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DEVELOPING STRATEGIES FOR COST SHARING OF UTILITY WORKS IN RIGHT OF WAY IN SRI LANKAN ROAD PROJECTS

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Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Construction Law & Dispute Resolution

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters Degree in Construction Law & Dispute Resolution under my supervision.

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Professor M. Lalith De Silva Date

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ABSTRACT

Roads Authorities in Sri Lanka are obliged to pay all costs associated with relocation and betterment works required/requested by utility service providers through the funds allocated for their initiated projects. As a result, substantial portion from the allocated funds for road works are transferred to unforeseen utility related works. There is no sound legislation exists defining the powers, rights and obligations of Roads and Utility authorities. Moreover, Road Authority is experiencing huge delays in getting utility services relocated while implementing Road projects. Substantial amounts of extra claim have to be paid to the contractors for extension of time due to such delays, which is a real burden to the country, irrespective of whichever agency make the payment. In some instances, when the Contract of Utility services were awarded road works were nearing completion or even completed, which will cause damages to the newly constructed road or road structures or vice versa, causing unnecessary expenditure out of public funds.

Since there were no documented cost sharing agreements in place between the Roads Authority and the local utility service providers, in response, this research is initiated for Developing Strategies for Cost Sharing of Utility Works in Right of Ways (ROW) between Roads Authorities and the respective Utility owners.

The research works includes conducting a desktop study of international cost sharing practice. Qualitative research method was adapted through inductive process by selecting purposive samples of experts for semi structured in-depth interviews and more data were collected through documents review from sources both International and Sri Lanka. Finally, the data collected from multiple sources were analyzed by creating themes, coding and thereafter combining codes into categories and summarizing the findings.

Therefore, this study will fulfill the knowledge gap in the sector to analyze the procedures and to identify the areas to develop to remedy for the issues prevail in Sri Lanka and formulate cost sharing strategies for utility relocation and the provision of new utility infrastructure between Roads Authority and the respective Utility owners.

Keywords: *Betterment works, Relocation, Right of Way(ROW), Utility Corridor, Utility Cost Share, Asset Life, Salvage Value*

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LIST OF ABBREVIATIONS

Abbreviation		Description
ROW	-	Right of Way
OHL	-	Overhead Lines
RA	-	Road Authority
UA	-	Utility Authority
BOQ	-	Bill of Quantities
NURCE	-	National Utility & Road Co-ordination Entity
PRDA	-	Provincial Road Development Authority
RDA	-	Road Development Authority
MOU	-	Memorandum of Understanding
WB	-	World Bank
IMF	-	International Monetary Fund
ADB	-	Asian Development Bank
JICA	-	Japan International Corporation Agency
AC	-	Asbestos Cement
GRP	-	Glass Reinforced Plastic
DI	-	Ductile Iron
NOC	-	No Objection Certificate

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CHAPTER ONE

1.0 INTRODUCTION TO THE RESEARCH

1.1 Background

Utilities (water, electricity and gas) generally defined as essential amenities that are important to the economy and development of society (ILO, 2019). Utilities have been supplied by an organization to the community with electricity, gas, water, or sewerage. Utilities, called as the basic facilities, services, and along with it infrastructure developments are essential for a community to work, such as road network, potable water, electricity and communications facilities and public necessities etc. The problem with these projects often go out of tracks, either in terms of the financial plan and /or the time. However, construction and maintaining utilities and other infrastructure is a vital undertaking and, frequently, even lifesaving, of example, sewage and water supply systems keep diseases like dengue, cholera away.

The initial literature review of Utility diversion and betterment works in Roads Projects and it's impact have revealed the following information. The construction work of the Colombo Baseline project (1) delay was 22 months, and out of which 19 months delay was due to the relocation of utilities such as water transmission and telecom lines (Teruo Kawakami, 2005). The main reason behind in resulting utilities diversion is particularly due to the fact that during design stage numerous underground utilities not been properly investigated and included in the design drawings and scope of work and were only discovered during construction stage, and much time has been spent trying to coordinate with the various utilities, such as water supply, sewerage, telecom, and electricity supply, which had administrative authority over these services (Teruo Kawakami,2005). As per the research findings of Wijekoon and Attanayake (2010) the second highest ranking factor in Sri Lanka is delay in the completion of road projects due to diversion of utilities. According to another study by Jayakanthan and Jayawardene (2012) delay caused by utility diversion in donor funded projects stood at 11th most influencing factor among 30 identified factors causing delays.

Pathiranage and Halwatura (2010) found in their study that Sri Lanka road construction projects exceeded the initial (planned) project period by 56 percent-88 percent of the average overrun time. Although sub soil ground conditions seldom can be carefully assessed, comprehensive planning and investigations are required before construction begins (about underground utilities) to reduce the impact of any unforeseen discoveries (Pathiranage & Halwatura,2010).

Developed nations such as US, Canada, European Nations, Australia and New Zealand are having best practices established state or provincial level laws and regulations regulate the placement of most services on road reserves to the contrary what is prevailing in Sri Lanka. While the legislation may differ between states in these countries, they are based on the similar principle that the agency responsible for the need to relocate utility infrastructure is also responsible for the relocation costs but not for betterment work (Victoria State Government, 2004).

The consultant overseeing the design and construction of the infrastructure works is ideally suited to handle the risks and impacts of those works can conflict with existing properties, utilities and infrastructures. Nevertheless, there is currently widespread debate within the construction industry as to whether the principal can bear the risks associated with stages such as relocating services in fully or partially (Maddoks, 2017).

Utility Service providers can (and do) insist on using their own consultants and approved contractors to carry out the work on their infrastructure. Changes imposed as a result of communication and co-ordination with utility authorities, delay in project site hand over, approvals of drawings, method statements, shutdown too caused significant contractual problems to Road Contractor and huge risk resulting from unexpected site ground conditions was important and moreover it was due to several challenges and difficulties in locating underground utilities (Perera, Dhanasinghe & Rameezdeen,2009).

It is therefore very important to identify the extent of utility relocation during the planning and design stages, and to discuss and resolve the relocation process in order to prevent any delays during construction stages.

Generally, all countries included in the literature survey embrace some form of cost sharing initiatives for relocation of services falling within rights of way, supported by legislation and/or agreements between the roads authorities and the utility service providers. It was also noted that cost sharing is rarely considered in isolation but rather forms part of the wider concept of utility relocation and accommodation which includes promoting cooperation, coordination, and communication; the provision of utility corridors; avoiding unnecessary utility relocations; and establishing utility agreements.

It is acknowledged that each of the countries considered during the literature survey would be able to add value to the intended international practice benchmarking toward their counterparts in Sri Lanka.

It is clear from the foregoing that there are serious unresolved issues and challenges related to Utility works do exist to a great extent in Sri Lanka. Therefore, to analyze such involvement and to identify the areas to be developed, this study fulfils the knowledge gap in the segment of the industry.

1.2 Research Problem

The growing number of infrastructural development projects being planned, executed and implemented in Sri Lanka has given rise to a large number of issues infringing the economic and budgetary challenges during project management. Due to governmental or political pressure Roads / Infrastructure projects were tendered and awarded for construction without adequate planning and investigation of sub surface soil conditions and existing underground utilities. This often results in dealing with "unexpected" without any cost and time provision in the contracts. Maintaining the status quo of existing underground utilities by providing protection or to relocate "as is basis" or upgrade as betterment works, would cause extensive delays in the project implementation, in turn causing the implementers to incur heavy cost implication. In addition to this dispute It is clear from the foregoing that there are serious unresolved issues and challenges related to Utility works do exist to a great extent in Sri Lanka that may arise with contractors which puts additional pressure on not only the implementers but also end users- the people whose rights have been infringed by the said project.

1.3 Aim

The aim of this research is to develop strategies for cost sharing of utility works in Right of Ways in Sri Lankan Road projects.

1.4 Objectives

Objective of the study is to identify the following through the research:

1. To examine the current good practices of Road & Transportation Authorities in developed countries.
2. To investigate the impact of Utility works during Road construction projects in Sri Lanka.
3. To identify and evaluate the method of Co-operation, Co-ordination, Collaboration and Communication for Utility works in Road Projects in Sri Lanka.

4. To make recommendations for cost sharing strategies for Utility relocation and betterment works in Road projects in Sri Lanka.

1.5 Research Methodology

Through a wide ranging literature survey, firstly the researcher intends exploring current practices available in Roads and Transportation Authorities of developed countries particularly relating to cost sharing practice in road projects for benchmarking purposes.

The criteria adapted for selecting these countries were based on where English is an official language. Hence, developed countries with most English speakers such as USA, Europe (3 countries), Canada, Australia and New Zealand were selected for the scope of literature survey. In addition, researcher visited Australia and had informal meetings, focus group interviews and discussion over the phone with University Professor, Director, Experts and Team Leaders representing Roads and Light Rail Authorities in Melbourne-Victoria, Canberra-ACT and Brisbane- Queensland.

Secondly, qualitative research method adapted through inductive process by selecting purposive samples of experts for semi structured in-depth interviews with key Team leaders / Specialists of Roads, Utility Authorities and other applicable Government entities in Sri Lanka to identify their current cost sharing practices, short comings and gaps.

Thirdly more data were collected through document reviews from sources both International and Sri Lanka.

Finally, the data collected from multiple sources were analyzed by creating themes, coding and thereafter combining codes into categories and summarizing the findings.

Based on the identified gaps with Sri Lankan authorities suitable recommended options and viable solutions would be identified and analyzed to conclude recommended options for Sri Lanka.

1.6 Scope and Limitations

In order to conduct a well-balanced and successful research some limitations are introduced. There are 193 UN member countries and out of which there are about only 50 countries that are known as developed countries, among them in 16 countries majority speak English. The web domains of these 16 countries are in English. As such, literature survey of overseas authorities was based on this limitation. The literature survey restricted to information with specific references to the cost sharing of utilities. Eastern and Asian countries were not considered due to their limited availability of subject matters in English.

On the other hand, Roads and Utility Authorities and their respective projects and assets in Expressways (Class E) and National Roads (Class A & B) in Sri Lanka are only considered for this research study.

1.7 Chapter Breakdown

This research consists of five chapters divided into different segments which are carried out as shown below in Figure 1.1.

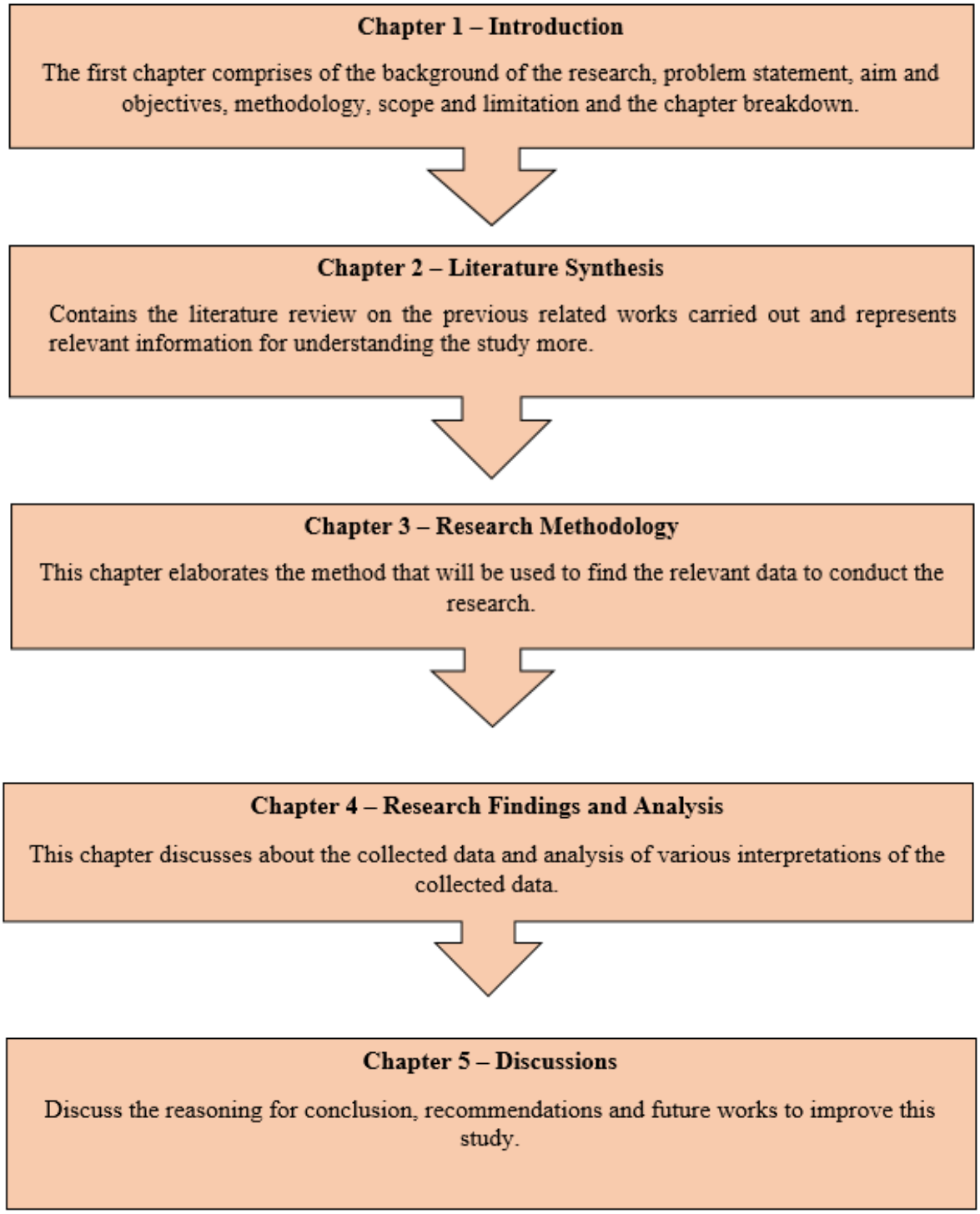


Figure 1.1: Research Process

CHAPTER TWO

2.0 LITERATURE SYNTHESIS

2.1 Introduction

The research subject and research question was briefly explained in Chapter One. Thus synthesizing the existing knowledge status of the landscape that is within the scope of the research is the aim of this chapter.

Chapter one briefly explained that research topic and research question. This chapter is devoured to elaborate that Roads Authorities in Sri Lanka and other developing countries in the world are obliged to pay all costs associated with relocation and betterment works required/requested by utility service providers through the funds allocated for their initiated projects.

This chapter therefore consists of literature review of the area of research being performed for the purpose of improving understanding of the research problem. The literature review deals with the research's goal; First and foremost, the chapter describes and explains the principle of cost sharing in Roads Projects as the first step towards the doorway of study with an added weight to its one of the most significant and imperative topic; Impact of Utility works in Road Project works, current good practices found in developed countries in terms of cost sharing, good governance and cooperation, coordination, collaboration and communication.

2.2 Impact of Utility Works in Road Project Works

Roads Authorities in Sri Lanka are obliged to pay all costs associated with relocation and betterment works and as a result, substantial portion from the allocated funds for road works are transferred to unforeseen utility related works.

Delay in completion of roads projects due to utility diversion / shifting is the second highest ranked factor in Sri Lanka (Wijekoon & Attanayake, 2010). Delays to road construction projects are inevitable since majority of the projects commence works before relocation of utilities and therefore it is very important that scope of utility relocation to be identified during design stage and the relocation process to be initiated to avoid any delays to construction activities (Wijekoon & Attanayake, 2010). Increased competition in the services sector in the recent past has led to changes in the organizational ownership structures and regulatory frameworks, in addition to diversification of companies (ILO,2019).

In particular, with regard to relocation of utilities, the main reason for the delays was that as-built details of several underground utilities that had not been recorded and shown contract documents were only exposed during the construction stages and substantial time was spent to communicate with the various utility authorities such as water, sewerage, telecom and electricity that had ownership and administrative power over those services (Teruo Kawakami, 2005). The project cost for Phase I of the Base Line Road reached up to LKR 3,645 million, a substantial increase over the estimated cost of LKR 2,662 million because the expense of the relocation of utilities was increased, and the amount for consultancy and civil works was also increased due to the delay in the execution of the project (Teruo Kawakami 2005).

Table 2.1 below provides an idea of the extent of National Road Kilometers in each province Sri Lanka to visualize quantum of road network. During the data collection process, it was confirmed that most projects were not completed within the contract amount and period, causing in cost overruns (Wijekoon & Attanayake, 2010).

Table 2.1: National Road Kilometers in Provinces in Sri Lanka

Province	National Roads (Including Expressways - Km)	Provincial Roads (Km)	Rural Roads (Km)		Bridges (Nos)
			Tarred	Concrete or gravel	
Western	1,699.49	1,952	6,696.55	13,336.73	788
Central	1,766.93	2,246	1,344.58	8202.06	626
Southern	1,575.31	1,630	2,820.72	9,323.96	473
Northern	1,258.53	2,120	1,067.05	7,139.09	276
Eastern	1,160.95	1,098	1,207.05	9,236.94	334
North Western	1,336.85	2,875	1,004.00	18,623.78	463
North Central	1,158.54	1,947	747.79	14,659.30	361
Uva	1,168.40	1,739	3,603.76	8,306.87	437
Sabaragamuwa	1,214.90	2,791	1,724.30	4,497.34	698
Total	12,340.00	18,397	20,215.80	93,326.07	4,456

Source: Road Development Authority (RDA), Ministry of Provincial Councils and Local Authorities

Source: Road Development Authority (RDA), Sri Lanka

As a result, substantial portion from the allocated funds for road works were transferred to unforeseen utility related works. Moreover, there is no sound legislation exists defining the powers, rights and obligations of Roads and Utility authorities and service providers. Utility

Service providers usually insist on using their own consultants and approved contractors to carry out the work on their infrastructure. At times the rates charged by the utility provider's contractor were significantly higher than those secured by the Roads Authorities. The process of land acquisition and relocation took nearly seven years in a Road Network Improvement Project (RNIP), two years longer than expected, resulting 40% of the project delay (Jayakanthan & Jayawardene, 2012).

Table 2.2: Expressways and National Highways in Sri Lanka

Road Class	Length
Class "E" Roads	**217.825 km**
Class "A" Roads	**4,217.420 km**
Class "AA" Roads	3,720.310 km
Class "AB" Roads	466.920 km
Class "AC" Roads	30.190 km
Class "B" Roads	**8003.167 km**
Total of "A" & "B" Class Roads in Sri Lanka	**12,220.587 km**
Grand Total of National Highways in Sri Lanka ("A", "B' and "E" Class Roads)	**12438.412 km**

November 2019 National Highways in Sri Lanka (Class "A", "B" & "E" Roads)

Source: Road Development Authority, Sri Lanka -

Therefore, during this period effective coordination with utility authorities is very crucial y the Project team to undertake shifting the utilities without leaving the relocation in the future during the construction period (Jayakanthan & Jayawardene, 2012).

On the other hand, approval permits/ NOC process is considered tedious and it is felt that Approval permits/ No Objection Certificates (NOC) are at times unreasonably withheld or delayed. The projects were also delayed by corridor allocation from relevant authorities. Requirements and specifications of Utility owners were not always consistent between projects and can change at any time. Further, materials issued by utility owners were not delivered on time.

Initiatives encouraging collaboration, teamwork and contact between road authorities and providers of utility services; expedite the allocation of utility corridors and to avoid unnecessary utility relocations.

Key factors affecting the effect of Utility works such as complexity of projects, lack of information on underground utilities, lack of experience of contractors on certain types special projects, lack of knowledge of local regulations (Roachanakanan, 2005).

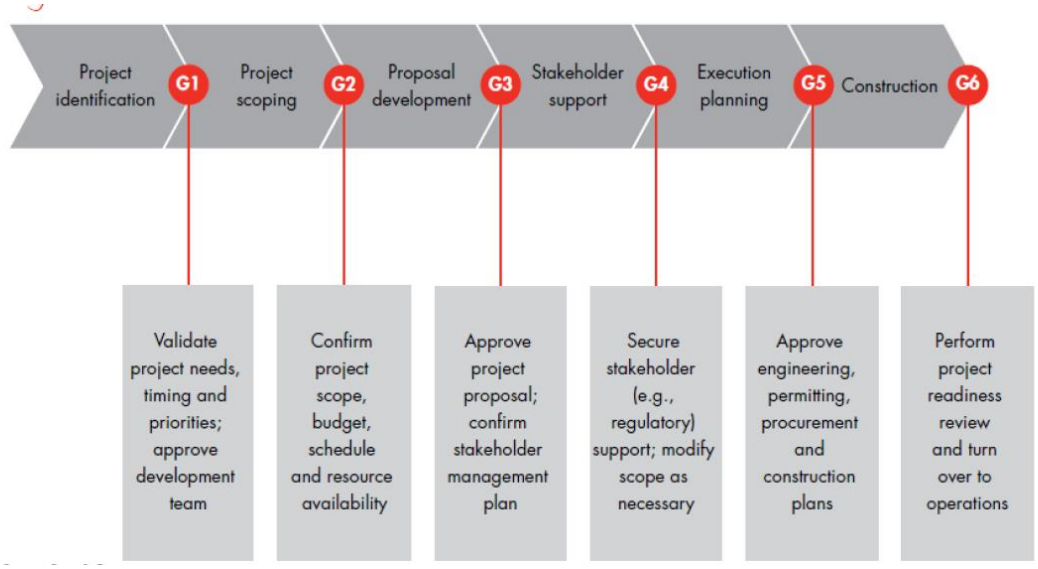


Figure 2.1: Typical Stage Process
Source: Bain & Company

Major projects seldom adapt the standards established whereby the cost is defined in the conceptual or preliminary design stages, whereas after construction commences, the project scope increases significantly, when utility authorities require shifting services, betterment works or adherence to environmental requirements. Critical scope and cost control, need to be monitored at every crucial juncture, but may not be feasible, but they need to be coupled with regular communication with stakeholders to maintain cordial working relationship and co-operation to achieve win-win situation (Matt & Joseph, 2012).

Many road projects in Sri Lanka are facing greater delays, which in many ways adversely affect the progress of the nation and economy resulting in socio-economic problem and an urgent mitigation is therefore needed (Pathranage & Halwathura, 2010).

2.3 Current Practices of Utility Cost Sharing Implemented in Road Project Works in Developed Countries

Additional literature survey of Road & Transportation Authorities in the developed countries were carried out to explore their current and established practices to complement the research topic and perhaps as a yard stick for bench marking for the benefit of authorities in Sri Lanka.

United States of America

Utilities normally pay 100% of relocation costs in the United States, when utilities are found in right-of-way and are forced to divert move to facilitate road project works. However, in New Jersey and Alaska, where the State Road Authority pays 100% of cost of diversion, and in Montana, State Road Authority share 75%. (US Transportation Department-Federal Highway Administration, 2014).

The noted advantage of Montana's 25/75 cost-sharing arrangement is that while major portion of the costs are paid by the Road Authority, where utilities are more likely to be diverted in a timely manner. One other topic need to be resolved in the United States on the subject of determining about prior rights, among stake holders such as the Roads / Highway and utility authorities (U.S. Department of Transportation-Federal Highway Administration, 2014).

In response to the growing awareness in the USA of the costly practice of relocating utility services and that unnecessary utility relocations are not in the public's best interest, many State DOTs have avoided unnecessary relocations by adapting an engineering practice referred to as subsurface utility engineering, a process through which comprehensive underground utility information is obtained. With this information, highway designers are able to make minor design changes to avoid many underground utilities. A recent Purdue University study revealed that State DOTs saved at least $4.62 in avoided costs for every $1 spent for subsurface utility engineering. Savings to utility companies and the public are believed to be even greater.Michael Reinke claimed (as quoted in Quiroga 2007) that the Texas Transportation Institute (TTI) at Texas A&M University had performed a variety of research for the Transportation Department of Texas (TxRA) relating to the cost of relocating utilities.

Table 2.3: Relocation Cost Contribution between Road and Utility Authorities in USA

	Department of Transport (DOT) and Utility Authority Contribution to Relocation Cost		
	State	Utility Authority	Road Authority
U.S.A	General	100%	0%
	New York & Alaska	0%	100%
	Montana	25%	75%

Canada

In Canada cost of diversion or shifting of utilities due to road work varies.

In Ontario, the Act on Highways for Public Service Works allows for the road and utility authorities to mutually decide on cost allocations. For situations where no compromise exists, the expenses are shared equally. However, the disputing parties can appeal to the Ontario Municipal Board for a decision on fair cost sharing (Transport Association Canada, 2016).

For Toronto and New Brunswick, the City undertakes the final reinstatement resulting from utility work and charges for the reinstatement costs to the utility company plus an amount to cover the overhead and administration (Transportation Association Canada, 2016).

Alberta Transportation - Alberta described a policy where the utility occupies the right-of-way for free but then they try to negotiate agreements for cost sharing when relocations are required. Gas distribution lines have received compensation due to an old agreement. There is a dispute regarding gas transmission lines as discussed above (Alberta Transportation, 2008).

Nova Scotia Department of Transportation and Infrastructure does not normally pay compensation for relocation costs. While the report indicates that while there is some consistency in the legislative and policy framework and, marked differences were found in the approaches to compensation for use of the right-of-way and for relocations with most federally chartered utility companies receiving compensation from the state for relocations while others may or may not be compensated depending on the authority (Alberta Transportation, 2008).

Table 2.4: Relocation Cost Contribution between Road and Utility Authorities in Canada

	Ministry of Transportation & Infrastructure and Utility Authority Contribution to Relocation Cost		
	State	Utility Authority	Road Authority
Canada	Ontario	Negotiable	Negotiable
	Alberta	Negotiable	Negotiable
	Nova Scotia	100%	0%
	Quebec	50%	50%

Europe

In Europe most of the utilities are owned by private parties, although they serve the public, are usually allowed to use public rights of way. When their services need to be moved to accommodate highway construction, they would typically be expected to do so at their own cost. England and Germany are just two noted exceptions. In England, utilities pay 18 percent of the diversion cost and the Roads Authority pays 82 percent of the rest. In Germany, the German highway authority is obliged to pay for the diversion when a company owns the property interest at its current location (FHWA-Eurorightofway, 2014).

A report published by the International Programs Office of the Federal Highway Authority of the United Sates Department of Transportation in August 2002 titled "European Right-of-Way and Utilities Best Practices" documents findings of a scanning team of right-of-way and utilities specialists from state Federal / State, agencies from private sector. The team travelled to Norway, Germany, England, and the Netherlands in March 2000 to observe right-of-way and utilities best practices and identify potential value with techniques essential for implementation in the United States. Their findings reported that although majority of the utilities in Europe are privately owned, but normally are permitted to occupy right-of-way provided their services are to the public and if utilities need to divert for the purpose of Road construction, they generally required to do it at their own cost (FHWA-Eurorightofway, 2014). According to Asphalt Industry Alliance (2018) Utility companies for road openings are spending each year an average of £1.3m (11%) of their carriageway maintenance budget. Excavating a carriageway to create a trench can decrease its structural life up to 30% and the utility openings of higher number in England and Wales can have a damaging consequence (Asphalt Industry Alliance ,2018).

When the Road and Utility Authorities failed to agree on diversion costs and the dispute likely to delay work, the Road Authority will provide funds as advance for construction costs to the utility authority under an agreement called pre-financing. Once the cost sharing compensation is settled or determined by a court, the Utility authority returns any overpayment to the Roads authority (FHWA-Eurorightofway, 2014).

Table 2.5: Relocation Cost Contribution between Road and Utility Authorities in Europe

	Department for Transport and Utility Authorities Contribution to Relocation Cost		
	Country	Utility Authority	Road Authority
Europe	England	18%	82%
	Germany	0%	100%
	Netherlands	Negotiable	Negotiable
	Norway	Negotiable	Negotiable

Australia

In Australia, states usually compensate utility authorities for the diversion of assets owned by the utility agencies (but not for betterments). Historically, majority of the utility authorities and operators have been government bodies. Therefore, whoever was obligated to pay for relocation work was of the opinion the funding came from the same source but this attitude affects the project schedule and cost. However, the policy remains unchanged that the authority responsible for the Road project that requires the need for the diversion is also responsible for the utility diversion costs. In recent past, in Australia utility organizations industry has amended the regulation, with a higher percentage of utility agencies are now in private hands. However, the policy for reimbursing utility diversion is continues as before (Victoria State Government, 2004).

The concept of multiple-level structure for MOU's between road and utility authorities has been considered to smoothen the cooperation and coordination process. In a given situation, a high-level MOU facilitate the intent of both parties that sets forth general principles and to work co-operatively and usually signed executive director-level by parties. The specific issues such as specifications, procedures, conflict resolution and general procedures are covered within MOU are included as attachments. The contract-level specifics and particular provisions are not covered under higher-level MOUs, amendments or agreements. (Opening Conference on Streets NSW, 2007).

The Code of Practice assists road and utility authorities in delivering critical services to the public, provides direction to ensure that projects prioritize public transport, provides guidance to reduce overall community costs, collaboration between road authorities and utilities and also provides guidance to road authorities on the management installations non road related infrastructure (The Government of the State of Victoria, 2004).

The Model Agreement (Model Agreement for Local Councils and Utilities / Service Providers, NSW (Streets Opening Conference, August 1999) provides for the acceptance of standards to provide the basis for individual agreements on reimbursement for utility asset diversions. In general, the party that request the need to divert the infrastructure is responsible for the costs of the transfer, less any concession for mutually agreed enhancement, the cost of which will be borne by the benefitted party. This describes betterments in size and standard as including performance that increase the asset's functional working life when it is replaced or when the asset's utilizable potential is increased (NSW Street Opening Conference, 2007).

For example, the code elaborates when utilities are laid as per the options agreed upon and the total cost allocation and sharing methodology to the community should be taken into consideration for providing the facilities such as both road and utility infrastructure. Similarly, the code recommends when utilities are attached to bridges and other road structures, that the concerned parties shall agree to enter into an agreement including relevant terms and conditions, such as cost estimates for engineering works, providing proper access for work and maintenance, indemnity for damages, and relocation costs with binding responsibility (Victoria State Government, 2004).

As per the provision of the Road Management Act 2004 for the establishment of an Infrastructure Advisory Committee to advise the Victorian government on matters related to the occupation and use by utilities of the right of way. The members from Vic Roads, Utility authorities, local governments and public transport represented and provided their inputs to the Advisory Committee on Infrastructure and services. The panel members of the Advisory Committee provides advice in a number of areas, including governance, applicability of code of practice, coordination of utilities works and other occupants and road users of the right of way. Moreover, utility authorities and other stake holders made use of the panel as a consultation body regarding the use of the right of way (Victoria State Government, 2004).

Model Agreement developed by the NSW SOC for Local Councils and Utility and other Service providers and Stake holders and also as a guide to Codes and Practices of Street

Opening to serve as a model for local councils and utility authorities. (Opening Conference on Streets NSW, 2007).

Laws and regulations to govern the occupation of most utilities in right of way at the state level in Australia. While the legislation may differ between states, they are based on similar principles. Only in the case of Telecommunication, which is governed by federal legislation can be termed as an exception (Victoria State Government, 2004).

In Queensland, the Department of Transport and Main Roads (TMR) has two MOUs in place, one with the major electric utility (Energex) and the telecommunication utility (Telstra). One of the issues addressed in the MOU's is seeking to provide corridors which take into consideration future road planning to minimize the need for future relocation (Department of Transport Report on International Benchmarking Tour, 2013).

Table 2.6: Relocation Cost Contribution between Road and Utility Authorities in Sydney, Australia

.	Roads and Maritime Services (RMS) Contribution to Relocation Cost			
	Utility Owner	Like for Like	Betterment	
			Asset Life	Capacity
Sydney	General	100%	100%	0%
	Ausgrid	100%	100%	0%
	Sydney Water	100%	Proportional	0%

Table 2.7: Relocation Cost Contribution between Road and Utility Authorities in Brisbane, Australia

	TMR Contribution to Relocation Cost			
	Utility Owner	Like for Like	Betterment	
			Asset Life	Capacity
Brisbane	Queensland Urban Utilities	100%	Existing Asset < 40 years 100%	0%
			Existing Asset > 40 years 0%	

New Zealand

Cost sharing arrangements in New Zealand are normally resulted from negotiation between the affected parties as per legislation. Different Acts apply depending on the road authority, utility owner and the location of the service and the extent of contribution between them also varies. On State Highways, for instance, gas, electricity and telecommunications utilities are governed by the Gas Act (11), the Electricity Act (12) and the Telecommunications Act respectively (13). Where the utilities are located within a state highway the general law is that the New Zealand Transport Agency (NZTA) will pay for the cost of relocation of the utilities with the exception that the charges for all fittings which shall be borne by the utility owner. Gas Act, the Electricity Act and the Telecommunications Act respectively (New Zealand Ministry of Transport, 1989).

This can be varied if the utility owner elects to install their infrastructure over, under, or through a road structure that is being, or is to be, constructed, or altered. If the costs associated with this increases the cost of construction or alterations, the increased cost is to be met by the utility owner.

If the utility owner wants the work done in accordance with specifications different from those of the original works, the utility owner pays the difference between what it would have cost to relocate and reconstruct the works to their original specifications and the actual cost of the relocation and reconstruction (New Zealand Ministry of Transport, 1989).

The Telecommunications (13) Act definition of a Road includes motorways so the provisions of that Act prevail over the Government Roading Powers Act and the cost sharing arrangement referred to for State Highways applies.

It is expected that the actual cost share arrangement will be subject to agreement between the utility owner and the NZTA and all the above pprovisions are subject to any agreement that may be reached between The National Draft Code of Practice for Utilities' Access to the Transport Corridor provides guidance as to the form and content of these agreements. While the draft Code is currently being applied and is accepted as industry best practice, it cannot override the legislation. However once the code is finalized it will need to be complied with by virtue of the Utilities Access Act 2010 (14) (New Zealand Ministry of Transport, 1989).

Cost sharing for relocating or altering works located on motorways is different depending on the utility. The Gas and Electricity Acts specifically exclude Motorways from the definition of roads and therefore the Government Roading Powers Act (15) applies and the cost of

relocating and/or replacing those utilities is shared equally by the NZTA and the utility owner. (New Zealand Ministry of Transport, 1989).

There are often local agreements for individual bridges such as when the roads authority is aware of a scheme on the horizon, they will negotiate that a new utility will be moved by the service owner at zero cost to the road authority in the future.
Determining which costs apply also poses challenges with regard to consistency when trying to establish how costs are to be shared such as agreeing on the extent to which contractors Preliminary and General costs (P&G's) or traffic management costs are distributed.
In the case of Local roads, if the local authority makes the request, then the provisions of the utility acts apply which contain arbitration provisions in the event agreement cannot be reached on the cost sharing matter. In Auckland, the Local Government (Auckland Council) Act 2009 (16) provides that Auckland Transport has the functions of a controlling authority in respect of local roads in Part 4 of the Government Roading Powers Act, which appears to give Auckland Transport certain powers. This would apply for utilities other than gas, electricity and telecommunications and would enable Auckland Transport to seek a 50/50 contribution. (New Zealand Ministry of Transport, 1989).

The New Zealand Utilities Advisory Group Incorporated (NZUAG), is a joint advisory group working together to achieve benefit for all road users and communities and comprising o members of Road, Utility companies and Rail owners/ Managers. NZUAG has been working on a number of initiatives over the past few years to fix issues that arise from utilities occupying and operating on the Right of Way from which Roadshare has developed. "RoadShare is an epitome of the Responsiveness, Integrity, Partnership, Efficiency and Effectiveness NZUAG values (New Zealand Utilities Advisory Group, 2018).

NZUAG's work program has created results that will manage New Zealand's roading corridor more effectively. This has developed guidelines and tools for all aspects of road corridor management as best practice through number of projects, which includes the preparation of a model partnership agreement between road and utility authorities to provide a collaboration structure within which Road Controlling Authorities (RCAs) and Principal Utility Service Providers may work together for benefit of communities and organization they serve to achieve mutually agreed results (New Zealand Handbook , 2003).

Table 2.8: Relocation Cost Contribution between Road and Utility Authorities in Auckland, New Zealand

	New Zealand Transport Agency (NZTA) Contribution to Relocation Cost		
	Utility Service	Motorways	State Highways
Auckland	Gas and Electricity	50%	100%
	Storm-water, Sewer, Irrigation and Water	50%	50%
	Telecommunications	100%	100%
	All Betterment Work And Fittings	0%	0%

2.4 Good Governance, Regulation and Sound Legal Practices Resulting Good Practices of Utility Works in Road Projects:

The concept of multiple-level structure for MOU's between road and utility authorities has been considered to smoothen the cooperation and coordination process. In a given situation, a high-level MOU facilitate the intent of both parties that sets forth general principles and to work cooperatively and usually signed executive director-level by parties. The specific issues such as specifications, procedures, conflict resolution and general procedures are covered within MOU are included as attachments. The contract-level specifics and particular provisions are not covered under higher-level MOUs, amendments or agreements. (Opening Conference on Streets NSW, 2007).

In **New South Wales** (NSW), the Roads and Maritime Services (RMS), formerly the Roads and Traffic Authority (RTA) and the Sydney Water Corporation entered into a Memorandum of Understanding (MOU) between Sydney Water Corporation and New South Wales Roads and Traffic Authority, Sydney, which includes a framework covering issues such as cost sharing, knowledge sharing, dispute resolution, project planning and management. (Opening Conference on Streets NSW, 2007).

In **Queensland**, the Department of Transport and Main Roads (TMR) has two MOUs in place, one with Energex, the major electric utility and Telstra, the telecommunication utility. One of the issues addressed in the MOU's is seeking to provide corridors which take into consideration future road planning to minimize the need for future relocation.

The NSW Streets Opening Conference (SOC) is a voluntary association of member groups that have agreed to meet regularly to resolve issues for mutual benefits by respecting the rights and responsibilities of individual members to provide their particular facilities to the community (NSW Streets Opening Conference, 2007). SOC membership is generally open to government regulatory bodies, utility, local, road authorities, light rail operators. Membership may also include consultants and other organizations that have a continuing interest in Roads, Utilities including underground oil or gas pipeline suppliers or operators. (NSW Streets Opening Conference, 2007).

The Road Management Act 2004 (9) in **Victoria** includes issues relating to diversion, reservation for laying of utilities for Road projects. The Code of Practice for Infrastructure Management in Road Reserves (10), as indicated in the Act, provides details to road and utility authorities, and public transportation providers on the planning and management of their standard reserve and corridor allocation in the right of way. (The Government of the State of Victoria, 2004).

The Code of Practice assists road and utility authorities in delivering critical services to the public, provides direction to ensure that projects prioritize public transport, provides guidance to reduce overall community costs, collaboration between road authorities and utilities and also provides guidance to road authorities on the management installations non road related infrastructure (The Government of the State of Victoria, 2004).

The Model Agreement (Model Agreement for Local Councils and Utilities / Service Providers, NSW, Streets Opening Conference, August 1999) provides for the acceptance of standards to provide the basis for individual agreements on reimbursement for utility asset diversions. In general, the party that request the need to divert the infrastructure is responsible for the costs of the transfer, less any concession for mutually agreed enhancement, the cost of which will be borne by the benefitted party. This describes betterments in size and standard including performance that increase the asset's functional working life when it is replaced or when the asset's utilizable potential is increased (NSW Street Opening Conference, 2007).

For example, the code elaborates when utilities are laid as per the options agreed upon and the total cost allocation and sharing methodology to the community should be taken into consideration for providing the facilities such as both road and utility infrastructure. Similarly, the code recommends when utilities are attached to bridges and other road structures, that the concerned parties shall agree to enter into an agreement including relevant terms and conditions, such as cost estimates for engineering works, providing proper access for work and maintenance, indemnity for damages, and relocation costs with binding responsibility (Victoria State Government, 2004). As per the provision of the Road Management Act 2004 for the establishment of an Infrastructure Advisory Committee to advise the Victorian government on matters related to the occupation and use by utilities of the right of way. The members from Vic Roads, Utility authorities, local governments and public transport represented and provided their inputs to the Advisory Committee on Infrastructure and services. The panel members of the Advisory Committee provide advice in a number of areas, including governance, applicability of code of practice, coordination of utilities works and other occupants and road users of the right of way (Victoria State Government, 2004).

Model Agreement developed by the NSW SOC for Local Councils and Utility and other Service providers and Stake holders and also as a guide to Codes and Practices of Street Opening to serve as a model for local councils and utility authorities. (Opening Conference on Streets NSW, 2007). Laws and regulations to govern the occupation of most utilities in right of way at the state level in Australia. While the legislation may differ between states, they are based on similar principles. Only in the case of Telecommunication, which is governed by federal legislation can be termed as an exception (Victoria State Government, 2004).

The New Zealand Utilities Advisory Group Incorporated (NZUAG), is a joint advisory group working together to achieve benefit for all road users and communities and comprising o members of Road, Utility companies and Rail owners/ Managers. NZUAG has been working on a number of initiatives over the past few years to fix issues that arise from utilities occupying and operating on the Right of Way from which Roadshare has developed. "RoadShare is an epitome of the Responsiveness, Integrity, Partnership, Efficiency and Effectiveness NZUAG values (New Zealand Utilities Advisory Group, 2018). NZUAG's work program has created results that will manage New Zealand's roading corridor more effectively. This has developed guidelines and tools for all aspects of road corridor management as best practice through number of projects, which includes the preparation of a model partnership agreement between road and utility authorities to provide a collaboration structure within which Road Controlling

Authorities (RCAs) and Principal Utility Service Providers may work together for benefit of communities and organization they serve to achieve mutually agreed results (New Zealand Handbook, 2003).By contrast, utilities must obtain vast number of work permits from public and private authorities before commencement of any work on site (Scalise,2012). They also need to coordinate with a range of other communities with a stake in the project (special interest groups, residents, rate payers) that have different, and sometimes challenging objectives such as clean energy, environmental safety. low costs (Scalise, 2012). Table 2.9 below shows the summary of Acts, Admin guide lines, Procedure Manual and more details are available in Appendix C.

Table 2.9: Summary of Acts, Admin Guidelines, Procedure Manual and URL Address

Summary of Acts, Admin Guidelines, Procedure Manual and URL Address	
1	Telecommunications in Road Reserves: Operational Guidelines for Installations - https://www.commsalliance.com.au/data/assets/pdf_file/0009/2340/G591_2006.pdf
2	Telecommunications in Road Reserves — Administrative Guidelines for Road Authorities https://www.onlinepublications.austroads.com.au/items/AP-RE303-07
3	Roads Act 1993 - https://www.legislation.nsw.gov.au/inforce/a82dffc6-0797-4030-f2ce-a3f8a66cb109/1993-33.pdf
4	Water Supply (Safety and Reliability) Act 2008 https://www.legislation.qld.gov.au/view/pdf/2017-07-03/act-2008-034
5	Utilities Access Act 2010 http://www.legislation.govt.nz/act/public/2010/0098/latest/DLM2248926.html
6	Guide to Codes and Practices for Streets Opening - http://streetsopening.com.au/data/files/34/10/00/00/Case-Study-Esri-Sydney-Water-City-of-Sydney.pdf
7	Gas Act 1992 - http://www.legislation.govt.nz/act/public/1992/0124/latest/DLM285412.html
8	Infrastructure (Amendments Relating to Utilities Access) Act 2010 - http://www.legislation.govt.nz/act/public/2010/0099/latest/resultsin.aspx?search=sw_096be8ed805db05c_utility_25_se&p=1
9	Telecommunications Act 2001 - http://www.legislation.govt.nz/act/public/2001/0103/latest/DLM124961.html
10	Electricity Act 1992 - http://www.legislation.govt.nz/act/public/1992/0122/latest/DLM281858.html
11	Government Roading Powers Act 1989 - http://www.legislation.govt.nz/act/public/1989/0075/latest/DLM173369.html
12	Local Government (Auckland Council) Act 2009 http://www.legislation.govt.nz/act/public/2001/0103/latest/DLM124961.html
13	National Code of Practice for Utilities' Access to the Transport Corridor - https://mstn.govt.nz/wp-content/uploads/2017/03/nr1321395904-1.pdf

Source: Department of Transport Report on International Benchmarking Tour, 2013

2.5 Methods of Co-operation, Co-ordination, Collaboration and Communication of Utility works in Road Projects:

Right of Way (ROW) owners in Canada responsible for the construction and management of infrastructure within ROWs and providing a wide range of public services and consequently demand rise and therefore public ROWs are resulting increasingly congested and complex (Transportation Association Canada,2016). Initiated projects by numerous parties soon become ineffective and expensive without proper co-ordination. Therefore, in the best interests of all stakeholders, both ROW regulatory authorities and utility service providers' responsibility to design consistent, competent and well organized coordination process for utilities (Transportation Association Canada, 2016).

The findings of a 2008 study conducted by the Canadian Transportation Association — Association des transports du Canada (TAC— ATC) are reported in a report entitled "The Management of Utilities in and adjacent to Public Right-of-Way: Survey of Practices." While the method of organizing work with utility companies differs across jurisdictions, the report suggests that there is broad agreement on the issues of utilities facing road authorities, including:

- Disruption and increase in costs to Road Projects are caused by utility diversions;
- Utilities as built drawing data and site location detail of existing underground assets are often found inaccurate and poor in quality;
- When utility service providers excavate/cut newly laid road carriageways additional burden of cost incurred by road authorities as a consequence of a reduction in road service life; and
- To ensure reasonable cost share of all utility related works within the right-of-way significant effort is needed from all concerned stake holders.

Following initiatives between the roads authorities and the utility service providers were mentioned in the report as described below to promote collaboration

Canada

- *"The Ministère des Transports du Québec* (MTQ) developed framework agreements to develop procedures related to management of work and also to address issues across the province. A committee, comprising members from MTQ employees and utility companies, meets once in four months a

year to address issues resulting from the agreements and use the meetings as a forum to promote innovation and flexibility.

- The Ministry of Transportation and Infrastructure of **British Columbia** has partnered with utilities to coordinate the works of a project in the right-of-way and ways and means to minimize the relocations through better communications.
- The Ministry of Transportation of **Ontario** and major utility companies meets twice a year with the to discuss current and pending issues.
- The Transportation Department of **New Brunswick** conducts annual meetings that discuss future plans and schedules of work.

With the exception of Quebec, these approaches appear to focus mainly to coordinate utility diversion works as a priority instead of solving problems related to research and/ or organizations (Transport Association, Canada).

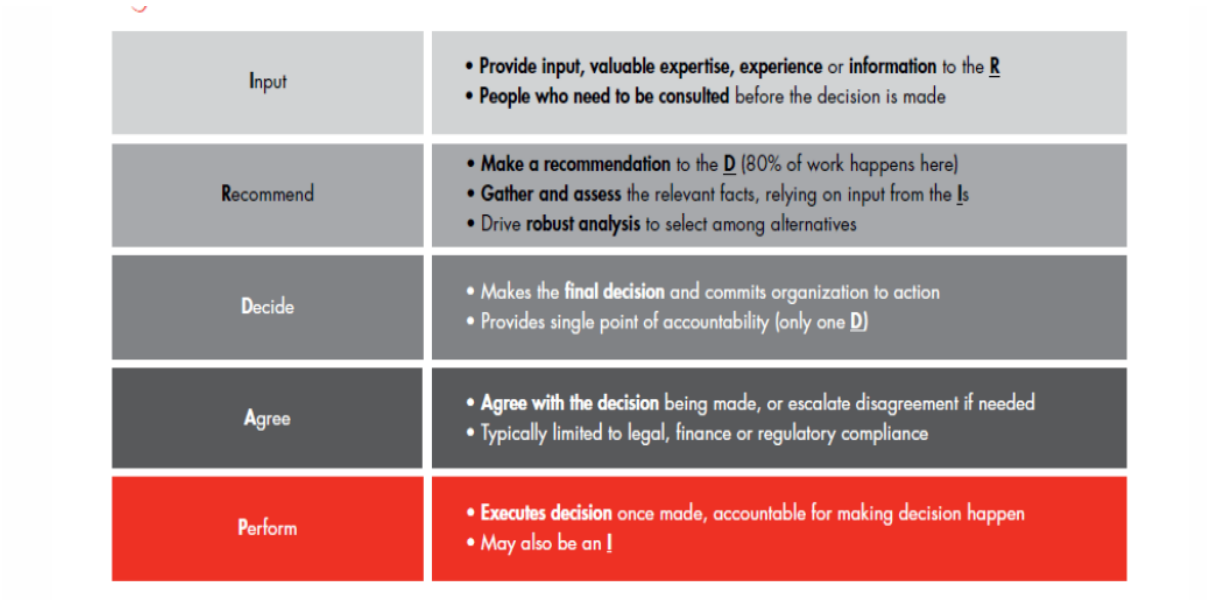


Figure 2.2: The Rapid Decision Making Model
Source: Bain & Company

Abbott and Scalise (2012) had stated that projects can only progress effectively from one phase to the next if teams have set out in advance who will be accountable for decisions and how feedback will be taken under careful consideration throughout the business. A decision-making method, such as model (recommend, approve, execute, feedback, decision), can assist to

decision-makers to produce a consistent process that provides direction throughout the project (see Figure 2.2).

Europe

In 1998, a Federal Highway Administration (FHWA) research found lack of co-operation, communication and coordination to be the most important utility-related challenges and problems. While some Roads and transport state authorities are maintaining very good working relationships with utility companies whereas utility coordinating committees are active between some roads and utility authorities. However, this is not practiced in all states. Interestingly, a U.S.-led report, The General Accounting Office found that States had fewer problems relating to efficiency because they carried out their tasks with commitment for co-operation, communication and co-ordination (U.S Department of Transportation-Federal Highway Administration, 2014).

Jayakanthan and Jayawardene (2012) found out through their research in Sri Lanka for Road Projects funded by donors, some of the major factors such as insufficient stakeholder participation, poor or unsuccessful communication with stakeholders throughout the project, failure to recognize all stakeholders and their demands, that led to disputes and misunderstandings during the execution phase of the project.

In the Netherlands the highway agency has established a good working relationship with utility companies by stressing continuous communication, cooperation and emphasis on team work to execute projects between highway and utility team members, as well as within their respective authorities and department (FHWA-Eurorightofway, 2014).

Progress and success of numerous utility projects during different stages mainly due to advance planning of the activities during each stage of work, taking client feedback on wide ranging issues and making the team members accountable for their decisions. A decision-making tool that provides decision-makers direction throughout the project which recommends, agrees, performs, inputs, and decides can help to create a uniform process (Abbott & Scalise, 2012).

The Utilities Division of the Montana Department of Transportation's (MDT) Right-of-Way Bureau works in conjunction with utility companies on behalf of the MDT when those companies choose to identify corridors within the MDT ROW and when diversion or betterment works requested by utilities due to conflicts with MDT projects. To identify relocation alignments and create cost-sharing agreements, the Services Section provides

guidance on issues and works directly with utility companies (U.S. Department of Transportation-Federal Highway Administration, 2014).

Generally speaking, Australia's road authorities require service authorities to position their assets in the road reserve. Unless they adhere to their accepted agreement and the permit that allowed them to be there, then any costs of relocation are the responsibility of the troubling party. There have been cases where the utility service providers have failed to comply, in which case the road authority has kept the service provider responsible for the costs of relocation or even incurred the costs of penalties to the utilities. (Government of the Victoria State, 2004).
We have seen that clarifying project selection criteria, defining decision-making process, explaining project specifications step-by-step and describing team member responsibilities would dramatically improve project team performance and help companies push projects faster through the pipeline (Abbott & Scalise, 2012).
By far the most important works, in terms of volume, are the smaller works (service connections, inspection cover replacements, reactive road maintenance repairs, etc.) which, although not as clearly prevalent as the major and emergency works, require dedicated resources to ensure they are scheduled and handled effectively so as not to compete with other more disruptive works. One vital aspect of these works ' planning is to ensure that they do not interfere with the diversion or escape routes designated for vehicle and pedestrian traffic that may need to be introduced when major works are carried out on adjacent or parallel roads involving road closures.

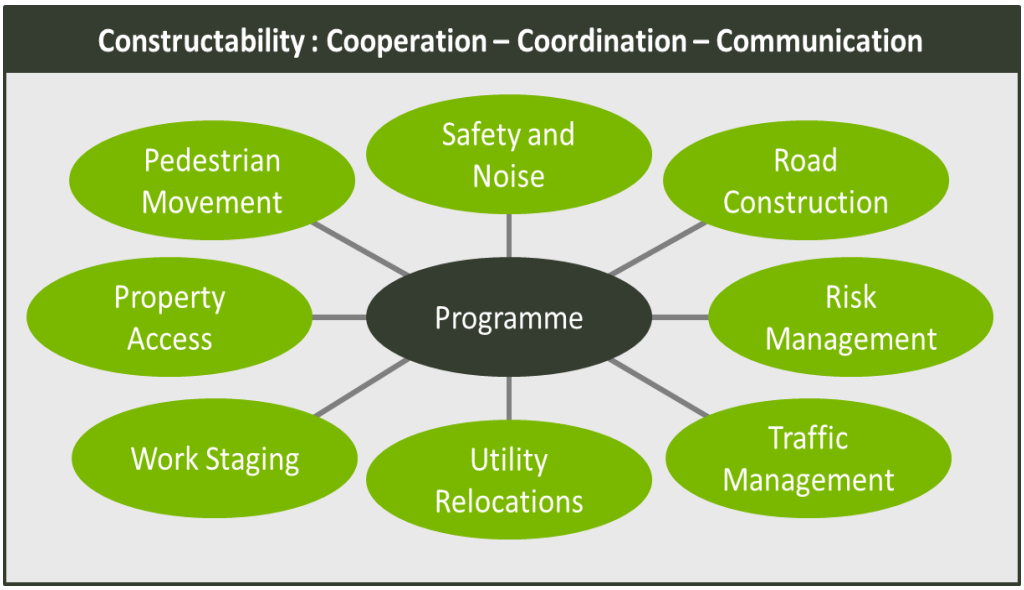


Figure 2.3: Constructability: Cooperation-Coordination-Communication
Source: Department of Transport Report on International Benchmarking Tour,2013

2.6 Summary

"Partnering" mechanism- Implementing a development collaboration strategy to tackle better cooperation with local governments and service authorities, among other issues, would improve the situation. It is recommended that they be held accountable for any subsequent rise in project costs and delays when local authorities cancel a project due to infrastructure issues, environmental problems, or right-of-way efforts. The authorities shall take steps to suggest that policymakers continue to recover these costs where liability is clearly reduced and cost-effective and make recommendations for cost sharing of utility relocation and betterment works in road projects to overcome the critical factors in future.

The procedure of the utility relocation, betterment works should be focused on in depth to investigate and to reveal the reality behind them. However, without a proper in depth study and analysis, the system cannot be addressed for the required improvement. Therefore, this study will fulfill the knowledge gap in the sector to analyze the procedures and to identify the areas to develop and identify recommended options to remedy the issues prevails in Sri Lanka. In the future, when introducing a similar road project in a large city, the executing entity should be advised to maintain close communication with stake holders so as to prevent unnecessary delay caused by poor coordination. To identify and formulate cost sharing of utility relocation and the provision of new utility infrastructure between Roads Authority and the respective utility owners based on material type, age of utility, life span with option to bench mark best practices from Developed Countries.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The literature review was presented under chapter two and the research problem was identified, and this chapter was reviewed to find solutions to the research problems by logical approach and achieving the research goals and objectives. The approach of analysis is distinguished from one another. Identifying different research methodologies is therefore one among the significant parts of a study be influenced by heavily on the research outcome. Undertaking a research is not just about gathering facts and figures about a specific subject, but it is about providing solutions to problems that have not yet been applied or executed (Goddard & Melville, 2007). That is to say, a study should consist of new discoveries or information about undiscovered topic and/ or subject area. Therefore, Kothari (2004) clarified research methodology as an organized method and Fellows and Liu (2003) described research methodology as principles and producers of the process of reasonable thinking which helps to find solution to research problems.

3.2 Research Design

The research design is the reason for conducting the study for data collection, measurement and analysis (Lapan, Quartarol, Rieme,2011). Furthermore, Tan (2002), has defined the research design as the conversion of the research problem into a conclusion. According to Punch (2005), Research Design is the initial preparation for the research which consists of four key concepts; such as what strategy to follow, within what framework, from whom data will be collected and how to collect and analyze such data. In addition, a research design defines the partnership between research approach and research technique to effectively attain the target objectives (Gary, 2014). Therefore, to achieve the research aims and objectives, the research approach and research techniques have been identified. The model explains the study method in detail with a proper research technique preferred based on research approach and further, such research approach is selected based on a certain philosophy of investigation.

3.3 Research Approach

Guidance plan of research question to research conclusion can lead to identify the research approach (Tan,2002). An appropriate research approach to address research problems needs to

be selected. It is possible to identify three research methods as the quantitative, the qualitative and the mixed approaches (Creswell, 2013). Quantitative approach consists of data in quantitative format which has association between evidences and principles and results previously executed. The qualitative approach allows analyzing the total population as groups or individuals, and examining the thoughts, attitudes, understandings and beliefs of individuals (Malterud, 2001). Based on the above description qualitative research approach was adapted for this study. Moreover, the requirement of comprehensive analysis was important to discover the existing practices in the industry. This research aim is to develop strategies for cost sharing of utility works in ROWs in roads projects as to how cost of utility relocation and provision of new utility infrastructure can be shared between Road Authorities and respective utility owners. To accomplish the research goal, data collections are conducted as part of research activities. Selection of the right approach to research is very important task to the research process. However, as mentioned before, when collecting data, the qualitative approach is adapted by posing emerging questions and the researcher interprets the data. On the other hand, the mixed approach described as combined method against the collection and integration of qualitative and quantitative data. Precise selection of the appropriate research method is essential to achieving the research objective and research goals.

Table 3.1: Comparison of Research Approach

CHARACTERISTICSS	QUANTITATIVE APPROACH	QUALITATIVE APPROACH	MIXED METHOD APPROACH
Way of determining the question	Pre-determined	Emerging Methods	Both combination of pre-determined and emerging methods
Base of the question	Questions are instrument based	Questions are open ended	Both combination of open and closed – ended questions
Considered data type	Attitude data, Performance data, Census data and observational data	Interview data, document data, observational data and visual data.	Different and multiple type of data from all possibilities
Method of Analysis	Statistical analysis	Text and image analysis	Both statistical and text analysis
Method of interpretation	Statistical Interpretation	Themes, patterns interpretation	Across data base interpretation

Source: Creswell, 2013

In order to realize that suitable identification of the characteristics is important in each type of research approach. Table 3.1 demonstrates in a comparative way the features of the subjective,

quantitative, qualitative and mixed process methods. The utmost effective method to this research has been chosen, over reflection of the features in each quantitative, qualitative and mixed method approach.

3.4 Research process

The overall research strategy is offered by the research process (Punch,2005). The overall process in this research and the corresponding goals achieved in each stage were shown in Figure 3 .1. Their overall process was divided into six steps, such as Introduction, literature review, data collection, data analysis, and the creation of cost sharing strategies for ROW utility works. So, as shown below diagram in Figure 3.1 explains the each step involved in conducting this research.

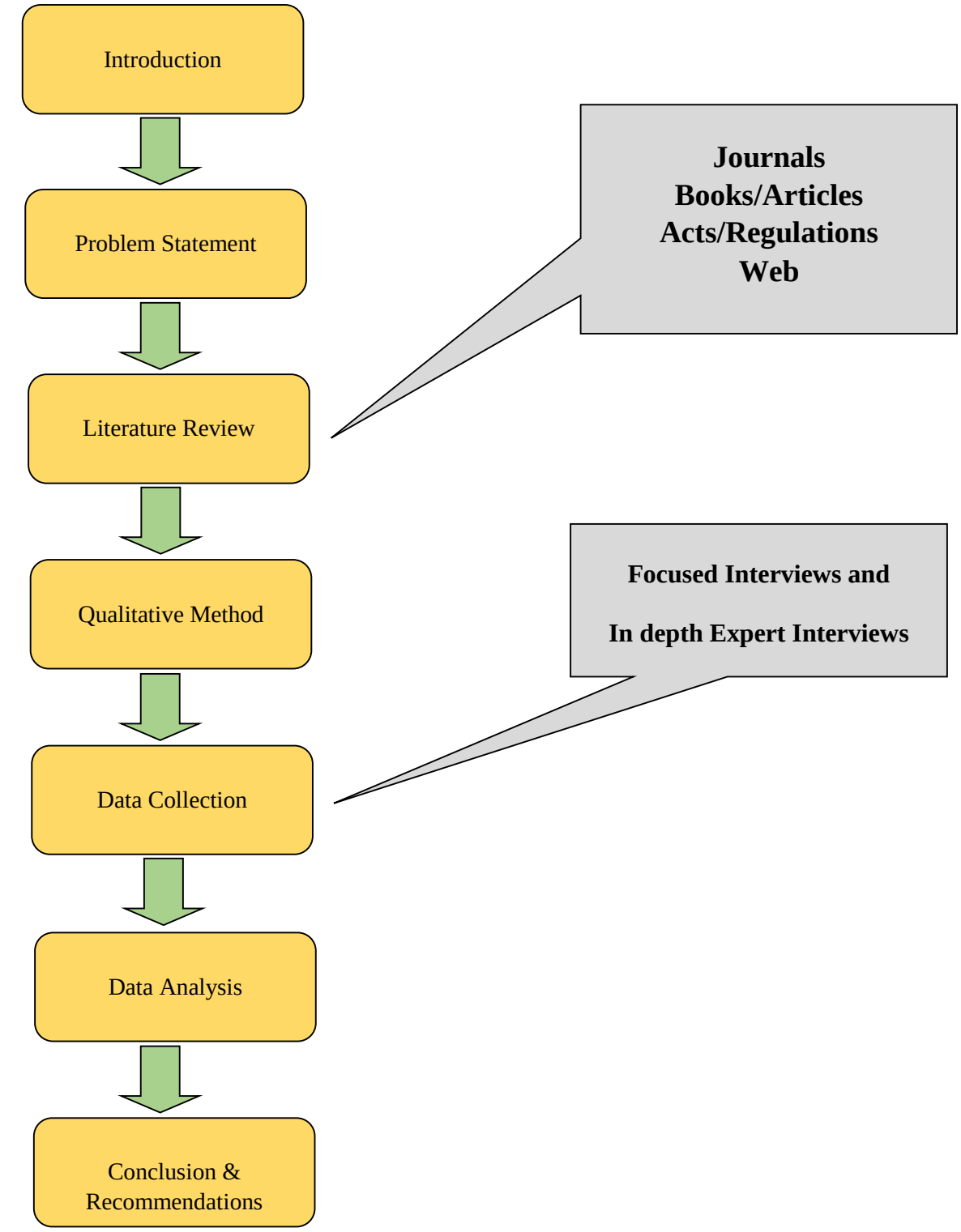


Figure 3.1: The Research Process

3.5 Research Techniques

Research approach followed by the selection of the research teccost sharinghniques (MacDonald & Headlam, 2011). In addition, MacDonald and Headlam (2011) claimed data collection and analysis includes research techniques. There are numerous ways adapted to gather data, such as surveys, interviews, case studies, experiments, quantitative data collection, ground theory to gather qualitative data, and ethnography. In addition, the method of data analysis is dependent upon data collection method (Fellows Liu, 2015).

3.5.1 Sample selection

Sample is capable of representing given study population. Mathers et al. (2009) reported that main sampling techniques exist as random sampling methods/techniques as well as non-random sampling method. Researcher sets out the people/experts according to qualifications, experience and practical knowledge to offer information in the research area in purposeful sampling method (Etikan, Musa & Alkassim, 2016). Judgment sampling allowed the selection of a particular sample which had the proficiency and expertise to share research area data (Etikan, Musa & Alkassim, 2016) (Marshall, 1996). Qualitative research method will be adapted through inductive process by selecting purposive samples of experts for semi structured in-depth interviews. It was also noted that cost sharing is rarely considered in isolation but rather forms part of the wider concept of utility relocation and accommodation which includes promoting cooperation, co-ordination, and communication; the provision of utility corridors; avoiding unnecessary utility relocations; and establishing utility agreements. Industry professionals and experts who were actively and enthusiastically involved in managing Road and /or Utility projects were found through initial investigation. These experts were selected from various disciplines, fields and positions ranging from Senior Advisors, DGM, AGM, Project Directors, Team Leaders, Senior Project Managers, Multi-Disciplinary Professionals having relevant and substantial experience and exposure in the research area both in Sri Lanka and overseas. The following organizations / authorities were selected for interviewing of higher level officials in Roads and Utilities Sector representing

1. Road Development Authority, Sri Lanka
2. Ceylon Electricity Board, Sri Lanka
3. National Water Supply and Drainage Board, Sri Lanka
4. Sri Lanka Telecom, Sri Lanka
5. Colombo Municipal Council, Sri Lanka
6. Integrated Transportation Centre, UAE

3.5.2 Data Collection

Kumar (2011) has categorized the methods of data collection into interviews, observations, questionnaires, document review, simulation and participation; as part of the qualitative technique, there are data collection sources such as documents, archival records, interviews, direct and participant observation, etc. The interviews were adapted taking into consideration the nature of the research.

To choose the proper method of collecting data, researcher must identify the type of data required by taking into account the merits and demerits of each process (Kothari,2004). Observation is a procedure used to gather qualitative data, while research observes opinions of others that are not modified by the observer within a specific research field (Seymour & Rooke, 1995).

Within these interviews and documents review were adapted considering the nature of the research. Interviewing is known as the effective method of data collection and the most commonly used qualitative technique because of the reliability of the data collected (Fontana & Fery,2000 cited in Senaratne, 2005). Interview can be conducted in categories such as organized, semi-structured and unstructured interviews. Structured interviews contain predetermined and defined questions. Semi-structured interviews are given correct direction to avoid open-ended questions and the reliability of data collection processes by providing the respondent an opportunity to explain (Sofaer, 2002). Unstructured interviews with subject matters concerned processing involved many information spread everywhere. Expert interviews is the most suitable technique from the available methods based on the aim, objectives and research background. As such semi structured interview is the most suitable method for this research. Beside this, reviewing documents such as existing legislative, regulatory guidelines, code practice, agreements and RA and UA MoU will provide broad knowledge applicable to research topics. Third and fourth objectives in this research were aimed at achieving by results from the data analysis. Thus, independent expert opinions were the most appropriate method for achieving the study's objectives.

3.5.3 Data Analysis

Data analysis is carried out primarily to establish proof of the relationship and to comprehend the goals. In the course of analyzing incoherent nature of qualitative data, content analysis is the best effective widely used (Westbrook, 1994).

Content analysis is a method of known as valid and frequently used methodology when study related to ideas and relationships rather than just expression and being there (Hsieh & Shannon,

2005).The code-based content analysis was therefore chosen to promote the minimization of data to be analyzed in order to create on the ideas obtained from the interviews.

When analyzing data, firstly interview transcripts were prepared for each individual field. In that the codes or key concepts were identified in each individual field. But in some points drawing such codes was not practical, as all Roads and Utility Authorities are under the research were not intervening in the same manner. In here the selected cases were equal as all of them lead to prevent such conflicts and impacts by utility works carried out under road projects. Finally, the data collected from multiple sources were analyzed by creating themes, coding and thereafter combining codes into categories and summarizing the findings.

Based on the identified gaps suitable recommended options and viable solutions were identified and analyzed to conclude recommended options for Sri Lanka.

3.6 Chapter Summary

The recommended research methodology contended and discussed in detail in this chapter. The research process included a chronological process of background study, determination of research problem, establishment of aim and objectives, defining scope and limitation, identifying research methodology, literature reviewing, data gathered from semi-structured interviews and documents review, data analysis, interpretation of data and recommendation. The qualitative approach to research was decided based on the research's purpose and literature. Under the qualitative method, focused and in- depth interviews were conducted in data collection. By data collection, gaps were identified during literature review and methodology is addressed to look forward to fulfill with the research findings.

CHAPTER FOUR
4.0 RESEARCH FINDINGS, DATA ANALYSIS AND DISCUSSION

4.1 Introduction

The preceding chapter review was about research methodology, data collection methodology to the research topic and objectives. Discussion through this chapter is about results of the assessment of data collected from selected sources. Interviews with experts were conducted to determine applicability of the results of the literature review applicable to Sri Lankan construction industry in order to establish closest and the most relevant direction toward achieving the study objective. Content analysis analyzed the findings collected, and the findings were analyzed in the following chapter.

4.2 Expert Interview

Semi structured interviews were carried out with infrastructure industry professional of experts attached to roads and utility authorities during the initial phase of the process of data collection. Five segment based on subject area of the objectives were conducted to meet the objectives interviews. The first section dealt with the interviewee's general information, access to utility works characteristics and driving factors for road works in the right of manner, obstacles and challenges, cost sharing, legal aspects, best practices and barrier resolution. Interview transcript categorized into different headings annexed as appendix A more reference as sample interview.

4.3 Purpose of the expert interviews

The key reason of choosing the expert interview was to determine the significance of being appropriate to the findings from the Sri Lankan context element of the acquired literature review. Results of literature collected were based primarily on developed countries. There have been very few relevant findings which currently apply to developing countries. The goal was therefore to determine how to apply the aforementioned findings in third world nations. During the process of the expert interview, it was envisaged to include data collection relating to identified four goals in order to gain enhanced and meaningful understanding of how the research should be pursued. The cost sharing of utilities not only will contribute to effectively manage the budgeted sum for the roads and utility projects but expected to considerably improve trust, coordination, communication and collaboration between Road and Utility

Authorities beside number of other benefits. The information gained after the expert interview was extremely successful and resulted in added specialized feedback being obtained in order to improve the study.

4.4 Background and Experience of the Interviewees

In drawing the requisite conclusions for the appropriate legal framework, qualitative approach must be integrated. Thus views and awareness of Utility Works in Road Projects, Construction and Legal Expertise and relevant government officials were discussed and based on their past experience.

From eleven interviewees to the study, focused interviews / in-depth expert interviews were conducted. The interviewed participants were highly experienced practitioners representing those fields. We are all enriched by new information, in line with their respective fields ' current practices and procedures. They all have an average of over 25 years of experience with their professional fields respectively.

These interviews were conducted with the aim of accomplishing the research objectives. A brief description about selected professionals are given in the Table 4.1:

Table 4.1: Details of Experts

Respondent	**Profession / Designation**	**Industry Experience**	**Level of Awareness / Experience in Practice**
REI	Director-Design	31 years	High
RE2	DGM-WPS2	33 years	High
RE3	Project Director	28 years	High
RE4	DGM-NCP	25 years	High
RE5	Director- Legal	30 years	High

RE6	AGM- Development	28 years	High
RE7	Project Manager	08 years	Moderate
RE8	Senior Advisor- Major Projects	30 years	High
RE9	Director- Engineering	35 years	High
RE10	Chief Engineer	15 Years	High
RE11	DGM / Project Director	35 Years	High

Source: Prepared by the Researcher

When each respondent receives experiences in the construction industry, nine of them have over 25 years of experience that could offer very high degree of expertise in their respective field. All of the respondents were right attentive in their research. The rationale for choosing one legal fraternity specialist to demonstrate the subject area's existing legislative provisions.

The interview transcript (*Refer –Appendix A*) were categorized into five sections which was addressed in detail in the literature review. The participants were directed to provide their responses based on their respective expertise in Sri Lanka. The realistic approach to the topics and their expert perceptions of utility works in road projects in right of ways were discussed at length with suggested solutions to the challenges faced along with adapting current good practices in order to achieve the research objectives.

4.5 Analysis of Interview details and findings

Interviewees' background and expertise on their professional knowledge and experience in the field, maximized in identifying the gaps and challenges of utility relocation and/or betterment works in right of ways to develop strategies for cost sharing of utility works in road projects. The interviews were conducted based on predetermined questions that were grouped in area as described in separate headings below:

4.5.1 The impact of Utility Works in Road Construction Projects

All respondents unanimously admitted that there are numerous problems and challenges do exist when executing works within right of ways. There are many reasons for this and one of the important reason is lack of standard procedures and process. Delays and cost overruns have become hallmark of almost each and every project which are affected by Utilities relocation and betterment works.

According to respondent RE8 major impacts are caused by utility works due to factors such as not sharing the common or same vision of the government initiatives and not feeling responsible for other's interest. Moreover, tend to ignore and forget that developments works are for one nation, same government within one ROW thus providing services to the public and contribute to economic growth for the wellbeing of the citizens. Technically things are easier to solve by sharing common vision and values. The top management need to play a major role to make sure vision, values and common interest are deployed from very top to the lowest level of the organization to facilitate in helping the project to complete on time, without cost overrun and to the required level quality. Respondents RE3, RE6, RE7 & RE9 provided long list of impacts caused by utilities during road projects such as follows:

On many occasions Utility Authorities were not in possession of their own as-built drawings with required accuracy of showing the correct location, line and depth of their exiting utilities. As a result, road contractions were compelled to carry out trial pits to locate existing locations of their services by spending additional amount and extra time.

As per policy of a Utility authority relocation cannot be carried out in short lengths for electrical overhead poles and it is permissible at minimum distance between two shackle points which is about 16 to 18 poles distance. Until this quantum of work is completed road contractor will be idle and no excavation or any other work in this section will be possible. This in turn attract contractual time and cost implication. In the case of telecom, fibre optic cable replacement is permissible only between manholes to manhole. On the other hand, utility assets were relocated temporarily until such time road related works in that section is completed and again relocated to its original location. This results in double expenses and once again time and cost implications. Water pipe lines joints, specials, fittings and couplers are often in demand, too

expensive. Therefore, relocation of long lengths and bends are avoided to prevent pressure drop and also to cut down the number of concrete thrust blocks.

The site inspection by authorities sometimes not done on regular basis. If the inspections are carried out on a timely manner as and when requested by the contractor which may give confidence to contractors and their services are done as per approved shop drawings, method statements, and as per specification. Therefore, the work will be done to the required quality and at the same time and projects can be completed on time.

Respondent RE7 pointed out that when constructing three bridges of cell type cast in-situ of 10.4m width and spans of 32m, 16m and 4m along old Kesbawa Road. Construction period was 6 months but due to impact of utility works ended up completing in 10 months. The entire delay was purely due to delay in relocating Electrical, Water and Telecom services. The reasons cited were that existing utilities were found everywhere in the ROW due to absence of standard dedicated corridor. As per the policy of Electricity Authority shutdown was not granted during the month of August to avoid disruption of services for GCE A/L examination. There were hardly any coordination and communication during the entire process of relocation and betterment works. On the other hand, respondent RE7 mentioned that utility authorities insisted payment in advance to commence relocation of their services. Contractor was unable to pay in advance until such time signed of their agreement is formalized. Even after receiving payment Utility authorities took about another month to visit site and arrange relocation in a particular project. Respondent RE3 mentioned another aspect that Utility authorities refuses to relocate their assets until substantial length of land acquisition is completed, compensated and moreover demolition of obstructing houses and structures. This has caused considerable delays in issuing construction permits / No objection Certificate (NOC), shutdown for relocation works, approval of shop drawings. The other impact was during the period of relocation and betterment work service outage. This will not only cause inconveniences but also loss of revenue for both trading companies and service provider.

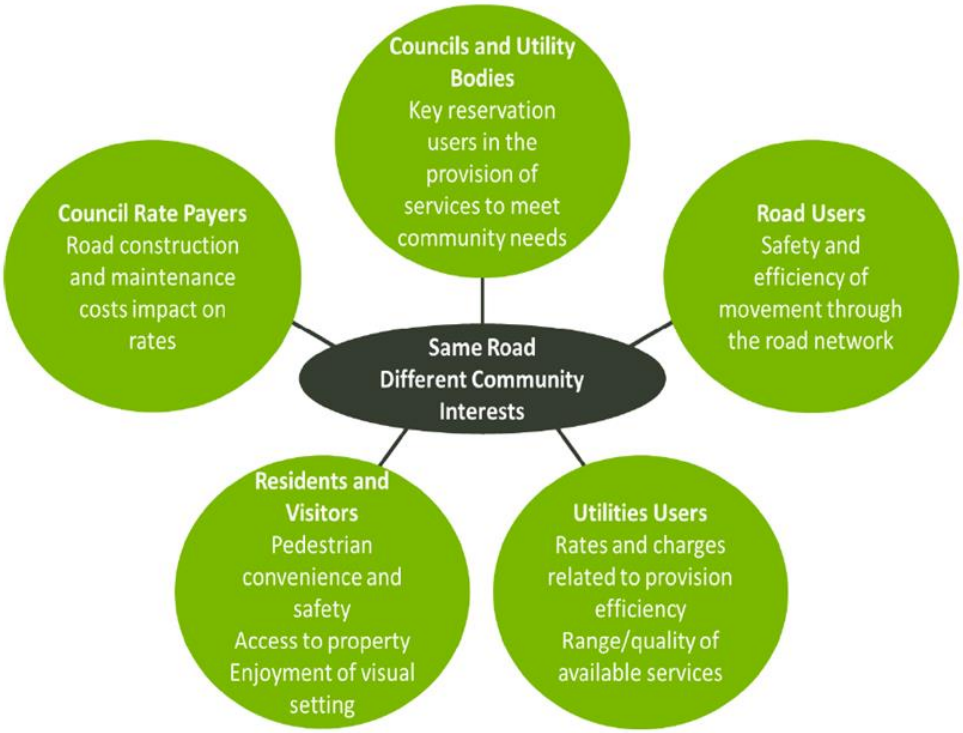


Figure 4.1: Different Community Interest in Road Reservation of ROW

Source: Report on International Benchmarking -Department of Transport-Abu Dhabi, UAE

Figure 4.1 illustrates the number of stake holders of a road likely to be affected due to delays caused by utility works. Respondents RE1, RE3, RE6, RE9, RE10 and RE11 informed that funds from donors such as ADB, World Bank, JICA, European Union, Saudi, Kuwaiti are granted at different interval of time for Roads and Utility projects and not simultaneously. Major projects for roads, water, telecommunication, sewerage and electricity are financed under the above mentioned donor funding and are implemented at different times due to lack of coordination at the planning stage. Also, funds for major utility services projects may get confirmed while the road projects are under construction or after completion or vice versa, causing abortive works and wasteful expenditure of public funds. Due to excavation of deep excavation and trenches across and along the new roads eventually reduces their life span and causing perennial inconvenience to traffic and general public. There is a study carried out by asphalt research agency in UK and they found out when the road is cut for laying any services of utility etc., it reduces life by 30%. Almost 1/3, it is a huge impact and has made everyone to realize the importance of allocating dedicate corridor reserved for utilities.

Respondent RE8 shared his experience in one of the Road project with 600 m long underpass in UAE as follows. Utility departments do not have a database of their assets and therefore service lines they show in their drawings, are first of all not to be scaled, chances are there for quantity has increased from several folds whereas what was shown as one line but it could be 10 and even when find them out, UA are surprised. The accuracy of UA database is not more than 30% in Abu Dhabi, so 70% is left as a risk to RA and the cost overrun because once those risks are shown or appear, the road contractor is bound to claim for time and cost.

And all these hassles, regardless of relocating or paying utility for betterment works, entire cost has to be borne by project owner since there are no agreements between concerned government entities and lack of depreciation factors, protocol of betterment and lack of dispute resolution agreement.

In most part of the world, the problem of cost overrun in the construction industry is very acute and severe. And there is a need to study more to improve this serious situation. This is a common issue found generally in every type of projects and locations. Simply because there is no lessons learnt process, when we finish a project, we don't sit and discuss what happened, what went wrong, what could be better? If it was better, what could be better than that? So we don't ask these questions, we keep complaining and we keep changing people, blame culture which does not solve the problem

According to respondent RE6 there are four major hurdles which are causing impact on Road projects such as non-availability of funds at the right time which attributes 70% of the impact and cost overrun and then absence as-built details (whatever available most of them are found to be inaccurate) together with restricted working hours only in the nights in Colombo city and right of ways with congested underground services adds up to remaining 30% of the impact and problems.

Respondent RE6 further added that in one of the water project of Rs.1 (One) million allocated separately for road reinstatement works as provisional sum but later Road authority estimated the actual reinstatement cost as Rs. 98 Million. In order to accommodate the funds needed for road reinstatement works, 14 km length of pipe line works from the original scope was reduced. In addition to this, pipe lines for future demand were also deleted. Opposite of this also true when dealing with utility relocation works scope of road works were reduced to compensate for Utility relocation and at times for betterment works too.

Respondent RE3 stated that land acquisition process also contributing substantial delay in utility relocation. Land acquisition proposal has to be initially submitted to Survey Department and then through Divisional Secretariat of that particular area has to be submitted to Land ministry for gazette notification and thereafter to Valuation Department. The bureaucracy and time involved in the entire process consume almost 2 years. In many projects it so happened that projects were awarded with minimum or no investigation whatsoever of existing underground utilities whereas in some instances roads and utility relocation works were held up until such time land acquisition is finalized and suitable service corridor were identified, allocated. Multiple effect of this will affect the project completion for couple of years resulting in huge cost overrun and there were instances projects ends up in arbitration too adding fuel to fire. If this delay period was spent early on during planning and design stage several hundreds of million rupees could be saved. Based on the past experience projects that are currently under design stage are actively exploring possibilities of identifying utility corridors for relocation and/or betterment works. For example, for JICA funded elevated LRT project, as stated by respondent RE1, existing footpath also been identified as new utility corridor to accommodate both new services as well as for relocation. Further, Road Authority is contemplating to prepare an agreement with respective UA to levy annual or one off payment as a lease amount for occupying the corridor.

4.5.2 Current good practices related to Utility works in Road Construction Projects

According to respondent RE11, a hybrid tender document with tentative BOQ was issued to contractor at the inception of the contract and upon completion of site investigations and design works BOQ was amended from tentative to confirmed status with more or less accurate quantities. In this process all unknown elements were reconfirmed, quantified and delays can be reduced to absolute minimum if not eliminated.

RE11 further added that through regular and continuous awareness programs for residents, general public and various target groups were well informed about project schedule, community benefits, temporary inconveniences, traffic diversions, re-route details for the local area through leaflets, electronic/ print media and discussions by media consultant exclusively assigned to the project.

Almost all respondents suggested the need and urgency of establishing a National Utility & Roads Coordination Entity (NURCE) representing Roads and Utility authorities and this will be of immense benefits to all stake holders in many ways in terms of sharing current, near and long term master plans, assist in solving issues of projects in planning, design and construction

stages. The other aspect is to establish cost share agreement between all stake holders for relocation and betterment works across the board for initial period of say 3 years rather current ad- hoc agreements / MoUs for limited projects and /or resources sharing.

One of the example RE8 referred here that during road construction there were many spare large diameter ducts were laid under the carriageways for future use in order to avoid road cutting because Non-Disruptive Road Crossing (NDRC) will be very expensive. As such, the road authority decided to giveaway these spare ducts to various utility authorities who are in need of this for their urgent development works. Instead of going through time consuming procedures, higher risk and expensive NDRC, this approach had smoothened and improved the relationship remarkably among the stake holders and created give and take attitude among all authorities.

Even in developed countries such as in Europe for instance it is about collective measures, technical approach, right people with right attitude, government with their audit and financial department put in place. If they all work together and in a proper cycle, then the utility coordination can be carried out without any hurdles with the support of visionary government and visionary authorities.

4.5.3 Degree of Co-operation, Co-ordination, Collaboration, Communication and Contribution during Relocation and Betterment works

According to RE7 in road projects no proper co-ordination and communication was done except for kick-off meeting. The biggest drawback was no monthly coordination meetings conducted to discuss and resolve current and impending project issues.

RE7 once again emphasized the need to establish National High Committee for Utility Co-ordination (NHCUC) members representing minimum level by GM / CEO of top management of all stake holders. NHCUC need to meet once in a month to discuss matters related to their respective Design and Construction projects, exchange of their short/mid/long term master plans, emergency and priority project needs in order to save government funds and wellbeing of general public.

RE7 stated that along Jaffna-Mannar Road –A32 Road, 67km of dual carriageway construction and Electrical Overhead line (OHL) were carried out simultaneously. OHL Alignment was at 15m from center line but at places where road curve improvements needed, it was noted that OHL construction was already completed. However, upon pointing out the constraints the electrical contractor rectified without any charges. This was possible due to good level of communication and co-ordination between both authority representatives at the project site.

Respondent RE6 mentioned that road widening project details are notified at the last minute instead during planning or design stages and this shows lack of communication and much more could be achieved if project details are communicated to utility authorities at the outset and coordination and communication should be initiated right from feasibility, site investigation stages.

Respondent RE4 suggested that current "Right for Information" provision the in law most suited particularly for engineering organization in developed countries and for a country like Sri Lanka UA to respond within 2 weeks causing difficulties and their technical teams are really under pressure to leave all other works and dedicate time for this.

4.5.4 Recommended Options to Overcome the Future Impacts and Challenges

As a measure to reduce the impact of utility relocation there was a special clause inserted in particular conditions in one of the Road contract that Utility relocation will be responsibility of the Contractor. That has paved the way to prevent the contractor from submitting financial claim but for time extension only. Respondents RE1, RE6, RE7, RE8 and RE10 held the view that allocating dedicated reserved corridor within ROW right from inception during design stage will be of another way such impacts can be either reduced if not eliminated. But this may not be possible in a ROW fully developed in an area densely populated or in a commercial area where possibility of entire corridor would have been already utilized. There is one more proposal put forward by respondents that when Road authority grant conditional permission for utility works in ROW, authorities shall obtain an undertaking letter confirming their unconditional acceptance to relocate their assets to desired location free of charge when requested during road widening or any other infra structure developments. Respondents RE3, RE7 and RE8 are of the opinion to introduce an exclusive contract to take care of utility relocation and betterment works ahead of the commencement of road project works. By doing so time and cost implications can be reduced to a great extent and the entire project/contract sum of road project can be fully utilized for roads works without having to compromise for utility related works.

4.5.5 Cost sharing of Utility Relocation and Betterment Works in Road projects in ROW

It appeared from respondents' response that word "cost sharing" had different level of understanding not merely in terms of utility relocation as well as for betterment works. Moreover, it is very much to do with construction industry and due to its technical nature no one took notice to educate enormous benefits and contemplated for it to be legislated. Utility

authorities request payment for relocation work to be made in advance prior to commencement of work by Road Contractors and payment request was given as lump sum but the break down was not provided despite formal request/s. There is an element of doubt in the minds of RA whether charges for the betterment work also included. Respondent RE6 brought yet another important point to attention about in an existing agreement between RA and Water Authority (WA) for design and supervision fees of 6%, which both parties can claim from each other for their respective services. It is kind of cost sharing to certain extent. Also in certain projects in the case of relocation of water lines in a road project, works such as excavation, backfilling and payment for relocating pipe lines were undertaken by the Road Contractor and remaining works were done by WA. However, these are isolated partial cost sharing practiced but not an overall arrangement for each and every project.

Respondent RE4 suggested to lay electricity and telecom cables in a common single trough as a measure to share cost and standardize the corridor conflicts. However, respondent RE2 confirmed this is possible where electrical distribution lines run between two points say "X" to "Y" as what they called as backbone and also known as "Express Way", which means no power supply drawn between "X" and "Y". Otherwise, under normal circumstances tapping points are created for house connections and also access need to be provided for maintenance and emergency attendance for cable fault. Moreover, horizontal clearance of 7m needed to attend to emergency.

RE4 further pointed out yet another cost share concept to implement similar to what was noticed in Japan to erect both electrical and telecom cables in 14m tall common pole in which top half assigned to electrical cables and bottom half for telecom. However, RE2 mentioned that ROWs in Sri Lanka are not as wide as in Japan and there is a likelihood of knocking the pole during accident and exposing live electrical cables hazardous to public. Respondent RE4 also added that during construction of 84 km length Anuradhapura-Paadania road there was a suggestion to provide service trough to accommodate multiple services as opposed to relocating telecom network in isolation. But this suggestion was turned down for unknown reason and instead Rupees 8.0 million was paid to relocate telecom network. Moreover, there were two separate OHL pole routes from Anuradhapura to Jaffna by Telecom and Dialog. What a gross waste of resources as well as two sets of corridor was wasted in a single ROW.

Respondent RE4 further added that phasing out from telecom copper cable to fiber optic cable will now facilitate to share common service trough with electricity and other telecom service

providers and this concept is called network sharing. Moreover, it is highly recommended that Telecom Regulatory Authority (TRA) to take initiative and lead role to carry out land survey of the entire country and build common or sharing facilities such as telecom towers, underground troughs, signal towers, base station towers which can be leased out to current 5 mobile operators. This will not only promote cost share among all service providers but also save spaces and generate regular income to TRA. This will also promote communication, collaboration and coordination between all telecom operators and other utility authorities.

On the other hand, respondent RE6 provided details of the Minutes of Meeting in the form of an agreement between RA and WA signed in March, 2008 for "Coordination of Planning and Design Activities of Pipe Laying along RA Roads" as a measure to implement cabinet decision based on Cabinet Memorandum signed in August 2007 This includes five sets of implementation arrangement firstly for relocation of utility services future major projects, secondly same as first option but for current projects , thirdly pipe laying when there is no Road project and fourthly when roads and water projects are implemented concurrently and finally pipe laying or relocation along RA bridges. Payment of 5% and 6% of the value of work for design and supervision fees charges by RA and WA respectively and annual rental will be charged by RA from all UA for occupation of the corridor.

Further, regular coordination between two authorities has been emphasized in the Cabinet Memorandum. However, this is not applicable to all projects but only for very few which can be broadly classified as foreign funded and major projects. Respondent RE6 further added there were instances for specific projects agreements reached in two categories. First being, Road Contractor is responsible to carry out excavation of trenches, chamber construction, thrust blocks for water line relocation works and on the other hand supply and laying of pipe lines are under taken by water line contractor. Payment for the water pipes will be made by road contractor. The indirect cost sharing by this agreement between these two authorities for specific projects could be in the region of approximately (Roads) 70% - 30% (Water).

Respondent RE8 stated that there is no standard approach in determining the cost of providing new or relocating utilities, but there are good practices initiated in Dubai back in 2002. At that time Roads Department in Dubai was under Dubai Municipality, came up with a very good methodology of calculation to determine the cost of relocation and betterment / upsizing and improving the utilities in the projects and that was accepted by all Government entities and it

is being practiced till date. In Abu Dhabi, again same effort was taken and proposal was made but due to rapid organizational changes this was withheld.

Respondent RE8 further stated that the following approach be adapted. If the project initiator say RA or their contractor want to relocate utility "X" from location A to location B, 100% of the total cost should be borne by RA, However, during the relocation asset owner of that utility request for same size and same standard of the same material but new to be laid either the utility owner provides the material free of cost and supply the material to RA contractor to relocate from point A to point B or the utility owner should accept the cost difference and bear the cost of buying new material. But in the process the owner of the utility wants to upsize or increase the current capacity when located from point A to point B, say from 600 mm diameter to 800 diameter pipe or 1000mm pipe. In that case again UA should pay for the material and contractor's work which should be limited to the length of relocation in accordance to the standard and specification. Therefore, it is very simple, logical and it is scientific approach and could be easily accepted and adapted by any authority. Project ownership and manager may change and at the end of the day, if all stakeholders adapt this approach, it can be rest assured of best results for the project and industry and also when it comes to each and every one's turn it will make project management lot easier. It is always the one who is granting the construction approval or permits (or NOC's) to projects will have to seek construction approval permit for their own project as well. So this is a simple way of doing it which is not difficult and could be easily done.

Biggest approach is scientific, logical and arithmetically done and proven and according to respondent RE8 there is hardly any barrier for implementing cost share of utility works in ROW. The only barrier is lack of understanding, lack of knowledge and lack of sharing the same vision, lack of feeling the responsibility, and lack of direction given by the top management at different level of organization, which should go through the process and accept the procedures. These are the barriers and they are not scientific barriers. Some of the team members of stake holders tend to be stubborn and not having enough knowledge like junior staff dealing with the subject which could come and work against the specific formula and standard, and if barriers are reviewed then again it can be realized that all of them come back to human being and the way it is thought and the nature of human being and nothing to do with science. Science comes and supports the idea rather than rejecting it.The method to overcome these barriers are all related to managing people and team members and their behavior and has nothing to do with the science. As mentioned before, going back again to Top Management,

they should close doors on such bad conducts and practices. Top Management shouldn't interfere and should intervene and overrule on the basis of long term benefits. So the role of the top management is crucial, without their support the subject matter cannot be resolved.

According to respondent RE8, current cost sharing scheme in Dubai, UAE, was initiated in year 2000/2003 and since then cost sharing mechanism between Road and Utility Authorities was working well with mutually agreed terms. With the agreement project execution was very smooth without argument, they follow the same standard. To name few projects such as Al Safooh road, entrance to Burj Khalifa Tower (World's tallest Tower)) in Dubai which is huge three level interchange (1 km x 1 km in size), Doha road which is double decking road adjacent to Burj Khalifa and surrounding areas. These projects since 2003, they were following the same cost sharing agreement. That's why Dubai doesn't suffer like other Road / Utility departments or governments in the region. It is a testimony for the projects to complete on time or even some time ahead of schedule within budgeted amount to highest quality. There are many examples such as world's longest driver less metro 72 km constructed at three levels elevated, at grade and underground. Apart from these projects there are plenty of projects under construction including for World 2020 Expo (An event scheduled to last for 6 months with expected attendees over 30 million), Freeways, Expressway projects with 6 to 12 traffic lanes in each direction with several fly overs, huge interchanges, under passes right now in Dubai are following the same standard and the same procedures of the Utility Cost Share. Again it is worth exploring and authorities need to be visited in Dubai and find out why they were able to execute projects successfully on time within budget to highest quality. One of the biggest reason for being able to do that again in Dubai because their Government having clear vision and organized and methodical way of dealing with utility authorities in any project.

4.6 Governing Laws, Regulations, MoUs

As shown in Figure 4.3, RDA Act 73 of 1981 prior approval should be obtained from authority before commencement of any activity. According to National Thoroughfares Act No.40 of 2008-Section 26 (5), (Figure 7) that Utility Authorities need to relocate /shift their existing pipe lines and/or structures at their own cost within the time period specified. Section 26 (6) says if any party unwilling to relocate or shift or else cause obstruction for relocation, then Executive Engineer can refer the matter to Magistrate's court having jurisdiction. Since there is no by-laws or regulation respondent RE5 said minister can decide on such matters when needed.

However, respondent RE5 informed that practical aspect of implementing the above said provision of the law was nil. The reason being based on a meeting with other government departments top management of RA was of the opinion that since the legal action will be to and from government owned institutions and therefore decided not to implement that provision in the law.

No. 73 of 1981

ROAD DEVELOPMENT AUTHORITY

Act No. 73 of 1981.

AN ACT TO PROVIDE FOR THE ESTABLISHMENT OF THE ROAD DEVELOPMENT AUTHORITY, TO SPECIFY THE POWERS, DUTIES AND FUNCTIONS OF SUCH AUTHORITY AND TO PROVIDE FOR MATTERS CONNECTED THEREWITH OR INCIDENTAL THERETO.

[Commencement--15th December, 1981; Operation-17th June, 1982.]

Short title.

1. This Act may be cited as the Road Development Authority Act, No. 73 of *1981.*

PART I

ESTABLISHMENT AND CONSTITUTION OF THE ROAD DEVELOPMENT AUTHORITY

Establishment of the Road Development Authority.

2. (1) There shall be established an Authority which shall be called the Road Development Authority (hereinafter referred to as the "Authority").

Highways nominated by the Minister in charge of that subject ;

(ii) a senior officer of the Ministry charged with the subject of Finance nominated by the Minister in charge of that subject ;

(iii) a senior officer of the Ministry charged with the subject of Power nominated by the Minister in charge of that

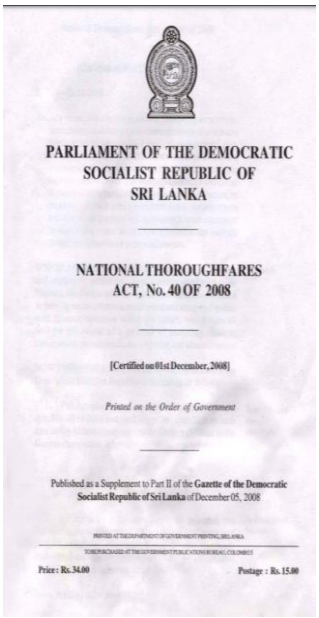
(2) When implementing any programme of development work relating to road planning and road development within any development area, it shall be the duty of the Authority in the exercise, performance and discharge of its powers, duties and functions under subsection (1) to implement such programme or development work in consultation with the appropriate Government departments, public corporations, Provincial Council or local authority, as the case may be.

(3) Any person or Institution to whom the provisions to paragraph (*p*) of subsection (1) applies shall obtain the prior approval of the Authority, before commencing any activity referred to in that paragraph.".

Figure 4.2: Act, No.73 of 1981, (Amendment Act No.7 of 2009, Section 9 (2)
Source: Legal Department-Road Development Authority, Sri Lanka

(5) In the event of the widening or the improvement or deviation of a road, a public road or a national highway, the Director-General or the Provincial Director or the Chief Engineer or the Executive Engineer, as the case may be, may by notice require any person to remove or shift any physical structure or pipe line erected or laid by such person at the own cost of that person within the time period specified in the notice.

(6) Where the Executive Engineer is unable or unwilling to remove any obstruction referred to in this section due to any resistance or if the person responsible for causing such obstruction cannot be found the Executive Engineer may make an application in that behalf to the Magistrate's Court having jurisdiction.



PARLIAMENT OF THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

NATIONAL THOROUGHFARES ACT, No. 40 OF 2008

[Certified on 01st December, 2008]

Printed on the Order of Government

Published as a Supplement to Part II of the **Gazette of the Democratic Socialist Republic of Sri Lanka** of December 05, 2008

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Figure 4.3: National Thoroughfares Act, No;40 of 2008-Section 26 (5)
Source: Legal Department, Road Development Authority, Sri Lanka

However, there are many drawbacks including economic, financial losses and disadvantages for not adhering to advance pre-construction utility shifting and/or implementing the above

provision in the law. As a result, multiple contractual implications are experienced and cost huge payments due to time extension, prolongation cost, arbitration cost and so on.

According to RE4, CEB Act no.1 of 1969 and Electricity Act no.20 of 2009, states such as to generate, transmit, distribute and collect due revenue without adding profit. Whereas all other regulated directives are given through different type of circulars issued on case by case basis for instance for Land sales development, Road development, private single development, bulk community or condominium development. It is noted that some of these circulars are hampering the development. Moreover, Chief Electrical Inspector under Electricity Act and the Ceylon Electricity Board (CEB) under CEB act are responsible for safety of the public from hazard arising from power supply.

Respondent RE5 mentioned that ROW is cut or excavated to lay pipe lines, cables, erect lamp poles, or any other poles to carry electricity or telecommunication services. The life span of the road and the strength of the roads are reduced beside other inconveniences to traffic and general public including environment pollution. Roads Authority has to pay for shifting the utility services. Roads other than roads govern by local authorities and all the national thoroughfares belong to Roads Authority and initiate taking rentals from Utility service providers. Also in the future when designing the roads, the ROW shall include utility corridors on either side for occupation of utilities, parking, footpath and dedicated cycling path.

4.7 Discussion on Research Questions

In this section, discussion on research questions as per analyzed data is described.

4.7.1 The Impact of Utility Works During Road Construction Projects

It is evident from the foregoing there are number of factors related to utilities contribute impacts during construction of road projects. During feasibility and design stages no proper investigation were carried out and on the other hand communication and co-ordination between RA and UA were bare minimum that attributes severe impact. Many factors surfaced during literature survey were repeatedly confirmed during the process of interviews with industry experts. It is also learnt that site investigation process was done after the award of the road contracts and this give rise to many fundamental and serious contractual disadvantages in terms of financial, project delivery and several other indirect cost to the economy as well to general public. Major projects for roads, water, telecommunication and electricity are financed under donor funding and are

implemented at different times due to lack of co-ordination at the planning stage. Also funds for major utility services projects may get confirmed while the road projects are under construction or after completion or vice versa, causing abortive works and wasteful expenditure of public funds.

4.7.2 Current good practices of Developed Countries in Utility works during Road Construction Projects

As in the case of developed countries, Utility Coordination Division or Right of Way Departments should be established under RA to exclusively coordinate and communicate with UA and this division also shall develop MOUs, SLAs or any other overall agreement between authorities. Through these practices projects can be completed on schedule, to the required quality, within budget and maintain proper procedures and process in place for dealing with utilities in all projects. Once the utility works are completed then the main scope such as construction of roadworks can commence.

The best option is to raise that MOU to the government and until such time legislative provision become available and the MOU become by-law. So it makes it stronger and more binding subject rather than calling it as MOU or agreement between utility authorities. MOUs, bilateral agreements, and SLAs are subject to being respected by Utility Authorities, Heads of Departments and employees.

Therefore, having common vision, support from top management, quality manual procedures, process checklist forms, digitization of as-built drawings, on-line web based construction approval permit system will smoothen and expedite the construction beside high standard of communication and coordination. All the above are so called science but human touch is also equally important as much as technical side of it. As for the human touch the head of the division should be an open minded leader, flexible and to demonstrate good examples for others to follow.

The developed countries in the world including Australia and New Zealand are also applying cost sharing measures. It is not a difficult task to come up with such a standard or with such approach but it needs collaboration, coordination and it is a team work. Focal point should then work and share the philosophy behind and discuss with Utility Authorities and because it is coming from logical scientific background, it will be almost impossible to reject by any authority and eventually they will all buy the idea. There is no standard approach in determining the cost but there are already many good

practices and good methodology in place which has been practiced successfully. The above confirms yet another group of interview questions under the heading of "Degree of Cooperation, Coordination, Collaboration and Communication during Relocation and Betterment works" raised during the interview with experts.

4.7.3 Cost sharing of Utility Relocation and Betterment Works in Road projects

4.7.3.1 Status Quo

Based on the data collected during the expert interview process the following can be concluded. Typically, where the RA initiates a project and undertakes construction work within the rights of way, the RA has to bear the full cost of the utility relocation and in some instances have paid for betterment works required by Utility Owners within the project limits as well. Internationally, the widespread accepted practice is that the initiator of the works pays for the like-for-like relocation work and the cost of betterment works is usually subject to some form of cost sharing.

In the United States and Canada, the approach to cost sharing differed significantly between the states and similarly between the European Countries. While there were also some laws and regulations in New Zealand and Australia at the state/city level which govern the accommodation of utilities within road reserves, they are based on similar principles and the application is mostly consistent throughout the respective countries.

At present there are no agreements in place that outline or facilitate cost sharing with respect to relocation of utility infrastructure amongst Roads Authorities and Utility Owners within Sri Lanka.

4.7.4 Proposed impact on Status Quo

The impact of the implementation of the proposed Cost Sharing Strategy on the status quo is reflected in Table below.

Table 4.2: Proposed impact on Status Quo

No	Activity	Impact on Asset	Current RA Share	Proposed RA Share
1.	**Relocation**			
	Relocate utility with existing material (like-for-like)	No Impact	100%	100%
2.	**Betterment**			
a)	**Relocation with new material**	Increase Asset Life	100%	Cost Share
b)	**Relocation and upgrade with new material**	Increase Asset Life	100%	Cost Share
		Increase Capacity	100%*	0%
c)	**New Works**	New Asset	100%*	0%

* In most instances

4.7.5 Governing Laws, Regulations, MoUs

In the absence of legislative provisions and law concerning cost sharing and by- laws in Sri Lanka, currently the utilities do not have a proper procedure and processes for dealing with Road projects. In few instances these are done specifically in the form of Memorandum of Understanding (MOU), Cabinet Memorandum, an agreement through Minutes of Meeting. So their MOU signed by all authorities which contains methodologies, approaches, procedures, processes requirements and its done in terms of MOU. Ideally need to strengthen the current MoUs and fine tune them to make it as a perfect document covering many practical aspects. MOU by nature is not a binding document but usually respected by government authorities.

The factors to determine the condition of underground utilities are very simple and easy. Utilities usually have tags and the tags are made in such a way either they are engraved on the utility, on the body of the cable, or body of pipe or even on tapes around them.

So the dates are mentioned and date of manufacture can be identified and through Geographic Information System (GIS) laid date of the utilities can be found. If they were laid long time ago it is very easy to conclude that the utility has already passed its life span and with its physical condition as well. Sometime the utility may appear old but very well kept in the ground and maintained.

4.8 Summary

In this chapter, data collected through semi structured interviews were analyzed and findings of the research were discussed in detail covering the objectives of developing strategies for cost sharing of utility works in road projects. Moreover, this chapter guides the research study to summarize that cost sharing is rarely considered in isolation but rather formulate part of the wider concept of utility relocation and betterment works which includes promoting co-operation, co-ordination, and communication; the provision of utility corridors; avoiding unnecessary utility relocations; and establishing utility agreements, to achieve the common goal of providing the best value for money solution to the client with least disruption to the public.

CHAPTER FIVE

5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 Introduction

The preceding chapter subjected an in-depth analysis of the research findings. Subsequently, this chapter aims at achieving conclusions and thereby making recommendations through the discovered specifics from the preceding chapter. The way to achieve the objectives are described in the conclusions. The recommendations propose the steps that can be taken to enhance the Road construction industry in Sri Lanka. Finally, further research directions are identified which emerged through this research.

5.2 Conclusions

Conclusion related to achieving identified objectives given in Chapter1-Section 1.4 are given below.

5.2.1 Conclusion: Objective 01- Examine the current good practices of Road & Transportation Authorities in Developed countries

To examine the current practices of Road & Transportation Authorities in Developed countries for the benefit of Road and Utility authorities in Sri Lanka was the first objective of this research study and this was achieved through the literature review and data collected through expert interviews. Current good practices of the developed countries and their benefits were presented in Chapter 4-Section 4.7.2.

Semi structured interview was conducted to identify the gaps and also validate the literature findings. Through this process few good practices were identified during the expert interview. However, good practices identified from developed countries were not implemented in specific projects in Sri Lanka. In majority of these projects in the absence of fundamentals, these were neither followed nor implemented in the Roads, Utility and Infrastructure segment of the Sri Lankan Construction industry.

5.2.2 Conclusion: Objective 02- Investigate the impact of Utility works during Road Construction projects in Sri Lanka.

Objective 02 of this research were accomplished through literature survey, document review and data collected from semi structured expert interviews.

As a measure to reduce the impact of utility relocation special clause in particular conditions of the Road contract to be inserted clearly identifying the responsibility of the parties to the

contract. Allocating dedicated reserved corridor within ROW right from inception during design stage will be of another way where such impacts can be eliminated. But this may not be possible in a fully developed ROW in an area densely populated or in a commercial area where possibility of entire corridor would have been already utilized. In such circumstances, Road authority may grant conditional permission and to obtain an undertaking letter confirming their unconditional acceptance to relocate their assets to desired location free of charge when requested during road widening or any other infra structure developments. To introduce an exclusive contract to take implement utility relocation and betterment works ahead of the commencement of road project works to mitigate time and cost implications and thereby entire project/contract sum of road project can be fully utilized for roads works without having to compromise for utility related works. Land acquisition process to commence well ahead of commencement of road projects and offer attractive compensation package to land owners.

5.2.3 Conclusion: Objective 03 - Identify method of Co-operation, Co-ordination, Collaboration and Communication for Utility works in Road Projects in Sri Lanka

To identify method of Co-operation, Co-ordination, Collaboration and Communication for Utility works in Road Projects in Sri Lanka was the third objective of this research study and this was achieved through the literature review and interview date analysis. Moreover, findings through expert semi structured interviews revealed that Co-operation, Co-ordination and Communication are basically inter linked. While it could be argued that coordination and communication are forms of co-operation, co-ordination and co-operation are certainly dependent on each other and neither would be achievable without open and timely communication.

Simplify communications between the Road and Utility Authorities and ensuring the prompt, timely and consistent provision of information and responses thereto by providing contact details and clarifying the roles and responsibilities of representatives assigned for various predetermined categories of work. Committing each party to independently review information provided and advise the other party of any concerns in relation to cost impacts, timing, coordination, environmental and quality impacts. Defining efficient approval process for the construction, operation and maintenance of their respective assets as they relate to the delivery of each party's works programs ensuring high standards of safety, best practice construction methods, minimizing environmental impacts and ensuring value for money. Acknowledge the need for ongoing communication and cohesive planning by sharing of information about their short and long term project proposals/work programs to allocate and secure utility corridors

within the Rights of Way in a way that balances the road use and utility requirements and other community needs. Avoid unnecessary re-digging the same road, recognize the overall need for co-operation, efficiency and effectiveness in the delivery of the works and the management of their respective assets to Minimize potential project delays.

5.2.4 Conclusion: Objective 04- Make recommendations for cost sharing of Utility Relocation and Betterment works in Road projects in Sri Lanka

The final objective of this research was accomplished through literature synthesis, data collection, semi structured interviews, data analysis and discussion. Accordingly, countries such as Australia, Canada, Germany, Netherlands, New Zealand, United Kingdom and United States of America embrace some form of cost sharing initiatives for relocation of utilities falling within rights of way, supported by legislation and/or agreements between the roads authorities and the utility service providers. It was also noted that cost sharing is rarely considered in isolation but rather forms part of the wider concept of utility relocation and accommodation which includes promoting cooperation, coordination, and communication; the provision of utility corridors; avoiding unnecessary utility relocations; and establishing utility agreements. At present there are no agreements in place that outline or facilitate cost sharing with respect to relocation of utility infrastructure amongst Roads Authorities and Utility Owners within Sri Lanka

Therefore, most suited method of cost sharing principles and apportionment for Sri Lanka Roads and Utility Authorities are concluded as follows.

Calculation of Cost Sharing Apportionment

The proposed cost sharing apportionment is as follows:

A. Cost of Betterment to be **paid wholly by the Utility owner** where:

Cost of Betterment =

Total Cost of New Asset – Cost of relocating/replacing Like for Like Asset

B. RA contribute to the cost of relocating or replacement of like-for-like using the formula: **RA Contribution =**

$$\left(\textbf{Cost of relocating or replacing Like for Like Asset x } \frac{\boldsymbol{Remaining\ Asset\ Life}}{\boldsymbol{Total\ Asset\ Life}}\right) - \boldsymbol{Salvage\ Value}$$

Finally, the matrix to reflect the instances in which the above two Cost Sharing Formulas are applied is as follows:

Table 5.1: Cost Sharing Principles

NO.	ACTIVITY	IMPACT ON ASSET	CURRENT-INITIATOR SHARE (RA)	PROPOSED-INTIATOR SHARE (RA)
1.	**Relocation**			
1.1	Relocate utility with existing material	No Impact	100%	100%
2.	**Betterment**			
2.1	Relocation with new material	Increase Asset Life	100%	Cost Share
2.2	Relocation and upgrade with new material	Increase Asset Life	100%	Cost Share
		Increase Capacity	100%	0%
2.3	New Works	New Asset	100%	0%

Therefore, apart from the above most crucial and vital aspect of cost sharing there are few other areas in which cost sharing shall be designed and incorporated such as Utility tunnels /troughs, sharing overhead poles for telecom, common overhead pole for traffic information and variable signs and street lights, common relay/signal towers for telecom.

5.3 Recommendation and Proposed Way Forward

5..3.1 Recommendations:

Based on the research study carried out it can be concluded that adapting following key elements are vital for successful implementation of both Road and Utility projects.

1. Involving Utility authorities as early as possible within the design phase of Road Projects.
2. Wherever deemed necessary reach up front agreements to establish co-operation, co-ordination, communication.
3. Cost sharing obligations and dispute resolution processes to achieve the common goal of providing the best value for money solution to the client with least disruption to the public.

4. Accurate utility service records are essential to constructible designs. In congested rights of way and/or the accuracy of records cannot be accepted as reliable, the location of services should be confirmed by trial trenches as part of design phase.
5. Agreement shall be reached between stake holders on holistic basis for an agreed fixed term say 3 to 5 years rather than project by project basis to include major aspects based on past experience.
6. Advance implementation of pre-construction utility shifting and/or under the current RDA Act 73 of 1981 and National Thoroughfares Act No.40 of 2008- Section 26 (5), provision in the law both should be implemented prior to commencement of Road Projects to avoid drawbacks including economic, financial losses and disadvantages such as multiple contractual implications and huge payments due to time extension, prolongation cost, arbitration cost and so on.

5.3. 2 Proposed Way Forward

5.3.2.1 Establishment of a National Utility & Road Co-ordination Entity

It is recommended that an independent Utility/Road Co-ordination Entity is established within Sri Lanka to foster co-operative environment for the Roads Authorities and Utility Authorities to offer their services. This may be a new entity with authority to steer the above recommendations. It is imperative that in pursuing the above initiatives, it has the endorsement and full support from the Government top management structures. Assuming that such endorsement is provided, it is proposed that the above be undertaken in a phased approach for everyone to get oriented.

5.3.2.2 Legislative Provision for Cost Sharing of Utility works in ROW

Sound legislation will be defining the powers, rights and obligations of all transport and utility authorities and service providers. MOU's have been developed for particular project/s between the roads authorities and some utility service providers to promote co-operation, co-ordination, communication and effective dispute resolution methods. Necessary legislative provision for cost sharing of utility works in ROW shall be initiated by choosing methodologies most suitable for Sri Lanka as highlighted in this report in Chapter 2 section 2.3 under "Current Practices of Utility Cost Sharing Implemented in Road Project Works in Developed Countries". In the absence of legislative provisions and law concerning cost sharing and by- laws currently

the utilities do not have a proper procedure and processes for dealing with utilities in road projects. Necessary amendment for National Thoroughfares Act No.40 of 2008-Section 26 (5) also needed to provide solutions to current challenges.

5.3.2.3 Recovery of Costs

Potential rise in project costs and delays arises due to local utility authorities delay the road projects because of infrastructure disputes, building permit problems, or right-of-way corridor issues. The RA shall take steps to ensure that governments continue to recover these expenses where liability is clearly established and economical to do so.

5.3.2.4 Sharing of Lesson Learnt

It appears there is no lessons learnt process, or lesson learnt document prepared to record all critical and vital information that could be used in planning future projects. The challenges such as, the problems encountered, causes of cost and time overrun, utility and management issues, etc. were not shared or discussed in an exclusive seminar to disseminate the knowledge, particularly as to what went wrong, what could be better? If it was better, what could be better than that? These questions were not discussed particularly after completing Colombo–Katunayake Expressway to share the knowledge with similar projects such as Southern or Central Expressway.

5.3.2.5 Advance Utility Relocation and Betterment Works

Through donor funded road project a special project should be executed exclusively for land acquisition, utility relocation and betterment works. Implementation of this project should commence works approximately 2 years ahead of commencement of the main road project. In addition, the acquisition and resettlement of land to be commenced immediately after the feasibility studies have provided the signs of "go ahead".

5.3.2.6 Trial pits pilot project & digitized as-built details

Majority of the Utility Authorities do not possess accurate as-built drawings of their existing utilities. The ill effect of this was discussed in the foregoing chapters. Once again this initiative can be through donor funded project and can be executed as a pilot project in designated areas in Western Province where road widening, rehabilitation or any other projects are due in the

near future. Findings from this project including digitized as-built details should be made available to all concerned including RA and UA free of charge.

5.3.2.7 Utility Management taught as a Major in Universities

Transportation Research Board-Washington DC conducts conference every year in February, and an idea for the first time in Washington, on the subject of introducing a new major in university in the subject of utility engineering. This was realized because this field is so important to the construction industry and impact of utilities are so huge because in any project if the issues related to utilities are not properly handled core project / business is delayed. when Relocation of utilities are vital for road construction. Let's introduce utility management / engineering course in Moratuwa University for the benefit of Contractors, Consultants, Government Agencies, Project Managers and Project Quantity Surveyors.

5.3.2.8 Agreements and MoUs between Roads and Utility Authorities

Current agreements and MoUs between Roads and Utility Authorities are executed only for specific projects or else some time on ad hoc basis. The MoU signed by all authorities which contains methodologies, approaches, procedures, processes requirements. It is recommended that the RA take the initiative to encourage the establishment of MOUs between the RA and service providers in order to promote collaboration, teamwork and communication, create conflict resolution mechanisms and identify cost-sharing arrangements for relocation work and relieving the RA from the full burden of funding utility relocations from within its budget, letting the RA to spend less on diversion, more on Roads and infrastructure delivery.

5.3.2.9 Road Management Act 2004- Code of Practice as a guide to Sri Lanka

Road Management Act 2004-Code of Practice by Victoria Government of Australia is highly recommended as a guide to Sri Lankan authorities, as shown in the appendix B. The Victoria Code of Practice – Management of Infrastructure in Road Reserves (Code), which provides good practice guidance on how road authorities and utilities can work together cooperatively to manage road infrastructure and utility infrastructure within road reserves. The use of this Code, which was developed by a working group representing road authorities and utilities, together with other key stakeholders. While this Code provides a wide range of guidance on the planning, construction and maintenance of utilities in road reserves, **clause 62** refers to the consideration of possible **cost sharing arrangements between road authorities and utilities**.

5.4 Further Research Directions

Given the limitations exercised during the research process, several further directions for research have been recognized as given below.

- Framework to assign standard reserved corridor in right of ways for utilities.
- An educational program and training procedure for Utility Management graduate or post graduate level in university education.
- Framework for Memorandum of Understanding and dispute resolution between Road and Utility Authorities.
- Factors to be considered in preparing Legal frame work, by-laws, Code of Practice for works within Right of ways.

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APPENDIX A

INTERVIEW TRANSCRIPT:

i. Name of Organization……..

ii. Venue……

iii. Name of Respondent……

iv. Designation……

v. Work Experience……

vi. Date……

GENERAL INFORMATION

1. Can you briefly explain your role in your organization?

FACTORS INFLUENCING AND CAUSING IMPACTS

2. What are the factors influencing and causing impact of Utility works in Road Project Works?
3. What are possible reasons for such factors for causing the impact/s?
4. Are you satisfied with the intervention of RDAs to minimize the impact of the Utilities?
5. What are the barriers in intervening to prevent impacts of Utility works?
6. What are the remedial measures could be introduced to prevent or improve the impact of impact Utilities/Road Works?

7.What are the suggestions for Improvement?

Causes	Effects	Solution

COST SHARING OF UTILITY RELOCATION AND BETTERMENT WORKS

8. Is there a standard approach in determining the cost of providing new and relocating existing utilities to be borne by the respective authorities (Cost sharing strategies)?
9. What are the recommendations you would suggest for cost sharing of Utility relocation and betterment works in road projects to overcome the critical factors in future?
10. What are the barriers in implementing cost sharing in Road projects.
11. Strategies to overcome identified above barriers?
12. What are the factors considered in determining the sharing of cost for utility relocations (e.g. material type, age of utility, expected life span etc.)?
13. What are the assumed life spans of different utilities and whether salvageable value of utility is considered during relocation or cost sharing?
14. Is there any specific or in general Road project you are aware of in which cost share arrangements between Road and Utility authorities?

Causes	Effects	Solution

GOVERNING LAWS, REGULATIONS, MoUs

15. Is there any existing associated Governing Laws, Regulations? Any references /web link?

16. What are the areas you would like to suggest to introduce new laws, regulations etc. related to implementation of Roads Projects & Utility works in right of way?

16. Is there any existing MOUs with Utility Authorities and would you suggest areas /sectors you would recommend in general?

17. Is there any established Dispute resolution processes to resolve issue?

Causes	Effects	Solution

Cooperation, Coordination, Collaboration and Communication for Utility works in Road Projects

18. Can you elaborate on the deficiencies in cooperation, coordination, and communication between road authorities and utility service providers?

19. How these deficiencies can be resolved / improved?

20. What are the initiatives to promote cooperation, coordination, and communication between road authorities and utility service providers to expedite the allocation of utility corridors and to avoid unnecessary utility relocations?

Causes	Effects	Solutions

BEST PRACTICES & GENERAL INFORMATION

21. What are best practices you can suggest to introduce in executing utility works in Road Projects?
22. Lesson learnt and your recommendation as to how well the challenges of utilities impacts can be mitigated?
23. Elaborate the extent to which site supervision is provided by the utility authorities and fees charged for the provision of the same?
24. Suggested methods to reduce response time by utility authorities to provide permits, approval of method statements, shutdown, carry out final inspections and issue completion certificates?
25. Any other recommendation, suggestion/ comments?

Causes	Effects	Solutions

APPENDIX B

AB.1 Implementation of Cost Sharing Strategy

AB.1.1 Cost Sharing Strategy

The overall objective of the Cost Sharing Strategy is to develop a sustainable and equitable policy for quantifying and apportioning costs with respect to utility relocations within Sri Lanka. The following five key fundamentals underlie achieving the above objective in the development of this Cost Sharing Strategy:

(i) **Benefit:** Those that derive the benefit from the installation of a new utility contributes to the cost thereof.

(ii) **Equity and Fairness:** Cost sharing should be reasonable, balanced and practical so as to be equitable to all stakeholders.

(iii) **Predictability:** Cost sharing charges should be a predictable, certain and reliable and undertaken in a transparent manner.

(iv) **Administrative Ease:** The calculation should be administratively simple. This might detract from the accuracy of individual charges but this is a necessary trade-off.

(v) **Add Value:** The policy acts as mitigation against the unnecessary relocation of utilities and thus results in more cost effective spending on infrastructure projects.

AB.1.2 Cost Sharing Principles

AB.1.2.1 Categorization of Relocation Works – Like-for-like and Betterment

Like-for-like replacement entails the relocation of an asset without any increase to its capacity or standard. The three categories for like-for-like replacement are as follows:

- **Like-for-like 1:**
  An asset is relocated and the existing material is re-used.
- **Like-for-like 2:**
  An asset requiring relocation is replaced using newly procured material with the same capacity and the existing material is abandoned.
- **Like-for-like 3:**

An asset requiring relocation is replaced using newly procured material with the same capacity and the existing material is recovered as salvage, either returned to stores or sold for scrap.

Betterment Works

Entails the relocation of an asset where there is an increase in the size, or standard of the asset providing a benefit to the Utility Owner's. The three categories for betterment work are as follows:

- **Betterment 1:**

  An asset is relocated re-using the existing material for the like-for-like component of the relocation and newly procured material is used to improve the capacity of the of the asset.

- **Betterment 2:**

  An asset requiring relocation is replaced using newly procured material which improves the standard of the asset and the existing material is abandoned.

- **Betterment 3:**

  An asset requiring relocation is replaced using newly procured material which improves the standard of the asset and the existing material is recovered as salvage, either returned to stores or sold for scrap.

The above categories are summarized in the following matrix as shown in Table 4.3:

Table 1: Cost Sharing principles

	Existing Material Used	**New Material Used**	**Exist Material Recovered**
Like-for-like 1	✓		
Like-for-like 2		✓	
Like-for-like 3		✓	✓
Betterment 1	✓	✓	
Betterment 2		✓	
Betterment 3		✓	✓

AB.1.2.2 Benefit to Utility Owners

As previously mentioned, one of the five key fundamentals which underlie the development of the Cost Sharing Strategy is that Utility Owners who benefit from an installation through relocation should contribute to the cost thereof. Expanding now on the categories of relocation works described above in section 5.2, the benefit derived by the Utility Owner are identified as follows.

Utility Owners benefit in three ways when relocation work is undertaken:

- **Lifespan**

In all instances where new material is used the benefit to the Utility Owner is an increase in the lifespan of that portion of the asset that has been replaced with the new material.

- **Increased Standard**

In all instances of betterment, the Utility Owner receives an asset of a higher standard.

- **Salvage Value**

In instances where the existing material is recovered and is either sold for scrap or utilized elsewhere then the benefit to the Utility Owner is the realization of the salvage value.

The matrix is updated to include the benefit to the Utility Owner.

Benefit to Utility Owners

	Existing Material Used	New Material Used	Exist Material Recovered	Benefit to Utility Owner		
				Lifespan	Increased Standard	Salvage Value
Like-for-like 1	✓					
Like-for-like 2		✓		✓		
Like-for-like 3		✓	✓	✓		✓
Betterment 1	✓	✓			✓	

Betterment 2		✓		✓	✓	
Betterment 3		✓	✓	✓	✓	✓

AB.1.3 Exemption Period

Period of exemption shall be agreed mutually between stake holders.Should the need arise to relocate an asset within agreed number of years of it being installed the RA will pay the full cost of the relocation. After that agreed period, the RA portion is calculated as per the formula with the straight line depreciation commencing from the date of installation.

R**A** $\boldsymbol{Contribution} =$

$$\left(\boldsymbol{Cost\ of\ Relocation} \times \frac{\boldsymbol{Remaining\ Asset\ Life}}{\boldsymbol{Total\ Asset\ Life}}\right) - \boldsymbol{Salvage\ Value}$$

1.Remaining Life= Asset Life – Age of Asset

2.If assets are to be left in place i.e. abandoned Salvage Value = 0

3.Asset life measured in months and rounded off to nearest whole month

Performance Betterment

In most instances the Utility Owner is expected to pay the cost of any increase in the size, capacity or standard of the facility that is for the Utility Owner's benefit. However, there are exceptions and in the following instances, performance betterment may, at the RA's discretion, be accepted as part of the RA costs and include:

- Instances where the RA request that the replacement materials or equipment are of a higher standard.
- The replacement of an installation with the same material or equipment is no longer possible as the materials or equipment is no longer regularly manufactured.
- The design standard or specification of the Utility Owners has changed and thus a like-for-like replacement is no longer permissible.

Non-operational and non-conforming Assets

A Utility Owner would be expected to pay for the full costs of the relocation of an asset/utility in the following instances:

The asset/utility has been found to be installed in the incorrect corridor. The asset/utility is not functioning.

AB.1.3 Forward Planning

The RA will endeavor to share with Utility Owners a five-year plan highlighting major transport projects to allow Utility Owners the opportunity consider these projects in their planning and secure the necessary budgets for the relocation work.

AB.1.4 Payment Terms

Utility Owners are required to make payment within mutually agreed period (e.g. in UAE not later than two years) after the conclusion of the project. This will allow Utility Owners the opportunity to secure in the current financial year, the budget required for payment in the following financial year.

AB.1.5 Assets Subject to Cost Sharing

Table below provides a list of assets which may reside in the affected rights of way which may need to be relocated and be subject to cost sharing imposed in terms of this Strategy.

Table 2 : Assets Subject to Cost Sharing

Utility	Asset Description
Potable Water	Water mains both distribution and transmission including valves, chambers, meters and all other associated equipment etc.
Sewerage	Sewage mains both gravity and pressure mains including manholes, valves, chambers, meters etc. Sewage pump or lift stations are also included.
Irrigation	Irrigation mains both distribution and transmission including valves, chambers, meters etc. Includes in field irrigation systems.
Storm water	Storm water mains both gravity and pressure mains including soakaways, manholes, valves, chambers, meters, storm water pump stations etc.

Electricity	Electrical cables forming part of transmission and distribution networks both above and below including joint boxes, manholes, catenaries, substations etc.

AB.1.6 Assets not Subject to Cost Sharing

The following assets located within the rights of way are not considered in cost sharing and include:

(i) Street Lighting
(ii) Advertising Signage
(iii) Landscaping
(iv) Solid waste infrastructure
(v) Road Signage
(vi) Parking equipment and installations

However, during second phase of the cost sharing implementation the above assets can be included under mutually agreed terms.

AB.1.7 Activities which Trigger Cost Sharing

All construction activities undertaken by the RA within the road rights of way and entail the relocation of utilities/assets as described in Section 4.4 to accommodate new or improvements to transportation infrastructure shall trigger cost sharing and includes but is not limited to:

(i) Roads including all services roads, parking areas, bridges, tunnel off/on ramps etc.
(ii) Dedicated road tunnels
(iii) Rail infrastructure including railway lines, stations and tunnels
(iv) Parking lots, parking structures and parking infrastructure

Public transport infrastructure such as bus lanes, bus stops etc.

AB.1.8 Phasing in of Cost Sharing Strategy

The policy Strategy will not apply to any projects which may have commenced prior to the Strategy has been finalized and agreed in collaboration with the respective Utility Owners.

AB.1.9 Process for Determining the Cost Sharing Apportionment Overall Process

Once a project has been initiated by the RA and has progressed sufficiently such that the need for utility relocation and the extent and nature of the utility relocation has been identified, the cost sharing process can be initiated.

The first step is to determine the Asset Age. Should the Asset Age be less than mutually agreed number of years between stake holders (example say 5 years), the RA shall pay for the full cost of the relocation and cost sharing is not pursued. Should the Asset Age be greater than 5 years

the Cost of Relocation is determined and the RA's contribution portion is calculated. Thereafter the RA can recover the balance of the costs on completion of the project.

- ✓ Remaining Life = Asset Life – Age of Asset.
- ✓ If assets are to be left in place i.e. abandoned Salvage Value
- ✓ Asset life measured in months and rounded off to nearest whole month

Road Authority Contribution =

$$\textbf{Cost of Relocation} \times \frac{\textbf{Remaining Asset } \boldsymbol{Life}}{\textbf{Total Asset } \boldsymbol{Life}} - \textbf{Salvage Value}$$

The Road Authorities engaged the affected utility owners early in the project and reached agreement on cost distribution of relocation work and material supply before going to tender. The agreements need to be negotiated in terms of applicable governing Acts. While the Acts may specify the percentage contribution required of parties, it makes provision for the parties reaching amicable cost contribution agreements.

APPENDIX C

ACTS, ADMIN GUIDELINES, PROCEDURE MANUAL

Chapter 2- page 22 Table 2.9

1. **Telecommunications in Road Reserves: Operational Guidelines for Installations- Australia**

   The Telecommunications Act 1997 requires a Carrier to make reasonable efforts to enter into an agreement with a public utility that makes provision for the manner in which the carrier engages in an 'authorized activity' that is likely to affect the operations of the public utility. A Clause 11 Agreement can be either project specific or activity-based. It can address issues such as:

   (a) Notification arrangements.

   (b) Technical standards.

   (c) Level of documentation.

   (d) Safety requirements.

   (e) Restoration requirements.

   (f) Emergency arrangements.

   (g) Contact protocols.

It is expected that a Clause 11 Agreement would be signed by authorized representatives of a Carrier and a Road Authority. Considerations for Carriers when working in road reserves. All reasonable steps must be undertaken by a Carrier to ensure that the activity results in as little detriment and inconvenience, and as little damage as is practicable. In addition, a Carrier must take all reasonable steps to:

(a) act in accordance with good engineering practice;

(b) protect the safety of persons and property;

(c) ensure that the activity interferes as little as practicable with:

(i) the operations of a public utility;

(ii) public roads and paths;

(iii) the movement of traffic;

Other guidance on preferred alignments for Carrier facilities: -

In respect of preferred alignments from the property line, Carriers' facilities will be installed in accordance with any local agreement or Utility Providers Code of Practice existing between the Carrier and the other service authorities, the Road Authority and the relevant Local Government Authority.

Positioning of Carrier facilities with respect to other utility infrastructure: -

In cases where another public utility or Carrier has already placed a facility in what is presently recognized as the preferred telecommunications carrier location, responsibility for resolution of the alignment should be by discussion, firstly between the service authorities and then with the Road Authority, if necessary. The solution to be adapted is that which is in the best overall interests of the community, and should take into account the Carrier's plans and costs and the Road Authority's plans for future use of the road reserve. If the need arises for portions of a Carrier's facility, e.g. a large manhole, to extend wider than the agreed space allocation, the Carrier should consult with potentially affected service authorities and consider their requirements before installing any such facility.

Railway level crossings -

If Carrier facilities are to be installed in a road reserve within the limits of a railway level crossing, the Carrier should also consult with the relevant rail infrastructure manager to attempt to reach agreement on any conditions for locating the facilities under or over the railway line(s). Some general guidance is provided in the current version of Australian Standard AS 4799, 'Installation of underground utility services and pipelines in railway reserves'.

Road Authorities should take account of applicable codes and road design standards when designing new roads. Carriers have rights to locate their infrastructure in road reserves and Road Authorities should work together with Carriers to make provision for telecommunications infrastructure when planning and designing new roads or improving existing roads. For example, it is desirable that nature strips are wide enough to accommodate all types of utility infrastructure and allow safe access to that infrastructure.

The same principles should apply when Road Authorities are approving plans from consultants and developers for new residential and commercial developments.

Use of the Dial Before You Dig service: -

Carriers should be members of the Dial Before You Dig service and therefore, before undertaking road works involving excavation or placing of filling, the Road Authority, or its contractor should contact the Dial Before You Dig service to determine the location of Carrier's underground facilities. Where applicable, the Road Authority should also refer to any relevant Utility Providers Code of Practice, dealing with desirable positioning of facilities.

Reinstatement works: -

Carriers should carry out reinstatement works on road reserves in a timely manner. On busy urban roads this may mean permanent reinstatement of any disturbed pavement at the completion of each day's work. On the verge of lightly trafficked rural roads, it may be agreed that reinstatement can be completed, say within two weeks. Each project needs individual consideration and the timing of reinstatement works should be in line with any relevant Utility Provider Code of Practice or as agreed with the Road Authority before the project commences.

2. Telecommunications in Road Reserves -Administrative Guidelines for Road Authorities -Australia

When considering proposals for activities by Carriers on road reserves, Road Authorities must endeavor to:

- manage and coordinate installations on a long term basis, including making provision for the potential needs of other Carriers and utilities

Generally, the types of facilities that can be low impact (depending on the size and location of the facilities) include:

- existing facility or 'public utility structure' (max 25% volume increase in some areas) Under Telecommunications Act 1997 Schedule 3 Part 1 Division 5 Cl 11:

'(1) A Carrier must make reasonable efforts to enter into an agreement with a public utility that makes provision for the manner in which the Carrier will engage in an activity that is:

(a) covered by Division 2, 3 or 4; and

(b) likely to affect the operations of the utility.'

Underground conduit or cable deployed by:

Conduit or cabling to be laid in:

(a) an existing trench

(b) a trench created by a developer, local government authority, public utility or

Carrier

Co-located facilities

1. Radio, pay phones or emergency facility, or cable location marking post or sign installed on

or within:

(a) an original facility

(b) a public utility structure.

where the levels of noise that are likely to result from the operation of the co-located facilities are less than or equal to the levels of noise that resulted from the operation of the original facility or the public utility structure.

3. Road Acts 1992: **NSW Australia**

Location of conduits for utility services roads authority that proposes to provide conduits across a public road for the carriage of utility services must consult, as to the location and construction of the conduits, with all persons:

(a) who are providing utility services along or in the vicinity of the road, or

(b) who are, in the opinion of the roads authority, likely to provide utility services along or in the vicinity of the road.

Utility Services to be located in sleeves/ conduits

(1) The roads authority for a public road in which there are conduits for the carriage of utility services across the road may direct any person who is entitled to place utility services in, on or over the road:

(a) to locate any new or replacement services in any such conduit, and

(b) to pay to the roads authority such proportion as may be prescribed by the regulations of the costs incurred by the roads authority in connection with the construction of the conduit.

(2) The direction may specify the manner in which or the standard to which the direction must be complied with.

(3) A provision of an Act that authorizes the provision of services in, on or over

a public road does not authorize the provision of the services in contravention of this section.

Nature of consent

In particular, a consent under this Division with respect to the construction of a utility service in, on or over a public road may require the service to be located:

(a) in such position as may be indicated in that regard in a plan of subdivision or other plan registered in the office of the

Registrar-General with respect to the road, or

(b) in such other position as the roads authority may direct.

road work includes any kind of work, building or structure (such as a roadway, footway, bridge, tunnel, road-ferry, rest area, transit way station or service center or rail infrastructure) that is constructed, installed or relocated on or in the vicinity of a road for the purpose of facilitating the use of the road as a road, the regulation of traffic on the road or the carriage of utility services across the road, but does not include a traffic control facility, and carry out road work includes carry out any activity in connection with the construction, erection, installation, maintenance, repair, removal or replacement of a road work.

utility service includes any water, sewerage, drainage, gas, electricity, telephone, telecommunication or other like service.

4.Water Supply (Safety and Reliability) Act 2008 –Queensland-Australia

Water Supply (Safety and Reliability) Act 2008

Chapter 2 Infrastructure and service

Part 1 Preliminary -

6. Application of Chapter 2 to local governments:

Nothing in this chapter affects the powers of a local government or an authorized person under the Local Government Act.

7. Sections 7–9 not used

See editor's note for section 1.

Part 2 The regulator

10. Who is the regulator

The regulator is the chief executive.

11. Regulator's general functions

(1) The regulator's general functions are—

(a) to keep a register of service providers registered under this Act; and

(b) to review and make recommendations about standards and practices under this Act; and

(c) to monitor compliance with this Act; and

(d) to perform other functions given to the regulator under this Act or another Act.

(2) In performing the regulator's functions, the regulator must consider the purposes of this Act.

(3) In this section— function includes power.

5. Utilities Access Act 2010 – New Zealand

Purpose of Act

The purpose of this Act is to—

(a)require utility operators and corridor managers to comply with a national code of practice that regulates access to transport corridors; and

(b)provide for the making and administration of that code.

Interpretation

In this Act, unless the context otherwise requires: -

Code means-

(a)the national code of practice that is approved under section 12 and has taken effect, along with all amendments to it that have taken effect; or

(b)if there is no Code approved under section 12, but regulations have been made under section 18, the code set out in those regulations

corridor manager means: -

a) in relation to a road (as defined in section 315(1) of the Local Government Act 1974, and which includes State highways and Government roads), the local authority or other person that has jurisdiction over the road:
b) in relation to a motorway (as defined in section 2(1) of the Government Roading Powers Act 1989), the New Zealand Transport Agency:
c) in relation to railway land, the licensed access provider who controls access to the land Minister means the Minister of the Crown who, under the authority of any warrant or with the authority of the Prime Minister, is for the time being responsible for the administration of this Act

Ministry means the department of State that, with the authority of the Prime Minister, is for the time being responsible for the administration of this Act

Railway land means any land upon which a railway line (as defined in section 4 of the Railways Act 2005) is constructed, along with any adjacent land that is held or used in connection with operating a railway on that railway line related Ministers means the Ministers of the Crown who are responsible for the administration of the Local Government Act 1974, the Electricity Act 1992, the Gas Act 1992, the Government Roading Powers Act 1989, the Telecommunications Act 2001, and the Railways Act 2005

Transport corridor means any road (as defined in section 315(1) of the Local Government Act 1974), motorway (as defined in section 2(1) of the Government Roading Powers Act 1989), or railway land utility operator means,

(a)in relation to electricity infrastructure, an electricity operator as defined in section 2(1) of the Electricity Act 1992:

(b)in relation to gas infrastructure, a gas operator as defined in section 2(1) of the Gas Act 1992:

(c) in relation to telecommunications infrastructure, a network operator as defined in section 5 of the Telecommunications Act 2001:

(d) in relation to water and wastewater infrastructure, a local authority as defined in section 5 of the Local Government Act 2002 or any person acting on behalf of a local authority in relation to that infrastructure:

(e) in relation to public letterboxes, a postal operator as defined in section 2(1) of the Postal Services Act 1998.

6. Obligation to comply with Code

(1) Utility operators and corridor managers must—

(a)co-ordinate work done in transport corridors by complying with the processes and rules set out in the Code; and

(b)before applying to the court for an order under section 7, use any appropriate dispute resolution procedures set out in the Code.

7. Court may order compliance with Code

1) On the application of any utility operator or corridor manager, the District Court may require another utility operator or corridor manager to comply with any of its obligations under section 6.

(2) The order may require the person against whom it is made to comply with it within a specified time.

3) In considering an application for an order, the court may take into account the practicality and cost of complying with the Code as compared with the practicality and cost of taking other steps that will, in the particular situation under consideration, achieve substantially the same outcome as compliance with the Code.

9. Purpose of Code

The purpose of the Code is to enable access by utility operators to transport corridors to be managed in a way that—

(a) maximizes the benefit to the public while ensuring that all utility operators are treated fairly; and

(b)ensures that disruptions to roads, motorways, and railways caused by work by utility operators are kept to a minimum, while maintaining safety; and

(c)provides a nationally consistent approach to managing access to transport corridors.

10. Content of Code

(1) In order to achieve its purpose, the Code must set out the following:

(a) who it applies to:

(b) the principles governing how corridor managers deal with utility operators, and how utility operators deal with corridor managers and other utility operators, on issues relating to access to transport corridors:

(c) the processes and rules for co-ordinating work done in transport corridors by utility operators, or that affects utility operators' assets:

(d) processes for dealing with conflicts of interest arising from the same person being both a corridor manager and a utility operator, or being the operator of different utilities:

(e) how the statutory criteria for setting reasonable conditions, when utility operators have a right of access, are to be applied:

(f) whether, what, and how any other conditions relating to access may be imposed by corridor managers when utility operators have a right of access:

(g) how the criteria (published in accordance with a statutory requirement) for granting access are to be applied when utility operators request access:

(h) processes and rules for utility operators and corridor managers to share information:

(i)how compliance with the provisions of the Code is to be encouraged and provided for, including 1 or more dispute resolution procedures:

(j) operational processes and rules about work done by utility operators within transport corridors:

(k) if the Code refers to standards, guidelines, or other documents that are not set out in the Code,

(i) how those standards, guidelines, or other documents (including any amendments and replacements) may be viewed and how copies may be obtained; and

(ii) which edition or version of the standard, guidelines, or other document is referred to and whether the reference includes subsequent amendments or replacements.

(2) The Code may also-

(a)provide for its provisions to be applied differently in different geographic locations, provided the variations comply with subsection (3); and

(b)include any other matter that is consistent with the purpose of the Code and not inconsistent with any enactment.

(3) Variations referred to in subsection (2) (a) may be allowed by the Code only if the variations—

(a) are generally consistent with paragraphs (a) and (b) of the purpose of the Code set out in section 9; and

(b) are in response to particular geographic factors that would result in inefficient or uneconomic outcomes if the standard requirements of the Code were adapted; and

(c) have been sought and agreed to by the corridor managers and utility operators in that region; and

(d) fairly balance the interests of corridor managers and utility operators.

11. Preparation of Code

(1) A draft Code may be prepared by the Ministry, or by any person or body of persons, using whatever processes the Ministry, person, or body considers appropriate.

(2) The process for developing a draft Code must include, at a minimum, the following steps:

(a) consultation with utility operators and corridor managers likely to be affected by the Code:

(b) publication of a draft Code and release to the public:

(c) consideration of comment received on the draft Code:

(d) preparation of a revised draft Code in response to comments received.

12. Power to make regulations if no Code

(1) The Governor-General may, on the recommendation of the Minister given in accordance with subsection (2), make regulations regulating how access by utility operators to transport corridors is managed.

(2) The Minister may not recommend making regulations under this section unless he or she is satisfied that—

(i) no Code has taken effect and no Code is likely to take effect; or

(ii) an existing Code is or is likely to be cancelled; and

(a) the regulations set out a code that has the purpose set out in section 9 and includes the matters set out in section 10(1); and

(b) the regulations are likely to improve the efficiency of utility operators' access to transport corridors, without compromising road or rail safety; and

(c) the regulations reflect, as far as possible, any agreements reached by utility operators and corridor managers.

6. **Guide to Codes and Practices for Streets Opening - Australia**

Presents an opportunity to adapt a best practice approach to capital works management - which pub community stakeholders first.

Key outcomes from the platform include:

- Better coordination between, underground utility works, avoiding damage to other underground services.

- Minimized impacts of underground utility works on both natural and built environments.
- Minimized interference to traffic and pedestrian flow caused by road openings for the installation, operation and maintenance of utility services.
- Reduced disruption to local communities.
- Minimized duplication of remediation efforts resulting in reduced cost of roadworks.
- Better quality roads through reduced impact of roadworks on the lifecycle of the road network.

7. Gas Act 1992 –New Zealand

Road has the same meaning as in section 315 of the Local Government Act 1974; and includes a road under the jurisdiction of any local authority; and also includes a public footpath; and also includes a State highway within the meaning of section 2(1) of the Government Roading Powers Act 1989; but does not include:

(a) a private road within the meaning of section 315 of the Local Government Act 1974; or

(b) a motorway within the meaning of the Government Roading Powers Act 1989; or

(c) any roadway laid out by order of the Maori Land Court under sections 315 to 327 of Te Ture Whenua Maori Act 1993 or under any former Act, except where that order has been cancelled, or where the roadway has been declared under section 320 of that Act to be a road; or

(d) any level crossing roading structure means any bridge, underpass, overpass, culvert, or tunnel

Construction or maintenance of fittings on roads

(1) Except as provided in subsection (2), a gas operator may from time to time construct, place, and maintain fittings in, on, along, over, across, or under any road, and for any of these purposes may-

(a) open or break up any road:

(b) alter the position of

(i) any pipe for the supply of gas; or

(ii) any pipe (not being a main) for the supply of water; or

(iii) any telecommunications line; or

(iv) any electric works

that are laid or placed in, on, along, over, across, or under that road:

(c) alter, repair, or remove any fittings so constructed, placed, or maintained, or any part of any such fittings.

(2) No gas operator may exercise the powers contained in subsection (1) otherwise than in accordance with such reasonable conditions as may be prescribed by the local authority or other body or person having jurisdiction over the road.

(3) Without limiting the generality of subsection (2), a local authority or other body or person having jurisdiction over a road may impose under that subsection, in relation to any work undertaken by any gas operator, a condition requiring the gas operator to meet the reasonable costs and expenses of that local authority or other body or person—

(a) in processing any notice given under section 26(1) by the gas operator in relation to the work:

(b) in supervising the carrying out of the work, where such supervision is necessary in the circumstances of the case.

Criteria for setting reasonable conditions

(1) In setting, varying, or revoking reasonable conditions under section 25(2), the local authority or other body or person having jurisdiction over the road concerned may consider all or any of the following matters:

(a) the safe and efficient flow of traffic (whether pedestrian or vehicular:

(b) the health and safety of any person who is, or class of persons who are, likely to be directly affected by the work on the road:

(c) the need to lessen the damage that is likely to be caused to property (including structural integrity of the roads) as a result of work on the road:

(d) the compensation that may be payable under section 51 for property that is likely to be damaged as a result of work on the road:

(e) the need to lessen disruption to the local community (including businesses):

(f) the co-ordination of installation of other networks:

(g) the co-ordination with road construction work by the local authority or other body or person who has jurisdiction over that road:

(h) the need of the gas operator to establish a gas network in a timely manner.

8. Infrastructure (Amendments Relating to Utilities Access) Act 2010 – New Zealand

Purpose of Act

(1) The purpose of this Act is to amend a variety of Acts relating to utility operators' access to transport corridors in order to achieve greater certainty and consistency in the rights and obligations of utility operators and corridor managers.

Notice requirement

Section 136 is amended by repealing subsection (1) and substituting the following subsection:

"(1) Except as provided in section 139, before a network operator proceeds to open or break up any road, the network operator must give notice of the intention to carry out the work to—

"(a) the local authority or other person who has jurisdiction over the road; and

"(b) any utility operator (as defined in section 4 of the Utilities Access Act 2010) whose pipes, lines, or other structures will or are likely to be affected by the work."

2) In this section, corridor manager, transport corridor, and utility operator have the meanings in section 4 of the Utilities Access Act 2010.

Construction, etc, of telephone cabinets or other similar appliances

Section 142 (2) is amended by repealing paragraph (a) and substituting the following paragraph:

(a) give notice of its intention to place a cabinet or other appliance on the road to-

(i) the local authority or other person who has jurisdiction over the road; and

(ii) any utility operator (as defined in section 4 of the Utilities Access Act 2010) whose pipes, lines, or other structures will or are likely to be affected by the work; and".

9. Telecommunications Act 2001 – New Zealand

Resource Management Act 1991 issues

Requiring authority status under Resource Management Act 1991

(1) Chorus is approved as a requiring authority, as a network operator, under the Resource Management Act 1991 for the following purposes:

(a)constructing or operating, or proposing to construct or operate, a network for the purpose of telecommunication as defined in section 5 of this Act; and

(b)constructing or operating, or proposing to construct or operate, a network for the purpose of radio communications as defined in section 2(1) of the Radio Communications Act 1989.

136 Notice requirement

(1) Except as provided in section 139, before a network operator proceeds to open or break up any road, the network operator must give notice of the intention to carry out the work to-

(a) the local authority or other person who has jurisdiction over the road; and

(b) any **utility** operator (as defined in section 4 of the Utilities Access Act 2010) whose pipes, lines, or other structures will or are likely to be affected by the work.

(2) Every notice must specify the location of the proposed work, the nature of the work to be carried out, and the reasons for it.

Co-location on cellular mobile transmission sites

Description of service:

A service that enables co-location of cellular mobile telephone network transmission and reception equipment (including any necessary supporting equipment on or with the following facilities (relevant facilities)):

(a) any towers, poles, masts, or other similar structures—

(i) that are used for the transmission or reception of telecommunications via a cellular mobile telephone network; and

(ii) that are owned, managed, or leased by the access provider:

all sites, buildings, or **utility** services that are associated with the kinds of structures referred to in paragraph.

10. Electricity Act 1992 – NEW ZEALAND

Infrastructure (Amendments Relating to Utilities Access) Act 2010

Purpose of Act

1) The purpose of this Act is to amend a variety of Acts relating to utility operators' access to transport corridors in order to achieve greater certainty and consistency in the rights and obligations of utility operators and corridor managers.

(2) In this section, corridor manager, transport corridor, and utility operator have the meanings in section 4 of the Utilities Access Act 2010.

11. Government Roading Powers Act 1989 – New Zealand

Removal of roadside structures

(1) In this section, unless the context otherwise requires

(2) structure means any tower, pole, or post lawfully upon or in or over a road or any pipes, cables, chambers, drains, or other services lawfully under a road; and includes any equipment that must be removed with the structure if the structure is removed; but does not include—

(a) any part of a bridge or culvert:

(b) any fence, gate, or cattle stop erected in accordance with this Act or the Local Government Act 1974:

(c) anything provided for the assistance or control of traffic:

(d) any structure that was erected when the land was not a road

Utility authority, in relation to any structure, means the Crown, or any Minister of the Crown, local authority, company, or person lawfully authorized to construct, maintain, utilize, or use the structure.

1) Where any structure has been erected upon, in, over, or under any road by any utility authority, either before or after the commencement of this Act, and the controlling authority has by notice in writing to the utility authority or to a responsible officer of it required the removal of the structure because-

(a) it is, or is likely to become, dangerous to vehicles and persons in them using the road; or

(b) it is in the way of any work undertaken or proposed for the improvement of the road; or

(c) the controlling authority desires its removal from under the road for the purposes of any work undertaken or proposed for the improvement of the road, the utility authority shall remove the structure within such period as may be specified in the notice.

1) Where any structure that has been erected upon, in, over, or under any road by any utility authority, either before or after the commencement of this Act, is unsafe or is likely to become unsafe because of any work undertaken or proposed to be undertaken for the improvement of the road as a public highway, the utility authority, after giving at least 5 working days' notice in writing to the controlling authority of its intention to do so, may remove the structure.
2) Subject to any agreement to the contrary, the reasonable costs incurred by a utility authority in so removing any structure and (where reasonably necessary) in re-erecting the structure (or an equivalent structure provided by the utility authority at its expense), including compensation payable to the owners and occupiers of the alternative site and a reasonable sum for proper overhead charges, shall, subject to subsection , be borne

by the controlling authority and the utility authority in equal shares, and the amount payable to the utility authority may be recovered as a debt.

3) A controlling authority or a utility authority may apply to the District Court to vary the proportions in which the costs and compensation shall be borne; and, in exceptional circumstances where it is reasonable to do so, the District Court may, after hearing the parties, vary those proportions, and the decision of the District Court shall be final and binding on all parties.
4) If the utility authority, after receiving notice under subsection (2), fails within the period so determined to remove the structure that is the subject of the notice, the controlling authority, after giving 10 working days' further notice of its intention to do so, may apply to the District Court for an order requiring the utility authority to remove the structure within such period as may be specified in the order; and in any such case, if the District Court orders the removal of the structure, the whole cost of carrying out the removal and re-erection of the structure shall be borne by the utility authority and shall be recoverable from it by the controlling authority as a debt.
5) Nothing in the Limitation Act 2010 or in any other Act or any rule of law shall cause or be deemed to have caused the right or title of the controlling authority of the road or of the authority in which the road is vested to be extinguished by reason of the road being occupied by any structure, and nothing in this or in any other Act or any rule of law shall entitle any utility authority to compensation otherwise than under this section for the removal of any structure from any road or in respect of the re-erection of any such structure (or equivalent structure), or in respect of any alteration of any road that necessitates any such removal or re-erection.

12. Local Government (Auckland Council) Act 2009 –New Zealand

47 Auckland Transport is requiring authority

1) Auckland Transport is deemed to be approved as a requiring authority, as a network utility operator, under section 167 of the Resource Management Act 1991 for the following purposes:

(a) constructing or operating or proposing to construct or operate roads in relation to the Auckland transport system; and

(b) the carrying out of an activity or a proposed activity (other than an activity

described in paragraph (a)) in relation to the Auckland transport system for which it or the Auckland Council has financial responsibility.

2) For the purposes of subsection (1), Part 8 of the Resource Management Act 1991 applies

a) with any necessary modifications (and despite the fact that an activity described in subsection (1) (b) is not a network utility operation within the meaning of section 166 of that Act); but

b) subject to subsection (3) and section 48(3).

64 Powers of Auckland water organization under Local Government Act 2002

An Auckland water organization that is not a local authority has the powers of a local authority under the following sections of the Local Government Act 2002 in relation to its water supply and wastewater services (and those sections apply accordingly, with any necessary modifications):

(a) section 171 (general power of entry):

(b) section 172 (power of entry for enforcement purposes):

(c) section 173 (power of entry in cases of emergency):

(d) section 181 (construction of works on private land):

(e) section 182 (power of entry to check utility services):

(f) section 186 (local authority may execute works if owner or occupier defaults).

Section 64: added, on 1 November 2010, by section 31 of the Local Government (Auckland Council) Amendment Act 2010 (2010 No 36).

13. National Code of Practice for Utilities' Access to the Transport Corridor- New Zealand

Scope This Code sets out the processes and procedures for:

a) Utility Operators to exercise their right of access to the Road Corridor for the placement, maintenance, improvement and removal of Utility Structures;

b) Corridor Managers to exercise their right to apply Reasonable Conditions on working in the Corridor;

c) Managers of Railway and Motorway Corridors to exercise their discretion to grant rights of access to Utility Operators.

Legislative Scope of Code

In accordance with section 9 of the Utilities Access Act, the purpose of this Code is to enable access by

Utility Operators to Transport Corridors to be managed in a way that:

a) maximizes the benefit to the Public while ensuring that all Utility Operators are treated fairly;

b) ensures that disruptions to Roads, Motorways, and railways caused by Work by Utility Operators are

kept to a minimum, while maintaining safety; and

c) provides a nationally consistent approach to managing access to Transport Corridors.

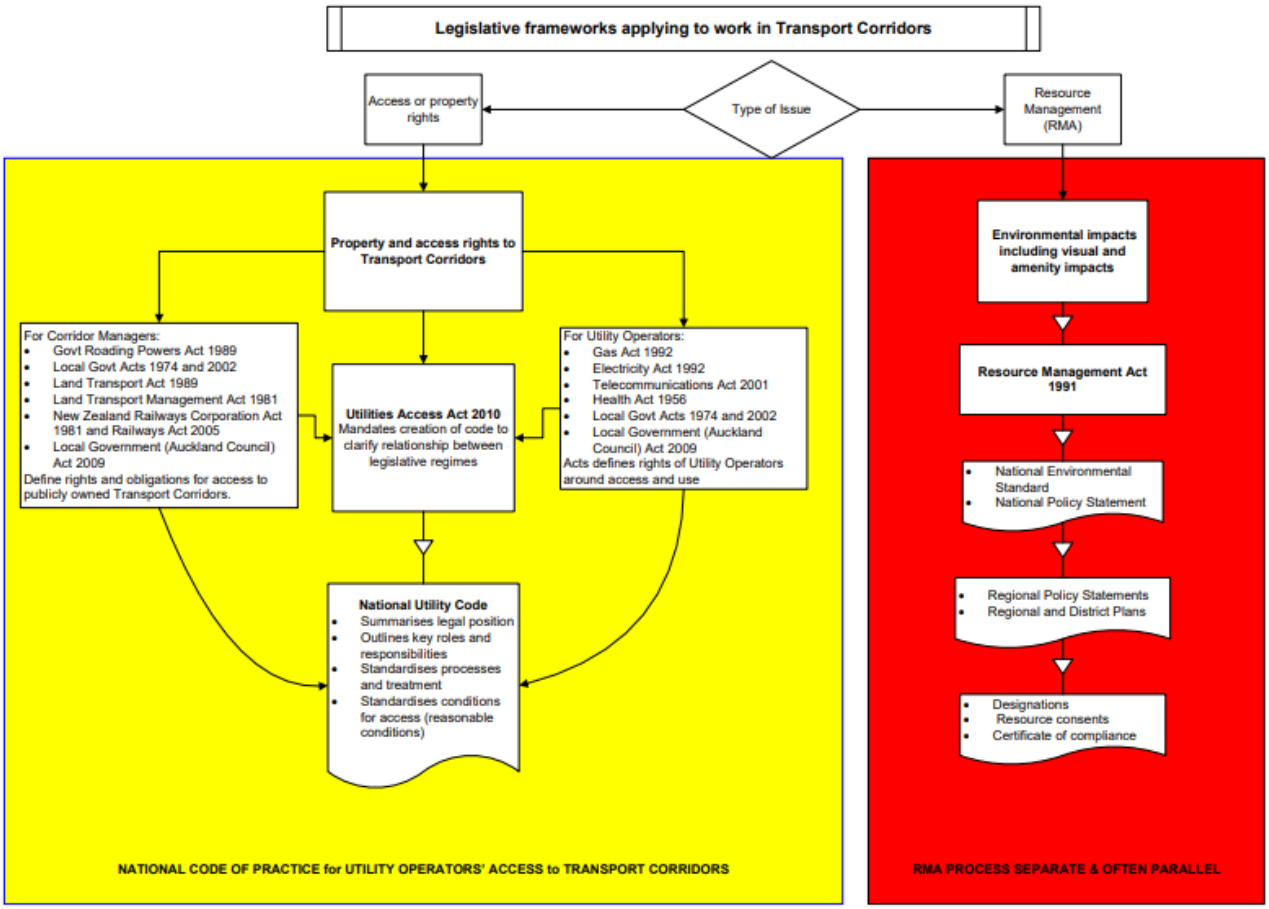
This Code provides mandatory requirements and supporting guidance to assist Utility Operators and

Corridor Managers in exercising these rights and complying with legislation relating to Utility Operators' access to Transport Corridors.

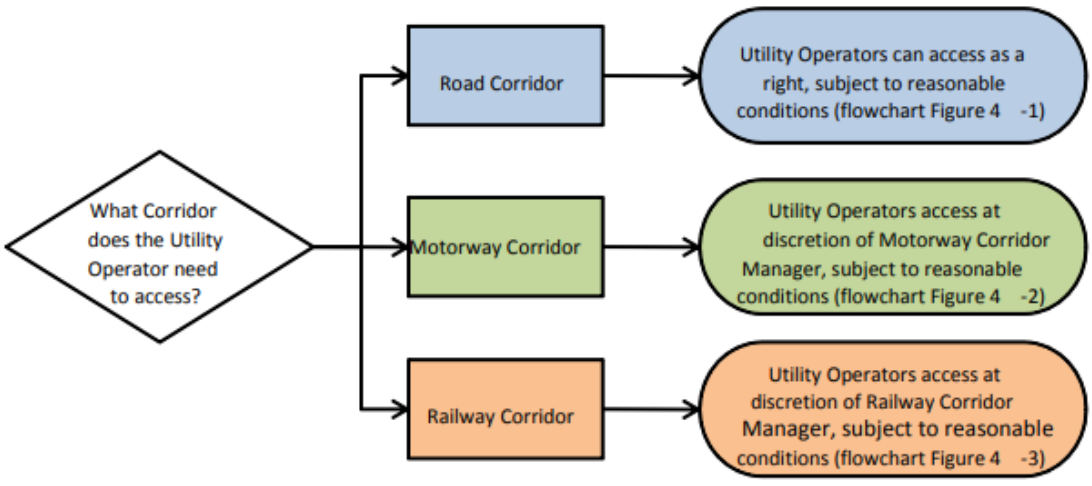
Code Limitations

Some installations of electricity lines carrying voltages greater than 110 kV and 100 MVA capacity, or gas lines with pressures greater than 2000 kPa, do not have direct legal right of access to the Road Corridor.

Corridor Managers have indicated the intent to use the procedures outlined in this Code and the expectation that those Utility operators will also comply with the procedures outlined in the Code. In some situations, additional approval processes will still be required.



Rights of Access to Transport Corridors



All Parties must interpret this Code as follows:

1. The following terms are used:

a) ‘must’ indicates minimum and mandatory requirements for Corridor Managers and Utility Operators;

b) ‘must, where practicable’ indicates that the requirement is mandatory unless the Party can demonstrate they are unable to reasonably apply it;

c) ‘must consider’ indicates that the Party must be able to demonstrate that they have considered those requirements;

d) ‘should’ is used to indicate best practice advice which Utility Operators and Corridor Managers must try to comply with in good faith; and

e) ‘may’ is used to indicate that the Party or Parties are able to carry out that requirement at their discretion

APPENDIX D

Victoria Government Gazette

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ROAD MANAGEMENT ACT 2004

CODE OF PRACTICE

MANAGEMENT OF INFRASTRUCTURE IN ROAD RESERVES

SPECIAL

61. Issues to consider

(1) If the proposed roadworks are likely to affect non-road infrastructure, the following issues should be considered in discussion between the parties as early as possible:

(a) the impact on road safety;

(b) the impact of delays to a train, tram or bus service, and interference with people's ability to access a train, tram or bus;

(c) opportunities to modify design of the roadworks;

(d) the economics of relocating the non-road infrastructure compared with modifying and/or protecting it in its present location;

(e) the availability of alternative locations for the non-road infrastructure;

(f) opportunities to undertake joint trenching;

(g) opportunities to avoid delays during the construction of the road project;

(h) opportunities to avoid disruption to the utility's or provider of public transport's operations and services;

(i) opportunities for programming contractors/labour forces of the respective parties to coordinate efforts and reduce costs; and

(j) any special safety procedures that are required (eg. 'No Go Zone' rules and regulations when working close to overhead powerlines; working on or near train tracks).

(2) Division 4A of Part 4 of the Act imposes a duty on road authorities, infrastructure managers, works managers and rail operators to ensure, so far as is reasonably practicable, that works on or in the vicinity of road-rail interface areas are performed safely.

62. Reaching agreement on alterations to non-road infrastructure associated with roadworks

(1) Where it is agreed between a utility or provider of public transport and a road authority that non-road infrastructure needs to be altered due to roadworks, an in-principle agreement regarding responsibilities for the alterations should be negotiated. Such an agreement should include responsibilities for design and costs, and should also consider timing of the proposed works.

(2) When the road authority undertakes to pay for any portion of the costs of the alterations, then:

(a) the road authority will formally request an assessment and quote from the relevant utility or provider of public transport for the alterations;

(b) the utility or provider of public transport will reply to the road authority with preliminary estimates of time and cost for all practical options for carrying out the alterations;

(c) when the road authority and utility or provider of public transport have agreed on the preferred option for the alterations, the utility or provider of public transport will send the road authority a final estimate of time and cost to carry out the alterations, to assist the road authority with programming and budgeting for the roadworks;

(d) formal agreement regarding payment for alterations should be reached between the road authority and utility or provider of public transport based on the final estimate, with actual or agreed cost used as the basis for final payment. The utility or provider of public transport will be responsible for any incremental costs associated with upgrading or betterment of existing facilities. The remaining life of non-road infrastructure should also be taken into account when assessing payment for alterations;

(e) the alteration work should be priced in a competitive environment; and

(f) the utility or provider of public transport and/or its agent should liaise with the road authority and/or the road authority's agent when finalising the design of alterations and programming the works.

63. Damage to non-road infrastructure

(1) The road authority should conduct an inspection before commencing roadworks, to identify and record the details of any damaged non-road infrastructure. If there is pre-existing damage to any non-road infrastructure, the road authority should formally advise the utility or provider of public transport before roadworks commence if it is aware of such damage, or as soon as the damage becomes evident to the road authority. The road authority is not required to fund repairs to pre-existing damage to non-road infrastructure.

(2) If the road authority damages another infrastructure manager's infrastructure whilst working in the road reserve, it should advise the infrastructure manager of the damaged infrastructure as quickly as possible to enable the infrastructure manager to arrange for repairs to be carried out, with the road authority being responsible for reasonable repair costs.

64. Use of contractors

(1) Generally, road authorities are responsible for the works carried out by their nominated works managers (who may be contractors). Road authorities should arrange adequate surveillance of their activities whilst working in road reserves, and are responsible for ensuring that their nominated works managers follow the requirements of all relevant legislation, Government policy, industry standards and codes of practice as well as any reasonable conditions prescribed by the utility or provider of public transport.

(2) Road authorities should ensure that their staff, agents and contractors can be readily identified as working for the road authority, when working on non-road infrastructure.

Division 3 – Works affecting public transport infrastructure and services

65. Works in the vicinity of train or tram tracks

(1) Infrastructure managers or works managers proposing to carry out works or activities in the vicinity of train or tram tracks should ensure that all personnel who are conducting the works have the appropriate level of safety training and rail accreditation.

(2) Division 4A of Part 4 of the Act imposes a duty on road authorities, infrastructure managers, works managers and rail operators to ensure, so far as is reasonably practicable, that works on or in the vicinity of road-rail interface areas are performed safely.

66. Festivals and parades

(1) From time to time organisations apply to coordinating road authorities to temporarily close roads to enable them to conduct a festival or parade.

(2) Road authorities should be mindful that traffic diversions caused by festivals and parades may have a major, negative impact on public transport services.

Note

The organiser of an event is required to notify Public Transport Victoria of a proposed event if it is reasonable to expect that the event will require the deviation, delay, replacement, supplementation or cancellation of a regular public transport service provided by a passenger transport company or a bus company – see section 195 of the **Transport (Compliance and Miscellaneous) Act 1983**. Notification should also be given to the passenger transport company or bus company.