions.

All interviews were semi-structured, based on a set of general questions as well as a supplementary set of interviewee-specific questions that targeted the knowledge pool that could potentially be drawn upon from each interviewee's special positioning and expected experiences. Interviewees were assured that this is essentially a 'looking back to collect & consolidate the lessons learned' exercise (including 'positives') so as to plan & implement future projects better. It was also conveyed that the interviewer was interviewing and/or had already interviewed a few stakeholders who were involved at different stages of both projects, but that the specific insights and inputs from the current interview would be valuable in filling some gaps and adding high level overviews. They were also assured that all views and sensitive information conveyed would be treated as confidential and in any case, neither specific individuals, work packages nor organisations would be cited on particular matters, but that the consolidated information would be used to derive general findings and conclusions, while important non-confidential data available may be cited, since it could have been obtained from one of many sources.

Typical general questions were developed in steps during the stage (1) interviews itself, following the initial document appraisal and a few interviews that pointed to some useful areas for exploration. Some of the general questions used were as follows:

1. (a) Were the **initial contract durations** reasonable/ realistic? (b) Were the **initial contract values** reasonable/ workable?
2. (a) To what extent were the Consultants expected to have **inputs** into the **designs and contract documents**, including special conditions of contract, specifications and drawings etc.? (b) *In hindsight could this be approached better, in the light of local conditions etc. on similar projects?*
3. (a) Was the demarcation of responsibility **clear** (to all including contractors), for the designs and detailed/ working drawings? (i.e. including centre lines, longitudinal sections, reference points/ levels, formation levels, structures, drainage)? (b) *as in 2(b) above?*
4. Did the compensation for **price fluctuations** seem reasonable (to both Employer and Contractor)?
5. Did the **Employer/ Client inputs** differ from what was expected on such projects? If so, how? Any examples?
6. Did the **Funding body inputs** differ from what was expected on such projects? If so, how?
7. Did the **Consultants' inputs** differ from what was expected on such projects? If so, how? Any examples?

8. Did the **Contractors' inputs and outputs/ performance** in general, differ from what was expected on such projects? If so, how? Any examples?
9. Did the **DAB** inputs and outputs in general, differ from what was expected on such projects? If so, how?
10. Could the **variations** have been reduced? If so how?
11. What were the **main issues** that led to (a) **time over-runs** and (b) **cost over-runs**?
12. (A) In your personal opinion, what were the **root causes** of (i) time over-runs and (ii) cost over-runs? (B) Of these, which root causes **contributed most**? (C) Of these, **which may be easier minimized** in future? ... by

In keeping with the interview strategy, a few Phase II interviews were of a few of those interviewed in Phase I, with the dual objectives of (a) filling in some information gaps and inconsistencies/ ambiguities that emerged subsequent to the first interview and (b) obtaining feedback on the initial/ interim findings and potential suggestions.

The basic interviewee profile is as below.

4.1.2 Schedule of Main Interviews:

Main INTERVIEWS SUMMARY

<u>Interviewee Category</u>	<u>Date</u>	<u>Interviewee Category</u>	<u>Date</u>
Phase I			
RDA	12 February 2014	RDA (including Ex-RDA)	8 May 2014
Consultant	13 February 2014	PRP	9 May 2014 am
RDA Contract Advisor	14 February 2014	PRP	9 May 2014 pm
RDA (including Ex-RDA)	18 February 2014	PRP	12 May 2014
RDA	18 February 2014	Consultant	14 May 2014
RDA (including Ex-RDA)	18 February 2014	PRP	19 May 2014
RDA (including Ex-RDA)	24 February 2014	PRP	19 May 2014
Contractor	26 February 2014	PRP	26 May 2014
Contractor	26 February 2014	Consultant	3 June 2014
DAB member	21 February 2014	Consultant's Contract Advisor	3 June 2014
DAB member	25 February 2014	PRP	5 June 2014
DAB member	27 February 2014	DAB member	9 June 2014
		DAB member	9 June 2014
		RDA	11 June 2014
		PRP	17 June 2014

4.2 SAMPLE EXTRACTS FROM EXPERIENTIAL OBSERVATIONS

Each interview yielded valuable findings. The initial interviews were exploratory but as the collective knowledge base developed iteratively, some overlapping observations served to reinforce certain points and suggestions, while some unclear areas were clarified when additional perspectives shone light on what could

have happened and why. Rather than list all points gleaned from all interviews, the following are some sample extracts. Since the following sub-sections are categorized according to groupings such as employers, consultants, contractors, in order to reduce repetition some points which originated from more than one group are not duplicated unless essential to complement and complete the picture.

4.2.1 Sample observations from Employers (RDA & PRP) and Funding Agency personnel & consultants

The employers conveyed how a few special issues triggered the more substantial time and cost over-runs in the RSAP and PRP projects. On the RSAP, an ‘across the board’ increase of the design road width from 5.5m to 6.2m after the contracts were signed, led to major works quantity spikes. These were of course aggravated in contracts in hilly terrain where substantially increased earthworks, enhanced culvert and drainage provisions etc. were entailed. Secondly, particular periods of a bitumen shortage, as well as of a bitumen price hike had significantly impacted time and cost.

In terms of ‘positives’ in ‘good practices’, in one project (as partly described in 4.2 above), net cost over-runs were reduced by rationalizing the designs of (a) drains and/or (b) road specifications, where (a) the ground conditions and/or (b) traffic conditions were better than those envisaged in the standard designs tendered upon. Such savings helped compensate for (some of) the extra costs arising from (a) the extra length of drains and/or (b) extra roadworks quantities, as well as (c) some area where the pavement design needed upgrading.

In general, some contract clauses were perceived to be prone to different interpretations if not misinterpretations e.g. (i) the regular use of the ‘changes in inputs %’ to claim price escalations (adjustments) on certain inputs like bitumen where prices may have risen relatively more to other inputs, even based on a small change from the contract quantities, whereas those who formulated this provision at ICTAD had reportedly envisaged recourse to this only where there was a substantial change; (ii) different approaches to claiming and evaluating EOT.

Although, employers believed that EOT on adverse climatic conditions was generally well justified with adequate weather records, this was examined further, given substantial claims on some contracts and it was found that different justification and quantification methodologies were used in different standard conditions, suggesting a need for revisiting and standardization. In particular, one apparent omission was noted in that the World Bank Standard Bidding Documents for Procurement of Small Works (WB.SBD.PSW) does not provide for EOT based on ‘exceptionally adverse climatic conditions’ (as does the corresponding World Bank Standard Bidding Documents for Procurement of Works - WB.SBD.PW and other standard contracts encountered), since it is neither in Clause 26 (on ‘extension of the intended completion date’) nor in Clause 41 (on compensation events referred to in Clause 26), leading to some allegedly using 41(f) which is for adverse ground conditions.

Another noteworthy example is that the EOT assessment of a delay analysis expert who was recently mobilized to assist in a major arbitration is that the EOT that had already been agreed on this contract was excessive. One may wonder if any more over-assessments may emerge if his assessment technique for EOT

due to increase of road width, is applied to other contracts that received EOT for the same reason. From a ‘lessons learned’ viewpoint, it appears necessary to develop and specify a standard EOT assessment methodology in contracts, given that different approaches yield diverse answers, but even worse, some approaches seen in contractors claims seem to lack any reasonable technique/ basis – so a recommended methodology would assist them and also minimize spurious claims, saving resources for all concerned.

In other general examples: (iii) some obligations of contractors were perceived by some to lack adequate contractual ‘teeth’ that could deter non-compliance e.g. for not supplying sufficiently detailed and timely work programmes, method statements, as-built drawings etc.; with even the termination clause being suggested for strengthening since some felt the reasons for termination need expanding and elaboration; (iv) different interpretations of ‘methods of measurement’ on some items was noted, e.g. disputes had arisen on tolerances and related payments for ‘average’ or otherwise, including when outside the tolerances; and (v) disputes on approaches to evaluating of overheads in variations or prolongation claims. Disputes had also arisen on interpretations of (vi) when a contractor can claim on ‘statement of completion’, one view being that the claim can be deferred to the end of the defects liability period, thereby increasing the uncertainty of contract price; (vi) the basis on which a contractor can apply for new rates for varied quantities – while there are four conditions in Clause 12.3 of WB.SBD.PW, it seemed difficult to disprove that the unit cost changed by over 1% unless a standard methodology was specified for evaluating both the initial and final unit costs.

At a more ‘macro’/ higher level, a concern aired in some quarters in terms of controlling over-runs, is on the adequacy and clarity of the threshold at which ‘no objections’ must be sought from (a) the funding agency and (b) the employer’s hierarchy. While some at the implementation ‘coal-face’ may prefer to retain a flexibility to deal with contingency related over-runs by balancing against potential savings, a case can be made for submitting for (a) ‘no objections’ review of the funding agency, not just when the contract price increases by over 15%, but even when any one of some defined critical elements/ items exceeds a certain margin e.g. whether 20% or 25%; and similarly (b) for employer’s review at an appropriate level too. Secondly, it seems useful to rationalize the appropriate authorization levels / thresholds in the employers’ hierarchy when the increase in contract price reaches a certain trigger-point ‘value’ (e.g. LKR 500m) and/or ‘%’ (e.g. 15%) increases,. Although guided by documents such as Supplement 14 to the Procurement Manual of GOSL and clause 8.13.4 therein, it appears there may be some perceived flexibility in for example, when to refer to a Provincial Secretary, a Ministry Secretary/ Ministry Procurement Committee or the Cabinet appointed Tender Board. While established practices may be proving adequate in each organization, tightening this type of requirement, along with introducing ‘elemental’ /critical item thresholds as recommended for triggering referral to the funding agency above, may help heighten efforts to ‘nip’ potential over-runs ‘in the bud’.

There was unanimous and emphatic agreement that more realistic time-frames and budgets should be provided for more comprehensive and/or detailed planning, site investigations and designs, along with the associated risk assessments, since many design changes and consequential over-runs could be traced to shortfalls in these areas e.g. with under-estimated quantities, unexpected conditions etc.

Employers (and also consultants) urged a revisiting of the insistence on quality assurance protocols that correspondingly reduced consultant resources available for quality control. It was felt that many contractors

on these projects (whether ‘international’ or ‘national’) abused the expectations, thereby leading to excessive rework, consequential disruptions and disputes and delays at the least, if not cost over-runs. On the other hand, a few employer representatives alleged room for improvements motivation / commitment of some of the consultant staff they had encountered on previous contracts. Indeed an example is documented in an Auditor General’s report of 30 June 2013 for the year ended 31 Dec. 2012 on the PRP project, which faulted the supervising consultant on one segment of a project on poor contract management, inadequate capacity and lack of professional commitment.

Some employers and consultants felt that the funding agency loan period limit imposed onerous restrictions. On the other hand, one may take an alternative view that while a realistic period should definitely be set at the outset, all stakeholders should be impressed with the time imperatives also from the inception, so that ‘work does not expand to fill the time (apparently) available for it’ and then over-run due to contingencies.

Another (apparently positive) perspective was that any ‘additional value’/ benefit that was targeted and obtained should be ‘factored in’ when viewing time and cost over-runs, e.g. the benefits from additional road width and/or improved road quality to cater for higher expectations and/or traffic loadings. However, post-contractual variations almost always cost more than what that work component would have cost if embedded in the original contract. In any case, the cardinal principle of anticipating and building in such possibilities/ risks should be a corner-stone in the agendas of planners and designers. That they should also be given time to do this, reinforces the imperative for the adequacy of upstream time-lines and resources for detailed planning and site investigations and careful designs.

4.2.2 Sample observations from Consultants

This sub-section also includes observations from a Contracts Adviser to one of the consultants, while it may be noted that the consultants interviewed were only those on the RSAP.

There were perceptions of unrealistic contract durations having been imposed on some contracts based on internal/ political targets and allegedly (as a couple of interviewees perceived) to fall within the funding agency loan period, or even with inadequate technical and practical considerations e.g. without considering the terrain and urban conditions. So while feasible for some flat non-urban terrains these were not workable in hilly or urban terrains. Also, road rehabilitation that entailed planned and unplanned utility relocations were apparently under-estimated in terms of risks, hence the ensuing time and cost over-runs. One positive suggestion to mitigate one such risk source, was to boost the ‘public engagement’ of the affected community – by (a) advancing its timing to well before the roadworks reached each area so that for example, temporary and permanent access / connection issues could be worked out and agreed by an advance team, rather than disrupting or stalling the work as often happened on some contracts and (b) ‘engaging’ more constructively and productively, possibly with higher level inputs. Similar suggestions were received on quarries and burrow pits, since delays in securing these and/or disruptions even after establishing these, had led to substantial EOT on some contracts.

Some consultants engaged for design review and supervision had been disappointed that the bulk of the documents arrived closer to the end of design review period. Also, when asked about significant EOT claims

that had been granted in at least one contract, based on ‘unavailability of points of reference issued by the Engineer’, ‘unavailability of drawings that required Engineer to design based on surveys done by the contractor’ and ‘entrusting the contractor to draft these drawings’, they attributed this to what was (not) done prior to their coming on board. It seems from such examples, that the demarcation of responsibilities for designs (arising from the definition of expected detail ‘design’), working drawings and approvals thereof is open to divergent interpretations. Any such ambiguity on fundamentals could easily trigger, as it evidently has, ‘passing the buck’, delays, disputes and over-runs.

There was a useful suggestion for the Engineer’s team to work with the Employer’s designated project team in a common office. Indeed this happens elsewhere. Specific requirements were recommended to be stipulated on the production of the ‘Clause 8.3 programme and supporting documentation’ including resource loadings. Similarly, method statements and monthly progress reports should be upgraded. Penalties were suggested for non-compliance with above, as well as for not supplying/ deploying the stipulated resources. The same interviewee suggested that the Engineer be required to submit a monthly ‘cost management report’.

Some other unsubstantiated observations which may be personality-specific, but arose from more than one source, were (a) allegations of direct site instructions from some Employer’s representatives, sometimes bypassing the Consultant and (b) a perception that claims and counter-claims (including Liquidated Damages) may be settled at a higher level on a global basis. Again (as in sub-section 4.2.1 above), there were comments about the funding agency loan expiry seeming to ‘drive the construction contract’ also leaving some alleged loose ends on the disputes resolution and defects liability period. Note: one may consider a somewhat mitigating perspective on this point where a deterrent of a definitive end date helps focus minds on completion from the outset (as also described at the bottom of the penultimate paragraph of the sub-section 4.2.1 above). However, these perspectives are worth revisiting together.

4.2.3 Sample observations from Contractors

It should be noted that although the contractors interviewed had worked on both RSAP and PRP projects, their observations were explicitly based on their broader experience on roadworks contracts funded by other agencies and GOSL as well. Interestingly, the particular contractors interviewed took a holistic and professional view of the issues to the extent of listing out to the interviewer, **their perceptions of ‘causes of time and cost over-runs on road projects’ under sources/ categories of General’, ‘Employer’, ‘Engineer’ and ‘Contractor’:**

4.2.3.1 General:

- Relative shortage (compared to current demand) of materials engineers, laboratory staff, quality officers, environmental officers, skilled plant operators
- Lack of job security, discouraging youth from joining the construction industry
- Inadequate training and skills development facilities
- Lack of incentive to seek proper training and skills development
- Quality of raw materials lacks control (including bitumen, that is now also imported privately)
- Out-dated environmental regulations/ standards
- Poor communication between parties

- Mistrust between parties
- Unexpected local community/ social demands
- Price Fluctuation indices not reflecting market
- Overseas contractors competing unfairly with financial packages that enable unrealistic prices
- Suppliers of bitumen & diesel demand advance payments, aggravating contractor's cash flow
- Obtaining permits for mining etc. is time-consuming and onerous

4.2.3.2 Employer:

- Relocating utilities taking longer than expected
- Slow decision making
- Awarding contracts below Engineer's estimate
- Unreasonable work distribution - only a few contractors benefit (including interviewees!), while having 'sufficient work in hand'
- Timing of awards – e.g. just before rains or long holidays, or delaying commencement
- Payment delays
- Lack of work continuity

4.2.3.3 Engineer:

- Quality assurance/ control misunderstood by many
- Inadequate numbers of qualified and experienced staff
- While the contract is based on calendar days, Engineer's staff do not work accordingly
- Inadequate pre-design investigations
- Inappropriate designs arising from above e.g. pavement design for a heavy rainfall and landslide prone area was not different from the standard design given for a sound terrain
- Inappropriate contract conditions and specifications
- Excessive variations
- Delays in approvals and decisions

4.2.3.4 Contractor

- Informal sub-contracting system leads to poor performance
- Inadequate planning and monitoring
- Inadequate resources arising from inadequate working capital
- Influx of poor quality plant and machinery due to affordability issues

4.2.4 Sample observations from DAB members

Some of the points derived from interviews were complemented and/or substantiated by relevant sample DAB reports obtained separately from the Employers (RDA and PRP). Also, informal discussions were held with two other DAB members, hence reinforcing and supplementing the following, gleaned mainly from the three who were formally interviewed.

Significant needs were identified for rationalization of tender and contract documents e.g. (a) for specifying items where expected in the 'documents hierarchy' e.g. in the drawings and (b) more consistency checks for discrepancies between documents. Examples on item (a) above included some that were also raised by other

parties (employers' representatives, consultants and contractors) e.g. listing of some specific high value construction activities in the Environmental Management Plan although not shown in the drawings, leading contractors to claim that they had not been priced in tenders. Many examples on item (b) above, centered on changes made in one document in particular conditions or specifications, as well as in drawings or Bills of Quantities that impacted on others, rendering them incompatible, hence a hotbed of ambiguities and consequential claims.

Two of the DAB interviewees raised a concern about the status of a payment made on an adjudication award, given that it can be reversed in arbitration; one saying that FIDIC had recently changed the wording to ameliorate this, while a bond may be given as security, although another opined that obtaining a bond can be onerous. Other issues that may be revisited, since emerging in disputes were whether a substantial quantity increase ('even 100%) could be considered a 'scope change'; and the perennial 'time bar' issue when seemingly reasonable claims are submitted 'too late' but still often entertained.

Two DAB interviewees drew attention to an ambiguity in the payment clause in terms of foreign vs. local currency components, when an extra payment has been evaluated on the price adjustment clause. Although it appears that no price adjustment is payable on the foreign component in most contracts, a loophole in interpreting the actual payment clause (where all payments must be in that agreed proportion) has led to DAB decisions upholding the contractor's interpretation.

DAB members also commented on some general issues leading to over-runs, reinforcing some points raised by others e.g. on inadequate designs, the shortage of qualified and competent staff at different levels, including in technical, financial and overall project management

Another macro level issue that emerged in other fora as well as in the above discussions, was the need to take stock of the DAB system itself, now that it has been in operation for a few years in Sri Lanka, with objectives of identifying strengths and weaknesses and ways forward in making better use of DABs for their intended purpose. For example, confidence in the value of DABs varies, so that in some cases they are not appointed early in the contract as expected; and in some DABs, even if appointed early they are not even copied claims by contractors, leave alone alerted in advance of brewing claims scenarios that may have been defused. One example was on a project with the same Engineer and the same DAB overseeing two parallel sets of contracts, where the contractor on one contract, copied the claims to the DAB, whereas the other did not. Benefits should accrue from standardizing DAB mobilization and operating procedures and one suggestion (not from the above interviews) was for a Seminar / Workshop to identify what has been achieved by DABs, what more can be achieved and how to get there.

5 POTENTIAL SOURCES, POSSIBLE CAUSES AND POINTERS TO IMPROVEMENT AREAS

5.1 IDENTIFIED COMMON SOURCES AND POSSIBLE CAUSES OF TIME AND COST-OVER-RUNS

5.1.1 Preamble

Previous sections are necessarily descriptive so as to explain and substantiate the basis for the conclusions reached in this section. The following conclusions are in a more concise format, of listings with bullet points and brief summaries where useful, so as to enable a quick overview and comparison. Justifications for each conclusion in 5.1 and suggestions in 5.2 and 5.3 may be revisited if needed, as such back-up data should be available in previous sections. No attempt is made to prioritize or rank the conclusions on sources and apparent causes of over-runs, nor on examples of suggested mitigation strategies; not only because it is outside the scope of this pilot study, but more importantly, since various stakeholders may assign different ranks, depending on their own experiences and priorities, as well as the practicalities and capacities for change in specific scenarios.

5.1.2 Principal Common Sources and apparent Causes of Over-runs identified from this pilot study

'Sources' of over-runs may be taken to be one level below the 'categories' (or 'claims heads') of claims such as 'exceptionally adverse weather', 'variations' or 'price escalations', where the over-runs can be linked to claims. Some over-runs may not be directly linked to claims heads though, particularly where the contractor is responsible for the over-run. Therefore the following listings will not be constrained by a strict definition of 'source'; thus whether or not the source can be linked to a contractually available claim category is immaterial in this report. Secondly a couple of sources such as 'Price Escalations' may seem to overlap with claim categories themselves, although these are differentiated herein, e.g. as 'High (and allegedly excessive) price adjustment computations'.

Thirdly, for this pilot study, no definitive demarcation (based on mutually exclusive definitions) is professed between sources and 'causes' either, since these boundaries are sometimes blurred. In general a 'cause' or 'causes' are generally expected to contribute to the source, just as some fundamental 'root causes' could later be taken to contribute to the 'proximate' (immediately apparent) causes that are identified herein. An illustrative example based on a wider and deeper previous study in Hong Kong, visualizes the eventually expected hierarchy and links, as in *Appendix 1*. However, if delving into more detail, more than one cause may contribute to one 'claim category', while one cause may contribute to more than one 'claim category' (as in *Appendix 1*) e.g. a proximate cause of 'inadequate brief' could unleash 'over-run' claim categories of both 'variations' and 'delayed design information'. A more detailed mapping of linkages is thus possible.

Fourthly, some of the identified 'proximate' causes may later be found to be fundamental i.e. root causes in themselves. Also, the 'causal hierarchy' envisaged in the current pilot study differs from that developed in *Appendices 1 and 2*, since the latter was based on one standard contract (Hong Kong Government standard conditions for civil engineering works), whereas the current one should cater for a few different standard

conditions as used in roadworks in Sri Lanka, even as come across in the current small sample. Therefore, the ‘starting level’ is with ‘common sources’ rather than ‘claim categories’, although the former feed into the latter.

Fifthly, it does not seem important to distinguish sources and causes of time over-runs from those of cost over-runs, given their substantial overlap, as well as the fact that time over-runs often trigger cost over-runs. The following listing of identified common over-run sources and proximate causes, is neither exhaustive nor in a specific sequence although the list was compiled along the general time-line of a typical project cycle.

Listing of ‘common over-run sources’ and ‘apparent proximate causes’ of over-runs as extracted from the pilot sample are indented as under:

Common over-run Sources	Apparent Proximate Causes
1. Inadequate preliminary studies including feasibility studies prior to project launch	could be political priorities and/or community /vested interest pressures and/or genuine urgent needs and/or funding time-line constraints etc.
2. Unrealistic contract durations (and possibly, correspondingly unrealistic budgets)	could be political priorities and/or community pressures and/or funding time-line priorities etc.
3. Inadequate site investigations e.g. including on bore-holes, cross-sectional surveys etc.	could be as in above item and/or limited funding etc.
4. Incomplete and/or delayed and/or inaccurate designs (with errors and omissions)	could be inadequate time and/or budget allocated for design and for design review ; and/or shortfalls in experience of design team; delays in passing bulk of design documents to review team i.e. close to the end of their review period etc.
5. Major changes in contract Quantities	could be as in above item, including possible shortfalls in experience of relevant teams i.e. on quantities take-off, etc.
6. New BOQ rates claimed by contractors due to allegedly major deviations in quantities (even when work scope was not changed)	could be as in above item, together with lack of clarity in relevant trigger clause, which in turn relates to the absence of a standard computation methodology to establish the need for a new rate, e.g. based on four conditions, one of which is to prove that the unit cost of an item increased by over 1%
7. Ambiguities or lack of clarity within contract-specific documents e.g. incomplete or conflicting information within the same document that can thus be interpreted differently, whether drawings, special	could be as in above item including possible shortfalls in experience of relevant teams and/or inadequate checks for compatibilities when changing some standard terminology, contract conditions or technical specifications

Common over-run Sources	Apparent Proximate Causes
conditions of contract, particular specifications, BOQ etc.	
8. Discrepancies between contract-specific documents e.g. between drawings and BOQ and/or specifications	could be as in above item including possible shortfalls in experience of relevant teams
9. Shortfalls or ambiguities in standard contract documents, including standard specifications, methods of measurement (e.g. on tolerances and related payments), standard bidding documents (e.g. [i] alleged ambiguities or inadequacies in definitions and implementation protocols, on for example: (a) 'price adjustment (escalation)' payments for foreign components, or when VAT is removed/ reduced (b) increasing the unit rate of a BOQ item; and [ii] alleged lack of contractual teeth – deterrents/ penalties to discourage non-compliance in submissions e.g. of proper programmes with resource loadings etc.	such generic 'loop-holes' in standard documents are not unexpected, but need periodic identifying and 'plugging' by review of standard documents. Note – ICTAD is currently reviewing its own documents, but the issues identified herein may not be on their agenda
10. Sub-standard performance of consultants	could be (a) inadequate attention on weighting of technical capacities and potential performance in selection criteria and/or (b) inadequate monitoring & control mechanisms and/or (c) inadequate monitoring & control implementation etc.
11. Sub-standard performance of contractors	could be as in the item above
12. Delays or other issues arising from overall contract administration	could arise from any needs to up-date, rationalize or streamline approval and/decision making mechanisms etc.; from occasional delays in release of GOSL funds leading to payment delays and interest costs; over-use of informal channels e.g. between employers and contractors that could compromise the formal contractual mechanisms as well as undermine or demoralize those in the formal channels etc.

Common over-run Sources	Apparent Proximate Causes
13. Excessive Rework (e.g. 'breaking and re-making' defective or redundant works etc.)	could arise from any or all of the above 3 items, as well as from the apparent misinterpretations of misuse of the Quality Assurance/ Control expectations; and also from inadequate controls e.g. on alleged corner-cutting, as well as from opening of roads (to traffic) earlier than specified, due to alleged pressures from local authorities/ police
14. Major Variations to suit site conditions	could arise from the 3 rd and 4 th points in this list, i.e. 'Inadequate site investigations' and 'Incomplete and/or delayed and/or inaccurate designs (with errors and omissions), as well as unforeseen utility interferences etc.'
15. Major Variations to meet public/ political needs	could arise from inadequate or belated public engagement etc.
16. Major Variations from major scope changes	could arise from inadequate planning and co-ordination with all potential stakeholders etc.
17. Inadequate Dispute Avoidance strategies and mechanisms	could arise from by-passing consultants and/or DABs and lack of co-operation between principal participants
18. Inadequate Dispute Resolution strategies and mechanisms	could arise from incomplete/ ambiguous Dispute Resolution clauses in contracts e.g. lack of confidence in the enforceability of DAB awards and/or lack of co-operation between principal participants
19. Absence of standard methodologies for evaluating EOT	Whatever the reasons for leaving it open before, it is worth considering, given costly 'lessons learned' in Sri Lanka, application of protocols in other countries and the waste of time and expenses of all concerned
20. Delays in approvals for quarries burrow pits etc.	could arise from inadequate information supplied to tenderers, over-reliance on contractor capacities to engage with and navigate complex official and local networks e.g. without high level proactive support mobilized by the employer
21. High (and allegedly excessive) Price escalation (adjustment) computations	these could arise from both [i] in overall 'parent contract' related situations of (a) excessive EOT awards e.g. if not evaluated systematically or settled 'globally' and (b) if documentation to prove purchases in 'extended' periods is not checked carefully; as well as [ii] in 'clause-specific' situations, where for example (a) one view is that there should be a trigger point for claiming 'change of input %'; (b) the foreign component of some payments could be allegedly higher than intended because of an alleged ambiguity in the payment clause requiring all payments to be in a specified ratio of foreign : local component after overall computation, even when no escalation (adjustment) was

Common over-run Sources	Apparent Proximate Causes
	<p>expected or computed directly on the foreign component ; (c) there could be ambiguity in entitlements when VAT is reduced/ removed, but overall prices maintained, hence no escalation (adjustment) in overall price, but alleged loss of VAT recovery potential</p>

Note 1: Some of the ‘apparent proximate causes’ identified above may indeed ‘grow’ from generic root causes such as mistrust and lack of communication between principal parties. Indeed these are mutually reinforcing shortfalls, which also lead to lack of co-operation and a potential vicious cycle of misunderstandings, personality clashes and snowballing disputes.

Note 2: Not all over-run ‘sources’ and ‘apparent proximate causes’ are listed above. Only what were perceived as common over-run ‘sources’ based on this short-term pilot study are included in the above summary listing in this Report.

5.2 POINTERS TO A SAMPLE OF ‘POTENTIAL AREAS FOR IMPROVEMENT’

5.2.1 Preamble

This pilot study aimed to identify common sources of over-runs, with the findings only expected to provide pointers to ‘potential areas for improvement’. Therefore, the following sub-section provide a sample of such pointers. Indeed, more pointers could be derived from each and every one of the sources and potential causes in 5.1 above.

In addition, some examples of potential improvements are provided in this sample, to help clarify and operationalize the needs, as well as to illustrate some possibilities. Needless to say, an in-depth long-term study - with a wider sample, more detailed data, deeper analysis and some form of validation - is needed, before well-structured improvement and mitigation strategies and protocols can be proposed, since these could well impact on long established policies and operational procedures and practices.

Some apparent ‘system shortcomings’ that are surfacing would need ‘systemic solutions’, but careful change management would be needed. It is suggested that (a) a ‘**road map**’ plotting an optimal route to the desired ‘destination’ of ‘reduced time and cost’ over-runs, be formulated, along with (b) an ‘**action plan**’ for structured implementation over a reasonable time-line that is agreed in advance by all stake-holders.

5.2.2 Sample of ‘Important Issues’ with ‘suggested areas for improvement’

It is stressed that the list below is only an indicative sample. Secondly, each of the ‘sources’ and ‘apparent proximate causes’ listed in 5.1.2 could be addressed by specific improvement and mitigation actions. However, this would be wasteful and probably counter-productive, since to ensure consistency and coherence, while reducing duplication/ overlaps and/or conflicts, such actions should be formulated under a consolidated mitigation strategy, along with a structured implementation plan. This is why only ‘**suggested areas for improvement**’ are given below the examples of ‘**Important Issues**’ listed below. However, some operational options are also added to illustrate each possibility.

Improvement Area	Suggestion	Examples of Operational Options
A. Issues arising from Procurement Strategies and Procedures –	Revisit and improve relevant guidelines and practices, including those on selection of Consultants and Contractor	Careful selection of both contractors and consultants, that looks well beyond the lowest price, to potential performance needs to be complemented by subsequent controls that strongly deter, if not penalize where possible, deviations from stated plans including programmes and the promised quality and quantities of the various resources. A ‘carrot and stick’ approach is usually better e.g. incorporating a well-designed performance assessment scoring system (as in the Hong Kong Housing Authority) or even with basic black marks or ‘grey marks’ incurred for bad or ‘poor’ performance, along with corresponding credits earned for good performance, that will reflect in future tendering opportunities (prequalifications), as well as tender evaluations.

Improvement Area	Suggestion	Examples of Operational Options
B. Issues arising from Standard Contract Documents, as well as their interpretation and implementation)	Revisit and suggest special conditions of contract, particular specifications or methods of measurement, on a trial basis , with a view to proposing changes in the parent documents, if the trial proves successful	<p>B1.Demarcation of responsibilities for designs, working drawings and approvals;</p> <p>B2.ambiguities in previously highlighted price fluctuations/ adjustments clauses, rate increase /'increase in quantities' clauses, EOT evaluation clauses e.g. on adverse weather, on evaluating EOT, etc. etc.</p>

Specific Example:

Taking EOT evaluation as an example, The RDA, being a major 'employer' on multiple roadworks projects, may consider to (a) build up the EOT evaluation capacities of their relevant project staff in general, (b) develop a small core team of experts in EOT evaluation, **as well as other critical contractual and 'over-run sensitive' issues** (as it is understood, has been recently started), and (c) meanwhile, engage a delay analysis specialist – whether on a periodic or 'on call' basis – so that such services may be mobilized as and when needed. A member of the internal core 'expert' team (and pending their development, the external consultant) could then provide a swift and timely 2nd opinion on EOT evaluations done by RDA consultants. Recent experience on one contract that has gone to arbitration shows that excessive EOT may have been awarded by the consultant to start with. Although a final ruling is pending, this is not surprising in general scenarios, even if the initial EOT evaluation had been diligently done, given the wide choice of assessment protocols and techniques that can be applied. Sadly, if extrapolating to similar scenarios, this could represent the tip of an iceberg on apparently excessive or questionable EOT awards.

Arising from the above, a parallel suggestion on this critical issue is to standardize the delay analysis techniques and protocols to be applied. Previously, Kumaraswamy and Yogeswaran (1999) demonstrated how different delay analysis methods could easily yield different answers (on possible EOT quantums). Subsequently Palaneeswaran and Kumaraswamy (2008) developed an 'integrated Decision Support System for dealing with time extension entitlements'. However, given recent developments and the criticality of this issue, a broader and fresh approach is recommended, hence it is suggested to launch an exercise to identify the most appropriate EOT evaluation system for Sri Lanka roadworks. For example, Chong et al. (2014) revisited the 'Delay and Disruption protocol', which was

Improvement Area	Suggestion	Examples of Operational Options
C. Issues arising from Contract Administration	Formulate strategies and operational practices with a view to improving overall ‘project governance’ including strong employer oversight (as in the Mass Transit Railway Corporation in Hong Kong), with effective monitoring and control systems	<p>C1. Consider whether the threshold for ‘No Objections’ from Employer and funding body should be triggered when the revised contract price surpasses the ‘original contract price less contingencies’ by a set % (e.g. 15%) i.e. discarding the present cushion of contingencies that may lull stakeholders into delaying corrective action until some issues have snowballed beyond effective containment.</p> <p>C2. Consider whether the need for ‘No Objections’ from Employer and funding body should also be triggered when the quantities of certain pre-identified critical items exceed the original quantities by a set % (e.g. 25%)</p>
D. Issues from Avoidable Variations arising from tender documents		

5.3 EXAMPLES OF FOCUS AREAS FOR IN-DEPTH INVESTIGATION

5.3.1 Focus area examples

In general a deeper investigation is suggested of: (a) all sources and possible causes that were unveiled in the pilot study, especially those listed in sub-section 5.1 above, together with any others that relevant decision makers may choose from the body of this report or their own collective experiences; as well as (b) examples of improvement areas in 5.2. Since prioritization would be premature in this pilot study, the following two sample focus areas are listed as examples only:

- Rework, related over-runs and resource wastages on the **Quality Assurance vs. Quality Control** issues / misinterpretations – these have reportedly led to less supervision ('control') resources provided by some consultants when Quality Assurance is specified and alleged abuse by some contractors and/or arguably excessive demands by consultants from contractors.
- Shortfalls in **Dispute Minimization and Dispute Resolution mechanisms** – current provisions and protocols, starting with relevant contract clauses and practices for DABs can be probed, with stock-taking of current strengths/ weaknesses and potential to benefit more from DABs e.g. at an industry forum.

5.3.2 Preliminary suggestions on strategies for In-depth Investigation and follow-up Implementation

While some **cost-significant and time-significant** sources of over-runs have been unveiled in this pilot study it is important to drill deeper to unearth the cost-significant and/or time-significant root causes – that may give rise to more than one 'source' of over-runs, and also to assess their '**avoidability**' / '**addressability**', so as to classify them for prioritization in an action plan.

For example: (a) identifying sources/ categories/ heads of time and cost over-runs *and* claims, that are [i] of *higher (relative) magnitude* (hence more substantial in impact) *and/or* [ii] of *greater frequency* (hence more likely) - through available statistics/ figures - quantitative), would help identify focus areas for probing in interviews; (b) conversely experiential knowledge/ perceptions distilled from cross-sectional interviews, along with common patterns/ potential vulnerabilities gleaned from base documents (qualitative) would help hone in on target areas for drilling deeper into the project databases/ statistics, with a view to unveiling any discernible potential patterns in frequency and/or relative magnitude (quantitative); while (c) comparisons of the findings from the above overlapping and often iterative lines of inquiry should enable 'triangulation' for cross-checks / reasonable comparisons, so as to consolidate the eventual outcomes with greater confidence.

Indeed a study-specific 'mixed methods' strategy would synergize quantitative with qualitative tools and enable more reliable findings, that would be compared and verified / validated to whatever extent possible. Apart from the standard approaches, the investigation strategy could include a 'longitudinal study' i.e. over a reasonable span of time on a few 'live' case study contracts. The resulting findings and recommendations could be ranked for potential impact and implementability. Then higher priority initial recommendations may be 'trialed' in 'pilot' or 'demonstration' projects or contracts, where deemed necessary or useful.

A proposal based on the above findings, could be to explore both the feasibility and potential value of developing an '**Over-run Hotspots Dashboard**' (or '**Over-runs Alert Indicator**') that could help management to focus more attention and deploy resources, on areas particularly vulnerable to over-runs in different types of roadworks projects. While certain methods could be similar to some of those in risk appraisals, databases of over-runs on previous similar contracts, could be developed and categorized **to highlight sources and causes triggering over-runs of higher (a) magnitude, (b) frequency and (c) avoidability.**

Focusing attention on such hotspots in advance, should help reduce the more avoidable and significant time and cost over-runs. Apart from the 'systemic solutions' suggested in 5.2.1, along with the proposed 'road map' and 'action plan', overall over-runs minimization would also need total organizational commitment, probably including a 'culture shift', adequate relevant resources and excellent change management.

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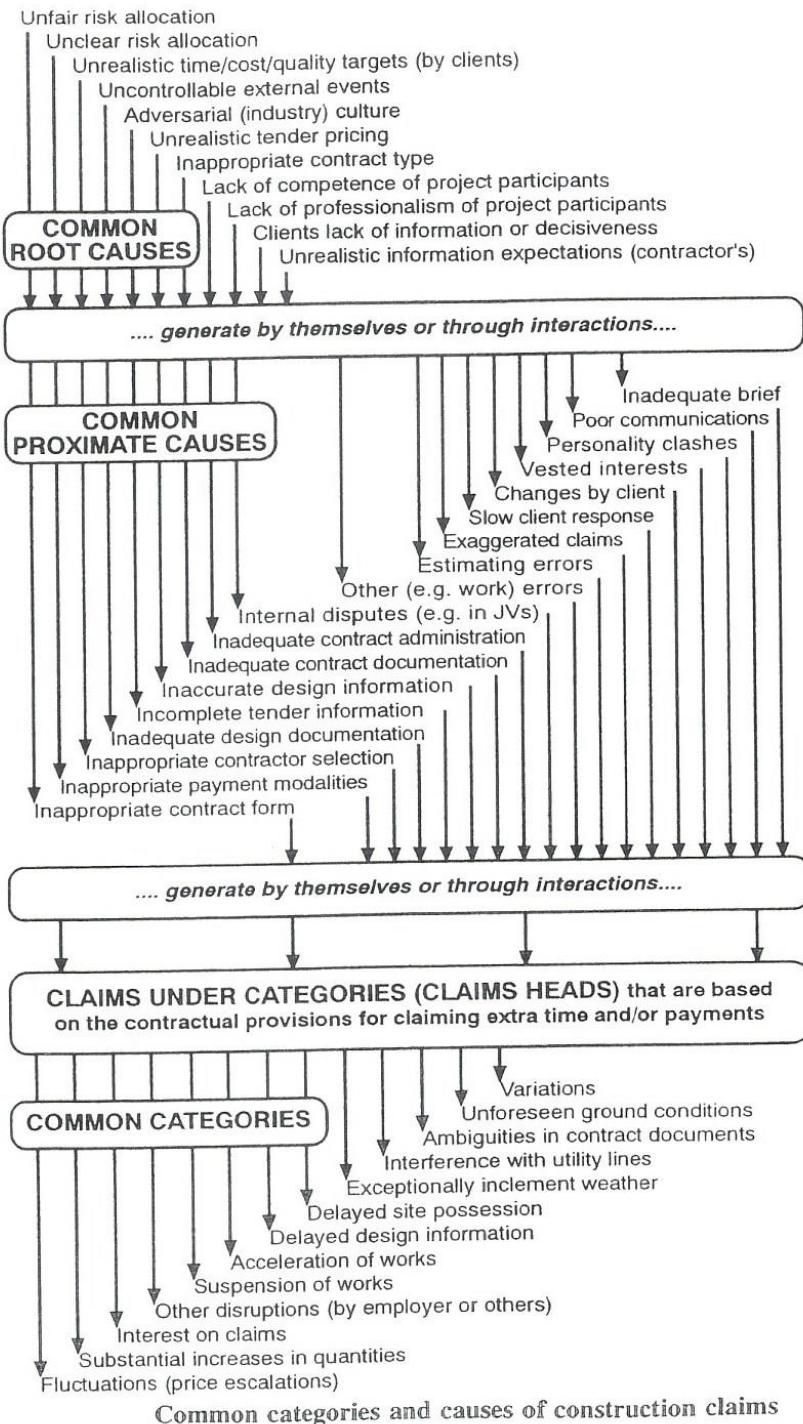
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APPENDICES and TABLES

- Appendix 1 Example from Hong Kong, of a previous ‘Causal hierarchy’ of Construction Claims
- Appendix 2(A) Example from Hong Kong, of a previous profile of Time Over-runs
- Appendix 2(B) Example from Hong Kong, of a previous profile of Cost Over-runs
- Table 1 PRP - May 2014 SUMMARY of Recommended EOT
- Table 2(a) PRP - ‘Approved Costs’ and ‘% Increases’ status summary – Uva Province
- Table 2(b) PRP - ‘Approved Costs’ and ‘% Increases’ status summary – Eastern Province
- Table 2(c) PRP - ‘Approved Costs’ and ‘% Increases’ status summary – Northern Province
- Table 3 RSAP -1: ‘Approved Costs’ and ‘% Increases’ status summary as in May 2013
- Table 4 RSAP -1 (Road Sector Assistance Project I): Time Over-runs & comparison
- Table 5 RSAP -2 Kantalai-Trincomalee Section: EOT on RSAP Phase 2 K-T section
- Table 6 RSAP Rural Roads Pilot: EOT on RSAP Rural Roads

APPENDIX 1: Previous Example from elsewhere (Hong Kong) of a 'Casual hierarchy' of Construction Claims

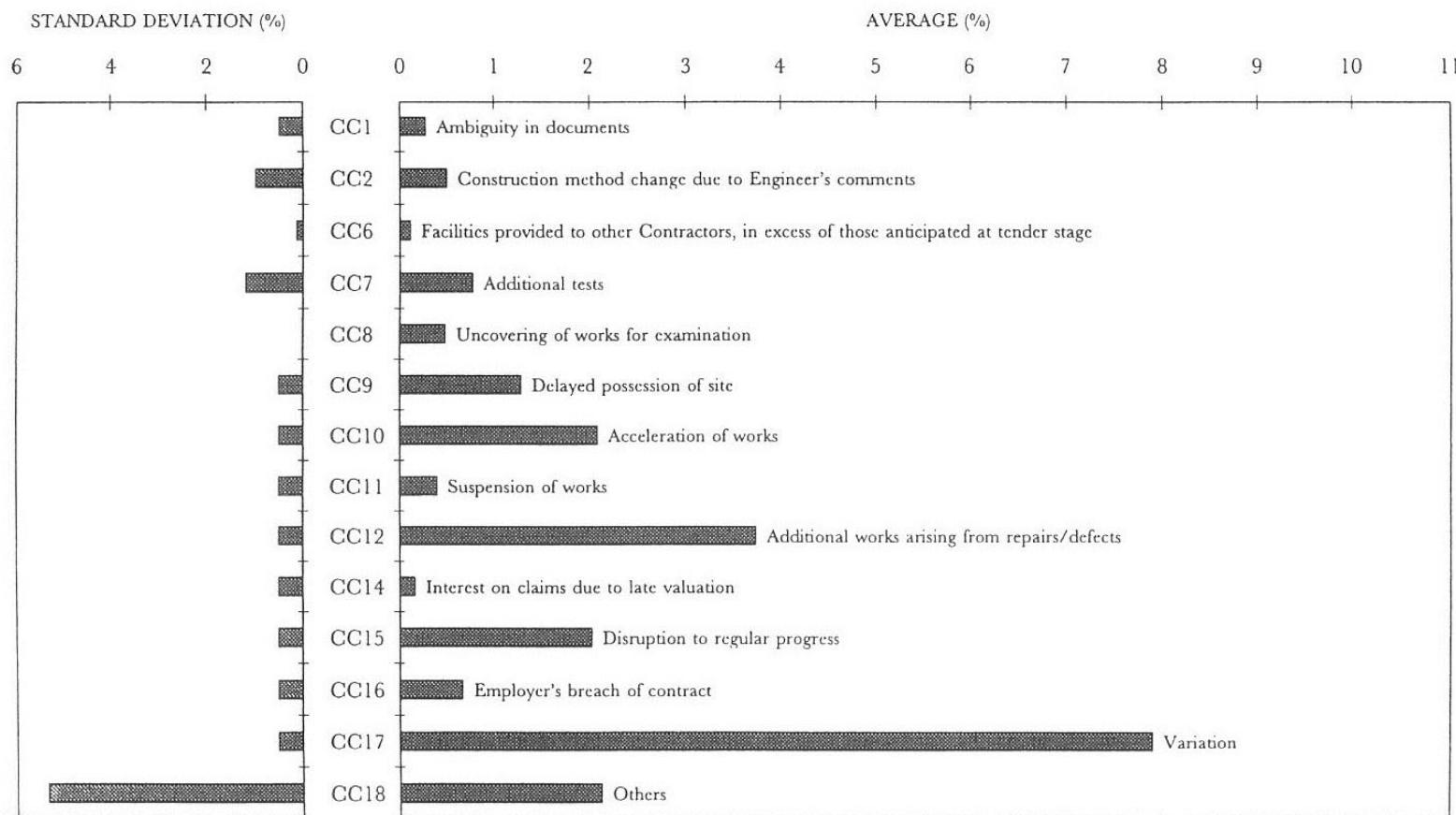
Source: Kumaraswamy, M.M. (1997a) 'Common Categories and Causes of Construction Claims', Construction Law Journal, Vol.13,1, pp 21-34



APPENDIX 2 (A): Previous Example from elsewhere (Hong Kong) of a sample profile of Time Over-runs

Source: Kumaraswamy, M.M. and Yogeswaran, K. (1998) 'Significant Sources of Construction Claims' International Construction Law Review, LLP, Vol. 15, Part 1, pp.144-160.

*Average and standard deviation of
"granted/original contract value" in common claim categories*



APPENDIX 2 (B): Previous Example from elsewhere (Hong Kong) of a sample profile of Cost Over-runs

Source: Kumaraswamy, M.M. and Yugeswaran, K. (1998) 'Significant Sources of Construction Claims' International Construction Law Review, LLP, Vol. 15, Part 1, pp.144-160.

*Average and standard deviation of
“claimed/original contract period” in common claim categories*

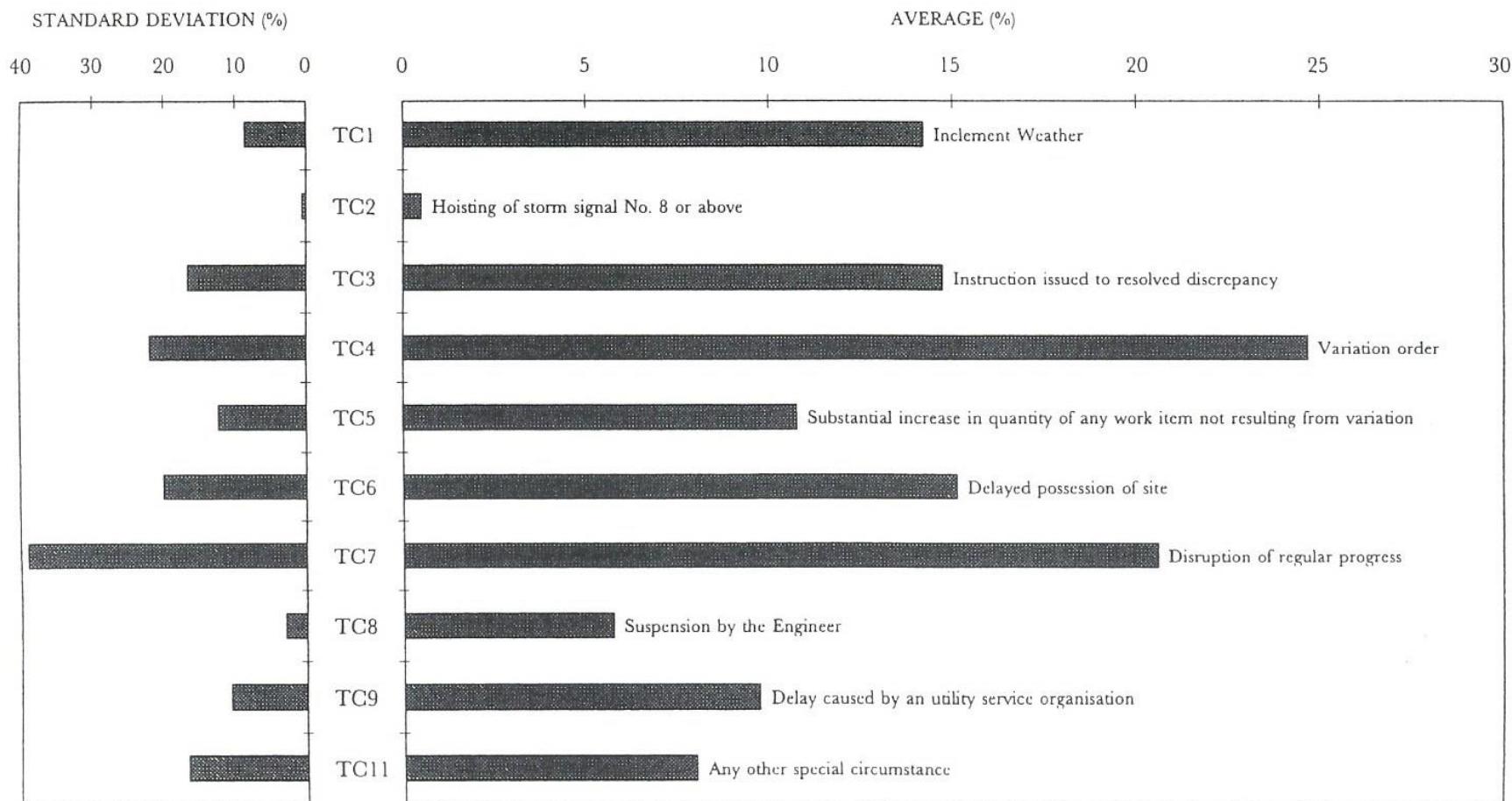


Table 1: PRP - May 2014 SUMMARY of Recommended EOT
NOT finalized (many actions/ steps remain)

(1)CONTRACT PACKAGE	(2)START DATE	(3)ORIGINAL COMPLETION DATE	(4)ORIGINAL CONTRACT PERIOD in days	(5) EOT recommended on WEATHER		(6) EOT recommended on QUANTITY INCREASES		(7) EOT recommended on OTHER REASONS		(8) TOTAL EOT RECOMMENDED		CONTRACTORS AGREEMENT on EOT RECOMMENDED
				(5A) NO OF DAYS	(5B) as a % OF ORIGINAL CONT. PERIOD=(5A*100/4)	(6A) NO OF DAYS	(6B) as a % OF ORIGINAL CONT PERIOD=(6A*100/4)	(7A) NO OF DAYS	(7B) as a % OF ORIGINAL CONT. PERIOD=(7A*100/4)	(8A) NO OF DAYS =(5A+6A+7A)	(8B) as a % OF ORIGINAL CONT. PERIOD=(8A*100/4)	
UVA 01	2010.11.01	2012.10.30	730	73+2+18(=93)	12.7	262	35.9	0	0.0	355	48.6	Agreed
UVA 02	3010.11.01	2012.10.30	730	11	1.5	291	39.9	0	0.0	302	41.4	Noticed ARBITRN. against DAB decision confirming this EOT
UVA 03	2010.11.08	2012.11.06	730	44.5+76	6.1	158.5	21.7	55	7.5	334	35.3	Agreed
UVA 04	2010.10.28	2012.10.26	730	41	5.6	40	5.5	0	0.0	81	11.1	Agreed
UVA 05	2010.12.07	2012.12.05	730	45	6.2	163	22.3	71	9.7	279	38.2	Agreed
UVA 06	2013.07.20	2014.09.19	455									ongoing
EP 01	22.08.2011	2013.02.21	550	0	0.0	101	18.4	0	0.0	101	18.4	Not agreed/under DAB
EP 02	2011.04.24	2013.04.23	731	38	5.2	90	12.3	0	0.0	128	17.5	Agreed
EP 04	2011.08.22	2013.02.21	550	38	6.9	80	14.5	89	16.2	207	37.6	Agreed
EP 05	2012.05.23	2013.11.22	549	0	0.0	41	7.5	0	0.0	0	7.5	Agreed
EP 07	2013.09.02	2014.09.01	365									ongoing
NP 01	2011.09.01	2013.04.30	609	18	3.0	123	20.2	38	6.2	179	29.4	Agreed for EOT but Noticed ARBITRN. against DAB decision on cost claim
NP 02	2011.09.12	2013.03.11	548	18	3.3	104	19.0	54	9.9	176	32.1	Agreed
NP 03R	2013.1.12	2015.03.11	455	-				-		-		ongoing
NP 05R	2013.1.12	2015.03.11	455	-		-		-		-		ongoing
Average EOT %					4.6		19.7		4.5		28.8	

Table 2a: PRP 'Approved Costs' and '% Increases' status summary – Uva Province

Note: Current status (NOT finalized)

PAY ITEMS' in Statement at Completion (SAC)	UVA 01			UVA 02			UVA 03		
	AMOUNT CLAIMED UNDER SAC (Statement at Completion)	ENGINEERS INTERIM ASSESEMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES	AMOUNT in Revised BOQ (contract in progress)	ENGINEERS ESTIMATE UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESEMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES
BOQ items	684,135,851.59	684,135,851.59	14.37	564,016,192.43	564,016,192.43	(5.74)	439,016,857.71	439,016,857.71	1.15
Variations	179,619,830.31	179,619,830.31	30.03	164,598,530.00	164,598,530.00	27.51	97,713,193.23	97,713,193.23	2.25
Price Escalation	75,894,681.89	75,894,681.89	12.69	103,000,000.00	103,000,000.00	17.21	53,227,142.45	53,227,142.45	12.26
CL 1-Change of I/P %	25,000,000.00	U/Review	U/Review	729,619,279.00	26,836,291.62	4.49	18,000,000.00	under review and includes I/P % claim and extention of insuernce etc.	Not known
CL 2-Prolongation	38,680,493.64	U/Review	U/Review						Not known
CL3-VAT on bitumen	9,900,504.27	U/Review	U/Review	Not noticed	NA	NA	Noticed only	Not claimed	Not known
CL4-Interest on payment delay	1,768,903.62	1,564,160.29	0.26	Not claimed	NA	NA	Not claimed	NA	NA
CL 5-Other claims	16,518,927.11	U/Review		NA	NA	NA	NA	NA	NA
CL 6-Rate change (Cl. 12.3)	-	NA	NA	NA	Included above CL 1,2	NA	included under VOO	included under VOO	included under VOO
<i>Sub total</i>	1,031,519,192.43	U/Review	U/Review	PROJ UNDER CONSTN			U/review	U/review	
<i>Cont. Price Excluding contingencies</i>	598,178,316.85			598,353,421.85			434,004,996.64		
<i>Duration -original, (revised)/days</i>	730,(730+355)			730,(730+302)			730,(730+334)		
<i>Continued....</i>									

Table 2a: PRP 'Approved Costs' and '% Increases' status summary – Uva (**Continued**)

PAY ITEMS' in Statement at Completion (SAC)	<i>Table 2(a) Continued</i>					
	UVA 4			UVA 5		
	AMOUNT CLAIMED UNDER SAC	AMOUNT CERTIFIED UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE <u>EXCL. CONTIGENCIES</u>	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESEMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE <u>EXCL. CONTIGENCIES</u>
BOQ items	629,052,447.04	616,407,077.40	7.58	616,534,897.81	620,000,000.00	11.07
Variations	171,467,835.36	171,467,835.36	29.92	141,093,082.82	119,000,000.00	21.32
Price Escalation	41,236,554.87	41,236,554.87	7.20	70,000,000.00	U/review	U/review
CL 1-Change of I/P %	171,000,000.00	U/review, I/P % claim and payment delay on SAC	Not known	312,843,201.58	u/review	u/review
CL 2-Prolongation			Not known		U/review	U/review
CL3-VAT on bitumen			Not known		U/review	U/review
CL4-Interest on payment delay	2,938,314.53	2,938,314.53	0.35		U/review	U/review
CL 5-Other claims	NA	NA	NA		NA	NA
CL 6- Rate change (Cl. 12.3)	No change	No change	No change		U/review	U/review
<i>Sub total</i>	832,049,782.16			1,176,065,208.79	U/review	
<i>Cont. Price Excluding contingencies</i>	572,998,189.60			558,185,955.72		
<i>Duration -original, (revised)/days</i>	730,(730+81)			730,(730+279)		

Table 2b: PRP 'Approved Costs' and '% Increases' status summary – Eastern Province

Note: Current status (NOT finalized)

PAY ITEMS' in Statement at Completion (SAC)	EP 01			EP 02			EP 04			EP 05		
	AMOUNT CLAIMED UNDER SAC (Statement at Completion)	ENGINEERS INTERIM ASSESSMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESSMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESSMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESSMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE EXCL. CONTIGENCIES
BOQ items	NOT YET SUBMITTED SAC	329,969,828.42	7.31	NOT YET SUBMITTED SAC	273,308,610.47	(3.18)	NOT YET SUBMITTED SAC	387,150,620.87	12.56	SUBMITTED THE SAC & UNDER EVALN	208,085,809.66	(38.13)
Variations	NOT YET SUBMITTED SAC	47,928,446.68	15.59	NOT YET SUBMITTED SAC	19,691,389.57	6.98	NOT YET SUBMITTED SAC	4,431,869.55	1.29	NOT YET SUBMITTED SAC	178,225,961.40	53.00
Price escalation		40,000,000.00	13.01		38,000,000.00	13.46		42,000,000.00	12.21	NA	NA	
CL 1 -EOT / Prolongation	77,890,632.87	8,640,229.59	2.81	No notices/Claims	NA	NA	No notices / Claims	NA	NA	No notice / Claims	NA	NA
CL 2- Scope change	40,042,967.06	2,924,792.63	0.95		NA	NA		NA	NA		NA	NA
CL3 - Interest on payment delay	2,584,505.14	2,584,505.14	0.84	1,413,441.48	1,413,441.48	0.50	1,575,388.09	1,575,388.09	0.46	1,095,857.71	1,095,857.71	0.33
<i>Sub total</i>		429,463,297.32			331,000,000.04			433,582,490.42			386,311,771.06	
<i>Cont. Price Excluding contingencies</i>	307,497,688.18			282,299,289.00			343,964,009.90			336,305,683.00		
<i>Duration -original, (revised)/days</i>	550,(550+101)			731,(731+128)			550,(550+207)			549,(549+41)		

Table 2c: 'Approved Costs' and '% Increases' status summary - PRP - Northern Province

Note: Current status (NOT finalized)

PAY ITEMS' in Statement at Completion (SAC)	NP 01			NP 02			AVERAGE % CHANGE against ORIGINAL CONT. PRICE exldg. Contingencies.
	AMOUNT CLAIMED UNDER SAC (Satement at Completion)	ENGINEERS INTERIM ASSESEMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE <u>EXCL. CONTIGENCIES</u>	AMOUNT CLAIMED UNDER SAC	ENGINEERS INTERIM ASSESEMENT UNDER SAC	% CHANGE AGAINST ORIGINAL CONT. PRICE <u>EXCL. CONTIGENCIES</u>	
BOQ items	NOT YET SUBMITTED SAC	365,736,270.12	1.37	390,321,237.75	390,821,237.75	0.06	0.77
Variations		58,283,125.32	16.15	39,032,393.23	39,032,393.23	9.99	19.46
Price escalation		51,000,000.00	14.14	NA	NA	NA	12.77
CL 1 - EOT/Prolongation	77,890,632.87	21,500,000.00	5.96	92,000,000.00	NA	NA	U/Review
CL 2- Scope change	40,042,967.06	not recommended	not recommended		NA	NA	U/Review
CL3 - Interest on payment delay	NA	NA	NA	Na	NA	NA	U/Review
<i>Sub total</i>		496,519,395.44			429,853,630.98		
<i>Cont. Price Excluding contingencies</i>	360,791,251.00			390,583,815.04			
<i>Duration -original, (revised)/days</i>	609,(609+179)			548,(548+176)			

Table 3: RSAP -1: 'Approved Costs' and '% Increases' status summary (as at May 2013)

	Base Contract Price (without contingency)	Variations	Quantity changes	Price Adjustment	Claims	Total Increase in project cost	% Cost Over-run	Final Project cost before deductions	Deductions (Liquidated damages & other)	Final Project cost after deductions
CP01										
Cabinet Approved	436,123,944.66	141,995,494.68	42,802,792.84	342,755,027.44	4,089,189.09	531,642,504.05		967,766,448.71	0.00	967,766,448.71
Bank approved	436,123,944.66	63,981,948.99	42,802,792.84	342,755,027.44	3,324,815.52	452,864,584.79	103.84	888,988,529.45	34,918,937.32	854,069,592.13
CP02										
CAPC recommended	1,694,497,880.00	910,798,911.03	-523,989,050.70	527,523,443.59	75,971,722.74	990,305,026.66		2,684,802,906.66	941,117.06	2,683,861,789.60
Bank approved	1,694,497,880.00	910,798,911.03	-523,989,050.70	527,523,443.59	3,353,922.50	917,687,226.42	54.16	2,612,185,106.42	941,117.06	2,611,243,989.36
CP03										
Cabinet Approved	426,042,063.75	42,847,713.82	97,051,350.17	410,880,380.82	3,421,207.27	554,200,652.08		980,242,715.83	-	980,242,715.83
Bank approved	426,042,063.75	42,847,713.82	97,051,350.17	410,880,380.82	300,000.00	551,079,444.81	129.35	977,121,508.56	-	977,121,508.56
CP04										
Cabinet Approved	354,652,092.00	28,723,408.41	96,140,128.40	344,439,491.03	5,579,845.52	474,882,873.36		829,534,965.36	-	829,534,965.36
Bank Approved	354,652,092.00	28,723,408.41	96,140,128.40	344,439,491.03	300,000.00	469,603,027.84	132.41	824,255,119.84	-	824,255,119.84
CP05										
CAPC recommended	1,048,328,562.54	325,542,464.48	101,678,260.01	361,684,099.68	30,631,849.36	819,536,673.53		1,867,865,236.07	1,451,437.48	1,866,413,798.59
Bank Approved	1,048,328,562.54	323,295,881.83	101,678,260.01	361,684,099.68	30,631,849.36	817,290,090.88	77.96	1,865,618,653.42	1,451,437.48	1,864,167,215.94
CP06										
MPC Approved	409,519,367.00	53,485,295.07	125,339,491.60	358,583,933.94	1,550,177.38	538,958,897.99		948,478,264.99	84,444.73	948,393,820.26
Bank Approved	409,519,367.00	53,485,295.07	125,339,491.60	297,733,837.77	-	476,558,624.44	116.37	886,077,991.44	84,444.73	885,993,546.71
CP08										
Cabinet Approved	515,626,595.00	104,920,475.20	-55,355,382.79	406,304,771.29	-	455,869,863.70		971,496,458.70	-	971,496,458.70
Bank Approved	515,626,595.00	104,920,475.20	-55,355,382.79	406,304,771.29	-	455,869,863.70	88.41	971,496,458.70	214,246.81	971,282,211.89
CP09										
Cabinet Approved	1,036,280,356.52	40,935,026.55	100,462,713.32	384,207,198.41	11,720,092.10	537,325,030.38		1,573,605,386.90	-	1,573,605,386.90
Bank Approved	1,036,280,356.52	40,935,026.55	100,462,713.32	384,207,198.41	8,012,403.73	533,617,342.01	51.49	1,569,897,698.53	62,984.41	1,569,834,714.12
CP10										
Cabinet Approved	1,013,657,403.86	132,673,505.98	209,752,483.16	401,558,802.35	5,510,444.50	749,495,235.99		1,763,152,639.85	-	1,763,152,639.85
Bank Approved	1,013,657,403.86	107,686,702.21	209,752,483.16	401,558,802.35	1,573,317.40	720,571,305.12	71.09	1,734,228,708.98	-	1,734,228,708.98
CP11										
Cabinet Approved	1,152,424,468.00	15,997,967.10	64,303,977.79	653,110,589.84	13,235,783.82	746,648,318.55		1,899,072,786.55	-	1,899,072,786.55
Bank Approved	1,152,424,468.00	15,997,967.10	64,303,977.79	653,110,589.84	2,281,250.00	735,693,784.73	63.84	1,888,118,252.73	1,582,571.06	1,886,535,681.67
CP12										
Cabinet Approved	1,277,770,992.00	66,631,699.37	86,725,177.15	858,122,972.46	-	1,011,479,848.98		2,289,250,840.98	-	2,289,250,840.98
Bank Approved	1,277,770,992.00	66,631,699.37	86,725,177.15	858,122,972.46	-	1,011,479,848.98	79.16	2,289,250,840.98	2,444,585.09	2,286,806,255.89
CP13										
Cabinet Approved	1,044,705,906.00	31,928,825.81	62,714,808.08	629,734,817.05	835,346.90	725,213,797.84		1,769,919,703.84	-	1,769,919,703.84
Bank Approved	1,044,705,906.00	31,928,825.81	62,714,808.08	629,734,817.05	835,346.90	725,213,797.84	69.42	1,769,919,703.84	1,058,610.02	1,768,861,093.82
Total										
Cabinet approved *	10,409,629,631.34	1,896,480,787.50	407,626,749.03	5,678,905,527.90	152,545,658.68	8,135,558,723.11		18,545,188,354.45	2,476,999.27	18,542,711,355.18
Bank approved #	10,409,629,631.34	1,791,233,855.39	407,626,749.03	5,618,055,431.73	50,612,905.41	7,867,528,941.56		18,277,158,572.90	42,758,933.98	18,234,399,638.92
% Rise on Bank aprvd. -overall project:		17.21	3.92	53.97	0.49	75.58				

Note 1: CP06 figures were excluded in the received summary , but included in above Totals, together with CP10 'total increase ...' etc.

Note 2 : The '% Cost Over-run' column is introduced to show 'Total Increase in project cost'/ Base Contract Price (without contingency).

86.46

Table 4: Road Sector Assistance Project I: Time Over-runs & comparison (as at present – NOT finalized)

Contract No.	Road Name	Contract	Date of Com-	Date of	Final Period	% Time	% Cost
		Period * (days)	mencement #	Completion #	# (days)	Over-run **	Over-run ^
1	Rehabilitation/ Improvements to Ingiriya - Ratnapura Road	487	01.03.2006	27.11.2009	1367	180.70	103.84
2	Rehabilitation/ Improvements to Nittambuw a - Kandy Road	669	15.03.2006	08.12.2009	1373	105.23	54.16
3	Rehabilitation/ Improvements to Bandaraw ela - Haliela Road	547	06.09.2006	10.07.2009	1039	89.95	129.35
4	Rehabilitation/ Improvements to Bandaraw ela - Welimada Road	547	06.09.2006	29.06.2009	1028	87.93	132.41
5	Rehabilitation/ Improvements to Galle - Akuressa - Deniyaya Road	669	06.11.2006	05.01.2010	1156	72.80	77.96
6	Rehabilitation/ Improvements to Hakmana - Talahanduw a & Denegama - Mulatiyana Road	547	21.03.2006	06.01.2009	1022	86.84	116.37
7	Rehabilitation/ Improvements to Galkulama - Rambew a Road						cancelled
8	Rehabilitation/ Improvements to Medaw achchiya-NCP boundary & Medaw achchiya - Punew a Road	669	06.11.2006	11.08.2009	1010	50.97	88.41
9	Rehabilitation/ Improvements to Wellaw aya - Siyambalanduw a Road	669	06.11.2006	19.11.2009	1109	65.77	51.49
10	Rehabilitation/ Improvements to Siyambalanduw a - Ampara & Ampara - Karativu Road	730	06.11.2006	26.03.2010	1236	69.32	71.09
11	Rehabilitation/ Improvements to Maradankadaw ela - Jayanthipura Road	669	05.01.2007	15.06.2009	895	33.78	63.84
12	Rehabilitation/ Improvements to Jayanthipura - Thirikkondiyadimadu Road	669	24.08.2007	14.08.2009	720	7.62	79.16
13	Rehabilitation/ Improvements to Padeniya - Puttalam Road	669	08.03.2007	30.06.2009	847	26.61	69.42
TOTALS and AVERAGE:		7541				12802	69.77
* from WB; # from RDA; ** 100 x (Final Period - Contract Period)/ Contract Period; ^ from Table 3							
Note 1: Raw data may need further checking for verification							
Note 2: Cost over-run is against contract price - excluding contingencies							

Table 5: EOT on RSAP Phase 2_K-T section

RSAP - KT SECTION				
EXTENSION OF TIME FOR COMPLETION OF CONTRACTS - STATUS AS AT 18th April 2013				
CONTRACT PACKAGE	KT 01	KT 02	KT 03	KT 04
CONDITIONS OF CONTRACT	FIDIC 2005 B/Harmonised edition	FIDIC 2005 B/Harmonised edition	FIDIC 2005 B/Harmonised edition	FIDIC 2005 B/Harmonised edition
CONTRACTOR	Access Engineering	Tudawe Brothers	CEC	VVK
ROAD NAME	Ambepussa-Kurunegala-Trincomalee Rd (157+000-167+280) & Kantale-Perathuweli Rd	Ambepussa-Kurunegala-Trincomalee Rd (167+280 -178+000)	Ambepussa-Kurunegala-Trincomalee Rd (178+000-190+000)	Ambepussa-Kurunegala-Trincomalee Rd (190+000 - 199+300)
ROAD LENGTH (Km)	13.48	10.72	12.00	9.30
Contract Commencement Date	11-Jul-11	11-Jul-11	11-Jul-11	11-Jul-11
Original Completion date of Contract	10-Oct-12	10-Oct-12	10-Oct-12	10-Oct-12
Original Contract Period (Months)	15	15	15	15
EOT - 01 for weather recommended by employer (days)	8	8	10	11
Extended Contract Completion date EOT1	18-Oct-12	18-Oct-12	20-Oct-12	21-Oct-12
EOT - 02 for quantity revision recommended by employer (days)	65	71	82	77
Extended Contract Completion date EOT2	22-Dec-12	28-Dec-12	10-Jan-13	06-Jan-13
EOT - 03 for additional items recommended by employer (days)	0	0	0	40
Extended Contract Completion date EOT3	22-Dec-12	28-Dec-12	10-Jan-13	15-Feb-13
Employer's Taking Over date	17-Dec-12	19-Dec-12	24-Dec-12	13-Feb-13
Notes:	DPL in force	DPL in force	DPL in force	DPL in force
WB RECOMMENDATION				
EOT - 01 (days)	8	8	10	11
EOT - 02 (days)	65	71	82	77
EOT - 03 (days)	0	0	0	40
Extended Contract Completion date	22-Dec-12	28-Dec-12	10-Jan-13	15-Feb-13
Employer's Taking Over date	17-Dec-12	19-Dec-12	24-Dec-12	13-Feb-13
End of DPL	16-Dec-13	18-Dec-13	23-Dec-13	12-Feb-14
Overall status	EOT acceptable	EOT acceptable	EOT acceptable	EOT acceptable

Table 6: EOT on RSAP Rural Roads

RURAL ROADS under RSAP								
No	Package No	Date of Award	Contract Period	Date of Commencement	Date of Completion	EOT Granted (days)	Revised date of Completion	% Increase of Contract Period
Southern Province								
1	SP/SO/01	21.06.2008	1yr	12.07.2008	11.07.2009	178	05.01.2010	48.8
2	SP/SO/02	15.09.2008	1yr	06.10.2008	05.10.2009	238	31.05.2010	65.2
3	SP/HK/01	03.11.2008	1yr	24.11.2008	23.11.2009	38	31.12.2009	10.4
4	SP/HK/04	10.10.2008	1yr	31.10.2008	30.10.2009	62	31.12.2009	17.0
5	SP/NL/02	11.06.2008	1yr	02.07.2008	01.07.2009	167	15.12.2009	45.8
6	SP/SO/03	23.10.2009	1yr	06.11.2009	05.11.2010	198	15.04.2011	54.2
7	SP/NL/01	22.09.2009	1yr	06.10.2009	05.10.2010	332	30.07.2011	91.0
8	SP/NL/03	23.10.2009	1yr	06.11.2009	05.11.2010	281	30.07.2011	77.0
9	SP/NL/04	18.08.2010	140d	01.09.2010	19.01.2011	56	15.03.2011	40.0
10	SP/HK/05	19.10.2009	1yr	02.11.2009	01.11.2010	109	28.02.2011	29.9
11	SP/HK/03	15.03.2010	250d	27.03.2010	03.12.2010	298	30.07.2011	119.2
North Central Province								
12	NC/VL/01	24/07/2008	1yr	12.08.2008	11.08.2009	90	09.11.2009	24.7
13	NC/PL/01	24.07.2008	1yr	12.08.2008	11.08.2009	90	09.11.2009	24.7
14	NC/DM/01	05.11.2008	1yr	26.11.2008	25.11.2009	150	24.04.2010	41.1
15	NC/DM/04	21.04.2009	1yr	13.05.2009	12.05.2010	60	11.07.2010	16.4
16	NC/DM/02	05.11.2008	1yr	26.11.2008	25.11.2009	60	24.01.2010	16.4
17	NC/PL/02	16.10.2009	1yr	30.10.2009	29.10.2010			
18	NC/DM/03	16.10.2009	1yr	30.10.2009	29.10.2010			
19	NC/VL/02	09.11.2009	1yr	23.11.2009	22.11.2010	250	30.07.2011	68.5
20	NC/DM/05	03.11.2010	150d	03.11.2010	02.04.2010	120	30.07.2010	80
21	NC/HG/01	19.04.2011	60d	19.04.2011	18.06.2011			
Uva Province								
22	UV/MG/01	01.09.2008	1yr	22.09.2008	21.09.2009			
23	UV/MG/02	22.09.2008	1yr	13.10.2008	12.10.2009	260	30.06.2010	71.2
24	UV/RD/01	22.09.2008	1yr	13.10.2008	12.10.2009	153	15.03.2010	41.9
25	UV/RD/02	22.09.2008	1yr	14.10.2008	13.10.2009			
26	UV/SY/01	01.09.2008	1yr	22.09.2008	21.09.2009			
27	UV/SY/05	24.07.2008	1yr	14.08.2008	13.08.2009	85	10.11.2009	23.3
28	UV/MG/03	12.11.2009	1yr	26.11.2009	25.11.2010	125	31.03.2011	34.2
29	UV/MG/04	08.03.2010	9m	22.03.2010	21.12.2010	104	31.03.2011	37.8
30	UV/RD/03	09.11.2009	1yr	23.11.2009	22.11.2010	264	15.08.2011	72.3
31	UV/RD/04	05.04.2010	9m	18.04.2010	17.01.2011	239	30.07.2011	86.9
32	UV/SY/02	20.01.2010	6m	03.02.2010	02.08.2010	60	01.10.2010	33.0
33	UV/SY/03	10.02.2010	1yr	10.02.2010	09.02.2011	50	31.03.2011	13.7
34	UV/SY/04	21.01.2010	6m	21.01.2010	02.07.2010			
35	UV/SY/06	18.03.2010	1yr	18.03.2010	17.03.2011			
						<i>AVERAGE of '% increase of contract period':</i>		47.6