



**THE CAUSES AND EFFECTS OF RIGHT OF WAY PROBLEM ON THE COST  
OVERRUN AND TIME OVERRUN OF ETHIOPIAN FEDERAL ROAD PROJECTS.  
(A CASE STUDY OF ERA WESTERN REGION PROJECTS)**

**M Sc. THESIS**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING  
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## LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
CFR	Code of Federal Regulations
CPM	Central Path Method
CTTS	Central Texas Turnpike System
DB	Design Build
DBB	Design Bid Build
DBST	Double Bitumen Surface Treatment
EOT	Extension of Time
ERA	Ethiopian road authority
ETB	Ethiopian Birr
ETCA	Ethiopian Transport Construction Authority
FHWA	Federal Highway Authority
FI	Frequency Index
FIDIC	Federation Internationale Des Ingenieurs-Conseils (International Federation of Consulting Engineers)
GTP	Growth and Transformation Plan
GIS	Geographic information systems
IHA	Imperial Highway Authority
IMP.I	Importance Index
IT	Information Technology
Mn DOT	Minnesota Departments of Transportation
NCHRP	National Cooperative Highway Research Program
PDG	Project Development Guide
PPA	Public Procurement & property Administration Agency
RII	Relative Importance Index
ROW	Right-of-way
RSDP	Road Sector Development Program
SDOT	State Departments of Transportation
TX DOT	Texas Departments of Transportation
US	United States
USC	United States Code SI: - Severity Index
VAT	Value Added Tax

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## ABSTRACT

*Right-of-way acquisition problem is a major obstacle in Ethiopian Federal road projects which significantly affect most projects' final cost and schedule by creating disruption. Even though some researchers state right-of-way problem as the main reason for delay and cost overrun of projects within the country, only few studies were done to investigate the causes and the effects it brought to the construction industry. Taking this into consideration, this research was carried out to study the root causes of right-of-way obstruction; the effects it brought to the time overrun and cost overrun of Ethiopian Federal Road Project and the mitigation measures to adopt. The research used literature review, questionnaire survey, case study and desk study to collect the necessary data. A total of 39 questionnaires from client, consultants and contractors were collected to see the perspectives of different group of respondents on causes of right-of-way problems on Ethiopian Federal Road projects and the mitigation measures to adopt. 26 causes of right-of-way problems of road projects and 19 mitigation measures to adopt were identified and rated using a four-point Likert scale. A case study was done on 10 Ethiopian Road Authority western region projects to see the practical effects of right-of-way problem on time overrun and cost overrun of projects. According to the total collected survey data analysis, the cause of right-of-way problem with the highest importance index of 72.68% was "Insufficient coordination between right-of-way agents and utility authorities" which was resulted from poor employer relationship with the utility authorities. In the same way, the best practice to mitigate right-of-way problem with the highest relative important index of 0.90 was "Creating good communication and team work sprit with Utility Authorities". All of the projects under the case study had both cost overrun and time extension due to many reasons. The extension of time due to right-of-way problem ranges from 4.2% to 58.8 % of the total extension of time and there were no cost claims in relation to right of way problems on projects under the case study. However the desk study shows delay has a major contribution to project completion cost through time related costs.*

**Key words:** *Cause, Cost Overrun, Effect, Extension of Time, Importance Index, Relative Important Index, Right of Way, Time Overrun.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The Ethiopian government aimed to transform the country in a middle income country by 2025. In achieving this goal, the government planned a Growth and Transformation Plan (GTP) which direct towards achieving Ethiopia's long term vision and sustaining the rapid and broad based economic growth. In realizing this, Ethiopian government invests a substantial amount of money on different sectors. This investment sectors include economic sector (agriculture, industry, trade and mining); Infrastructure development (road development, railway development, energy development, irrigation development etc.); social sector development (education and training and health sector); capacity building and good governance etc. From this investments made by the government, the civil engineering infrastructure development works took a great expanse. This works include hydropower stations development (for electric power and agricultural purpose), construction and urban development, irrigation projects, railway and high way projects, etc. (MoFED, 2010).

Recognizing the importance of infrastructure (especially road transport) in development of the national economic and social activities, the government of Ethiopia has attached a high priority to improving the road development. This is due to roads facilitate the socio-economic development of the country and support development of agriculture, industry, mining, tourism and service sectors such as education and health (MoFED, 2010).

Ethiopian road authority ERA, was reestablished by proclamation No 80/1997 with the objective to develop and administer highways, to ensure the standard of road construction and to create proper conditions on which the road network is coordinately promoted. According to the proclamation, ERA is legally autonomous agency responsible for the management of the country's roads. Based on the geographical location and equivalent road network volume five regional offices are established. These are northern, southern, eastern, western and central ERA Regional Offices (Organizational background of ERA, 2009). An internal study which was done on ERA regional right of way performance shows the cost of the ROW acquisition and related

ROW problems were extremely high on southern and western regions. This was due the southern and western regions are the leading cash crop production zones as well as densely populated. Due to this and data accessibility this paper focuses on the western region road projects.

Before any construction project work begin the client and the contractor sign a contractual agreement that explains the detail requirements of the project and identifies the rights & liabilities/responsibilities of each party. Since all projects are unique and carried out under certain constraints (usually cost, time and scope/quality), a well written contract document is very important for a successful completion of project.

Even though, completing each project on the specified budget and intended project time is basic in achieving the anticipated end result planned by the government, numerous construction projects in the country fail to be completed on the proposed project budget and time limit. According to a research by Abubeker (2015), some of the factors influencing time overruns of construction projects are

- ❖ Lack of experienced professionals during planning, designing and construction
- ❖ Lack of belongingness and coordination among the stakeholders
- ❖ The existence of obstructions in the right of way limit
- ❖ The bureaucratic system and corruption within the country etc.

Even though not many researches are made related to the causes of project delay and reasons for lugging a project work from the proposed work schedule in Ethiopian road construction industry, a research made by Abubeker (2015) shows delay to deliver the site (Right of way problem) is the primary reason and a research made by Tadesse (2009) place it in a second place. Right of way obstruction exists when there is an obstruction like electric pole, utility lines, personal or governmental properties etc. within the limit of the construction boundary. Since clearing the land from obstructions and hand over to the contractor is the responsibility of the employer, a claim (or further dispute) arises due to ROW obstruction may force the Employer (government) to additional time and cost (due to inflation of extended time). In a big picture, if completing a project on the specified budget and intended project time is difficult, achieving the anticipated goal by 2025 will not pass from being just a dream.

## **1.2 Statement of Problem**

Right of way obstruction is the major problem causing highway construction projects from failing to follow the work schedule properly and leads to disruption. It is a major problem in almost all of highway construction projects of Ethiopia. Even though some researchers state right of way problem as the major reason for the time and cost overrun of projects within the country no further studies are done to investigate the cause and effects it brought to the construction industry.

Therefore, in order to successfully finish a project according to the schedule and within the budget, studying the root causes of ROW obstruction and the effects it brought to the time and cost overrun of a project are very crucial so as to work on the mitigation measures to minimize problems in the future.

## **1.3 Objective of the Research**

The general objective of this research is to harmonize the practice of contract administration in assessing the cause and effect of right of way obstruction on the cost and time overrun of Ethiopian federal road projects with the principles of project management.

The specific objectives of this research are mainly:

- I. To assess the major causes that contributes to the right of way obstruction in Ethiopian federal road projects.
- II. To assess the effect of right of way obstruction on the cost overrun and time overrun of Ethiopian federal road project.
- III. To recommend mitigation measures in order to minimize right of way obstruction in the future.

#### **1.4 Significance of Research**

Due to the significance of road for the socio-economic growth of a country, the Ethiopian government allocates the highest budget for Federal road projects. Though, currently most of them fail to be completed on the contractually agreed schedule and budget due to many reasons. ROW problem is a currently practical problem area faced by many of highway construction projects and one of the major reasons behind for Federal road projects delay in Ethiopia. This research idea is significant because identifying the causes of ROW problems and assessing the effects it brought to project delay may possibly give an indication in solving the currently practical problem area and possibly in preventing the same mistakes for the future. Studying on this research idea may have an enormous impact in exposing a hidden indication with in the construction industry in addition to minimizing the knowledge gap on the research area.

#### **1.5 Research Questions**

The following research questions are raised in order to answer the objectives of the research:

- I. What are the major causes for right of way obstruction in road projects?
- II. What are the effects right of way obstructions have in terms of time and cost overrun of a road project?
- III. What possible mitigation measures may avoid/minimize the right of way obstruction in the future?

#### **1.6 Research Methodology**

The procedures that were undertaken to achieve the objectives set for the study was carried out using a three phase approach. The first was to review the relevant literature to form the theoretical framework for the study. In the second phase, the relevant data was collected and analyzed. The data collection was done through a questionnaire survey, which was conducted on selected Employer, contractors and consultant professionals with an experience in Ethiopian Federal road projects. In addition a case study was conducted on 10 ERA western region projects and finally a desk study was done to review previous research findings and gain a broad understanding on the research work. In the third phase, conclusions and recommendations are drawn from the outcome of the analysis.

## **1.7 Scope and Limitation of the Research**

In order to be specific and measurable the scope of this study was limited to assessing the causes and effects of Right of way problems on Federal road projects under the authority of Ethiopian Road Authority. All professionals (from employer, contractor and consultant) selected for the collection of questionnaire survey data were well experienced in Ethiopian Federal road projects. In order to see the effects of ROW problem on projects completion cost and time, a case study was done on ten ERA western region projects.

This research was not done without its limitations but the major problem was observed during the collection of data relevant for the case study. Due to administrative and data management issue, relevant data collection for the case study was a challenging process. In order to collect the detail information required for the case study, the researcher had to create a contact with the project engineers of each projects. This made the data collection process tedious and dependent on the availability of the project engineers.

## 1.8 Organization of the Research

The research was organized into five chapters and appendices. The overall organization of the research is summarized in the following chart.

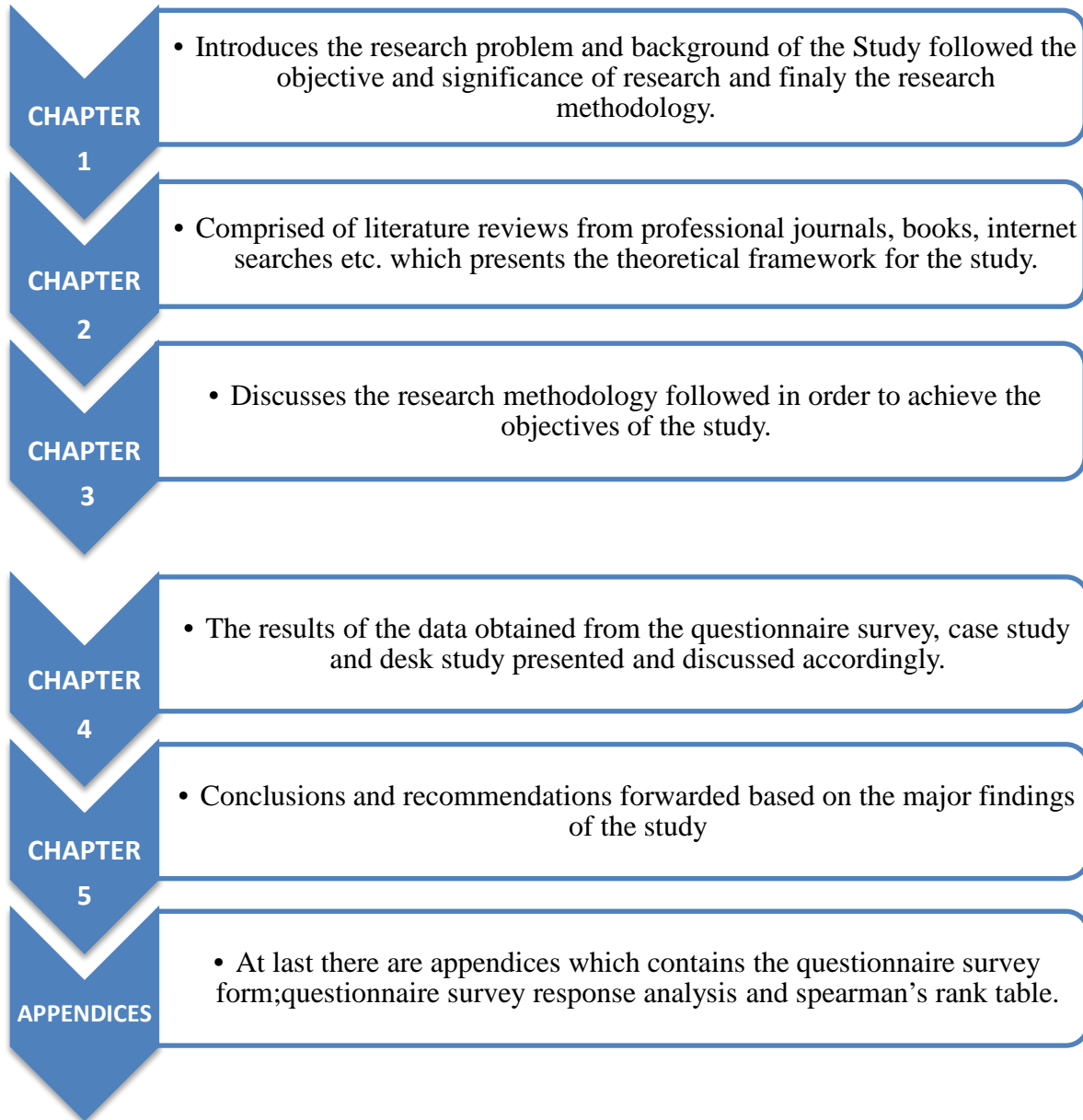


Figure 1.1 Organization structure of the research

## CHAPTER TWO

### LITERATURE REVIEW

In order to develop a better understanding of the research objective, a comprehensive literature review has been conducted focusing on identifying the causes of variations, their effects and on the way how to manage, control and administrate it.

#### 2.1 General

In any construction project, time (schedule), cost (budget) and quality (performance) are considered to be the basic project parameters. Often, these parameters are considered to be the three sides of a triangle. A project should satisfy all the three parameters in order to be successful (Haughey, 2011).

In the project control process, controlling the above variables are paramount importance. Time should be controlled by controlling and adjusting the schedule so that the project progress must much with the planned progress and the project may be completed within the planned contract time, cost should be controlled so that the project may be completed within the earmarked budget (the project must be completed without exceeding the authorized expenditure), the scope (performance and quality) should be controlled in order to maintain the anticipated employer's requirements and quality so that the end result of the project must fit to its intended purpose (Westland, 2018).

In a developing country like Ethiopia, infrastructure development is one of the basic needs required by the community. When projects are delivered on time and cost (within the quality required) they can serve the community for their intended purpose in addition to proper utilization of resources by the nation.

The inability to complete projects on time and within budget continues to be a chronic problem worldwide (Ahmed et al., 2002). Time and cost overruns occur in most construction projects and the magnitude varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project.

The debate in the construction industry on how to minimize or eliminate delays and cost overruns has been on for some time among professionals, clients and/or end users, and policy makers. A research by Abubeker (2015), the final results indicate that the factor "Delay to deliver the site (Right of way problem)" has been ranked in the first position by contractors and owners while it gets the second rank by consultant. This result indicates the high importance of delivering the site on time to complete the project on time. The right of way problem creates differences between the parties of project, and then the time of completion will be affected even more. This agreement of opinions between contractors and owners proves the importance of these factors in projects delay. This indicates how right of way problem affect the project time. If there is a right of way problem in construction project it will lead to a significant delay in a project. As observed from desk study some projects delay for years only due to right of way problem. This result is in line with the results of Tadesse (2009). The suitable description of this agreement is that the delay to deliver the site (Right of way problem) has a high impact in delaying Ethiopian road construction projects.

In Ethiopia, it is common to see construction projects failing to achieve their mission within the specified cost and time. Hardly few projects get completed on time and within budget since construction projects are exposed to uncertain environments because of such factors as construction complexity; presence of various interest groups such as the project owners, end users, consultants, contractors, financiers; materials, equipment, project funding; climatic environment; the economic and political environment and statutory regulations (Abubeker, 2015).

Time and cost overruns due to right of way problems occur in most construction projects and the magnitude varies considerably from project to project. So it is essential to define the actual causes and effects of time and cost overruns due to right of way obstruction in order to minimize and avoid the delays and increasing cost in any construction project.

The issue of right of way in road construction is complex and time consuming as well as expensive. In many cases, the right of way costs for new or expanded roadways exceed the cost for construction. Thus designers shall carefully consider every accesses point in every project in order to minimize design change after construction is started (Mark and Murray, 2004).

## **2.2 History of Road Construction in Ethiopia**

Historic chronicles of the 17th and 18th centuries show that there were a number of small roads trails and foot paths, in addition to the traditional shoulder portage, animals like mules, donkeys and horses and camels were used as a means of transportation in Ethiopia. In the 18th century, especially during the reign of Emperor Tewodros, although the technology was primitive it was believed that planned road construction efforts were made. It is also believed that Emperor Yohannes IV, who succeeded Tewodros, was engaged in road building. However, due to the danger of invasion by Egyptians, Derbush and Turkish the Emperor was not able to achieve his desires (ERA, 2007).

It was prior to the second Italian occupation i.e. between the years 1896 and 1936 that a great success was made in road construction. Emperor Menilik was said to be a successful road builder participating himself in the construction. In 1903 the road from Eritrea to Addis Ababa and the road from Addis to Addis Alem were built. In addition it was during this time that the first Asphalt roads appeared in Addis. From the time the Italian packed off to home to the eventual creation of the Imperial Highway Authority (1941 to 1951) road construction or maintenance activity was almost subsided for a stagnation period of one decade because of lack of funds, equipment and expertise (ERA, 2007).

### **2.2.1 Organizational Background of ERA**

Following the eviction of the Italian occupiers, the Imperial Ethiopian Government was convinced that a Road Agency solely responsible for rehabilitating/restoring and expanding the road network throughout the country had to be established. Accordingly, the Imperial Highway Authority (IHA) was established under proclamation No. 115/1951 as a semi-autonomous agency with specific duties to plan, design, construct, and maintain roads. Responsibilities for construction and maintenance of roads remained under a single autonomous authority (IHA) for 26 years (1951-1977) (ERA, 2007).

In 1980, the Military Government that took power in 1974 reformed the agency into the Ethiopian Transport Construction Authority (ETCA) by proclamation No. 189/1980 and became answerable to the newly formed Ministry of Construction. The proclamation enlarged

responsibility of the Authority by expanding its task to incorporate the construction of Airports, Seaports, Railways, and Municipal Roads. Following the shift from a command-based economy to a market oriented one in 1991, ERA was reestablished by proclamation No.63/1993 with a view to providing a strong administration under the leadership of a Board. As part of its reform, the government assigned administration of rural roads to the regional self-governments and main roads to ERA as part of the Federal Government's responsibility (ERA, 2019).

To cope up with existing situations, ERA was again re-established by proclamation No. 80/1997 with the objective to develop and administer highways, and to ensure the standard of road construction. Currently, the main responsibilities of ERA are network planning; management of contract projects and force account operations. The long-term objective is to focus on policy, planning and contract administration and to pull out gradually from direct operational works. Ethiopian Roads Authority's primary function is to maintain the existing road network through the districts as its corporate responsibility. The maintenance of the entire main road network is carried out by ten maintenance districts which are conveniently located at various regions throughout the country (ERA, 2007).

Based on the geographical location and equivalent road network volume five regional offices, northern, southern, eastern, western and central ERA Regional Offices are established. Each regional office is responsible for the contract administration of feasibility, design and project implementation, and also road network management. It also deals with Right of Way (ROW) issues related with the design, implementation and network management (ERA, 2007).

The Regional Office ensures proper administration of projects and the road network managements (through Design & Implementation Team Road; Network Management Team; Finance and Administration Team) within its boundary and also works in close coordination with the head office Road Asset Management team, Engineering Technical Support team and Quality Assurance and Inspection Teams (ERA, 2019).

Each regional office has its own ROW management team which is controlled by the Regional Office Directorate and in collaboration with other teams. The Design & Implementation Team is responsible for the overall ROW management issues during project design, implementation and asset management. Mainly, the team is responsible for identification, valuation, compensation

and removal of obstruction during the project development and implementation stage. In addition the Road Network Management team is responsible for the day to day inspection of the ROW reserve and prevention of properties from entering to the Right of Way (ROW) limit during the post construction phase of Road Network Management (ERA, 2007).

ERA is administered by a Board and the Board of Directors will provide General Policy direction and have primary oversight responsibility for project performance monitoring. Recognizing the importance of the road transport in supporting social and economic growth and its role as a catalyst to meet poverty reduction targets, the Government of Ethiopia has placed increased emphasis on improvement of the quality and extent of road infrastructure in the country. To address constraints in the road sector, related to restricted road network coverage and poor condition, the Government formulated the Road Sector Development Program in 1997. Ethiopia has a vision of joining middle-income countries by 2028. Hence, the country needs to increase its road network from 49,000 km (in 2010) to 201,750 km by 2028. For this vision to come true, a need for well-organized and strong local road construction industry is inevitable (ERA, 2019).

## **2.3 Right of Way (Access to Site)**

### **2.3.1 Definition of Right of way**

Right of way (ROW) is a right to make a way over a piece of land, usually to and from another piece of land (Henry, 2019).

According to FIDIC 2006 general conditions:

2.1 Right to access to site: “The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Contract Data”; And

4.13 Rights of Way and Facilities: “Unless otherwise specified in the Contract the Employer shall provide access to and possession of the Site including special and/or temporary rights-of-way which are necessary for the Works.”

Sufficient right of way must be acquired to construct, operate and maintain the roadway and the appurtenant features. Right of way should provide for access for maintenance, utility

accommodation, possible future widening, drainage structures, and in some circumstances control of access. It may be necessary to acquire temporary right of way for construction activities. Establishing proposed right-of-way widths can usually begin as soon as the earthwork design is substantially completed. This must include alignment, grade, drainage structures, driveways and approach roads and any other structure associated with the roadway. The right-of-way line must encompass the cut and fill catches as well as clearing limits and slope rounding (construction limits). It is recommended that additional right-of-way area be included to accommodate minor changes in construction and to allow access for typical maintenance operations (PDDM, 2018).

### 2.3.2 Right of Way Acquisition Process

Right-of-way (ROW) acquisition is the act of taking the land from its original owner by another party, with legal rights to take the real property, by providing a monetary compensation for the value of the property (Francis 2009). ROW acquisition process is a legal, administrative and regulatory procedure which is governed by the national laws and local regulations. When acquiring private property for project right of way certain federal regulations and local administrative laws must be followed to insure owners are paid just compensation. In addition it is a critical component of highway and transportation project development, which significantly affects a project's final cost and schedule.

Right-of-way (ROW) acquisition is a multifaceted process made even more complicated by factors such as alignment coordination issues, diverse state and local laws, conflicting public policies, environmental issues, public involvement, agency staffing, appraiser qualifications, mediation processes, condemnation processes, project characteristics, parcel types, and location that can significantly affect the cost and duration of ROW acquisition (Jeong, 2016).

In the context of Ethiopian Federal road construction projects the right of way problem is related to land acquisition issue from the community in rural and urban areas for the purpose of infrastructure development and relocating of utility facilities. The land required for these projects includes the land to be used for the construction of the road which includes appropriate right of way according to the requirements of ERA's standards for both rural and town sections and other part of the land which will be used as local material sources such as quarry site etc.

In general the right of way acquisition process comprises five phases:

- I. Planning;
- II. Valuation (i.e., Appraisal);
- III. Negotiation;
- IV. Property Management; and
- V. Relocation.

### *I. Planning*

Planning is the first phase of the Right of way acquisition process and mainly involves environmental assessments, location and design studies, and public involvement activities. The laws require environmental assessments during the planning phase that primarily measure the social, economic, and environmental impacts of a project's R/W acquisition and any relocation it might occasion. For instance, these assessments include determining the number of people or businesses displaced by the project, or the impacts on community services, wetlands, and wildlife habitat, etc. (FHWA, 2001).

Public involvement is as critical as the environmental assessment during the planning phase. The purpose of initial public involvement is to notify a community of the agency's intentions and to communicate the necessity of a project. Moreover, in public forums, the people of affected communities can learn about a project's possible social and environmental impacts, and they can voice their opinions on the project and on the Right of way acquisition process. There are several avenues for such communication with the public: public meetings, newspaper, television advertisements, and letters. However, the degree of public participation can vary depending on the complexity or size of a project and its impact on a community (TxDOT, 2004).

### *II. Valuation/Appraisal*

Valuation/an appraisal is a professional opinion, usually written in report form, of the market value of a property, such as a home, business, or other asset whose market price is not easily determined. The purpose of appraisals in this context is to appraise land needed for public transportation purposes. Appraisals establish with reasonable certainty the amount of money the property owner is entitled to receive. The goal of the second phase, valuation, is to establish the

amount of just compensation for a parcel by having the land appraised and the appraisal reviewed. Such valuation is the logical next step after the planning phase is complete (TxDOT, 2004).

### *III. Negotiation*

The next phase is negotiation, the part of the process (depending on the nation's land law) in which agencies make offers to property owners for acquisition of real property and improvements. Agencies also make payments for properties and notify property owners to vacate during this phase. If negotiation fails, the phase usually shifts to condemnation proceedings.

### *IV. Property Management*

In the property management phase of the acquisition process, clearing of the Right of way takes place. This phase can be as time-consuming as the negotiation phase and may involve extensive project schedule delays. Other activities may also take place during this phase, such as assessments of future use of the excess properties (e.g., expansion of Right of way). This phase is a process that requires a number of advanced skill sets, for example, time management, marketing, financing, etc.

### *V. Relocation*

Finally, in the relocation phase, residences, businesses, farms, and non-profit organizations are displaced due to federal or state projects designed for the benefit of the public. If ROW acquisition requires the displacement of individuals, families, businesses, farms, and nonprofit organizations, the agency needs to conduct a proper analysis of all proposed acquisitions in the relocation planning. The agency should analyze the detailed relocation plan, the associated cost estimate, and the lead time estimate to provide adequate relocation services.

#### 2.3.3 Highway Right of way practices of developed countries

Many counties and cities are spending more than 30% of their transportation project budgets on ROW acquisition (Sandberg, 2013), and ROW acquisition continues to become more expensive, difficult, and time consuming and a barrier to project implementation. These problems have led many countries state departments of transportation and local agencies to re-examine the current

ROW acquisition process to identify the factors critical to ROW acquisition, review the best ROW acquisition practices and develop ideas for improving the current ROW acquisition process. Studying and adoption of other countries best practices enhance the ability of State and local agencies to streamline delivery and improve the quality of right-of-way services.

#### *2.3.3.1 US's Highway Right of Way Practice*

Highway right-of-way acquisition and utilities accommodation in the United States have become significantly more complex. At the same time, right-of-way and utilities personnel have come under increasing pressure to provide cleared right-of-way on time(FHWA, 2002).

US's Property rights law and the issues surrounding public use of private property (right-of-way acquisition) flow from Amendments 5 and 14 of the U.S. Constitution. The Fifth Amendment provides in part that "...nor shall private property be taken for public use, without just compensation." The Fourteenth Amendment contains the due process clause that requires that when a state or local governmental body, or a private body exercising delegated power, takes private property it must provide just compensation and take only for a public purpose (Jeong, 2016).

At the Federal level, the policy and procedures related to acquisition of property are contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act). Each State has legislation that implements and in some cases expands on the minimum requirements established within the Federal legislation.

Laws enacted by Congress are contained in the *United States Code (USC)*. One Key code relevant for the acquisition of lands for highway is 23 USC 317 – *Highways on Federal Lands*. This section contains the legislative authority for DOT to assist in transferring necessary interests in land needed for right-of- way across federally owned lands for federally assisted projects.

The US's Federal references are the foundations for State laws and regulations that apply to land acquisition within their borders. While the federal laws and regulations provide the broad framework regarding property acquisition, the particulars lie in the laws, regulations or codes of the State where the project is located. State laws generally also govern the procedural policies of their county or municipal governments.

Acquisition of private property is based on the laws and procedures employed within each State. State Departments of Transportation (SDOT) have manuals and guidance materials, addressing the standards and procedures necessary to acquire property in compliance with the federal policy requirements of the Uniform Act.

Some of United States' identified best high way right of way practices are

❖ **Team work approach during the pre-acquisition phase.**

Since many of the potential issues that can increase costs and acquisition delays could be eliminated through interactive and continuous communication and coordination between team members, Team work approach is followed during the pre-acquisition phase. The team approach facilitated communication and coordination among different departments and functional areas and the expeditious resolution of utility issues (Cambridge Systematics, 2006).

❖ **Public Involvement in Appraisal**

Extensive interviews with property owners to discuss the project's impacts and potential gains and the property itself could contribute to a better appraisal. The Arkansas, Illinois, and Texas DOTs let the property owners or the owners' designated representatives accompany the appraiser during the inspection of the parcels. This enables the owners to provide more information, establishes a good relationship and trust between the agency and property owners, and can eventually increase the likelihood of better valuations and successful negotiations (Caldas et al., 2006).

❖ **Acquisition through Mediation**

In order to reduce condemnation cases, TDOT uses mediation, typically by a lawyer, to minimize litigation. This process has been successful in finding common ground between the agency and the property owner, and most of the parcels recommended for condemnation were settled by the mediation technique (Aleithawe, 2010).

❖ **Design-Build and Public-Private Partnership**

In 2002, TxDOT entered into a design-build contract with a developer for the State Highway 130 project, which is part of the Central Texas Turnpike System (CTTS) project. Because support for ROW acquisition, relocation, and utility adjustments was included in the developer's scope, the developer had the financial incentive to complete

ROW acquisition and utility relocation. The project's design-build and public-private partnership context facilitated the application of the team approach, early coordination, and development of creative alternate design solutions. TxDOT noted that the first 40 mile section of the project realized a one-year shortening of the schedule and cost savings of \$400 million, and the ROW spending was also \$100 million under budget (Cambridge Systematics, 2006).

❖ **Electronic Data Management and Geographic Information Systems**

TxDOT and MnDOT established a GIS-based electronic tracking database to track the status of ROW acquisition (Cambridge Systematics, 2006). The database includes information on parcels, titles, and other items affecting acquisition status. The system could track the status of individual ROW activities, issue automatic alerts to prevent schedule delay, and create summary reports about the status of parcel acquisition, condemnation, etc.

2.3.3.2 *European's highway right of way practice*

Practices used in most of European countries encourage property owner involvement before completion of final right-of-way plans and use an extensive property owner interview process. They make a conscientious effort to limit the number of people contacting the property owner, including assigning one person to serve as appraiser and negotiator for acquisition and relocation services. This section summarizes the ROW acquisition practices of England, Germany, the Netherlands, and Norway.

While their governments and cultures differ the right-of-way acquisition processes in the European countries and those in the United States are much similar and share basic principles that guide the process. Highway agencies in these countries reduce the time needed to provide acquisition offers to property owners by limiting the need for appraisal reviews and through passage of special enabling legislation to streamline the acquisition process. They use mediation and quick payment processes to facilitate settlements and payments to property owners. These actions underscore the desire of the highway agencies to provide a fair and equitable method for acquiring right-of-way (Jeong, 2016).

Some of European countries' identified best high way right of way practices are

### ❖ **Compensation And Relocation**

Compensation in Europe includes provisions for payment for land acquired, damages to remaining property, and relocation reimbursements. The impact on properties outside the project limits also is considered.

The countries all provide liberal payments to businesses affected by property acquisition, project construction, or highway operations. These payments range from liquidation and acquisition of businesses to the negotiated reimbursement of moving and relocation costs and incidental expenses incurred by displaced businesses.

Land consolidation concept is used in Norway, Germany, and the Netherlands. Land consolidation involves adjusting property boundaries in the area of a highway project and redistributing the land to affected landowners. Land for sale next to the project also can be acquired and reassembled with properties divided by the project. The idea is to create better parcels for continued agricultural use or more desirable parcels for development. In Norway, the acquiring agency or one property owner affected by the project can request an investigation into land consolidation. In Germany and the Netherlands, a consensus of landowners is required to begin the land consolidation process.

### ❖ **Training**

Training requirements vary among countries, but they all emphasize formal training and continuous employee development. Programs focus on college curriculums leading to a degree in right-of-way and internal training courses, including small workshops and mentoring. Each country has qualification requirements for right-of-way staff and most of Right-of-way personnel are trained as economists, attorneys, and engineers. In addition they have developed strong in-house training and continuing education programs. It is universally recognized in the countries that, along with appropriate education, a good right-of-way agent must be mature and have strong people skills. In the Netherlands, employees must demonstrate these traits before being deemed eligible for the two-year in-house training for right-of-way agents.

### ❖ **Utilities**

Most of the countries make special efforts to enhance relationships between highway and utilities officials by improving coordination, cooperation, and communication. In several countries, jurisdiction-wide master agreements with each utility company are used to

avoid having to develop new utility agreements for every project. Germany tries to avoid the need to relocate utilities during highway construction through design measures. Roadside safety in Europe has been greatly improved by placing most utilities underground using enhanced landscape aesthetics. Several countries have established utility corridors for highway crossings. These corridors may include empty conduit for future installations and joint trenching. Utilities are included as essential components of design-build contracts in England. This is advantageous to the Highways Agency because it transfers the risk of utility related delays to the highway contractor, reducing claims for delays and large cost overruns (Moeller et al., 2002).

#### ❖ **Project Development**

Several countries have adopted the project management approach to project development, including the use of multidisciplinary teams. Practices include right-of way participation that begins at the planning stage, budget and schedule commitments with a sign-off by functional representatives and project managers, and accountability for delivery on those commitments. England uses design-build practices extensively in its program. Although right-of-way acquisition remains the responsibility of the Highways Agency, officials believe the potential for delegating some or all acquisition activities to design-build contractor's merits evaluation. Each country has an extensive planning process that includes significant input from affected property owners, community members, and local authorities. In several countries, zoning and land use plans prepared at the local or regional level govern decisions about the location of the transportation infrastructure (Moeller et al., 2002).

During the planning process, the European countries define specifically the problems the project will address and describe how it will achieve intended results. Several countries also perform broad feasibility reviews before acquisition. The delegation noted that all of the countries budget enough time and funding for projects to allow appropriately timed and scoped acquisitions and relocations.

The two particularly useful practices countries appeared to engage in more extensive public coordination are:

- Field reviews by the project manager or designer and right-of-way team member to meet with affected property owners early in the development of the project.
- Encouraging owner participation in design issues at early stages of project development.

Each country has a method for facilitating early possession or acquisition. These methods, including advance payment and right-of-entry, provide a great deal of flexibility. In addition they develop a system for managing data relevant to right-of-way functions. In addition to project file data management, several use geographic information systems (GIS) technology for tracking all land use, including right-of-way.

Some countries also establish standard right-of-way acquisition limits, such as minimums of one meter from the back slope of the ditch and three meters from the edge of pavement.

#### 2.3.4 Ethiopian's highway right of way practice

Highway right of way practice and procedures (issues related to public use of private property) in Ethiopia is based and governed by the rural land administration laws Proc. No. 455/2005; 456/2005; Urban Lease Proc No. 721/2011; the compensation regulation law Reg. No. 135/2007 plus other administrative guidelines. The following summarized issues are the core points of the proclamation no.455/2005 “expropriation of land holdings for public purpose and payment for compensation”.

- Power to Expropriate Landholdings

A woreda or an urban administration shall, upon payment in advance of compensation in accordance with this Proclamation, have the power to expropriate rural or urban landholdings for public purpose where it believes that it should be used for a better development project to be carried out by public entities, private investors, cooperative societies or other organs, or where' such expropriation has been decided by the appropriate higher regional or federal government organ for the same purpose.

- Notification of Expropriation Order

Where a woreda or an urban administration decides to expropriate a landholding it shall notify the landholder" in writing, indicating the time when the land has to be vacated and the amount of compensation to be paid.

Any landholder who has been served with an expropriation order shall hand over the land to the woreda or urban administration within 90 days from the date of payment of compensation or, if he refuses to receive the payment, from the date of deposit of the compensation in a blocked bank account in the name of the woreda or urban administration as may be appropriate. If there is no crop, perennial crop or other property on the expropriated, land the holder shall hand over the land to the woreda or urban administration within 30 days from the date of receipt of the expropriation order.

- Responsibilities of the Implementing Agency

The implementing agency shall have prepare detail data pertaining to the land needed for its works and send same, at least one year before the commencement of the works, to the organs empowered to expropriate land in accordance with this Proclamation and obtain permission from them; and. pay compensation in accordance with this proclamation to landholders whose holding: have been expropriated.

- Procedures for removal of Utility Lines

Where land over or under which utility lines, owned by a Federal or Regional government office or public enterprise, pass is to be expropriated, the body requiring the land shall submit, in writing, its request to the owner by indicating the exact location of the lines to be removed. The body which has received a request shall within 30 days from receipt of such request, determine a fair compensation required to replace the lines to be removed and send details of its valuation to the requesting body.

The body which requested the removal of utility lines, shall pay compensation to the owner within 30 days from the date of receipt of the. The owner shall also remove the utility lines and vacate the land within 60 days from the date of receipt of compensation.

- Basis and Amount of Compensation

A landholder whose holding has been expropriated shall be entitled to payment of compensation for his property situated on the land and for permanent improvements he made to such land. The amount of compensation for property situated on the expropriated land shall be determined on the basis of replacement cost of the property. Where the compensation is payable to an urban owner, it may not, in any way, be less than the current cost of constructing a single room low cost house in accordance with the standard set by the concerned region. The cost of removal, transportation and erection shall be paid as compensation for a property that could be relocated and continue its service as before. Valuation formula for determining compensation for various properties and detail prescription applicable there to shall be provided for by regulations.

- Valuation of Property

The valuation of property situated on land to be expropriated shall be carried out by certified private or public institutions or individual consultants on the basis of valuation formula adopted at the national level.

- Property Valuation Committees

Where the land to be expropriated is located in a rural area, the property situated thereon shall be valued by a committee of not more than five experts having the relevant qualification and to be designated by the woreda administration. Where the land to be expropriated is located in an urban center, the property situated thereon shall be valued by a committee of experts having the relevant qualification and to be designated by the urban administration.

Where the property situated on a land to be expropriated requires specialized knowledge and experience, it shall be valued by a separate committee of experts to be designated by the woreda or the urban administration.

- Complaints and Appeals in Relation to Compensation

Rural areas and in an urban center where an administrative organ to hear grievances related to urban landholding is not yet established, a complaint relating to the amount of compensation shall be submitted to the regular court having jurisdiction.

Where the holder of an expropriated urban land holding is dissatisfied with the amount of compensation, he may lodge his complaint to the administrative organ established by the urban administration to hear grievances related to urban landholdings.

As discussed in the above each regional office has its own ROW management team which is controlled by the Regional Office Directorate and in collaboration with other teams. The Design & Implementation Team is responsible for the overall ROW management issues including of the identification, valuation, compensation and removal of obstruction under proclamation no.455/2005 during the project development and implementation stage.

#### 2.3.5 Factors affecting ROW acquisition process

To improve the ROW acquisition process, it is vital to identify significant factors affecting the costs and duration of ROW acquisition. Because ROW acquisition for highway projects involves many stakeholders (Le, 2009), the interaction and communication between the parties not only between the agency and the property owners, but also between different divisions within the agency and between the parties and utilities are very important for successful ROW acquisition. Many studies have identified the major factors that affect the ROW acquisition. This section summarizes and discusses the attributes identified as significant factors affecting the cost and schedule of ROW acquisition for each ROW acquisition phase.

In the review of the US and European ROW best practices, the most important factors affecting ROW acquisition were related to “project development” and “appraisal and acquisition” activities. The “project development” category refers to ROW planning activities such as title assessment, surveying, field investigation, environmental assessment, design studies, ROW map development, and staff authorization (Caldas et al. 2006, FHWA 2009, Waters 2000). The “appraisal and acquisition” processes were found to be critically important (Aleithawe 2010, Caldas et al. 2006) because the determination of a parcel’s fair market value, the review of a parcel, and negotiation activities are directly related to the cost and duration of ROW acquisition.

The ROW best practices of US and European public agencies primarily focus on improving the agency's internal capability and the relationship with the public. For the best practices for improving the agency's internal capability, a team approach, early involvement, performance management planning, training and education programs, and application of IT tools were identified (Aleithawe 2010, McMinimee et al. 2009, Cambridge Systematics 2006, Moeller et al. 2002). For the best practices for improving the relationship with the public, public involvement in the early phases before the project design is finally determined, public involvement in the appraisal, the one agent concept, and other practices were identified from literature review (Caldas et al. 2006, Cambridge Systematics 2006).

Other US ROW best practices *on the Design-Build and Public-Private Partnership shows, in 2002*, TxDOT entered into a design-build contract with a developer for the State Highway 130 project, which is part of the Central Texas Turnpike System (CTTS) project. Because support for ROW acquisition, relocation, and utility adjustments was included in the developer's scope, the developer had the financial incentive to complete ROW acquisition and utility relocation. The project's design-build and public-private partnership context facilitated the application of the team approach, early coordination, and development of creative alternate design solutions. TxDOT noted that the first 40 mile section of the project realized a one-year shortening of the schedule and cost savings of \$400 million, and the ROW spending was also \$100 million under budget (Cambridge Systematics, 2006).

#### 2.3.6 Highway Right of way obstruction or (Access to site problem)

Many right of way problems arise during processes of providing compensation to the community their land is handed over for infrastructure purpose. Dispute between the community and the government as a result of land acquisition for infrastructure development is the most predominant issue on the ongoing rehabilitation and reconstruction processes. Hence discussion is one important solution to minimize dispute between land owners and the government. It further describes the community should be willing to provide land for infrastructure development and the government in turn should be committed in providing replacement land and appropriate compensation.

Right of way problem is not limited to only land acquisition issues with the community but utility reallocation becomes a major conflicting issue between transportation and utility industries, which are responsible for highway improvements and utility facilities. Reconstruction/ rehabilitation of a road have a number of problems than constructing a new road due to the relocation of utility facilities. One of the common problems which make relocating utility facility difficult is obtaining information about the location of utility facilities during design phase. In addition problems related right of way to quarry site is another problem with the regional administration.

### 2.3.7 Causes and effects of right of way obstruction

According to previous studies, right of way problem is observed in almost all highway construction projects in Ethiopia. Even though some researches mention right of way problem is the major reason for the time and cost overrun of construction projects within the country, few studies were done to investigate the cause and effects it brought to the construction industry.

#### 2.3.7.1 *Causes of right of way problem*

To improve the ROW acquisition process, it is imperative to identify significant factors affecting the costs and duration of ROW acquisition. Because ROW acquisition for highway projects involves many stakeholders (Le, 2009), the interaction and communication between the parties not only between the agency and the property owners, but also between different divisions within the agency and between the parties and utilities are very important for successful ROW acquisition. The agency's management capability to deal with the ROW acquisition process and the characteristics of parcels are also significant for ROW acquisition.

Many studies have identified the major factors that affect the cost of ROW acquisition. Most of the recent studies completed in this domain (Change-Albitres et al. 2014, Heiner and Kockelman 2005, Le, 2009, Sohn et al. 2009) are highly dependent on explanatory research methodologies, with which potential factors are identified and screened through statistical analysis and used to predict the cost and duration of ROW acquisition. These factors include project type, project location, parcel type, ownership type, acquisition method, etc.

Some of the factors affecting (causes) of right of way acquisition process in Ethiopia are

- ❖ Poor Right of way acquisition process
- ❖ The absence of awareness within the society to cooperate with the employer representative/ right of way administrative personnel

For countries like Ethiopia, where more than 85% of the citizens are dependent on traditional agriculture, losing land for road right of way is like dealing with survival. On the other hand for people in urban areas land and property are like two faces of a coin and when the question of right of way is asked the community refuse to accept and cooperate on the situation.

- ❖ Loose communication and corporation during relocation of utility facility

According to the report by Indiana road system, Right of way problem is not only related to land acquisition issues but also utility facilities which are responsible too for problems with regard to highway upgrading and improvements. A study by penn state university of American association of state highway and transportation officials cited in this report indicated that, road construction projects generally takes longer and costs more when utility facilities need to be relocated. The study indicated that the reconstruction of road in Michigan was delayed more than a year by a number of problems including relocation problems of utility facilities. One of the common problems which make relocating utility facility difficult is obtaining information about the location of utility facilities during design phase. After an in-depth study, the utility task forces organized by Indiana highway systems forwarded a recommendation which includes; improving awareness and better communication, new procedures to better coordinate relocation of utility facility and clarifying responsibility and to establish accountability to improve the situation.

- ❖ Design modification or total design change

Most of the original road designs, made by the consultant office, are done for the proclamation bid process and seems to be modified or changed during the construction phase mainly when the design is outdated (specially for town sections) or when a better path is suggested either by the engineer or the contractor. This situation creates a vacuum in delivering the site on time due to the right of way obstructions on the new path.

### 2.3.7.2 *Effects of right of way problem*

The effect of Right of way problem is observed on both the project time and cost which results in delay and extra cost.

#### I. Effect of right of way obstruction on the Project time

According to Abubeker (2015), contractors ranked "Delay to deliver the site (Right of way problem)" in the first position with a mean score of 4.483. This indicates how right of way problem affect the project time. If there is a right of way problem in construction project it will lead to a significant delay in a project. As observed from desk study some projects delay for years only due to right of way problem. This result is in line with the results of Tadesse (2009). The suitable description of this agreement is that the delay to deliver the site (Right of way problem) has a high impact in delaying Ethiopian road construction projects.

#### II. Effect of right of way obstruction on Project cost

Referring to Tadesse (2009), the first significant cause identified in his research on "Cause and effect of variation in Ethiopian Federal road projects" is right of way or accesses to site problems. The research point out right of way as a cause for variation and is ranked first by all respondents' consultants, contractors and the employer. This implies that right of way is one of the serious problems which results variations and cost overrun in Ethiopian Roads Authority.

### 2.3.8 Impacts of right of way problem

Roads are the arteries through which the economy pulses. By linking producers to markets, workers to jobs, students to school, and the sick to hospitals, roads are vital to any development agenda.

Road infrastructure is the most important public asset in order to make a nation grow and develop. When a road project got delayed or requires extra cost for completion due to right of way problem, it directly influences the contribution it made to the economic development and growth together with the social benefits of the country.

## I. Impact of right of way problem on the nation economy

Road network should be efficient in order to maximize economic and social benefits of any country. Roads play a significant role in achieving national development, socio-economic development and social functioning of the community with contributing to the overall performance (Ivanova and Masarova, 2013). Road construction is a huge investment a country made in order to enable better way of living for citizens. Like many developing nations, Ethiopia is borrowing from international lenders to expand the transportation infrastructure with the intention of facilitating the country's economic growth.

It is known that all liabilities came from right of way obstruction lies on the shoulder of the employer/client. When there is right of way problem the contractor propose claim for compensation. A claim due to right of way obstruction includes extra time and payment for the completion of the project. When the client is a governmental agency (Like Ethiopian Road Authority) it directly touches the government and affects the national economy. Personal economic advantage of citizens due to road construction will be affected in addition.

## II. Impact of right of way problem on the environmental and social benefit

Roads are significant component of the transportation fabric of society. It connects communities and has major impact on air and noise quality in the surrounding atmosphere. In addition it enhances the quality of social by creating easy life style (Thorpe, 2012). When a road construction is interrupted due to right of way obstruction the community will be faced to social and health problems due to the delay and unfinished works.

### **2.4 Factors Affecting Cost Overrun and Time Overrun of a Project**

Inability to complete a project either by the original planned time or budget, or both, ultimately results in project delay. The social and economic costs of delay are very high and when a delay can no longer controlled by the client, it will result in the project being out of control. Thus, it is important to predict and identify problems in the early stages of construction and diagnose the main causes and implement the most appropriate and economical solutions to prevent further negative impacts of delay.

Time and cost overruns occur in most construction projects and the magnitude varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project.

#### 2.4.1 Project cost overrun

Project cost has been defined as the amount of commitment in terms of money that is required to produce a construction product such as building, road, etc. Project cost represents all those items included under the heading of the expenditures (Ashworth, 2004). Project cost is quantitative assessments of the likely costs of the resources (labor, materials, supplies, etc.) required to complete all project activities (Duncan, 1990). It can be concluded that project cost is the amount of money that is required to complete all project activities.

Cost overrun is defined as the increase of actual cost over estimated cost. Jackson (1990) defined cost overrun as ratio between change in contract costs and estimated costs. The calculation is in percentage for easier comparison and the equation for calculation cost overrun is:  $\text{Cost overrun} = (\text{change in contract estimated amount}) / (\text{original estimated cost})$ . Choudhury and Phatak (2004) defined cost overrun as the difference between the original cost estimate in contract for specific project and the actual cost after the completion of that project. Costs overrun is also known as cost escalation, cost increase or budget overrun (Zhu and Lin 2004).

Overall, Cost overrun is the amount by which actual costs of a project at completion exceed the baseline or approved costs. For the purpose of this research cost overrun is defined as the positive difference between the final or actual cost of a construction project at completion and the contract amount agreed by the client and the contractor during signing of the contract.

#### 2.4.2 Project time overrun/ delay

Project time has been defined as duration of the project on the date stated in the contract, or interim completion dates required for phases of the work (Clough et. al., 2000). Failure to complete the project on the specified time is called delay.

Stumpf (2000) defined delay as an act or event that extends the time required to perform the tasks under a contract. It usually shows up as additional days of work or as a delayed start of an activity. Al-Gahtani and Mohan (2007) defined the time overrun as the increase in time to complete the project after the due date of project in contract. Kaming et al. (1997) defines the time delay as the extension of time beyond planned completion dates traceable to the contractors. Choudhry (2004) and Chan (2001) defined the time overruns as the difference between the actual completion time and the estimated and agreed completion time. It is measured in number of days.

Generally, construction delay could be defined as the time over run either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. To the owner, delay means loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases.

Completing projects on time is an indicator of effectiveness, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations.

#### *2.4.2.1 Types of project time overrun /delay*

The type of delay has an impact on critical activities which need a more detailed analysis to determine whether additional time extension is warranted or not. Terry Williams (2003) revealed the basic ways to classify delays: Excusable or non-excusable delay, Concurrent or non-concurrent delay, and Compensable or non-compensable delay. Excusable delays can be further classified into excusable with compensation and excusable without compensation.

The types of delays mentioned above have internal or external sources on project process. Internal causes of delay include causes that come from the owner, designers, contractors, and consultants. External causes of delays are originated from outside of construction projects such as utility companies, government, subcontractors, suppliers, labor unions, nature, etc.

## I. Excusable or non-excusable delay

All delays are either excusable or non-excusable. An excusable delay is a delay that is due to an unforeseeable event beyond the contractor's or the subcontractor's control. If the delay is considered compensable, then the contractor is entitled to additional financial compensation as well as extra project time. Under certain circumstances where non-compensated excusable delays occur, the contractor receives extra time but not extra money for the additional completed work.

Excusable delays are known as "force majeure" delays, and commonly called "acts of God" because they are not the responsibility or fault of any particular party. Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money (Alaghbari et al., 2007). Delays resulting from the following events would be considered excusable:

- General labor strikes
- Fires
- Floods
- Acts of God
- Owner-directed changes
- Differing site conditions or concealed conditions
- Unusually severe weather
- Intervention by outside agencies
- Lack of action by government bodies, such as building inspection

Non-excusable delays are events that are within the contractor's control or that are foreseeable. This type of delay is caused due to contractor's action or inaction, on which the contractor could have predicted and prevented. Hence the delay presents no entitlement both to time extension and cost. According to (Alkass et al., 1996) if the delay can be proved to have affected the whole project performance, then the contractor could be entitled to liquidated damages. These are some examples of non-excusable delays (Al- Gahtani and Mohan, 2007):

- ❖ Late performance of sub-contractors
- ❖ Untimely performance by suppliers

- ❖ Faulty workmanship by the contractor or sub-contractors
- ❖ A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labor practices

## **II. Concurrent or non-concurrent delays**

If only one factor is delaying construction, it is usually fairly easy to calculate both the time and cost resulting from that single issue. A more complicated but also more typical situation is one in which more than one factor delays the project at the same time or in overlapping periods of time. These are called concurrent delays (Alaghbari et al., 2007).

Concurrent delay is said to be caused when there is a situation of two or more delay occurrence at the same time or overlap to some degree. In such circumstances the combinations of the aforementioned scenarios should be considered in order to determine the possible entitlement to the contractor whether it is only extension of time or extension of time with financial compensation. In other word, concurrent delays occur when both owner and the contractor are responsible for the delay.

Generally, if the responsible parties of the delays are intertwined, neither the contractor can be held responsible for the delay (force to accelerate, or be liable for liquidated damages) nor can he recover the delay damages from the owner. Until the development of CPM schedule analysis, there was no reliable method to differentiate the impact of contractor caused delays from owner caused delays (Alwi et al., 2002).

Concurrent delays arise when one event causes a delay simultaneously with another event. For example, if an owner denies access to a project site for two weeks, and a severe storm prevents a contractor from working on the project for one of two weeks as well, there will be a concurrent delay of one week. The contractor will be able to recover for delay damages for one week, as a severe storm is not a cause of delay that is compensable and would have prevented the contractor from performing even if the owner did not deny access to the site.

## **III. Compensable or non-compensable delays**

A compensable delay is a delay where the contractor is entitled to a time extension and to additional financial compensation. Relating back to the excusable and non-excusable delays,

only excusable delays can be compensable. Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. Thus, the question of whether a delay is compensable must be answered. Additionally, a non-excusable delay warrants neither additional compensation nor a time extension.

In addition to the compensable delays that result from contract changes by change notice, there are compensable delays that can arise in other ways. Such compensable delays are excusable delays, suspensions, or interruptions to all or part of the work caused by an act or failure to act by the owner resulting from owner's breach of an obligation, stated or implied, in the contract. If the delay is compensable, then the contractor is entitled not only to an extension of time but also to an adjustment for any increase in costs caused by the delay (Al-Gahtani and Mohan, 2007).

Whether or not a delay is compensable depends primarily on the terms of the contract. In most cases, a contract specifically notes the kinds of delays that are non-compensable, for which the contractor does not receive any additional money but may be allowed a time extension.

Here it is clear that delay in clearing of right of way problems means delay in handing over of the site to the contractor by the client. Delay in site possession disturb contractor's schedule and causes delay in execution of different activities of the project which in turn delays project completion time. This type of delay is related to client and thus they are excusable and compensable type.

#### 2.4.3 Causes of project cost overrun and time overrun

Many studies have been conducted in different countries to identify the factors affecting time overrun in construction projects and the main causes of time and cost overrun differ from country to country.

Mansfield et al. (1994) studied the causes of delay and cost overrun in construction projects of Nigeria and found out that seven out of ten projects suffered delays in their execution, due to financing and payment for completed work, changes in site conditions, shortage of material, poor contract management and improper panning.

Kaming et al. (1997) investigated the factors influencing construction time and cost overruns on high-rise projects in Indonesia and observed that cost overruns occur more frequently and are more severe than time overruns. According to their study the main factors influencing time overruns are design changes, poor labor productivity, inadequate planning and resource shortage.

According to the research by Abubeker (2015), Respondents identified 47 causes of time and cost overrun for Addis Ababa road construction case. The major causes of time overrun were delay to furnish and deliver the site (Right of way problem), financial problems and improper planning. Whereas the most important causes of cost overrun were found to be delay in construction, inadequate supply of raw materials and equipment by contractors, design changes, Incomplete design at the time of tender.

Tadesse (2009) studied the “Cause and effect of variation in Ethiopian Federal road projects” and found out the most significant causes which have an impact both on time and cost of a project are: right of way or accesses to site, change in defined scope, lack of proper planning, lack of proper evaluation of tender documents at tendering phase by contractors and contractor’s financial problems.

#### *2.4.3.1 Causes of project cost overrun*

Cost overrun is a very common phenomenon and majority of projects in construction industry are facing this problem. Cost overrun occurs when the final cost or expenditure of the project exceeds the original estimation cost (Avots, 1983). Angelo and Reina (2002) pointed out that cost overrun is one of the main problems in construction industry. The problem may be found in both developing and developed countries. This problem is quite serious and further study on this issue is needed to reduce the problems. There are some factors that contribute to cost overrun construction industry which are found from the researchers’ study. The major factors are listed as follow:

- i. Inaccurate or Poor Estimation of Original Cost:** - Peeters and Madauss (2008) stated that the biggest factor that contributes to overruns of budget is inaccurate estimation of original or initial cost of a project. It is because of technical problem on

how to estimate project costs and also not enough project information in the early stage of project.

- ii. **Inflation of Project Costs:-** Harrison (1981) stated that inflation of project costs cause increasing of costs. Inflation of materials, equipment and labors costs may vary geographically within a country, from country to country, and contracts of subcontractors with suppliers may involve different inflation protection terms that agreed with a client. As inflation goes up, interest rates will go up and the costs will increase too.
- iii. **Improper Planning:-** According to Frimpong (2003), improper planning and management experience limitation causes time and cost overrun.
- iv. **Poor Project Management:-** Poor of site supervision and management and poor project management assistance contribute to problem of cost overrun in construction projects. Poor of site management reflected the weakness and incompetency of contractors. Skillful and experience human resource is insufficient in site management (Long et al., 2008).
- v. **Lack of Experience:-** Chan and Park (2005) found that most of the contractors are lack of experience especially in financial management. The distribution of the costs does not plan well in the projects. It might cause over of costs budgeted.
- vi. **Obsolete or Unsuitable Construction Equipment and Methods:-** Obsolete and unsuitable equipment and methods cause the progress of construction works become slower. Some countries try to import or transfer the modern technology into their countries. However, the method is unsuccessful because lack of skillful human to operate the technology (Long et al., 2004a).
- vii. **Unforeseen Site Conditions:-** Nega (2008) found that actual site conditions of a project are not usually determined until excavation is completed. It is sometimes possible that site conditions are overlooked by the initial review or conditions have changed due to change of weather conditions or sub-soil conditions. The unexpected conditions on sub surface sometimes require fundamental redesign of projects with high expense. Changes of site conditions become a problem for machinery and supplies to move in and out of the site. This also increase costs required.

- viii. **Mistake in Design:** - According to Long et al. (2008), mistakes in design or poor design are caused by the low- competence designer. The approval design or drawing process becomes low quality and ineffective especially for those with government funded projects. The unrealistic design which found after the start the construction projects has to change and it could lead to cost overrun.
- ix. **Insufficient Fund:** - Long et al. (2008) noted that delay of the projects followed by cost increasing to cover all the expenses during construction. Owners are not preparing sufficient fund for project and pay on time as shown in contract agreement to contractor.
- x. **Poor Contract Management:**-Ogunlana and Olomolaiye (1989) mentioned that many contractors in developing countries have organizes their own commercial undertaking. They are good in managing expense because they are familiar with the business of making money. They pay low wages, submit low bids and low ability to plan and coordinate contracts. They do not follow the agreement that stated in contract.
- xi. **High Cost of Machineries:**-Chan and Park (2005) found that high cost of machineries is one of the market related problems. Construction industry is mainly market driven where it is influenced by current market style. For example, when the oil needed to run machineries increasing, the rental cost of machineries also increasing.
- xii. **Construction Cost Underestimation:**-According to Nega (2008), some parties have deliberately underestimating of costs for their project in order to get project approval.

#### 2.4.3.2 *Causes of project time overrun/delay*

Road projects are being contracted out by road Authorities and given to eligible contractors to perform the required work within time and cost. However, almost all road projects being constructed in Ethiopia (both by local and international contractors) are delayed for one or another reasons. Identifying the causes of road construction delay is difficult since every construction project is unique, uncertain and inconsistent in its own way.

Most studies conducted so far tend to explore only causes of delays whereas some of them looked into delays along with cost overruns. Bramble and Callahan, (1992) cited a project may be delayed as a result of the direct action of major parties, or of their failure to act especially if they have a duty to act in the circumstances. In addition outside forces could also intervene to delay a project as much as the parties involving. Hence it is very important to describe the cause of delay by looking at different factors.

Similarly, Chan and Kumaraswamy (1997) conducted a study on identification of principal causes of time overrun in building and civil engineering projects in Hong Kong. They have listed the top 20 significant delay factors, and concluded that poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, client initiated variations and necessary variations of works were the five more significant sources of delays as perceived by the clients, consultants and contractors. Odeh and Battaineh (2002) investigated the contractors and consultants in Jordan construction industry and founded top ten factors that cause time overrun. These factors are owner interference, inadequate contractor experience, financing and payments problems, labor productivity, slow decision making, improper planning and sub-contractors related issues.

Robel (2015) in his research studied concluded that construction delay in Ethiopia is mostly caused due to financial problem, managerial problem or local contractor's limited capacity and ability.

Robel further stated delay causes as;

- Delay in delivering material on site, poor site management and untimely provision of documents by the contractor.
- Slow supervision and decision by the consultant.
- Delay in site handover, right of clearance, late in approving payments and lack of proper liaison work of the employer with local authorities.

#### 2.4.4 Effects of project cost and time overrun

Project overruns can have adverse effect on the project procurement and on society in general ranging from escalation of cost, delay in schedule, disputes and litigation, as well as project

abandonment, Efficient and effective project monitoring. In general the total effect of project cost overrun and project delay directly influence the end users (the client and the community).

#### *2.4.4.1 Effects of project time overrun*

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. The five effects of delay identified were:

- ❖ Cost overrun;
- ❖ Dispute;
- ❖ Arbitration;
- ❖ Total abandonment; and
- ❖ Litigation.

In the study of Manavazhia and Adhikarib (2002), delays in the delivery of materials and equipment to construction sites are often a contributory cause to cost overruns in construction projects in developing countries. The actual impact of these delays on project costs was found to be on average, only about 0.5 per cent of the total budgeted cost of the projects.

#### *2.4.4.2 Effects of project cost overrun*

Cost overruns have obvious effects for the key stakeholders in particular, and on the construction industry in general. To the client, cost overrun implies added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as higher rental/lease costs or prices. To the professionals, cost overrun implies inability to deliver value for money and could well tarnish their reputations and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit for non-completion, and defamation that could jeopardize his/her chances of winning further jobs, if at fault. To the industry as a whole, cost overruns could bring about project abandonment and a drop in construction activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks [Mbachu and Nkado, 2004]. All these consequences undermine the viability and sustainability of the construction industry.

The effects of cost overrun are not confined to the construction industry but are reflected in the state of the overall economy of a country. They state that delays and cost overruns in construction projects prevent the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth (Arditi, et al, 1985).

#### 2.4.5 Project time and cost management

Project management defined as the application of knowledge, skills, tools and techniques to ensure the project is completed on time, within cost and fulfills the quality standard. George and Friedman (1999), defines management in construction project as a group of management activities and engineering services related to a program, carried out during the pre-design, design and construction phase that contributes to the control of time and cost in a new facility.

Construction project sites are generally complex because of the extensive use of sophisticated plant, equipment, modern methods of construction, multidisciplinary and multitasked aspects of its project workforce (Evelyn Ai Lin Teo *et.al*, 2004). That is why management in construction project is needed to organize, arranges every function, actions and everyone involved. Management will help to settle everything in the right place (Cartin, 1993).

Generally, time and cost management in construction project is defined as centralized of time and cost planning, organizing and controlling in the fieldwork or in the construction sites to meet the goals of schedule, cost and quality estimation (Ritz, 1994).

#### 2.4.6 Implication of Time Extension on the Total Project Cost Overrun

Project success has many dimensions, one of which is timely completion (Fawzy and EL-adaway 2013). It has been argued that it is the most important matric to measure project success (Ullah et al. 2016). But literature suggests that delays in construction projects are almost inevitable, resulting in reduced confidence in the efficiency of the construction industry (Arif and Morad 2013). It is reported that 70% of projects, on average, face delays that extend their duration by 10–30% (Assaf and Al-Hejji 2006). Similarly Aibinu and Jagboro (2002) reported that construction delays are responsible for 36–64% of cost overruns.

Delay is one of the biggest problems often experienced on construction project sites. Most of construction projects face delays resulting in extension of time (EOT). Delay/time overrun increases in final costs of projects; wastage and under-utilization of man power and resource; tying down of client capital due to non-completion of the project and dispute among parties involved (Owolabi et al., 2014). Once a contractor has secured an extension of time and relief from liquidated damages, thoughts will quickly turn to recovery of the costs incurred due to the delayed completion date i.e. “prolongation costs” (Khaled, 2014). Prolongation costs are the additional costs that a contractor has incurred as a result of the completion of the work being delayed by an event that is the responsibility of the other party (usually the employer). Such events might include; failing to give the contractor possession of the site on the date specified in the contract; delays in giving instruction, and so on (Designing Buildings wiki, 2019).

According to Dereje (2015), Disruption of progress (by right of way problem or other reasons) is categorized as the major causes of cost claim, while variations and late possession of site as second and third under the Ethiopian Federal road projects. On the other hand, late possession of site, disruption of progress and variation are categorized as the highest causes of cost claim elements that have high impact on the local contractors, in their order of degree of impact.

#### 2.4.7 Project Time Overrun and Cost Overrun in Ethiopia Road Construction

Time and cost overruns in road construction projects in Ethiopia is one of the most significant problems in the field construction management.

Getachew (2009), in his study of the design risk management in Ethiopian Federal road projects, pointed out that the major factors influencing time and cost overrun were errors in estimation of Quantities, inadequate subsurface investigation and interpretation, poor pavement investigation and interpretation, inadequate/inaccurate topographic survey data, lack of design details, omission of works, change of alignment, poor specification, late implementation of design and poor drainage assessment.

Turkey (2012), in his study of the risk factors leading to cost overrun in Ethiopia Federal road construction projects and its consequences, examined the effects of cost on the delivery of construction projects in the country. To obtain expert opinions from the sector, he listed fifty

four (54) factors and 16 possible effects. The result of the desk study indicated that out of 30 upgrading and rehabilitation road construction projects investigated, 24 projects (80%) suffered cost overrun in their execution. The average rate of cost overrun in these projects was 26.95% of the contract amount. And 100% of the respondents to the questionnaire have recognized cost overrun as one of the major problems in Federal road construction projects. Unexpected inflation/ material price escalation, delays on completion time, scope changes, unstable cost of manufactured materials, inadequate site investigation and right of way problems (access to site and quarry) are identified as major factors leading to cost overrun.

Abubeker (2015), in his research on Factors Affecting Time and Cost Overrun in Road Construction Projects in Addis Ababa, Ten out of ten, (100%), road projects investigated in the research suffered time and cost overrun in their execution. For these road construction projects, the actual time overruns ranges from 25% to 264.38% of the contract time and the cost overrun range from 4.11% to 135.06% of the contract amount. According to the research, 32 causes of time overrun and 13 causes of cost overrun were identified by the respondents. The most common causes of time overrun are Delay to deliver the site (Right of way problem), financial problems of contractors, Improper planning, and Site management. And the most common causes of cost overrun are Design change, fluctuation in the cost of materials and inadequate review for drawings and contract document.

The problem of project delay and cost overruns can nearly be noticed in every project in Ethiopia road construction. Even though cost and time overrun occur in every construction project, the magnitude and reasons of these problems varies considerably from project to project. This indicate enough attention by responsible authorities is requires and more researches shall be done on the root causes in order to minimize and avoid the problem.

## **2.5 Right of Way Problem on Ethiopian Road Construction Projects**

Right of way problem occurs when the project owner/client is unable to deliver the construction site on time according to the contractual agreement. Right of way problem is difficult to be controlled by one party since it involves and work together with the community, different governmental authorities and public utility (water, electric, and telecommunication) companies and organizations.

Right of way problem is visible in almost all highway construction both in the urban and rural parts of Ethiopia. Even though very limited studies are done on the area, according to researches made on factors affecting the cost and time overrun of projects in Ethiopia, most of the researchers found out right of way (access to site) problems are the number one reasons mentioned by the parties (client, consultant, contractor) involved on the construction industry.

Abubeker (2015), research results indicated that the factor "Delay to deliver the site (Right of way problem)" has been ranked in the first position by contractors and owners while it gets the second rank by consultant. This result indicates the high importance of delivering the site on time to complete the project on time.

The right of way problem creates a dispute within parties of a project resulting in claims and extended project time of completion. Besides when there is a time delay on a project by any reason cost overrun is inevitable. A research made by Derege (2015) concludes that disruption of progress (by right of way problem or other reasons) is categorized as the major causes of cost claim, while variation and late possession of site as second and third under the Ethiopian federal road projects.

The problem of projects delay and cost overruns can nearly be noticed in every project in Ethiopia. The report made on the accomplishment of the first 10 years Road Sector Development Program RSDP III (2007) reveals that the execution of most of the Federal road projects resulted in cost and time overruns. Though studying the causes for projects cost and time overruns and there occurrence is critical, sufficient attention is not given by the responsible bodies in identifying the reason behind each cause. Once the causes of a problem (like right of way problems) are identified proper mitigation measures can be taken to minimize and avoid the problem step by step.

In the meantime, right of way problem is the leading reason for cost and time overrun of projects in Ethiopia and knowing the problem can lead one to the prevention and solution. Having this in to consideration, this research is aimed in finding out the causes of right of way problems and the effects it brought to the cost and time overrun of the project.

## 2.6 Summary of Literature Review

The literature review was done through previous studies, searching internet, reading construction management books, and engineering journals. By referring studies and works done by other researchers helps in focusing on a specific issue to be used by this paper. In addition it was used to develop proper questions for the questionnaire survey used to collect data from the targeted respondent.

Right-of-way (ROW) acquisition is the act of taking the land from its original owner by another party, with legal rights to take the real property, by providing a monetary compensation for the value of the property (Francis 2009). ROW acquisition process is a legal, administrative and regulatory procedure which is governed by the national laws and local regulations.

Highway right of way practice and procedures (issues related to public use of private property) in Ethiopia is based and governed by the rural land administration laws Proc. No. 455/2005; 456/2005; Urban Lease Proc No. 721/2011; plus the compensation regulation law Reg. No. 135/2007/ plus other administrative guidelines.

Right of way problem (access to site or quarry) occurs when the project owner/client is unable to deliver the construction site on time according to the contractual agreement. Right of way problem is difficult to be controlled by one party since it involves and work together with the community, different governmental authorities and public utility (water, electric, and telecommunication) companies and organizations.

Right of way problem is observed in almost all highway construction projects in Ethiopia, it is not only limited to land acquisition issues with the community but utility reallocation becomes a major conflicting issue between transportation and utility industries, which are responsible for highway improvements and utility facilities. The effect of Right of way problem is observed on both the project time and cost which results in delay and extra cost due to variation to complete the project.

Inability to complete a project either by the original planned time or budget, or both, ultimately results in project overrun. Time and cost overruns occur in most construction projects and the magnitude varies considerably from project to project. So it is essential to define the

actual causes of time overrun and cost overruns in order to minimize or avoid the delays and increasing cost in any construction project.

According to the research by Abubeker (2015), the major causes of time overrun were delay to furnish and deliver the site (Right of way problem), financial problems and improper planning. Whereas the most important causes of cost overrun were found to be delay in construction, inadequate supply of raw materials and equipment by contractors, design changes, Incomplete design at the time of tender. Time and cost overruns in road construction projects in Ethiopia is one of the most significant problems in the field construction management.

Due to the unique property of a construction project, the causes for ROW problem may differ from project to project. The major factors contributing to right of way problems according to researches made by some developed countries were, ROW plan changes and revisions due to changes in scope of Work; lack of ROW staff's knowledge, skills, experience and commitment; delay in identification and appraisal of ROW problems; delays in compensation, displacement and relocation; and design errors by the design consultants. In addition, professionals working in/with the Ethiopian Federal road projects listed many reasons behind Ethiopian Federal roads ROW problems some are insufficient coordination between ROW agents and utility authorities; insufficient number of ROW staff or appraisers; delay in clearing of ROW properties after compensation and fencing land by property owners after taking property compensation.

The problem of project delay and cost overruns can nearly be noticed in every project in Ethiopia road construction. Even though cost and time overrun occur in every construction project, the magnitude and reasons of these problems varies considerably from project to project. This indicate enough attention by responsible authorities is requires and more researches shall be done on the root causes in order to minimize and avoid the problem.

Even though some researches indicates right of way problem as a major cause for time overrun and cost overrun of construction projects within the country, only few studies were done to investigate the cause behind and effects it brought to the construction industry. Having this in to consideration, this research aimed in finding out the causes of right of way problems and the effects it brought to the cost overrun and time overrun on Ethiopian Federal road project.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 Introduction**

This section describes all the procedures that were undertaken to achieve the objectives set for this study. Procedures adopted for the collection of data, where and how the data is collected and finally the techniques followed to analyze the data will be discussed. In addition, data and information sources, research instruments, sample size and detailed method of analysis are presented.

The succeeding section provides a general description of the research design adopted for this thesis, as well as the methodology to be followed.

#### **3.2 Description of the study area**

The study was conducted on Ethiopian Federal road projects, a case study of ERA western region. According to the proclamation No 80/1997; Ethiopian Road Authority is legally autonomous agency responsible for the management of the country's roads. Based on the geographical location and equivalent road network volume five regional offices are established under ERA. These are northern, southern, eastern, western and central ERA Regional Offices (Organizational background of ERA, 2009). The case study was conducted on ERA western region due to data accessibility.

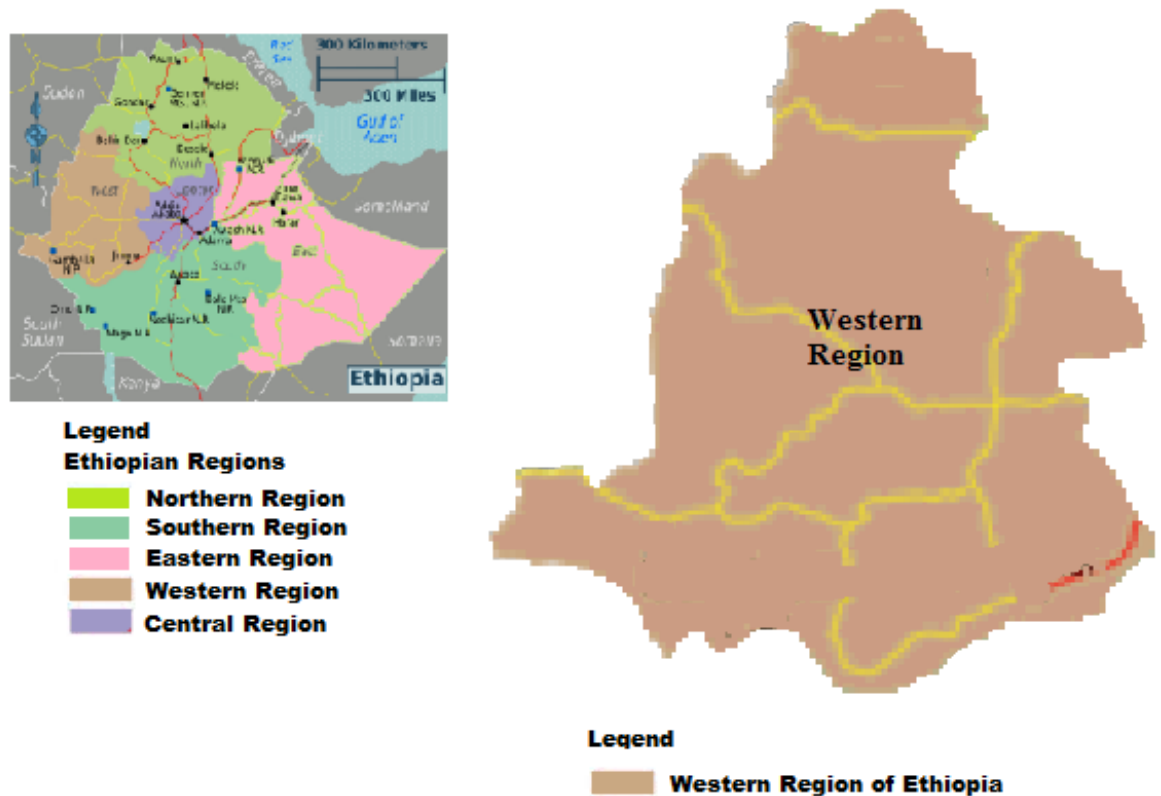


Figure 3.1 Graphic representation of the case study area (western region of ERA)

### 3.3 Research Design

Majorly, research strategies are categorized in two types, which are: quantitative research and qualitative research. Quantitative research is an objective measurement of a problem based on a theory composed of variables that can be measured in numbers; while qualitative research emphasizes meanings, experiences and descriptions to subjectively evaluate the opinion, view or perception of respondents towards a particular issue. The decision in the choice of the research type is mainly depends on the type of study and availability of the information required for the study (Naoum, 1998).

Triangulation, the use of qualitative and quantitative techniques together to study the topic (Richard and Anita, 2008), was used as a research strategy of this thesis. A qualitative study was used in order to collect the data regarding people’s perceptions towards the causes of right of way problem and the mitigation methods to adopt. In addition a quantitative research was

adopted as a research strategy to assess the effect of right of way problem on the delay and cost overrun of the projects under the case study. Case study, desk study, and questionnaire survey are the methods of data collections adopted for the research. Analysis of the case study and the desk study were carried out with regard to theoretical aspects.

### **3.4 Data Collection**

In order to successfully conduct the research different data gathering methods are used to look the subject matter from different perspectives and collect the necessary data properly. In achieving this primary data for the study was obtained through collecting questionnaires and case study in addition the Secondary data from the desk study and relevant literature that covered researches and publication on the subject matter is used to compliment the primary data.

#### **3.4.1 Questionnaire**

The questionnaire was developed to assess the perceptions and gather information from the main actor's (employer, contractor and consultant) of the Ethiopian federal road projects. It is designed and prepared to be suitable for all participants sharing common questions to be filled by all respondents and some questions specially aimed to be filled by specific group. The questionnaire have three sections, the first section deal with ranking the frequency and severity of the listed 26 cause of right of way problems categorized into 6 major groups; the second section focus on indicating how important/ significant an activity is from the listed 19 practice /activity categorized into 6 major groups is to alleviate the right of way problem and the third section aimed to get the current practices of ERA right of way management in Ethiopian federal road projects from the perspective of the respondent's and their organization.

#### **3.4.2 Case study**

The case study was done to see the practical effects right of way problem on time and cost overruns of Ethiopian federal road projects. The case study was performed on 10 ERA western region projects whose ROW acquisition process was completed.

### 3.4.3 Desk study

Desk research is used to review previous research findings and to gain a broad understanding of the field (David, 2016). Desk research is another name for secondary research and in this thesis desk study was done as a supportive for the primary data collected. In addition it was necessary to study on the relation between project delay and cost overrun due to EOT due to shortage of quantified primary data.

## 3.5 Sampling

The objective of sampling is to provide a practical means of enabling the data collection and processing components of research to be carried out whilst ensuring that the sample provides a good representation of the population; i.e. the sample is representative (Richard and Anita, 2008). The case study was done on Ethiopian Road Authority western region projects; by project commencement date with in the duration of 2010 up to present. Since the number of population for the case study was small, a full population sampling method was proposed. But from the total number of 16 projects, 4 of them were completed; 1 was terminated and 11 of them were on progress. In addition, from a total of 11 projects on progress, the ROW acquisition processes of the 6 projects were completed. Hence, the case study was done only on projects whose ROW acquisition processes was completed and have a completed data required by the study. Therefore a total of 10 (4 completed and 6 on progress) ERA western region Federal Road projects were seen under the case study. A total of 45 questionnaires were sent to reputable professionals selected from contractors, employer /ERA, and consultants that were considered to be familiar with Ethiopian federal road projects.

## 3.6 Method of Data Analysis

Data analysis is a process of inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, informing conclusion and supporting decision making (Xia et al., 2015). The data analysis for the case study and the desk study were carried out with regard to theoretical propositions and the primary data collected through questionnaires was done using Importance Index and Relative Importance Index techniques according to the information gathered.

The most common scale for obtaining respondents' opinions is the Likert scale (Richard and Anita, 2008). As noted by Bell (1993), such scales are concerned with determining respondents' degrees of agreement or disagreement. By using an odd number of response points, respondents may be tempted to 'opt out' of answering by selecting the midpoint. Hence, it may be helpful not only to keep the number of response points small but also to use an even number of response points, thereby having no central point. So, a 4- or 6-point scale of responses may be preferable to the more usual 5 or 7 points. Taking the advantages over the disadvantages, the researcher used the four-point Likert scale to get a specific response by eliminating the neutral option.

### 3.6.1 Importance Index technique:

In this technique, for each cause/factor of right of way problems two questions were asked: What was the frequency of occurrence for the cause? And what was the degree of severity of the cause on project delay? Both frequency of occurrence and severity were categorized on a four-point scale. Frequency of occurrence was categorized as follows: always, often, sometimes and rarely (point scale from 4 to 1). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to 1 point scale).

The important index as a function of severity index and frequency index using four-point Likert scale is given by the following equations (Aditya, 2017).

- I. **Frequency index:** A formula was used to rank causes of right of way problem based on frequency of occurrence as identified by the participants.

$$\text{Frequency Index} = (\text{F. I.})(\%) = \sum a \frac{n}{N} * \frac{100}{4} \dots [\text{Equation 3.1}]$$

Where, **a** is the weighting given to each factor by the respondents

(i.e. 1=rarely, 2=sometimes, 3=often, 4=always)

**n** is the frequency of the responses

**N** is total number of responses

II. **Severity index:** A formula was used to rank causes of right of way problem based on severity as indicated by the participants.

$$\text{Severity Index} = (\text{S.I.})(\%) = \sum a \frac{n}{N} * \frac{100}{4} \dots [\text{Equation 3.2}]$$

Where, **a** is the weighting given to each factor by the respondents

(i.e. 1= little, 2=moderate, 3=great, 4=extreme)

**n** is the frequency of the responses

**N** is total number of responses

III. **Importance index:** The importance index of each cause was calculated as a function of both frequency and severity indices, as follows:

$$\text{Importance Index} = (\text{IMP. I.})(\%) = \frac{[\text{F.I.}(\%) * \text{S.I.}(\%)]}{100} \dots [\text{Equation 3.3}]$$

The IMP.I was used to rank (R) the different causes of right of way problem. The ranking of factors according to the importance index made it possible to cross-compare the factors as perceived by the three groups of respondents (i.e. employer, consultants and contractors).

Each individual causes of IMP.I perceived by all respondents was used to evaluate the general and overall rankings in order to get an overall picture on the causes of right of way problems in Ethiopian federal road projects.

### 3.6.2 Relative Importance Index technique:

This method was adopted in the study to give a rank on the level of significance, from the listed mitigation measures of right of way problems according to the opinion of the respondents from different groups (i.e. clients, consultants or contractors). The four-point Likert scale ranged from 1 (less important) to 4 (extremely important) was adopted and transformed to Relative Importance Index (RII). Kometa et al. (1994) and Sambasivan and Soon (2007) used the RII method to determine the relative importance of the various causes of delays. The same method was adopted in this study. RIIs was calculated for each factor as follows.

$$\text{RII} = \sum \frac{W}{A} * N \dots [\text{Equation 3.4}]$$

Where, **W** is the weighting given to each factor by the respondents

(i.e. 1= Not Important, 2= Less Important, 3= Important, 4=Very Important)

**A** is the highest weight (i.e. 4 in this case),

**N** is total number of responses

The RII value had a range from 0 to 1 (0 not inclusive), the higher the value of RII, the more important the mitigation measure was. The RII was used to rank (R) the different mitigation measures. These rankings made it possible to cross-compare the relative importance of the factors as perceived by the three groups of respondents (i.e. Employer, consultants and contractors). Each individual RII perceived by all respondents are used to assess the general and overall rankings in order to give an overall picture of the best mitigation measure to adopt.

### 3.6.3 Data accuracy check approach

Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. The Spearman (rho) rank correlation coefficient is used for measuring the differences in ranking between two groups of respondents scoring for various factors and to discover the strength of a link between two set of data.(i.e. clients versus consultants, clients versus contractors, and consultants versus contractors), while ignoring the ranking of the third party. The Spearman (rho) rank correlation coefficient for any two groups of ranking is given by the following formula (Naoum, 1998):

$$\text{Rho } (\rho_{cal}) = 1 - \frac{6 \cdot (\sum di^2)}{N \cdot (N^2 - 1)} \quad \dots \text{ [Equation 3.5]}$$

Where:

**Rho ( $\rho_{cal}$ )** – Spearman rank correlation coefficient

**di** – The difference in ranking between each pair of factors

**N** – Number of factors (variables)

The correlation coefficient varies between +1 and -1, where +1 implies a perfect positive relationship (agreement), while -1 implies a perfect negative relationship (disagreement).

## CHAPTER FOUR

### ANALYSIS AND DISCUSSION OF RESULTS

#### 4.1 Introduction

In this chapter, different analysis methods are used to come up with a result and discussion is made on the outputs. The results from the questionnaire survey on the causes of right of way problems on Ethiopian Federal road projects and the mitigation measures to follow are discussed from the point of contractors, consultants and the Employer. The detailed data collected for the case study from ERA western region on road projects regarding the effects of right of way problems on time and cost overrun are discussed along with the desk study. These help to know whether there is time and cost overrun exist due to right of way problems or not, in addition to investigate the exact amount of time and cost overruns a project got due to right of way problems and to compare the value with the total extension of time and cost overrun at completion of the project.

#### 4.2 Analysis and Discussion of Questionnaires

The questionnaire was prepared to collect the perspectives of different group of respondents on the frequency and severity of causes of right of way problems on Ethiopian federal road projects and the mitigation measures to adopt. Twenty-six causes of right of way problems of road projects and nineteen mitigation measures were identified from literature and professional's experience then categorized under six main groups as: Project Development; Agency's Internal Capability; Relationship with the Public; Appraisal and Acquisition; Relationship with Utility Authorities and Others.

The survey focused on two questions, causes of right of way problems and mitigation measures and rated using a four-point Likert scale. For ranking the causes of right of way problems and the mitigation measures, questionnaires were prepared and analyzed based on two approaches. Importance index is calculated as a function of frequency and severity index for each cause of right of way problems and Relative Importance Index (RII) is calculated for each mitigation measure and ranked according to the perception of the respondents. An essay answer form was also provided to obtain other causes for ROW problems, recommended practices, issues that

were not fully addressed in the survey questionnaire. The full survey questionnaire is attached in the Appendix A, and the survey responses are provided in Appendix B.

#### 4.2.1 Questionnaires Response Rate

A total of 45 questionnaires were sent to a selected sample of respondents in the Federal road construction industry which comprise: 15 client (ERA), 15 consultants, and 15 contractors that are considered to have direct relation with the objectives of the research. Out of these 39 questionnaires were collected that comprises 12 from client (ERA), 14 from consultants, and 13 from contractors. The total response rate is 86.7%. The details of the overall questionnaire distribution and collected percentages are shown in the table below.

*Table 4.1 Questionnaires Response Rate*

No	Respondent	Total Questionnaire Distributed	Total Questionnaire Collected	Response rate (%)
1	Consultant	15	13	86.7
2	Contractor	15	14	93.3
3	Employer (ERA)	15	12	80
<b>Total</b>		<b>45</b>	<b>39</b>	<b>86.7</b>

#### 4.2.2 Respondents general experience on Road Projects

Out of the 39 respondents, the data depicted below shows that 25.6% of the respondents had 5 or less years of working experience, 38.5% had 5 to 10 years of experience, 30.8% had 10 to 15 years of experience and 5.1% had more than 15years of experience.

*Table 4.2 Respondents general experience on Road Projects*

No.	Experience	Client	%	Contractor	%	Consultant	%	Total	%
1	≤ 5 years	3	25	3	21	4	30.8	10	26
2	5 - 10 years	5	41.7	4	29	6	46.1	15	39
3	10- 15years	3	25	7	50	2	15.4	12	31
4	≥ 15 years	1	8.3	0	0	1	7.7	2	5.1
<b>Total</b>		<b>12</b>	<b>100</b>	<b>14</b>	<b>100</b>	<b>13</b>	<b>100</b>	<b>39</b>	<b>100</b>

#### 4.2.3 Questionnaires results: Causes of ROW problems in Ethiopian Federal Road projects

The most common scale for obtaining respondents' opinions is the Likert scale (Richard and Anita, 2008) and as noted by Bell (1993), the four-point Likert scale was used to get a specific response by eliminating the neutral option. The questionnaire respondents were asked to rank the frequency of occurrences (4- Always; 3- Often; 2- Sometimes; 1- Rarely) and severity of effect (4- Extreme; 3- Great ; 2- Moderate ; 1- little ) of an identified factor of right of way problem from listed groups of factors according to their level of reputation.

The collected data was tabulated according to the weight given for each factors of right of way problems. Accordingly, the Importance index as a function of frequency and severity index of each cause of right of way problem was calculated and ranked to its level of importance. Finally the group Importance index is calculated and used to rank the group with the highest and lowest contribution to right of way problem.

Here summary of the analysis and results are discussed and presented according to the perception of each respondent groups and general. The survey responses and detail analysis and results are provided in Appendix B.

##### *4.2.3.1 Employer's group view*

The table below shows the analysis results for the causes of right of way problems according to the data collected from the employers group.

Table 4.3 Data analysis results for the causes of ROW problems (Employer view)

No	Factors/Causing right of way problems	Frequency Index	Severity Index	Importance Index	Factor Rank	Category IMP.I	Category Rank
		(F.I.) (%)	(S.I.) (%)	(IMP.I.)(%)			
		$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\frac{[F. I. * S. I. ]}{100}$			
<b>1</b>	<b>Project Development</b>				<b>46.48</b>		<b>2</b>
1.1	Conflict of interests between different work divisions	62.5	62.5	39.06	18		
1.2	Lack of coordination and sequential hand over environment among project teams	70.83	75	53.16	8		
1.3	ROW plan changes and revisions due to changes in scope of Work	75	66.67	50	9		
1.4	Tight schedule for ROW acquisition tasks with specified time line and limited number of staff	58.33	75	43.75	14		
<b>2</b>	<b>Agency's Internal Capability</b>				<b>33.33</b>		<b>6</b>
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	66.67	58.33	38.89	19		
2.2	Insufficient number of ROW staff or appraisers	66.67	41.67	27.78	26		
<b>3</b>	<b>Relationship with the Public</b>				<b>49.96</b>		<b>1</b>
3.1	Less communication between appraiser/ ROW staff and the public including property owners	62.5	58.33	36.46	20		
3.2	Limited information provision to the public (e.g. price Disclosure)	66.67	50	33.33	23		
3.3	Property owners' distrust of agency and/or appraisal	87.5	64.58	56.52	3		
3.4	Property owners' refusing to accept the appraisal's decision.	83.33	75	62.5	1		
3.5	Absence of motivation for property owners to settle early.	79.17	77.08	61.02	2		
<b>4</b>	<b>Appraisal and Acquisition</b>				<b>42.21</b>		<b>5</b>
4.1	Delay in identification and appraisal of ROW problems	70.83	56.25	39.84	17		
4.2	Delays in compensation, displacement and relocation	75	70.83	53.13	7		
4.3	Delay in clearing of ROW properties after compensation (property management)	79.17	68.75	54.43	5		
4.4	Limited access to the property due to the resistance of the property owners	75	62.5	46.88	12		
4.5	Errors and omission in identification of ROW problems	58.33	52.08	30.38	24		
4.6	Fencing of the land by property owners after taking property compensation	62.5	45.83	28.65	25		
<b>5</b>	<b>Relationship with Utility Authorities</b>				<b>46.00</b>		<b>3</b>
5.1	Insufficient coordination between ROW agents and utility authorities	79.17	68.75	54.43	5		
5.2	Lack of commitment and sufficient manpower from utility authorities	83.33	66.67	55.56	4		

5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	70.83	47.91	33.94	22		
5.4	Over cost estimation by utility authorities	70.83	50	35.42	21		
5.5	Delay in relocation/protection of utilities lines after compensation.	75	58.33	43.75	14		
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	79.17	62.5	49.48	10		
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	79.17	62.5	49.48	10		
6	<b>Other</b>				42.79	4	
6.1	Lack of temporary land for subsidiary construction activities	70.83	62.5	44.27	13		
6.2	Design errors by the design consultants	70.83	58.33	41.32	16		

The factor/causes of ROW problems categorized under “Relationship with the Public” were ranked primary followed by “Project Development” and “Relationship with Utility Authorities” with the category IMP index of 49.96%, 46.48% and 46.00% respectively. On the other hand, factors under the category “Agency’s Internal Capability” ranked as less important for causes of right of way problem with IMP. index of 33.33 %.

The table below shows the top five most important causes of ROW problems from the point of view of employer’s group respondent.

*Table 4.4 Most important causes of ROW problem (Employer view)*

Rank	Cause of ROW problem	(IMP.I.)(%)
1	Property owners’ refusing to accept the appraisal’s decision.	62.5
2	Absence of motivation for property owners to settle early.	61.02
3	Property owners’ distrust of agency and/or appraisal	56.52
4	Lack of commitment and sufficient manpower from utility authorities	55.56
5	Insufficient coordination between ROW agents and utility authorities	54.43

As shown in the above table “Property owners’ refusing to accept the appraisal’s decision” was the top-ranked factor for right of way problem with an Importance Index of 62.5%. This cause of ROW problem occurred since most of the property owners use compensation issue as an asset development mechanism and usually refuse to accept the payment offered from the appraisal since they are interested in maximizing their compensation.

“Absence of motivation for property owners to settle early.” and “Property owners’ distrust of agency and/or appraisal” are rated the second and third with an Importance Index of 61.02% and 56.52% respectively. These factors interrelated in that if there is distrust in the agency the action to settle will be interrupted. Under the current system, property owners do not have motivation to accept the agency’s offer to settle early because there is no incentive for them. Some owners strongly believe that they can get more compensation if they reject the agency’s offer (Jeong, 2016). Property owners’ distrust on the agency and/or appraisal may be resulted from the property owner’s belief on the acquiring agency would not present an offer at a fair market value and just compensation. Some others may simply be interested in maximizing their compensation.

Other factors “Lack of commitment and sufficient manpower from utility authorities” and “Insufficient coordination between ROW agents and utility authorities” are rated as the fourth and fifth most important factor/causes of right of way problem. Less commitment and insufficient manpower from the utility authorities’ results delay in relocation process and disruption of project work. The acquisition of right of way or other property and utility relocation located near or on property impacted by a transportation project require close coordination between the agencies and the government bodies (TxDOT, 2004).

From the top five most important factors/causes of right of way problems, it should be noted that the top three factors were under the “Relationship with the public” factor group and the last two were from the “Relationship with utility authorities” category. As a result, the two groups’ are the top two categories’ with factors/causes of right of way problems. This implies that effective interaction with the property owners and utility authorities is highly significant in facilitating the ROW acquisition process.

*Table 4.5 Less important causes of ROW problem (Employer view)*

Rank	Cause of ROW problem	(IMP.I.)(%)
26	Insufficient number of ROW staff or appraisers.	27.78
25	Fencing of the land by property owners after taking property compensation	28.65
24	Errors and omission in identification of ROW problems	30.38
23	Limited information provision to the public (e.g. price Disclosure)	33.33
22	Unexpected sub-surface conditions due to inadequate information from utility authorities	33.94

The table 4.5 shows the least contributing factors of right of way problems with low important index. The factors “Insufficient number of ROW staff or appraisers” with an Importance Index of 27.78%; “Fencing of the land by property owners after taking property compensation” with an Importance Index of 28.65 and “Errors and omission in identification of ROW problems” with an importance index of 30.38 were placed on the top of the table.

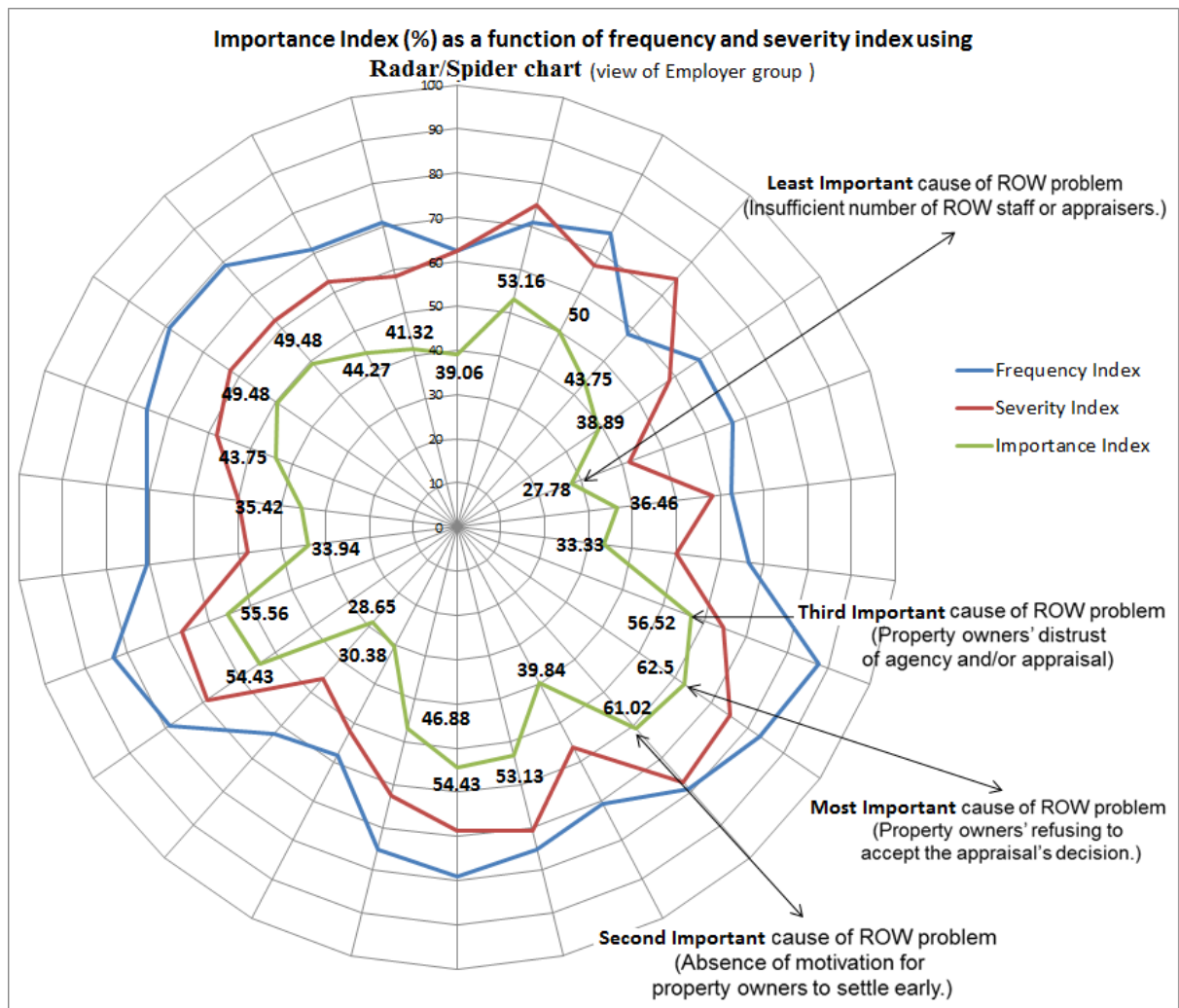


Figure.4.1 Summary of Employer group view in spider chart

#### 4.2.3.2 Contractor's group view

According to the data collected from the contractor group respondents, the importance index was calculated as a function of frequency and severity index of each cause. The group importance index was calculated and rated accordingly. The table below shows the analysis results.

Table 4.6 Data analysis results for the causes of ROW problem (Contractor view)

No.	Factors/Cause of right of way problems	Frequency Index	Severity Index	Importance Index	Factor Rank	Category IMP.I	Category Rank
		(F.I.) (%)	(S.I.) (%)	(IMP.I.)(%)			
		$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\frac{[F. I. * S. I. ]}{100}$			
<b>1</b>	<b>Project Development</b>				<b>64.39</b>		<b>1</b>
1.1	Conflict of interests between different work divisions	85.71	78.57	67.35	5		
1.2	Lack of coordination and sequential hand over environment among project teams	87.5	83.93	73.44	3		
1.3	ROW plan changes and revisions due to changes in scope of Work	67.86	66.07	44.83	15		
1.4	Tight schedule for ROW acquisition tasks with specified time line and limited number of staff	83.93	85.71	71.94	4		
<b>2</b>	<b>Agency's Internal Capability</b>				<b>45.85</b>		<b>5</b>
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	76.79	71.43	54.85	12		
2.2	Insufficient number of ROW staff or appraisers	60.71	60.71	36.86	22		
<b>3</b>	<b>Relationship with the Public</b>				<b>50</b>		<b>3</b>
3.1	Less communication between appraiser/ ROW staff and the public including property owners	64.28	69.643	44.77	16		
3.2	Limited information provision to the public (e.g. price Disclosure)	64.28	64.29	41.33	18		
3.3	Property owners' distrust of agency and/or appraisal	71.43	60.71	43.37	17		
3.4	Property owners' refusing to accept the appraisal's decision.	75	80.36	60.27	8		
3.5	Absence of motivation for property owners to settle early.	75	80.36	60.27	9		
<b>4</b>	<b>Appraisal and Acquisition</b>				<b>55.05</b>		<b>2</b>
4.1	Delay in identification and appraisal of ROW problems	83.93	89.29	74.94	2		
4.2	Delays in compensation, displacement and relocation	92.86	92.86	86.22	1		
4.3	Delay in clearing of ROW properties after compensation (property management)	78.57	78.57	61.74	7		
4.4	Limited access to the property due to the resistance of the property owners	71.43	66.07	47.19	14		
4.5	Errors and omission in identification of ROW problems	58.93	64.29	37.88	20		
4.6	Fencing of the land by property owners after taking property compensation	44.64	50	22.32	26		
<b>5</b>	<b>Relationship with Utility Authorities</b>				<b>49.15</b>		<b>4</b>
5.1	Insufficient coordination between ROW agents and utility authorities	78.57	83.93	65.94	6		
5.2	Lack of commitment and sufficient manpower from utility authorities	73.21	78.57	57.53	11		

5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	62.5	58.93	36.83	23		
5.4	Over cost estimation by utility authorities	69.64	69.64	48.50	13		
5.5	Delay in relocation/protection of utilities lines after compensation.	78.57	75	58.93	10		
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	67.86	53.57	36.35	24		
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	67.86	58.93	39.99	19		
6	<b>Other</b>				34.26	6	
6.1	Lack of temporary land for subsidiary construction activities	58.93	64.29	37.88	20		
6.2	Design errors by the design consultants	55.36	55.36	30.64	25		

Factor/causes of ROW problems categorized under “Project Development” were ranked primary with an important index of 64.39% followed by “Appraisal and Acquisition” and “Relationship with the Public” respectively. The contribution of the causes under the factor group “Other”, for right of way problem, were less important.

The top five most important causes of ROW problems from the point of contractor group respondent are listed on the table below.

*Table 4.7 Most important causes of ROW problem (Contractor view)*

Rank	Cause of ROW problem	IMP.I. (%)
1	Delays in compensation, displacement and relocation	86.22
2	Delay in identification and appraisal of ROW problems	74.94
3	Lack of coordination and sequential hand-off environment among project teams	73.44
4	Tight schedule for ROW acquisition tasks	71.94
5	Conflict of interests between different divisions	67.35

The two top-ranked factors “Delays in compensation, displacement and relocation” and “Delay in identification and appraisal of ROW problems” were under the “Appraisal and Acquisition” factor group. Since ROW compensation, displacement and relocation are chain procedures of ROW acquisition process; if delay occurred in one of the procedures the entire development will be entrapped. This show the contractors have concern on the employer’s right of way appraisal and acquisition process.

“Lack of coordination and sequential handover environment among project teams”; “Tight schedule for ROW acquisition tasks” and “Conflict of interests between different divisions” were ranked as the most important causes of ROW problems respectively. These factors are related to project development factor group and highly contribute for the group to be considered primarily.

In general each phase and activity of the ROW acquisition process is important and influences the cost and duration of ROW acquisition. However, the appraisal phase is especially critical for determining ROW cost because the determination of a parcel’s fair market value and the review of the appraisal are directly related to the cost of ROW acquisition and the overall project development (D Jeong, 2016).

*Table 4.8 Less important causes of ROW problem (Contractor view)*

Rank	Cause of ROW problem	IMP.I (%)
26	Fencing of the land by property owners after taking property compensation	22.32
25	Design errors by the design consultants	30.64
24	Lack of contractually binding responsibilities b/n the client & utility companies/ public agencies	36.35
23	Unexpected sub-surface conditions due to inadequate information from utility authorities	36.83
22	Insufficient number of ROW staff or appraisers	36.86

The above table shows the less important causes of ROW problems. The contractor group put “Fencing of the land by property owners after taking property compensation” as the least important factors followed by “Design errors by the design consultants” and “Lack of contractually binding responsibilities b/n the client & utility companies/ public agencies”.

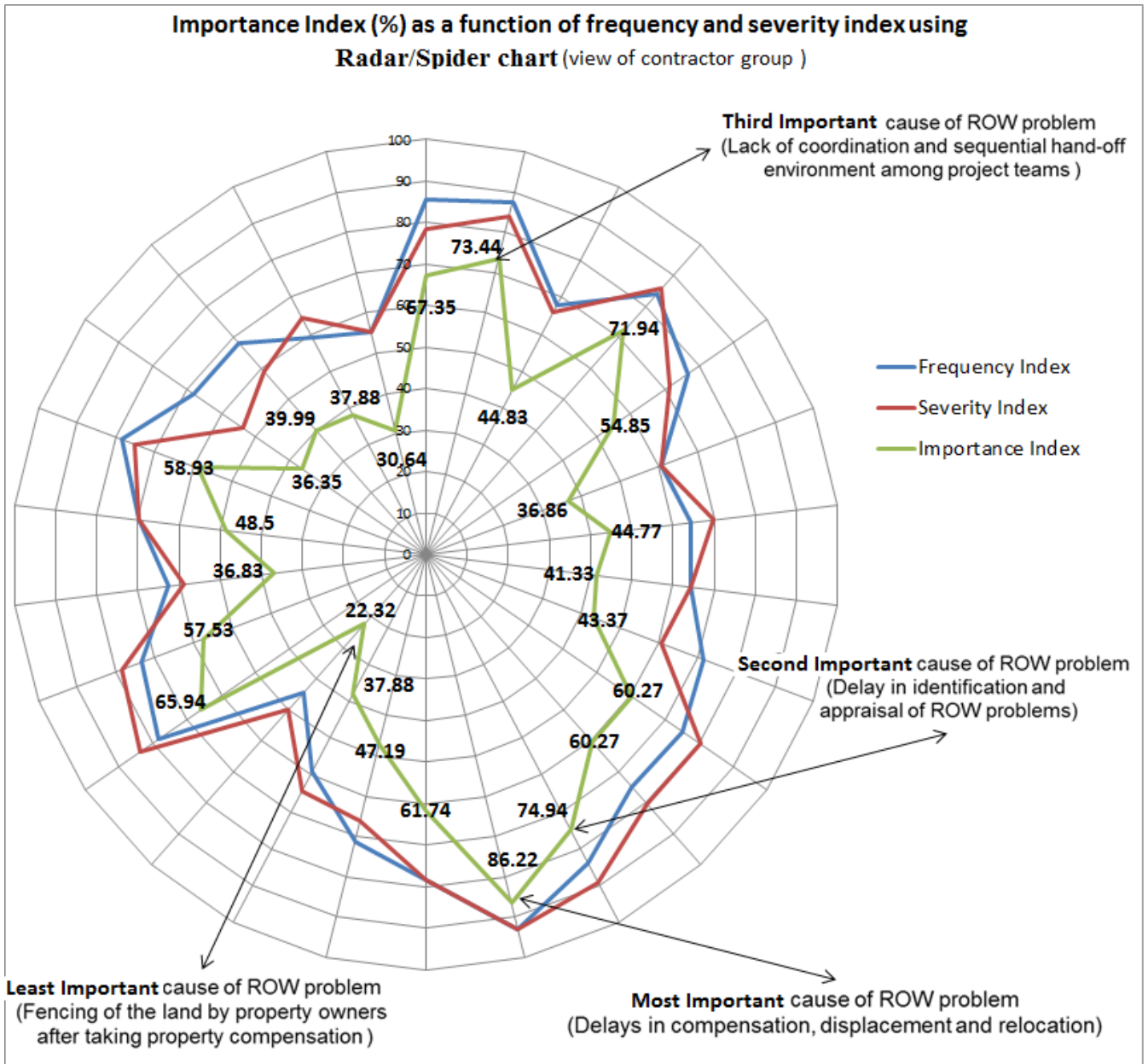


Figure.4.2 Summary of Contractor group view in spider chart

#### 4.2.3.3 Consultant's group view

The table below shows the analysis results for the causes of right of way problems according to the data collected from the consultant's group.

Table 4.9 Data analysis results for the causes of ROW problem (Consultant view)

No.	Factors/Causing right of way problems	Frequency Index	Severity Index	Importance Index	Factor Rank	Category IMP.I	Category Rank
		(F.I.) (%)	(S.I.) (%)	(IMP.I.)(%)			
		$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\frac{[F. I. * S. I. ]}{100}$			
<b>1</b>	<b>Project Development</b>				<b>54.66</b>		<b>4</b>
1.1	Conflict of interests between different work divisions	67.31	75	50.48	20		
1.2	Lack of coordination and sequential hand over environment among project teams	67.31	82.69	55.66	17		
1.3	ROW plan changes and revisions due to changes in scope of Work	75	84.62	63.46	11		
1.4	Tight schedule for ROW acquisition tasks with specified time line and limited number of staff	65.38	75	49.04	21		
<b>2</b>	<b>Agency's Internal Capability</b>				<b>61.41</b>		<b>3</b>
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	84.62	92.31	78.11	6		
2.2	Insufficient number of ROW staff or appraisers	59.62	75	44.71	23		
<b>3</b>	<b>Relationship with the Public</b>				<b>62.84</b>		<b>2</b>
3.1	Less communication between appraiser/ ROW staff and the public including property owners	82.69	82.69	68.38	9		
3.2	Limited information provision to the public (e.g. price Disclosure)	90.38	82.69	74.74	7		
3.3	Property owners' distrust of agency and/or appraisal	76.92	76.92	59.17	13		
3.4	Property owners' refusing to accept the appraisal's decision.	82.69	67.31	55.66	17		
3.5	Absence of motivation for property owners to settle early.	75	75	56.25	14		
<b>4</b>	<b>Appraisal and Acquisition</b>				<b>47.95</b>		<b>6</b>
4.1	Delay in identification and appraisal of ROW problems	69.23	100	69.23	8		
4.2	Delays in compensation, displacement and relocation	75	90.38	67.79	10		
4.3	Delay in clearing of ROW properties after compensation (property management)	65.38	80.77	52.81	19		
4.4	Limited access to the property due to the resistance of the property owners	50	67.31	33.65	25		
4.5	Errors and omission in identification of ROW problems	50	73.07	36.54	24		
4.6	Fencing of the land by property owners after taking property compensation	42.31	65.38	27.66	26		
<b>5</b>	<b>Relationship with Utility Authorities</b>				<b>81.75</b>		<b>1</b>
5.1	Insufficient coordination between ROW agents and utility authorities	100	100	100	1		
5.2	Lack of commitment and sufficient manpower from utility authorities	92.31	100	92.31	2		

5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	75	75	56.25	15		
5.4	Over cost estimation by utility authorities	84.61	100	84.61	5		
5.5	Delay in relocation/protection of utilities lines after compensation.	92.31	92.311	85.21	4		
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	84.61	75	63.46	11		
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	100	90.38	90.38	3		
<b>6</b>	<b>Other</b>				<b>52.02</b>	<b>5</b>	
6.1	Lack of temporary land for subsidiary construction activities	75	75	56.25	15		
6.2	Design errors by the design consultants	65.38	73.07	47.78	22		

From the above table, factor/causes of ROW problems categorized under “Relationship with Utility Authorities” were ranked primary followed by “Relationship with the Public” and “Agency’s Internal Capability” with the factor group important index of 81.75%, 62.84% and 61.41% respectively. On the other hand, factors under the group “Appraisal and Acquisition” were ranked as less important causes of Right of way problem with an important index of 47.95%.

The table below shows the top five most important causes of ROW problems from the point of consultant’s group respondent.

*Table 4.10 Most important causes of ROW problem (Consultant view)*

Rank	Cause of ROW problem	IMP.I (%)
1	Insufficient coordination between ROW agents and utility authorities	100
2	Lack of commitment and sufficient manpower from utility authorities	92.31
3	Lack of legal enforcement (law) and accountability towards utility authorities	90.38
4	Delay in relocation/protection of utilities lines after compensation.	85.21
5	Over cost estimation by utility authorities	84.61

All of the top five most important causes of right of way problems were under the “Relationship with Utility Authorities” factor group. This indicates the relationship and communication between the employer and the Utility Authorities have a direct effect on the right of way problem

and their severity implies effective interaction with the Utility Authorities was highly significant to facilitate the ROW acquisition process.

In addition the third most important factor “Lack of legal enforcement (law) and accountability towards utility authorities” indicate if there is no legal binding contract and specified liability between two parties, it may lead to a conflict and results a prolonged project delay.

*Table 4.11 Less important causes of ROW problem (Consultant view)*

Rank	Cause of ROW problem	IMP.I (%)
26	Fencing of the land by property owners after taking property compensation	27.66
25	Limited access to the property due to the resistance of the property owners	33.65
24	Errors and omission in identification of ROW problems	36.54
23	Insufficient number of ROW staff or appraisers	44.71
22	Design errors by the design consultants	47.78

Similar to the contractor group, “Fencing of the land by property owners after taking property compensation” was the least important factor of right of way problem. The second and third bottom to top factors were, “Limited access to the property due to the resistance of the property owners” and “Errors and omission in identification of ROW problems” respectively. The least three factors were under the same factor group showing the respondents considered the appraisal and acquisition process had limited impact on the right of way problem.

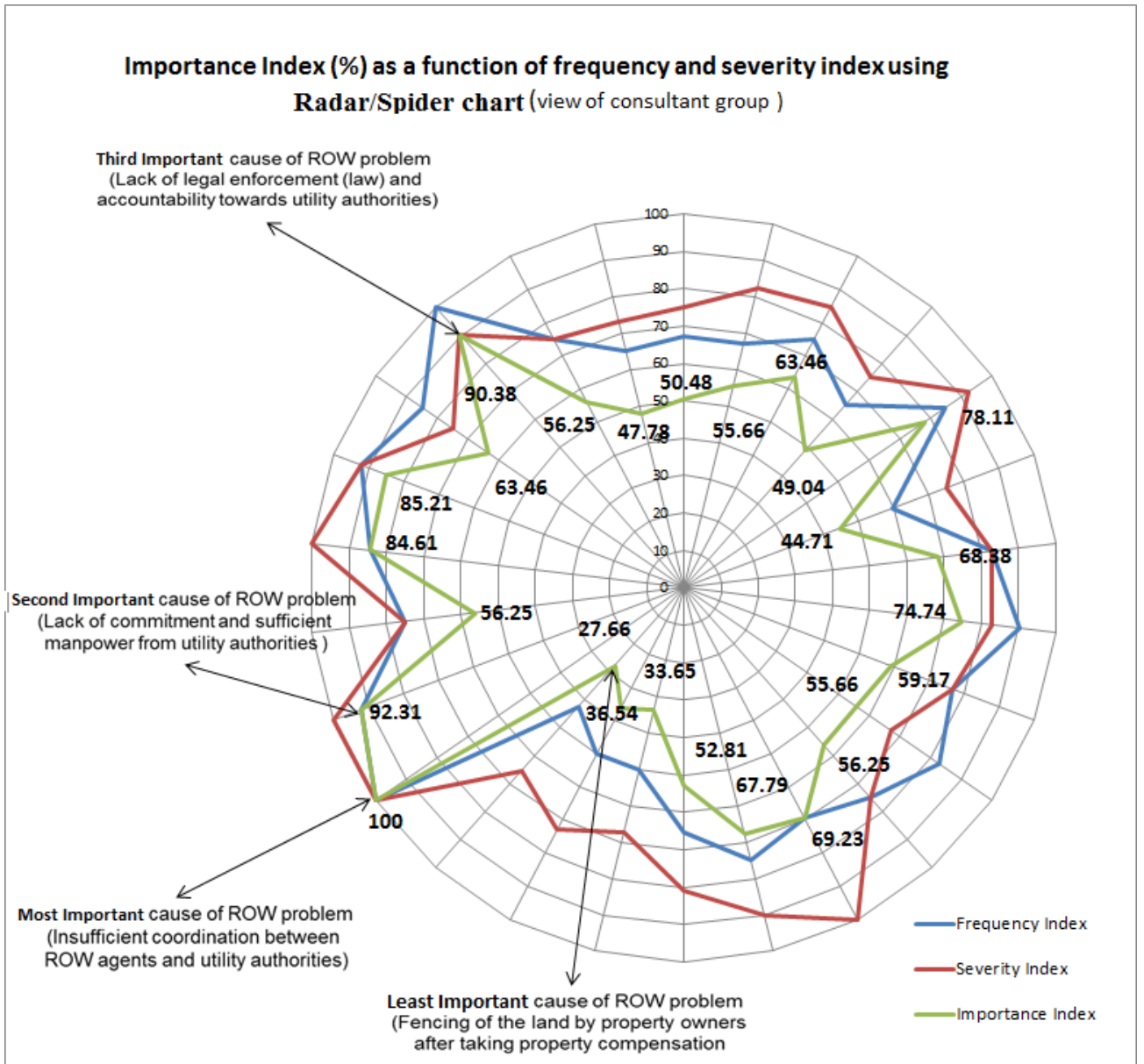


Figure 4.3 Summary of Consultant group view in spider chart

#### 4.2.3.4 Combined views of the respondents

The collected survey data was used to see the general perception of all participants. Here the general views of the respondents are summarized in the table below. The weights given for each factor by each group respondents (Employer, Contractor and Consultant) are used to calculate and rate of each cause.

Table 4.12 Data analysis results for the causes of ROW problem (collected view)

No.	Factors/Causing right of way problems	Frequency Index	Severity Index	Importance Index	Factor Rank	Category IMP.I	Category Rank
		(F.I.) (%)	(S.I.) (%)	(IMP.I.)(%)			
		$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\Sigma a \left[ \frac{n}{N} \frac{100}{4} \right]$	$\frac{[F. I. * S. I. ]}{100}$			
<b>1</b>	<b>Project Development</b>				<b>55.29</b>	<b>2</b>	
1.1	Conflict of interests between different work divisions	72.44	72.44	52.47	15		
1.2	Lack of coordination and sequential hand over environment among project teams	75.64	80.77	61.09	6		
1.3	ROW plan changes and revisions due to changes in scope of Work	72.44	72.44	52.47	15		
1.4	Tight schedule for ROW acquisition tasks with specified time line and limited number of staff	69.87	78.85	55.09	13		
<b>2</b>	<b>Agency's Internal Capability</b>				<b>47.28</b>	<b>5</b>	
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	76.28	74.36	56.72	10		
2.2	Insufficient number of ROW staff or appraisers	63.46	59.61	37.83	24		
<b>3</b>	<b>Relationship with the Public</b>				<b>53.87</b>	<b>3</b>	
3.1	Less communication between appraiser/ ROW staff and the public including property owners	69.87	70.51	49.271	17		
3.2	Limited information provision to the public (e.g. price Disclosure)	73.72	66.02	48.67	19		
3.3	Property owners' distrust of agency and/or appraisal	78.20	67.31	52.64	14		
3.4	Property owners' refusing to accept the appraisal's decision.	80.13	74.36	59.58	7		
3.5	Absence of motivation for property owners to settle early.	76.28	77.56	59.17	8		
<b>4</b>	<b>Appraisal and Acquisition</b>				<b>48.81</b>	<b>4</b>	
4.1	Delay in identification and appraisal of ROW problems	75	82.69	62.02	5		
4.2	Delays in compensation, displacement and relocation	81.41	85.26	69.41	2		
4.3	Delay in clearing of ROW properties after compensation (property management)	74.36	76.28	56.72	10		
4.4	Limited access to the property due to the resistance of the property owners	65.38	65.38	42.75	21		
4.5	Errors and omission in identification of ROW problems	55.77	63.46	35.39	25		
4.6	Fencing of the land by property owners after taking property compensation	49.36	53.85	26.58	26		
<b>5</b>	<b>Relationship with Utility Authorities</b>				<b>58.10</b>	<b>1</b>	
5.1	Insufficient coordination between ROW agents and utility authorities	85.89	84.61	72.68	1		
5.2	Lack of commitment and sufficient manpower from utility authorities	82.69	82.05	67.85	3		

5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	69.23	60.89	42.16	22		
5.4	Over cost estimation by utility authorities	75	73.72	55.29	12		
5.5	Delay in relocation/protection of utilities lines after compensation.	82.05	75.64	62.06	4		
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	76.92	63.46	48.82	18		
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	82.05	70.51	57.86	9		
6	<b>Other</b>				42.60	6	
6.1	Lack of temporary land for subsidiary construction activities	67.95	67.31	45.73	20		
6.2	Design errors by the design consultants	63.46	62.18	39.46	23		

According to the above table, causes of ROW problems categorized under “Relationship with Utility Authorities” were ranked primary followed by “Project Development” and “Relationship with the Public” with the factor group important index of 58.1%, 55.29% and 53.87% respectively. On the other hand factors under the category “Other” were less important causes of right of way problem with an important index of 42.6 %.

The total collected data was analyzed to generalize the perception of the participants. Accordingly the top five most important causes of ROW problems are presented below.

*Table 4.13 Most important causes of ROW problem (collected view)*

Rank	Cause of ROW problem	IMP.I (%)
1	Insufficient coordination between ROW agents and utility authorities	72.68
2	Delays in compensation, displacement and relocation	69.41
3	Lack of commitment and sufficient manpower from utility authorities	67.85
4	Delay in relocation/protection of utilities lines after compensation.	62.06
5	Delay in identification and appraisal of ROW problems	62.02

In general the analysis of the collected survey data shows most important causes of ROW problems were resulted from poor appraisal and acquisition process and employer relationship with the utility authorities. The most important cause of ROW problem was “Insufficient coordination between ROW agents and utility authorities” which was cause by unhealthy relationship between the employer and the utility authorities. Good communication and

relationship between ROW agents and utility authority representatives facilitate the work and avoid conflicts.

“Delays in compensation, displacement and relocation” and “Delay in identification and appraisal of ROW problems” are the second and fifth most important causes of right of way problems respectively. These factors are resulted from poor Appraisal and Acquisition process and special attention is mandatory since the “appraisal and acquisition” processes were found to be critically important (Aleithawe 2010, Caldas et al. 2006) for the determination of a parcel’s fair market value, the review of a parcel, and negotiation activities are directly related to the cost and duration of ROW acquisition.

The third and fourth important causes of right of way problems were “Lack of commitment and sufficient manpower from utility authorities” and “Delay in relocation/protection of utilities lines after compensation.” Both factors were under the “Relationship with Utility Authorities” category and resulted from poor ROW management of utility authorities.

The table below shows the least important causes of right of way problems of the general participants of the survey.

*Table 4.14 Less important causes of ROW problem (collected view)*

Rank	Cause of ROW problem	IMP.I (%)
26	Fencing of the land by property owners after taking property compensation	26.58
25	Errors and omission in identification of ROW problems	35.39
24	Insufficient number of ROW staff or appraisers	37.83
23	Design errors by the design consultants	39.46
22	Unexpected sub-surface conditions due to inadequate information from utility authorities	42.16

According to the general perception of the respondents of survey “Fencing of the land by property owners after taking property compensation” was the least important cause of right of way problem followed by “Errors and omission in identification of ROW problems” and “Insufficient number of ROW staff or appraisers”.

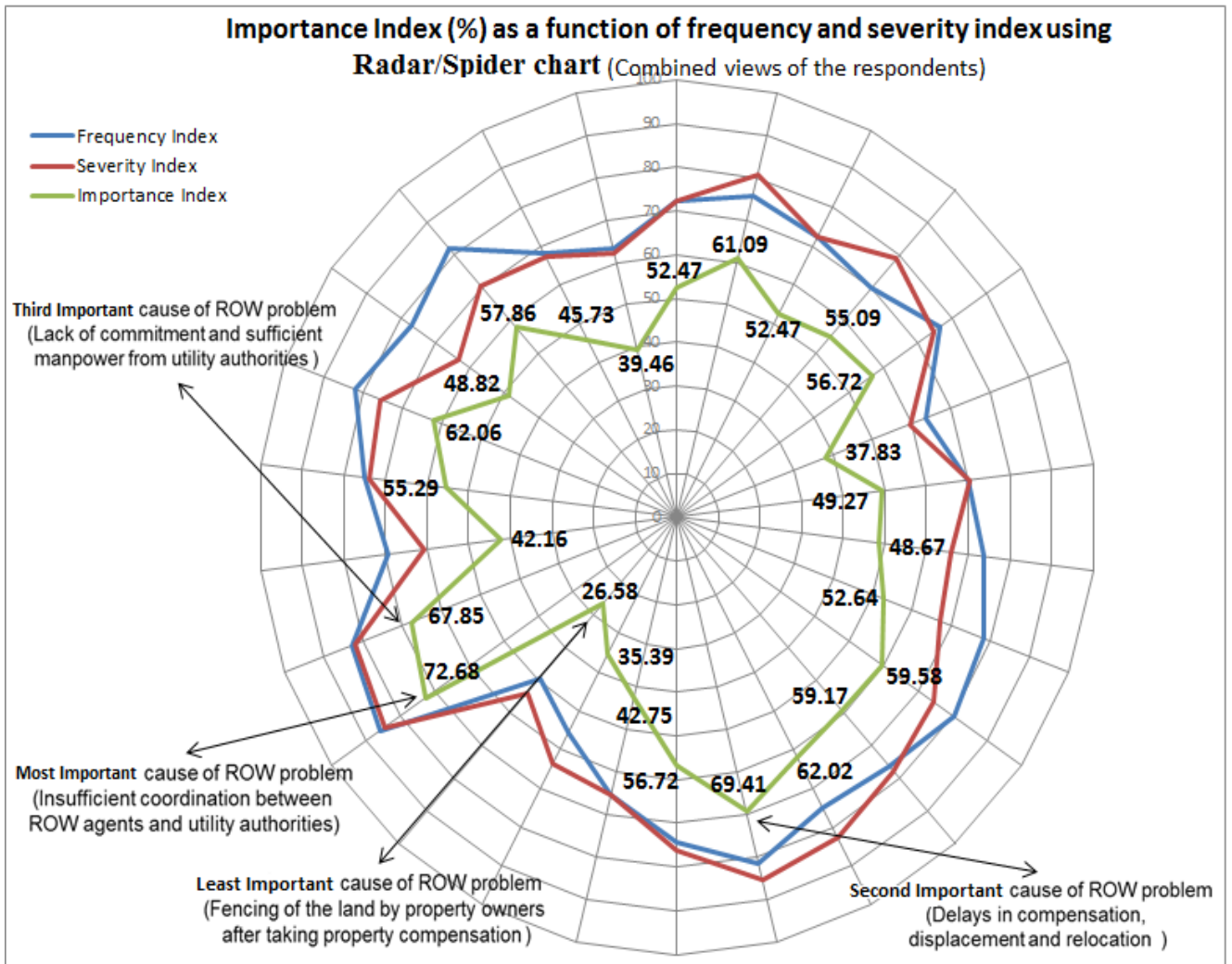


Figure 4.4 Summary of Combined views of the respondents in spider chart

#### 4.2.3.5 Tests of agreements on causes of ROW problems among survey participants

Checking the level of agreement, on the causes of ROW problems of Ethiopian federal road projects, among the group of survey participants was one of the purposes of this thesis. Hence in this section respondents' response will be tested for correlation using Spearman rank correlation coefficients, to see if there is difference in ranking between two groups of respondents; these are Clients versus Contractors; Contractors versus Consultants; Clients versus Consultants; General versus client; General versus Contractors; and General versus Consultants, on the variables of causes of ROW problems and their rate of occurrence. The purpose of a hypothesis test was to

avoid being deceived by chance of occurrences. The tests also helped to evaluate whether consensus of opinions exist among respondents.

**The Null Hypothesis (H<sub>0</sub>) is:** -There is no agreement in the ranking of causes of ROW problems between two groups of respondents.

**The Alternative Hypothesis (H<sub>A</sub>) is:** -There is agreement in the ranking of causes of ROW problems between two groups of respondents.

In order to decide whether to accept or reject the null hypothesis, the level of significance 95% (P = 0.05) is used. This allows to state whether or not there is "agreement" between respondents response. If the calculated spearman correlation coefficient value Rho ( $\rho_{cal}$ ) is greater than the critical value ( $\rho_{critical}$ ), H<sub>0</sub> is rejected, i.e. there is evidence of a statistically significant agreement between the groups. If the calculated value ( $\rho_{cal}$ ) is less than the critical value ( $\rho_{critical}$ ), H<sub>0</sub> is accepted, i.e. there is no evidence of a statistically significant agreement between the two groups.

*Table 4.15 Summary of correlation test on the ranking of causes of ROW problems*

Respondent Group	Calculated value Rho ( $\rho_{cal}$ )	Critical value ( $\rho_{critical}$ )	Result	Justification
Client Vs Contractor	0.4711	0.331	( $\rho_{cal}$ ) > ( $\rho_{critical}$ )	H <sub>0</sub> is rejected
Client Vs Consultant	0.2517	0.331	( $\rho_{cal}$ ) < ( $\rho_{critical}$ )	H <sub>0</sub> is accepted
Client Vs General	0.6598	0.331	( $\rho_{cal}$ ) > ( $\rho_{critical}$ )	H <sub>0</sub> is rejected
Contractor Vs Consultant	0.2555	0.331	( $\rho_{cal}$ ) < ( $\rho_{critical}$ )	H <sub>0</sub> is accepted
Contractor Vs General	0.8022	0.331	( $\rho_{cal}$ ) > ( $\rho_{critical}$ )	H <sub>0</sub> is rejected
Consultant Vs General	0.6707	0.331	( $\rho_{cal}$ ) > ( $\rho_{critical}$ )	H <sub>0</sub> is rejected

After calculating the spearman rank correlation coefficient value Rho ( $\rho_{cal}$ ) for each group cases the critical value ( $\rho_{critical}$ ) for spearman rank correlation coefficient with significance level of 95% (P = 0.05) and n=26 was found from the table. Four of the six groups (Client Vs Contractor; Client Vs General; Contractor Vs General and Consultant Vs General) calculated values ( $\rho_{cal}$ ) are greater than the critical values ( $\rho_{critical}$ ), so the hypothesis that there is no significant agreement between the respondents is rejected i.e. the null hypothesis is rejected. The other two groups (Client Vs Consultant and Contractor Vs Consultant) the calculated value ( $\rho_{cal}$ ) is less than the

critical values ( $\rho_{\text{critical}}$ ) so the hypothesis that there is no significant agreement between the respondents is accepted.

In general it can be concluded that there is strong correlation between the Client and Contractor; the Client and General respondents; the Contractor and General respondents and the Consultant and General respondents. On the other hand perception/contemplation of the respondents of the Client and Consultant as well as Contractor and Consultant on causes of right of way problems was different.

#### 4.2.4 Questionnaires result: Practices to mitigate ROW problems of Ethiopian Federal Road projects

The questionnaire was prepared from the best practices of developed countries to follow in order to mitigate right of way problems that are currently observed in Ethiopian federal road projects. The respondents were asked to rank the level of importance of an activity to improve and further reduce the problems observed on right of way.

The collected data was tabulated according to the weight (4-very Important; 3-Important; 2-less Important; 1- Not-Important) given for each Practice to mitigate ROW problems. Accordingly, the Relative Importance index was calculated for each practice in order to rank the practice according to its RII. Finally the group Relative Importance index was calculated and used to rank the group with the highest and lowest contribution to alleviate right of way problem.

Here summary of the analysis and results are discussed and presented according to the perception of the respondent's, groups and general. The survey responses and detail analysis and results are provided in Appendix B.

##### 4.2.4.1 *Employer's group view*

The table below shows the analysis results for the practices to mitigate ROW problems according to the data collected from the employers group.

Table 4.16 Data analysis results for practices to mitigate ROW problem (Employer view)

No.	Practices to Mitigate Right Of Way Problems	Relative Imp. Index (RII) $\Sigma \left[ \frac{W}{N} A \right] 100$	Factor Rank	Group RII	Group Rank
<b>1</b>	<b>Project Development</b>			<b>0.88</b>	<b>3</b>
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	<b>0.85</b>	10		
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	<b>0.92</b>	2		
1.3	Performance management planning of ROW activities	<b>0.85</b>	10		
<b>2</b>	<b>Agency's Internal Capability</b>			<b>0.76</b>	<b>5</b>
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	<b>0.79</b>	14		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	<b>0.75</b>	15		
2.3	Assign sufficient number of ROW staff for projects according there experience	<b>0.75</b>	15		
<b>3</b>	<b>Relationship with the Public</b>			<b>0.91</b>	<b>1</b>
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	<b>0.92</b>	2		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	<b>0.88</b>	7		
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	<b>0.92</b>	2		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	<b>0.94</b>	1		
<b>4</b>	<b>Appraisal and Acquisition</b>			<b>0.78</b>	<b>4</b>
4.1	Developing a system for good property management.	<b>0.88</b>	7		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	<b>0.81</b>	12		
4.3	Creating unlimited access to the property by developing a good relation with the property owners	<b>0.75</b>	15		
4.4	Outsource ROW acquisition process for licensed private agency.	<b>0.67</b>	18		
<b>5</b>	<b>Relationship with Utility Authorities</b>			<b>0.89</b>	<b>2</b>
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	<b>0.89</b>	6		
5.2	Creating good communication and team work sprit with Utility Authorities	<b>0.92</b>	2		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	<b>0.88</b>	7		
<b>6</b>	<b>Other</b>			<b>0.73</b>	<b>6</b>
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	<b>0.65</b>	19		
6.2	Minimizing design errors through collaborating with responsible bodies	<b>0.81</b>	12		

Here we can see the practices to mitigate ROW problems categorized under “Relationship with the Public” was ranked primary followed by “Relationship with Utility Authorities” and “Project Development” with the category RII of 0.91, 0.89 and 0.88 respectively. On the contrary the employers group found practices under the category “other” with 0.73 value of IRR as less important practices to mitigate right of way problem. The table below shows the top five most important practices to mitigate ROW problems from the point of view of employer’s group respondent.

*Table 4.17 Most important practices to mitigate ROW problem (Employer view)*

Rank	Practices to mitigate ROW problems	(RII)
1	Refining the benefits of the project for the society and property owners to cooperate and settle early.	0.94
2	Involving the public and property owners’ in the ROW acquisition process so as to develop trust on the agency.	0.92
2	Encourage ROW staff agents to meet/communicate the public and property owners	0.92
2	Creating good communication and team work sprit with Utility Authorities	0.92
2	ROW involvement in early project stage	0.92

As shown in the above table the employer (ERA) ranked the activity “Refining the benefits of the project for the society and property owners to cooperate and settle early” as the finest practice to mitigate ROW problem compared to the lists. Even though the benefits gained through infrastructure development is recognized by the society, continuous briefing and discussion with the community and property owners helps to create a clear understanding and cooperative environment for the project.

Practices to improve the relationship with the public and the utility authorities, “Involving the public and property owners in the ROW acquisition process so as to develop trust on the agency.”; “Encourage ROW staff agents to meet/communicate the public and property owners” and “Creating good communication and team work sprit with Utility Authorities” are ranked as the second most necessary/effective practices. Similarly ROW involvement in the early project phases is ranked as the second most necessary/effective practice to improve the ROW problems. However, it is not yet a very important cause of right of way problem.

From the top five best practices to mitigate ROW problems four of them are direct solutions for the most important factors/causes of right of way problems which were discussed previously. This top four best practice, including the number one ranked best practice, will be accomplished by improving the relationship with the public and utility authorities.

*Table 4.18 Less important practices to mitigate ROW problem (Employer view)*

Rank	Practices to mitigate ROW problems	(RII)
19	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	0.65
18	Outsource the ROW acquisition process for private agency	0.67
15	Creating unlimited access to the property by developing a good relation with the property owners	0.75
15	Assign sufficient number of ROW staff for projects according there experience	0.75
15	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	0.75

The above practices were found to be less important than other practices, as shown in Table 4.18 the least important practice to mitigate ROW problem is using of special delivery method (e.g. design-build, public-private partnership, etc.). The other four least important practices are from “Agency’s Internal Capability” and “Appraisal and Acquisition” categories.

#### *4.2.4.2 Contractor’s group view*

The table below shows the analysis results for the practices to mitigate ROW problems according to the data collected from the contractor group.

Table 4.19 Data analysis results for practices to mitigate ROW problem (Contractor view)

No.	Practices to Mitigate Right Of Way Problems	Relative Imp. Index (RII) $\Sigma \left[ \frac{W}{N} A \right] 100$	Factor Rank	Group RII	Group Rank
<b>1</b>	<b>Project Development</b>			<b>0.91</b>	<b>1</b>
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	<b>0.89</b>	3		
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	<b>1</b>	1		
1.3	Performance management planning of ROW activities	<b>0.84</b>	5		
<b>2</b>	<b>Agency's Internal Capability</b>			<b>0.89</b>	<b>2</b>
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	<b>0.89</b>	3		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	<b>0.95</b>	2		
2.3	Assign sufficient number of ROW staff for projects according there experience	<b>0.84</b>	5		
<b>3</b>	<b>Relationship with the Public</b>			<b>0.79</b>	<b>4</b>
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	<b>0.78</b>	11		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	<b>0.84</b>	5		
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	<b>0.80</b>	10		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	<b>0.73</b>	14		
<b>4</b>	<b>Appraisal and Acquisition</b>			<b>0.65</b>	<b>6</b>
4.1	Developing a system for good property management.	<b>0.73</b>	14		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	<b>0.78</b>	11		
4.3	Creating unlimited access to the property by developing a good relation with the property owners	<b>0.68</b>	17		
4.4	Outsource ROW acquisition process for licensed private agency.	<b>0.39</b>	19		
<b>5</b>	<b>Relationship with Utility Authorities</b>			<b>0.82</b>	<b>3</b>
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	<b>0.79</b>	11		
5.2	Creating good communication and team work sprit with Utility Authorities	<b>0.84</b>	5		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	<b>0.84</b>	5		
<b>6</b>	<b>Other</b>			<b>0.66</b>	<b>5</b>
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	<b>0.69</b>	16		
6.2	Minimizing design errors through collaborating with responsible bodies	<b>0.63</b>	18		

The practices under the category “Project Development” were found to be very significant practices to mitigate ROW problems. Any problem related to ROW can be avoided or minimized if it is identified and planned during the project development stage. Practices to improve the Agency’s Internal Capability and relationship with the utility authorities to mitigate ROW problems are ranked as the second and the third important categories.

The least important category with practices to alleviate right of way problems is the “Appraisal and Acquisition” category. Even if the two top-ranked causes of right of way problems are under the “Appraisal and Acquisition” category, the mitigation measures under this category were considered as minor.

The table below shows the top four most important practices to mitigate ROW problems from the point of view of contractor’s group respondent.

*Table 4.20 Most important practices to mitigate ROW problem (Contractor view)*

Rank	Practices to mitigate ROW problems	(RII)
1	ROW involvement in early project stage	1.00
2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	0.95
3	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	0.89
3	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	0.89

From the listed Practices to mitigate ROW problems “ROW involvement in the early project phases” is ranked as the first most necessary/effective practice to improve ROW acquisition process. Improving agency’s internal capability through Utilization of advanced technology was rated as the second most important practice to mitigate ROW problems. IT-based tools and devices such as a parcel information management system and GIS-assisted ROW planning system have improved the efficiency of their ROW acquisition tasks (D Jeong, 2016).

Both activities “Constitute a multi-functional/multidisciplinary project delivery team” and “Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers” were ranked as the third most important practices. Currently young ROW

professionals usually learn from their senior staff and do not often have a chance to learn from a standardized professional training program.

The table below shows practices considered to have small contribution to mitigate ROW problems from the listed activities.

*Table 4.21 Less important practices to mitigate ROW problem (Contractor view)*

Rank	Practices to mitigate ROW problems	(RII)
19	Outsource the ROW acquisition process for private agency	0.39
18	Minimizing design errors through collaborating with responsible bodies	0.63
17	Creating unlimited access to the property by developing a good relation with the property owners	0.68
16	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	0.66

“Outsource the ROW acquisition process for private agency” is a practice that is considered to be least important activity to alleviate ROW problems. Even though the ROW acquisition process is done by internal appraisals in Ethiopia, most of the developed countries use either internal staff appraisers or outsource the appraisal to licensed appraisers. The estimate should be made either by licensed staff appraisers (internal) or by licensed fee appraisers (outsourced) (MnDOT 2015).

The second and third least important activity with less contribution to mitigate ROW problems was “Minimizing design errors through collaborating with responsible bodies” and “Creating unlimited access to the property by developing a good relation with the property owners” respectively.

#### *4.2.4.3 Consultant’s group view*

The table below shows the analysis results for the practices to mitigate ROW problems according to the data collected from the consultant group.

Table 4.22 Data analysis results for practices to mitigate ROW problem (Consultant view)

No.	Practices to Mitigate Right Of Way Problems	Relative Imp. Index (RII) $\Sigma \left[ \frac{W}{N} A \right] 100$	Factor Rank	Group RII	Group Rank
<b>1</b>	<b>Project Development</b>			<b>0.76</b>	<b>4</b>
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	<b>0.85</b>	7		
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	<b>0.69</b>	15		
1.3	Performance management planning of ROW activities	<b>0.75</b>	13		
<b>2</b>	<b>Agency's Internal Capability</b>			<b>0.78</b>	<b>3</b>
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	<b>0.92</b>	2		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	<b>0.59</b>	18		
2.3	Assign sufficient number of ROW staff for projects according there experience	<b>0.83</b>	9		
<b>3</b>	<b>Relationship with the Public</b>			<b>0.88</b>	<b>2</b>
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	<b>0.83</b>	9		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	<b>0.83</b>	9		
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	<b>0.85</b>	7		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	<b>1</b>	1		
<b>4</b>	<b>Appraisal and Acquisition</b>			<b>0.75</b>	<b>5</b>
4.1	Developing a system for good property management.	<b>0.83</b>	9		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	<b>0.92</b>	2		
4.3	Creating unlimited access to the property by developing a good relation with the property owners	<b>0.65</b>	17		
4.4	Outsource ROW acquisition process for licensed private agency	<b>0.59</b>	18		
<b>5</b>	<b>Relationship with Utility Authorities</b>			<b>0.92</b>	<b>1</b>
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	<b>0.92</b>	2		
5.2	Creating good communication and team work sprit with Utility Authorities	<b>0.92</b>	2		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	<b>0.92</b>	2		
<b>6</b>	<b>Other</b>			<b>0.71</b>	<b>6</b>
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	<b>0.67</b>	16		
6.2	Minimizing design errors through collaborating with responsible bodies	<b>0.75</b>	13		

Most of the practices believed to solve the problems of ROW problems were under the category “Relationship with Utility Authorities” followed by “Relationship with the Public” and “Agency’s Internal Capability”. The least important category with practices contributing less to right of way mitigation was under “Other” category. The table below shows the top five most important practices to mitigate ROW problems from the point of view of consultant’s group respondent.

*Table 4.23 Most important practices to mitigate ROW problem (Consultant view)*

Rank	Practices to mitigate ROW problems	(RII)
1	Refining the benefits of the project for the society and property owners to cooperate and settle early.	1.00
2	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	0.92
2	Creating good communication and team work sprit with Utility Authorities	0.92
2	Preliminary study on already existing Utility lines to avoid unexpected sub-surface conditions	0.92
2	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	0.92
2	Involving an experienced agent for a good and on time appraisal report delivery	0.92

Table 4.23 shows six most significant practices. The practice to improve the relationship with the public, “Refining the benefits of the project for the society and property owners to cooperate and settle early.” was ranked as the topmost important practice to mitigate right of way problems.

Five practices were rated as the second top important practices to mitigate ROW problems. It should be noted that the three practices, “Forming contractual agreement with Utility authorities to create accountability and legal accountability.”; “Creating good communication and team work sprit with Utility Authorities”; “Preliminary study on already existing Utility lines to avoid unexpected sub-surface conditions”, were in the “relationship with Utility Authorities” category and the other two of the five practices, “Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers”; “Involving an experienced agent for a good and on time appraisal report delivery”, were from the “agency’s internal capability” and “Appraisal and Acquisition” category respectively.

Table 4.24 *Less important practices to mitigate ROW problem (Consultant view)*

Rank	Practices to mitigate ROW problems	(RII)
18	Outsource the ROW acquisition process for private agency	0.59
18	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	0.59
17	Creating unlimited access to the property by developing a good relation with the property owners	0.65
16	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	0.67
15	ROW involvement in early project stage	0.69

Two practices “Outsource the ROW acquisition process for private agency” and “Utilization of advanced technology (e.g. electronic parcel information management, GIS)” were ranked as the least important practices to mitigate ROW problems. Other practices with less contribution to the right of way problems were “Creating unlimited access to the property by developing a good relation with the property owners”; “Use of special delivery method (e.g. design-build, public-private partnership, etc.)”; “ROW involvement in early project stage”.

#### 4.2.4.4 *Combined views of respondent’s*

The collected survey data was analyzed using Relative Important Index in order to measure the survey respondents’ perception on the practices to mitigate ROW problems in terms of their level of importance.

Table 4.25 Data analysis results for practices to mitigate ROW problem (Collected view)

No.	Practices to Mitigate Right Of Way Problems	Relative Imp. Index (RII) $\Sigma(W/N*A)*100$	Factor Rank	Group RII	Group Rank
<b>1</b>	<b>Project Development</b>			<b>0.83</b>	<b>3</b>
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	<b>0.86</b>	7		
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	<b>0.87</b>	5		
1.3	Performance management planning of ROW activities	<b>0.76</b>	15		
<b>2</b>	<b>Agency's Internal Capability</b>			<b>0.82</b>	<b>4</b>
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	<b>0.87</b>	5		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	<b>0.77</b>	14		
2.3	Assign sufficient number of ROW staff for projects according there experience	<b>0.81</b>	12		
<b>3</b>	<b>Relationship with the Public</b>			<b>0.87</b>	<b>2</b>
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	<b>0.88</b>	3		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	<b>0.85</b>	10		
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	<b>0.85</b>	9		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	<b>0.89</b>	2		
<b>4</b>	<b>Appraisal and Acquisition</b>			<b>0.72</b>	<b>5</b>
4.1	Developing a system for good property management.	<b>0.81</b>	12		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	<b>0.84</b>	11		
4.3	Creating unlimited access to the property by developing a good relation with the property owners	<b>0.69</b>	17		
4.4	Outsource ROW acquisition process for licensed private agency	<b>0.54</b>	19		
<b>5</b>	<b>Relationship with Utility Authorities</b>			<b>0.88</b>	<b>1</b>
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	<b>0.86</b>	7		
5.2	Creating good communication and team work sprit with Utility Authorities	<b>0.90</b>	1		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	<b>0.88</b>	3		
<b>6</b>	<b>Other</b>			<b>0.69</b>	<b>6</b>
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	<b>0.67</b>	18		
6.2	Minimizing design errors through collaborating with responsible bodies	<b>0.72</b>	16		

According to the analysis result, improving the practices under relationship with Utility Authorities and relationship with the public category was considered to be more important than others. The activities under others category was the least practices to mitigate right of way problems.

The table below shows the top five most important practices to mitigate ROW problems from the general survey collected data respondent.

*Table 4.26 Most important practices to mitigate ROW problem (Collected view)*

Rank	Practices to mitigate ROW problems	(RII)
1	Creating good communication and team work sprit with Utility Authorities	0.90
2	Refining the benefits of the project for the society and property owners to cooperate and settle early.	0.89
3	Preliminary study on already existing Utility lines to avoid unexpected sub-surface conditions	0.88
3	Encourage ROW staff agents to meet/communicate the public and property owners	0.88
5	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	0.87

“Creating good communication and team work sprit with Utility Authorities” was rated as the best practice to mitigate ROW problems. Followed by “Refining the benefits of the project for the society and property owners to cooperate and settle early.”

“Preliminary study on already existing Utility lines to avoid unexpected sub-surface conditions” and “Encourage ROW staff agents to meet/communicate the public and property owners” were activities with equivalent importance and ranked as the third most important practices. From the top five the last important practice to mitigate right of way problems, which is under “Agency’s Internal Capability”, was “Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers”.

From the top five important practices to mitigate right of way practices the top four were under the category relationship with the utility authorities and relationship with the public. Poor communication and low coordination between the employer and other parties will affect the flow of the information and will affect the overall working progress. Here it was observed creating a good relationship is a key for successful project.

Table 4.27 *Less important practices to mitigate ROW problem (Collected view)*

Rank	Practices to mitigate ROW problems	(RII)
19	Outsource the ROW acquisition process for private agency	0.54
18	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	0.67
17	Creating unlimited access to the property by developing a good relation with the property owners	0.69
16	Minimizing design errors through collaborating with responsible bodies	0.72
15	Performance management planning of ROW activities	0.76

From a least five practices to mitigate right of way problems “Outsource the ROW acquisition process for private agency” was the first which was agreed with other group respondents except the employer group. This means the survey respondents consider Outsource the ROW acquisition process for private agency as the least preference in mitigating the right of way problem. The second and third least important practices were “Use of special delivery method” and “Creating unlimited access to the property by developing a good relation with the property owners”.

#### 4.2.4.5 *Tests of agreements on practices to mitigate ROW problem among survey participants*

In this section respondents’ response will be tested for correlation using Spearman rank correlation coefficients, to see if there is difference in ranking between two groups of respondents; these are Clients versus Contractors; Contractors versus Consultants; Clients versus Consultants; General versus client; General versus Contractors; and General versus Consultants, on practices to mitigate ROW problems.

**The Null Hypothesis (H<sub>0</sub>) is:** -There is no agreement in the ranking of practices to mitigate ROW problems between two groups of respondents

**The Alternative Hypothesis (H<sub>A</sub>) is:** -There is agreement in the ranking of practices to mitigate ROW problems between two groups of respondents

In order to decide whether to accept or reject the null hypothesis, the level of significance 95% (P = 0.05) is used. This allows to state whether or not there is "agreement" between respondents

response. If the calculated spearman correlation coefficient value Rho ( $\rho_{cal}$ ) is greater than the critical value ( $\rho_{critical}$ ),  $H_0$  is rejected, i.e. there is evidence of a statistically significant agreement between the groups. If the calculated value ( $\rho_{cal}$ ) is less than the critical value ( $\rho_{critical}$ ),  $H_0$  is accepted, i.e. there is no evidence of a statistically significant agreement between the two groups.

*Table 4.28 Summary of correlation test on ranking of “practices to mitigate ROW problem”*

Respondent Group	Calculated value Rho ( $\rho_{cal}$ )	Critical value ( $\rho_{critical}$ )	Result	Justification
Client Vs Contractor	0.196	0.391	$(\rho_{cal}) < (\rho_{critical})$	$H_0$ is accepted
Client Vs Consultant	0.5894	0.391	$(\rho_{cal}) > (\rho_{critical})$	$H_0$ is rejected
Client Vs General	0.8039	0.391	$(\rho_{cal}) > (\rho_{critical})$	$H_0$ is rejected
Contractor Vs Consultant	0.1557	0.391	$(\rho_{cal}) < (\rho_{critical})$	$H_0$ is accepted
Contractor Vs General	0.4478	0.391	$(\rho_{cal}) > (\rho_{critical})$	$H_0$ is rejected
Consultant Vs General	0.775	0.391	$(\rho_{cal}) > (\rho_{critical})$	$H_0$ is rejected

As shown in the above table comparison was done for six groups. The calculated values ( $\rho_{cal}$ ) of the four groups (Client Vs Consultant; Client Vs General; Contractor Vs General and Consultant Vs General) are greater than the critical values ( $\rho_{critical}$ ), so the hypothesis that there is no significant agreement between the respondents is rejected i.e. the null hypothesis is rejected. The other two groups (Client Vs Contractor and Contractor Vs Consultant) the calculated value ( $\rho_{cal}$ ) is less than the critical values ( $\rho_{critical}$ ) so the hypothesis that there is no significant agreement between the respondents is accepted.

In general it can be concluded that there is strong correlation between the Client and Consultant; the Client and General respondents; the Contractor and General respondents and the Consultant and General respondents. On the other hand perception/contemplation of the respondents of the Client and Contractor as well as Contractor and Consultant on mitigation measures of right of way problems was different.

#### 4.2.5 Results of questions specially prepared for each groups

##### 4.2.5.1 Responses for questions specially design for employer group

Selected questions were exclusively designed for employer group to get data on the current practices of ERA right of way management in Ethiopian federal road projects and related issue.

All employer group respondents believed the primary cause of project delay and cost overrun in Ethiopian road construction project is Right of way problem. The table below shows the phase of the acquisition process where most of delays occur according to the employer group.

*Table 4.29 Summary of the current practices of ERA right of way management*

Acquisition process	Delay Occurrence				RII (%)	Rank
	High (4)	Medium (3)	Low (2)	None (1)		
Utility Relocation	12				100	1
Property management & clearing	9	3			94	2
Compensation payment	3	3	3	3	63	3
Property Valuation		6	3	3	56	4
Identification, listing & notification		3	6	3	50	5

Accordingly to the above table the employer group ranks the Utility Relocation stage, with RII of 100%, as the phase of the acquisition process where most delays occur and highly influential for ROW problem. On contrary the least contributory process of acquisition for ROW problem was Identification, listing & notification with RII of 50%.

All respondents agreed on the fact that the employer is contractually responsible for providing clear right of way to the contractor, however all stakeholders in relation to utility and other obstruction along the road should play their role accordingly.

In fact most ERA projects were transferred to the contractor without completely clearing the right of way and become a reason for time and cost claims when it couldn't go in line with project progress and became a reason for disruption. Some said ERA handover projects with ROW problems based on the assumption that the ROW will be attained before contractual completion occurs considering the cooperation of all stakeholders within an appropriated time

frame. Others said the acquisition process is performed side by side with the project construction and considered as a part of the project work. Additionally budget for ROW removal is allocated along with works and consultancy budget. In addition, ROW clearing takes much time and the local woreda and people are not willing to remove obstruction if the project work is not commenced. Finally all agreed on the idea that ERA handover projects with ROW problems due to social and political pressure.

#### *4.2.5.2 Responses for questions specially design for contractor group*

The most common forms of contract PPA and FIDIC, commonly applicable in Ethiopian federal road projects, clearly specify that the contractor has a right to access the site. Here the contractor group respondents said according to the contract agreement ROW problem is not contractor problem but it may not only be employer's responsibility as well. Mainly the ROW problem is caused by employer/ROW agent execution performance and interest; consultant design problem and poor communication and coordination with local authorities.

Some of the contractor group respondents agreed that Project Delivery Systems and procurement/bidding procedure have great and direct effect on ROW problem. They believe DB delivery system has a better chance of incorporating the employer with the contractor in solving the right of way problem. Others said the project Delivery Systems and bidding procedure have no effect on the right of way problem since the right of way issue is belong to the client and local authorities.

Most (Not all) contractors record the idle machineries and manpower during the ROW problems for entitlement purpose but most of them only claim for extension of time and doesn't submit cost related claims in relation to ROW. Few respondents give a common reason that in order to create a good relationship with the employer the contractor withdraw cost claim related to ROW in return it will not be liable for liquidated damage. Others said the cost claim was not requested since the contractor fail to collect all relevant data considering its impact was minor.

According to the contractor group participants, most contractors receive a project with ROW problems in to their knowledge hoping the problem will be solved as per the contract agreement. The contractor group split in to two on the idea of "Contractors use ROW problems as a cover

for their poor performance and means of extension of time.” Here some of them agreed on the concept, others said the contractor should not be questioned for receiving a project with right of way problems and it is impossible for them to get extension of time without a record and solid justification.

#### *4.2.5.3 Responses for questions specially design for consultant group*

Most of the consultant group concept goes in line with employer and contractor group, where ROW problem is not only the employer’s responsibility but a collective result of the participants of the road sector. However few participants understand the concept of liability from the contractual agreement angle and agreed on the concept of “ROW problems are purely employer’s responsibility”.

Most of the respondents said the Project Delivery Systems/type (DB, DBB) and method of procurement (bidding procedure) doesn’t have a direct effect on ROW problem since in Ethiopian land law land belongs to the government and the acquisition process is the same in any delivery system. Some made a comparison between DB and DBB Project Delivery Systems and choose DB since the design and construction are done concurrently there is a chance of managing the right of way issues on site.

Most participants agreed on the responsibilities of the Engineer to predict the possible risk scenarios of ROW problems and assist the employer on the possible solutions but have a doubt on the application. Practically it had some limitations but every design modification was presented together with ROW consequences.

It is possible to create a mechanism to predict the financial consequence (on ERA) of transferring projects (with ROW issue) to the contractor but most of the time the employer hire consultants for design (before bidding) and supervision (after a contract agreement with contractor) purpose and couldn’t get the chance to advise the employer on the right time. In addition to this, due to the pressure from the government offices (politics) and the top management, it was very difficult for the employer to cancel projects and simply jump in without considering the possible risks.

### **4.3 Results of Case Study**

Case study approaches facilitate in-depth investigation of particular instances of a phenomenon (Richard, 2008). In this research work the case study was designed and prepared to see the practical effects of right of way problems on federal road projects. The case study was executed on recently completed federal road projects under Ethiopian road authority specifically on western region projects. The case study was done on 4 completed and 6 on progress (ROW work completed) projects to see the currently practical effect of ROW problem on time and cost overrun of each projects. The projects under the case study have both extension of time and cost overrun due to many reasons but the case study focuses on the extent/amount of extension of time and cost overrun due to right of way problems. The detail information of the projects under the case study is presented below.

#### **4.3.1 Detail information of projects**

##### **I. Project No. 1**

Project 1 was 61 Km Asphalt Concrete pavement and Measurement Contract Type financed by African Development Bank and Government of Ethiopia. The project commencement date was 22-Apr-2013 and original completion date 21-Apr-2016. The project was expected to be completed within 1095 Calendar days and with original contract amount of 696,807,456.1 ETB. Unfortunately the project was completed neither on time nor on budget. Total EOT of 1043 Calendar days were approved to date accordingly the total project completion date was extended to 2138 Calendar days and the completion date of the project was revised to 28-February-2019. The EOT were due to: Variation Order for landslide treatment; exceptionally adverse climatic conditions; delay in removal of obstructions and related reasons. EOT approved due to right of way problem was 187 Calendar days which was 17.9%. The main reason for the project cost escalation was Variation due to public and regional administration request for upgrading of the Town section to Zonal Seat standard and extension of the town limits as a result the project Contract amount was changed to 744,476,161.7 ETB. At present, the project ROW issues are completed with the project progress of 92%.

## **II. Project No. 2**

Project 2 was 50.6 Km Asphalt Concrete pavement and unit rate Contract Type financed by African Development Bank and Government of Ethiopia. The project commencement date was 12-Feb-13 and original completion date 12-Feb-16. The project was expected to be completed within 1095 Calendar days and with original contract amount of 610,019,298.35 ETB. Unfortunately the project was completed neither on time nor on budget. Total EOT of 1105 calendar days were approved to date accordingly the total project completion date was extended to 2200 Calendar days and the completion date of the project was revised to 21-Feb-2019. The EOT were due to: introduction of climbing lane, protection works for embankment failure, public access construction and culvert outlet channelization. EOT approved due to right of way problem was 193 Calendar days which was 17.5%. The main reason for the project cost escalation was Variation due to introduction of climbing lane, protection works for embankment failure, public access construction and culvert out let channelization. As a result the project Contract amount was changed to 726,543,847.04 ETB.

## **III. Project No. 3**

Project 3 was a 51.8km DBST type of pavement and unit rate contract type. It was awarded to a foreign contractor with a commencement date of 1-Apr-13 and original completion date to be on 30-Sep-16. The project had a total contract period of 1278 days and original contract amount of 842,661,582.01 ETB. The project was not completed on the intended time and cost due to different reasons. Total extension of time of 902 days was given and the completion date of the project was revised to 21-Mar-19 (a total contract period of 2180 days) in association with adverse weather condition (Rainfall) and additional works due to mass landslides at a multiple locations. From the total EOT 39.5% which was 356 days were given due to right of way problems. The project Contract amount was changed to 889,954,439.35 ETB as a result of Additional works instructed for restoring Landslides at a multiple locations and realigned sections. Even though the ROW issue finalized, the current project progress is 94%.

## **IV. Project No. 4**

Project 4 was 26.5km DBST type of pavement and unit rate contract type. The commencement date of the project was 1-May-13 and original completion date 30-Apr-16. The project had an initial total contract period of 1095 days and original contract amount of

376,996,880.19ETB. The project was not completed on time due to different reasons and a Total extension of time of 1005days was given. Consequently the completion date of the project was revised to 15-Dec-15 (A total contract period of 2100 days) Even though the time for completion has been extended mainly due to adverse weather condition (Rainfall) and Design Problem, ROW problem was another contributory factor. 53days or 5.3% from the total EOT were due to right of way. . Since the Initial Design Review findings revealed scope reduction and Introduction of new unit rate for measuring and paying, the project Contract amount was reduced to 352,245,677.90 ETB.

#### **V. Project No. 5**

Project 5 was a 57 km DBST type of pavement and unit rate contract type. It was awarded to a foreign contractor with a commencement date of 1-Apr-13 and original completion date to be on 30-Sep-16. The project had a total contract period of 1278 days and original contract amount of 834,554,046.64 ETB. The project was not completed on the intended time and cost due to different reasons. Currently most of the ROW works are completed and the project progress is 90.8 %. Time for Completion has been extended mainly due to additional works following recurrent Landslides and Adverse Weather Conditions (Rainfall). The land slide problem being serious, ERA is considering omitting parts of the road section and making further land slide study. Hence total extension of time of 936 days was given and the completion date of the project was revised to 25-Apr-19 (a total contract period of 2215 days). From the total EOT 30.3% which was 284 days were given due to right of way problems. The project Contract amount was raised up to more than 1 Billion ETB as a result of cost escalation, quantity change and occurrence of landslides at a multiple locations the Engineer had been obliged to introduce various mitigation measures through variation orders resulted the project not to be completed on the intended time and cost.

#### **VI. Project No. 6**

The road construction is located is located in Benishangule Gumuze regional state in Metekel zone constructed by a local contractor. It had total length of 66.5 km and total contract amount of over 824 million birr. Out of the total length of the project, 35 km of the road was built with asphalt whereas the remaining 31 km was gravel road. The construction was started on January 11 2013 with original completion date of January 10 2016. Due to significant scope of work change and other result the time for completion has been extended

by 1209 days and the completion date of the project was revised to 4-May-2019. From the total EOT garnered 000 Calendar Days were due to right of way problem which was 000% of the total EOT. The cost increment was mainly as a result of change in scope of work and price escalation resulting project contract amount change for more than 1.04 billion ETB.

**VII. Project No. 7**

Project 7 was 52.06 km Asphalt Concrete type of pavement and unit measurement contract type. The construction was awarded to a Chinese contractor with a commencement date of October 07, 2011 and original contract duration/period of 910 days. The project was not completed on time and cost due to different reasons. Total extension of time of 727 days was given and the completion date of the project was changed to 31-Mar-16. (A total contract period of 1637 days) The EOT was mainly associated with additional works in Town section extension; Change in Urban Drain Type and Delayed removal of obstructions in town sections. 31 Calendar Days of EOT due to delay in removal of ROW Obstructions in town sections was garnered. Here we can see the EOT due to right of way was 4.3%. The original project Contract amount was 633,534,840.56ETB but the project cost was increased to 656,801,471.56 ETB as a result of variation order to Change in Urban Drain Type from Concrete to Masonry; Design Modification on Town Section and Provision of Retaining Wall.

**VIII. Project No. 8**

Project 8 was 70.55km Asphalt Concrete type of pavement and unit rate contract type. It was awarded to a Chinese contractor the commencement date was October 07, 2011 and original completion date April 03, 2014. The project had an initial total contract period of 910 days and original contract amount of 669,143,993.90ETB including VAT. The project was not completed on time and cost due to different reasons. Total extension of time of 620 days was given and the completion date of the project was revised to 15-Dec-15. (A total contract period of 1530 days) Two extension of time were garnered: EOT#1 was 365 calendar days and it was due to delay in removal of ROW Obstructions in town sections and EOT#2 was 255 calendar days as a result of delay associated with varied/increased quantities. Here we can see the EOT due to right of way was 58.9%. The project Contract amount was changed to 805,369,526.05 ETB [including VAT and Price Adjustment] as a result of price escalation and variation.

**IX. Project No. 9**

Project 9 was 65.05 Km Asphalt Concrete pavement and Measurement Contract Type. The construction was done by a Chinese contractor with project commencement date of 7-Oct-11 and original completion date 4-Apr-14. The project was expected to be completed within 910 Calendar days and with original contract amount of 648,548,842.21ETB. Unfortunately the project was completed neither on time nor on budget. Total EOT of 846 Calendar days were garnered and the total project completion date was extended to 1756 Calendar days and the project was completed on 28-Jul-16. The EOT were due to: Delay caused by varied quantities associated with additional works; varied/increased quantities and Delayed removal of obstructions. From the total EOT garnered 182 Calendar Days were due to right of way problem which was 21.5% of the total EOT. The cost increment was mainly as a result of additional work of internal asphalt roads in town and change in drainage type/modification. Due to this and related reasons the project Contract amount was raised to 698,545,730.63 ETB.

**X. Project No. 10**

Project 10 was World Bank financed project with a DBST type of pavement and unit rate contract type. It was awarded to a foreign contractor with a commencement date of September 23, 2013 and original completion date to be on 22-sep-16. The project had a total contract period of 1095 days and original contract amount of 1,133,472,329.44 ETB. However, the project was not completed on the intended time and cost due to different reasons. The EOT /project delay was mainly associated with additional scope of work in the town section extension; additional drainage facilities and due to delay in the removal of row obstructions. Consequently, the completion date of the project was revised to 9-des-18 with 830 days of total granted extension of time. From the total EOT 336 days or 40.5% of the total EOT was due to right of way problems. Correspondingly the main reasons for contract amount change were due to escalation, variation and primarily as a result of the public and regional administration request to upgrade the town section standard from wereda to zonal section of 8.8km. As a result the project cost augmented to ETB 1,259,227,607.14. With current project progress of 89% most of the project ROW issues were completed.

Table 4.30 Summary of case study projects

No.	Project progress to date (%)	Initial Contract cost (Birr)	Completed Actual Cost (Birr)	Total Cost overrun (Birr)	Cost claim due to ROW (birr)	Contract Time (cal.das)	Completed Time (cal.days)	Total EOT (cal.days)	EOT due to ROW (cal.days)	EOT due to ROW (%)
1	92% Completed	696807456	744476161	47668705.6	0	1095	2138	1043	187	17.9
2	Completed	610,019,298	726,543,847	116524548.7	0	1095	2200	1105	193	17.5
3	94% Completed	842248579	889954439	47705859.5	0	1278	2180	902	356	39.5
4	On progress	376996880	352245677	-	0	1095	2100	1005	53	5.3
5	90.8% Completed	834,554,046	1002489284	167935237.6	0	1278	2215	937	284	30.3
6	On progress	824614347	1307289681	482675333	0	1095	2304	1209	86	7.1
7	Completed	633,534,840	656,801,471	23266631	0	910	1637	727	31	4.2
8	Completed	669,143,993	805,369,526	136225533.1	0	910	1530	620	365	58.8
9	Completed	648,548,842	698,545,730	49996888.42	0	910	1756	846	182	21.5
10	89% Completed	1133472329	1,259,227,607	125755277.7	0	1095	1925	830	336	40.5

Form the case study it was observed that all of the projects under the study had both time and cost overrun due to ROW problems and other factors. The data collection for the study focused on the effects ROW problems brought on the project completion cost and time. Result shows the effects of ROW problems on time overrun are clearly visible and supported by the requested and garneted EOT by the contractor. However it was difficult to see the effects of ROW problems on projects final cost since no cost related claims linked to ROW problem was raised by the contractor. The effect of ROW problems on project delay was examined by comparing the total EOT granted with the EOT due to ROW. Hence the figure below shows the comparison (in days) using column chart.

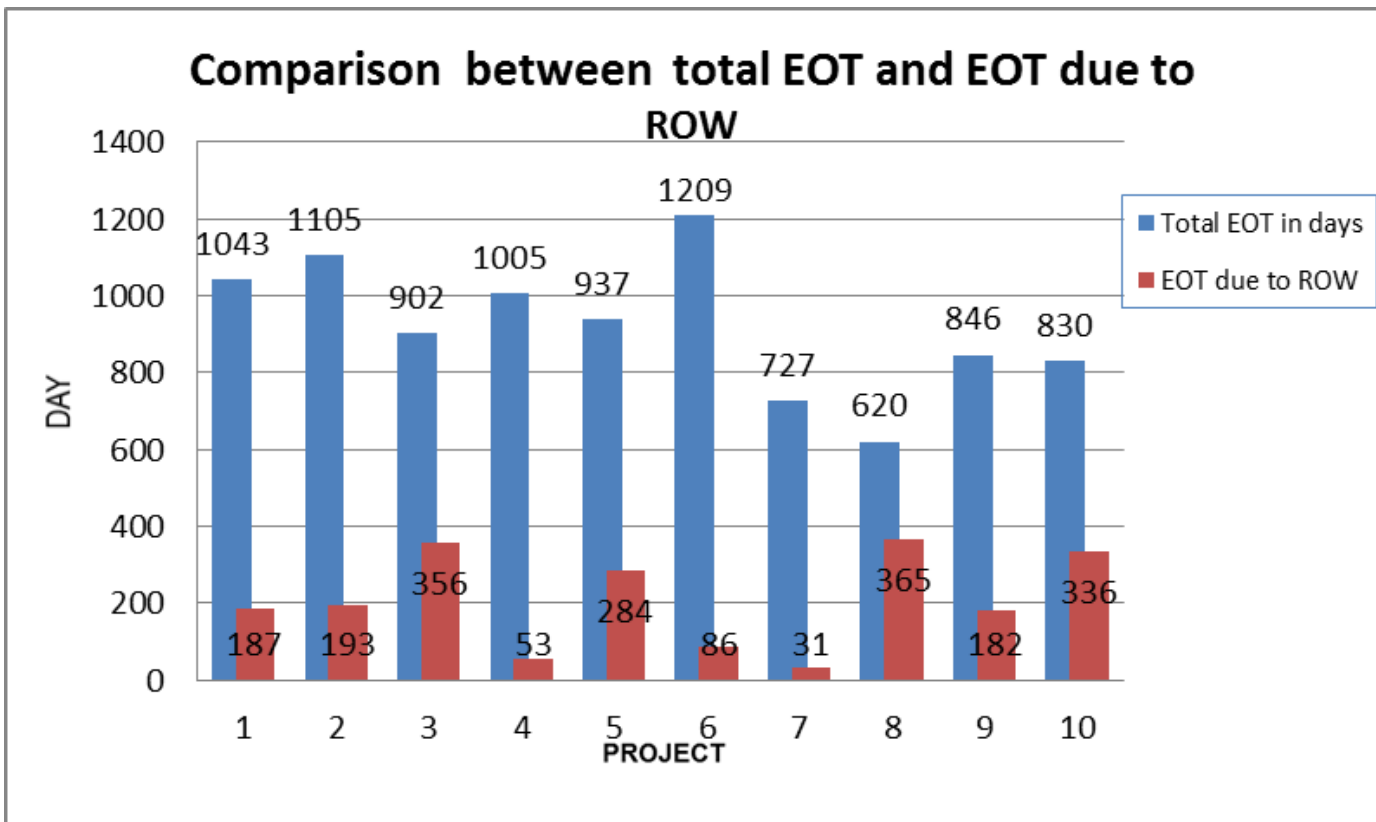


Figure 4.5 Comparison between total EOT and EOT due to ROW using column chart

On the other hand the effect of ROW problems on project time overrun was examined by dividing the project’s EOT due to ROW by the total EOT garneted to get project EOT due to ROW in percentage.

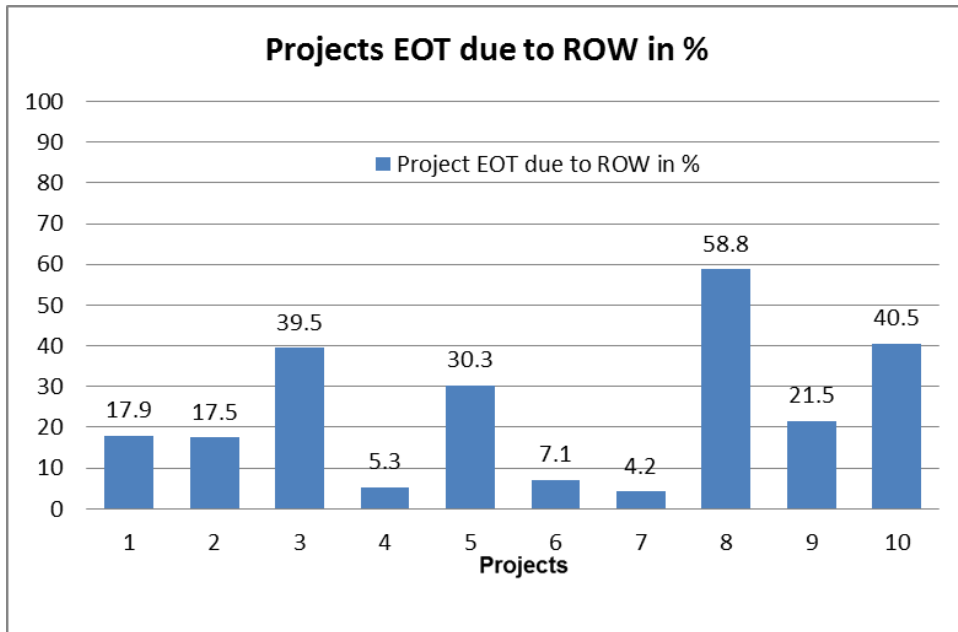


Figure 4.6 Project EOT due to ROW in percentage

The study shows the EOT due to ROW ranges from 4.2% to 58.8 % of the total EOT of the projects under the case study. The contribution of ROW problem for project delay (from the 10 projects under the case study) was less than 10% on 3 projects and more than 50% on 1 project. The following figure explains more on this issue.

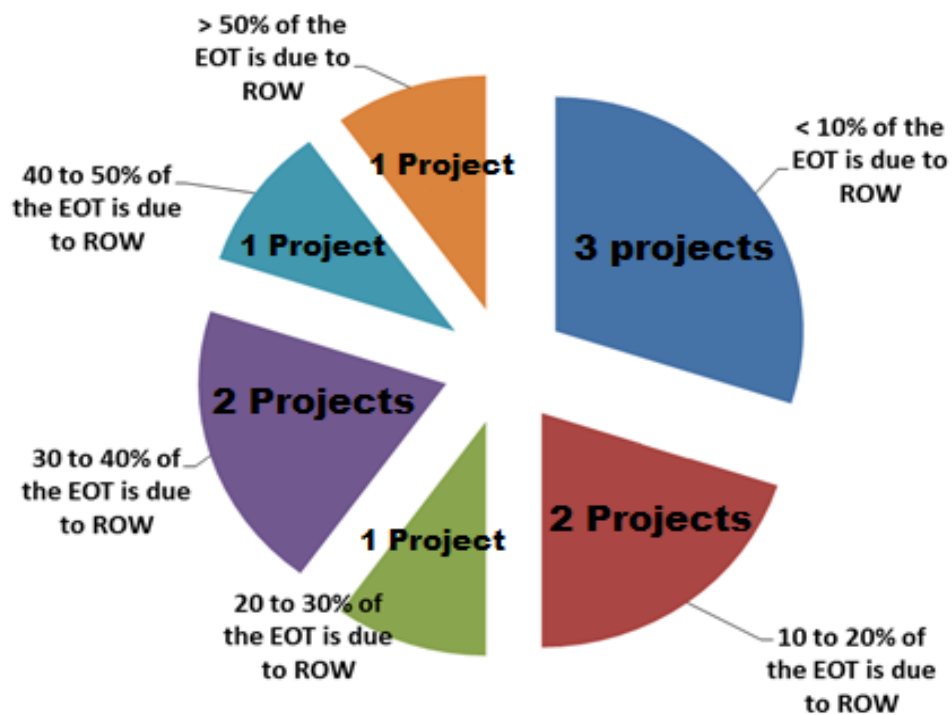


Figure 4.7 Distribution of EOT due to ROW on projects under the case study

#### **4.4 Results of Desk Study**

The benchmark for this desk study was the case study. The case study was done to see the effects of ROW problem on the time and cost overrun of a project. All of the projects under the study had both time and cost overrun due to ROW and other factors. The effect of ROW problems on the project delay was clearly observed during the case study and extension of time in relation to ROW problem was raised and proper EOT was deployed accordingly. However the effects ROW problem on project cost overrun couldn't be detected since none of the contractors requested for cost related claims in relation to ROW problems. However this doesn't imply the effects of ROW problems only results in extension of time. This desk study was prepared to see the implication of time extension on the total project cost overrun.

The case study clearly shows ROW problem directly affects the project completion date and results on construction delay and the desk study reveal any delay in construction results in cost overruns. Though there were no cost related claims in relation to ROW problems, all project under the case study experienced cost overrun. Direct cost in relation to right of way problem was not recorded but the case study shows there were time related costs like Prolongation/other Costs and Extended Supervision Fee for all projects under the case study. Therefore when there is ROW problem on site it results in project delay hence, highly influences the project's completion cost.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are forwarded from the research work. Questionnaire, case and desk study data collecting approaches were used to collect the required data and the results attained were analyzed, discussed and presented in the previous chapter to address the specific objectives of the study. The first and second specific objective of this study were to assess the major causes that contribute to the right of way problems and assessing the effect of right of way obstruction on the cost and time overrun in Ethiopian federal road projects. The last specific objective of the study was to come up with mitigation measures in order to minimize right of way obstruction in the future.

ROW acquisition is a complex process in which many participants and stakeholders are involved. The questionnaire was prepared to get multidimensional view from all professional participants working on federal road projects. The first and third specific objectives of the study were addressed through questionnaire survey. Case study and the desk study were performed in order to reach the second specific objective of the research.

#### 5.1 Conclusions

The following major conclusions based on the results attained are summarized and presented below.

To attain the first objective of the study Twenty-six causes of right of way problems of Ethiopian federal road projects categorized under six factor groups were identified by the respondents. The frequency and severity of each cause from the perspectives of different group of respondents were analyzed using Importance index as a function of frequency and severity index.

The analysis of total collected survey data shows, the top important cause of ROW problem was “Insufficient coordination between ROW agents and utility authorities” caused by unhealthy relationship between the employer and the utility authorities. Followed by factor resulted from poor Appraisal and Acquisition process, “Delays in compensation, displacement and relocation”.

The third and fourth important causes were “Lack of commitment and sufficient manpower from utility authorities” and “Delay in relocation/protection of utilities lines after compensation”.

During the analysis the participants were grouped according to their entitlement as Client, consultants and contractors groups in order to understand the group’s perception. Results shows the insights of one participant group differ from another in identifying the most important causes of ROW problems. The tests of agreements shows there were strong correlation between the Client and Contractor; the Client and General respondents; the Contractor and General respondents and the Consultant and General respondents. On the other hand perception/contemplation of the respondents of the Client and Consultant as well as Contractor and Consultant on causes of right of way problems was different.

The second specific objective of the research was obtained through a case study and desk study. In order to investigate the practical effect of right of way problems on the cost and time overrun of Ethiopian Federal road projects, a case study was done on ten road projects under ERA western region. The result shows the projects under the case study have both extension of time and cost overrun due to different reasons. The EOT due to right of way problems were significant in all projects under the study ranging from 4.2% to 58.8 % of the total EOT. The effect of ROW problems on project cost overrun couldn’t be evaluated since there were no cost related claims in relation to ROW for projects under the case study. However this doesn’t imply the effects of ROW problems only results in extension of time. Thus desk study was performed to see the implication of time extension on the total project cost overrun. The desk study reveal, when there is ROW problem on site it results in project delay which highly influences the project’s completion cost through time related costs.

The third objective of the study was to obtain best practices to follow in order to mitigate right of way problems and the result shows, the practice “Creating good communication and team work spirit with Utility Authorities” was rated as the best practice to mitigate ROW problems. Followed by “Refining the benefits of the project for the society and property owners to cooperate and settle early.” And “Preliminary study on already existing Utility lines to avoid unexpected sub-surface conditions”.

Tests of agreements on practices to mitigate ROW problems among survey participants concluded that there was strong correlation between the Client and Consultant; the Client and General respondents; the Contractor and General respondents and the Consultant and General respondents. On the other hand perception/contemplation of the respondents of the Client and Contractor as well as Contractor and Consultant on mitigation measures of right of way problems was different.

## **5.2 Recommendation**

This chapter summarizes the recommendations for changes to overcome the major causes of ROW problems identified in this study and reduce the effects it brought on the time and cost overrun of Ethiopian Federal road projects.

- I. The employer shall develop and implement an adequate and realistic ROW acquisition schedule to reduce delay due to design issues. A significant issue observed in many projects was that design is notoriously and habitually late, which disrupts a project's schedule by imposing significant delays in delivering accurate construction limits. Information about accurate construction limits is a prerequisite for commencing the right of way acquisition process and it's crucial for determining the efforts and resources required.
- II. The teams handling ROW acquisition process should coordinate with the project planning, management, and engineering divisions from the early phases. In addition, involving utilities companies in the planning phase of highway projects where major relocations are anticipated is very critical to identify potential ROW acquisition problems.
- III. It is essential to provide a continuous cross-training program within the agency. The knowledge and experience of agency staff is critical in the overall ROW acquisition process. Inadequately trained staff could be one of the biggest obstacles identified for ROW acquisition (Caldas et al., 2006). Continuous efforts to provide proper education and training on the ROW acquisition process and to instill effective methods should be made. All ROW staff members are required to take this training program (Moeller et al., 2002).

- IV. The employer shall develop healthy relationship with utility authorities based on a formal contractual agreement. Thus there will be accountability and fewer conflicts between parties.
- V. The society shall be cooperative and understand the consequents and benefits of new road project development. Hence they shall work together with the ROW agents for smooth ROW acquisition process.
- VI. The government shall give the proper attention to the ROW acquisition issue and create mechanisms to adopt the best practices of developed countries which can facilitate the current ROW acquisition process. In addition the ministry of education shall prepare a professional training program of study that focuses on ROW acquisition process and land law.

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**APPENDIX A: QUESTIONNAIRE SURVEY FORM**

## QUESTIONNAIRE SURVEY FORM

This questionnaire is prepared to obtain information from key informants with semi- structured questions. The information is required for the academic research entitled “*Assessing the Cause and Effect of Right of Way Obstruction on The Cost and Time Overrun of Ethiopian Federal Road Projects.*” which is being conducted as partial fulfillment of MSc in Construction technology and management. The main objective of the research is assessing the cause and effect of right way obstruction on the cost and time overrun of Ethiopian federal road projects and came up with mitigation measures.

The questionnaire consists of three sections. *Section 1: Current Practice of Right of Way Acquisition and Management of ERA; Section 2: General Organization Information; Section 3: Factors/Causes of Right of Way Problems and Section 4: Practices to Mitigate Right of Way Problems in Ethiopian Federal Road Projects.* At the end there is a space that left for general comments regarding the research topic.

Your participation and response in this important survey is valuable and contributory to the outcome of the research. The time required to complete this form is approximately 10 minutes and all feedback will be kept strictly confidential, and utilized for this academic research only.

Please answer all questions to the best of your knowledge. However, you may skip some questions if you are not comfortable with answering them. If possible, please consult with others in your organization and/or look up past records and data in order to ensure accuracy of the information collected in this survey.

Thank you, (**Yealem Tilahun**)

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Addis Ababa

**Section 1: General Profile of the Respondent**

1. The questions below are related to your organization and yourself. Please indicate your response by ticking (√) in the appropriate box or by filling the blank spaces provided, as appropriate.

1.1. Name of organization (Optional): \_\_\_\_\_

1.2. Type of organization:

Employer                       Consultant                       Contractor

1.3. Organization’s experience in Federal road construction projects.

< 5 years       5 – 10 years       10 – 15 years       > 15 years

1.4. Your Position/ Job Description: \_\_\_\_\_

1.5. Your experience on road projects:

< 5 years       5 – 10 years       10 – 15 years       > 15 years

1.6. Educational Status

BSc               MSc               others (Please specify): \_\_\_\_\_

1.7. Your work experience in /with ERA (on which road projects you have worked/involved)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1.8. Your name and Contact Address (Optional)

Name: \_\_\_\_\_

Tel. no.: \_\_\_\_\_

E-mail address: \_\_\_\_\_

**Section 2: Factors/Causes of right of way problems**

The following factors/causes for right of way problems are identified and tabulated from review of literature and personal experience in road construction projects. Please consider in terms of your organization’s experience and/or your knowledge to indicate the Degree of Occurrence and contribution of each factor, for right of way problems, by ranking according to the project which your organization undertook.

Please respond by ticking (√) in the appropriate box or filling the blank space provided, as appropriate. For other factors which require specific elaborations, please reply to the subjective questions in the space provided.

**Please indicate how frequently you feel each items below as factors/causes for right of way problem and there contribution (how much each factor is influential/ critical) to ROW cost increase and schedule delay.**

No.	Factors/Causes of right of way problems	Degree of Occurrence (Frequency)				Contribution to Project cost and time overrun			
		High (4)	Medium (3)	Low (2)	None (1)	High (4)	Medium (3)	Low (2)	None (1)
1	<b>Project Development</b>								
1.1	Conflict of interests between different work divisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	Lack of coordination and sequential hand over environment among project teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3	ROW plan changes and revisions due to changes in scope of Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4	Tight schedule for ROW acquisition tasks (with	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	specified time line and limited number of staff)								
2	<b>Agency's Internal Capability</b>								
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Insufficient number of ROW staff or appraisers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<b>Relationship with the Public</b>								
3.1	Less communication between appraiser/ ROW staff and the public including property owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Limited information provision to the public (e.g. price Disclosure)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Property owners' distrust of agency and/or appraisal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	Property owners' refusing to accept the appraisal's decision.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	Absence of motivation for property owners to settle early.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<b>Appraisal and Acquisition</b>								
4.1	Delay in identification and appraisal of ROW problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Delays in compensation, displacement and relocation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3	Delay in clearing of ROW properties after compensation (property management)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Limited access to the property due to the resistance of the property owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5	Errors and omission in identification of ROW problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.6	Fencing of the land by property owners after taking property compensation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5</b>	<b>Relationship with Utility Authorities</b>								
5.1	Insufficient coordination between ROW agents and utility authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2	Lack of commitment and sufficient manpower from utility authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4	Over cost estimation by utility authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5	Delay in relocation/protection of utilities lines after compensation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6</b>	<b>Other</b>								
6.1	Lack of temporary land for subsidiary construction activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2	Design errors by the design consultants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Others:** If there are any other causes/reasons contributing to ROW problem that you have experienced, please describe them here.

**Section 3: Practices to Mitigate Right Of Way Problems**

Best practices to mitigate right of way problems are identified below, Please consider in terms of your organization’s experience and/or your knowledge to indicate the Degree of Significance of each action, for right of way problems, by ranking according to the project which your organization undertook.

Please respond by ticking (√) in the appropriate box or filling the blank space provided, as appropriate. For other factors which require specific elaborations, please reply to the subjective questions in the space provided.

**[Practices/Actions]: Please indicate *how important/ significant each practice and/or activity below to alleviate right of way problem.***

No.	Practices to mitigate right of way problems	Degree of Significance			
		High (4)	Medium (3)	Low (2)	None (1)
<b>1</b>	<b>Project Development</b>				
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3	Performance management planning of ROW activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2</b>	<b>Agency’s Internal Capability</b>				
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3	Assign sufficient number of ROW staff for projects according there experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>3</b>	<b>Relationship with the Public</b>				
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Involving the public and property owners’ in the ROW acquisition process so as to develop trust on the agency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>4</b>	<b>Appraisal and Acquisition</b>				
4.1	Developing a system for good property management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Involving an experienced agent for a good and on time appraisal report delivery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3	Creating unlimited access to the property by developing a good relation with the property owners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Outsource the ROW acquisition process for licensed private agency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>5</b>	<b>Relationship with Utility Authorities</b>				
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2	Creating good communication and team work sprit with Utility Authorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>6</b>	<b>Other</b>				
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2	Minimizing design errors through collaborating with responsible bodies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Others:** If there are any other mitigation measures for right of way problem that you consider, please specify them here.

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**Section 4: Specific questions designed for the Contractor group on Current Practice of  
Right of Way Acquisition and Management**

The following questions are aimed to get the current practices of ERA right of way management in Ethiopian federal road projects. Please respond in terms of your organization's experience and/or your personal knowledge and indicate your response by ticking (√) in the appropriate box (es) or filling the blank space provided, as appropriate.

I. Who is responsible for ROW problems? Do you think ROW problems are purely employer's responsibility?

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II. Do you think the Project Delivery Systems/type (DB, DBB) and method of procurement (bidding procedure) have a direct effect on ROW problem?

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III. As a contractor do you record the idle machineries and manpower during the ROW problems? Besides do you consider and submit cost related claims in relation to ROW? If your answer is NO why?

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IV. Why do you think a contractor receive a project with ROW problem in to his knowledge? Some's say "Contractors use ROW problems as a cover for their poor performance and means of extension of time." Please Explain.

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**Section 4: Specific questions designed for the Consultant group on Current Practice of  
Right of Way Acquisition and Management**

The following questions are aimed to get the current practices of right of way management on Ethiopian road projects. Please respond in terms of your organization's experience and/or your personal knowledge and indicate your response by ticking (√) in the appropriate box (es) or filling the blank space provided, as appropriate.

I. Who is responsible for ROW problems? Do you think ROW problems are purely employer's responsibility?

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II. Do you think the Project Delivery Systems/type (DB, DBB) and method of procurement (bidding procedure) have a direct effect on ROW problem?

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III. Does the consultant perceive, predict and discuss with the client about the financial impact and related consequence of ROW problems.

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IV. Is it possible to create a mechanism to predict the financial consequence (on ERA) of transferring projects (with ROW issue) to the contractor? So that the employer takes a calculated risk or suspend the project for the right time.

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**Thank You for your Time!!!**

**APPENDIX B: QUESTIONNAIRE SURVEY RESPONSE ANALYSIS**

Table B.1 Response rate of the Employer's group on Causes of right of way problems

No.	Factors/Causing right of way problems	Frequency of occurrences				Degree of severity			
		Always	Often	sometimes	Rarely	Extreme	Great	Moderate	little
<b>1 Project Development</b>									
1.1	Conflict of interests between different work divisions	2	4	4	2	2	4	4	2
1.2	Lack of coordination and sequential hand over environment among project teams	2	6	4		4	4	4	
1.3	ROW plan changes and revisions due to changes in scope of Work	4	4	4		2	4	6	
1.4	Tight schedule for ROW acquisition tasks (with specified time line and limited number of staff)	2	2	6	2	4	4	4	
<b>2 Agency's Internal Capability</b>									
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	4	2	4	2	2	4	2	4
2.2	Insufficient number of ROW staff or appraisers	2	4	6				8	4
<b>3 Relationship with the Public</b>									
3.1	Less communication between appraiser/ ROW staff and the public including property owners		6	6		2	2	6	2
3.2	Limited information provision to the public (e.g. price Disclosure)	2	6	2	2		4	4	4
3.3	Property owners' distrust of agency and/or appraisal	6	6			5		4	3
3.4	Property owners' refusing to accept the appraisal's decision.	5	6	1		5	3	3	1
3.5	Absence of motivation for property owners to settle early.	4	6	2		5	3	4	
<b>4 Appraisal and Acquisition</b>									
4.1	Delay in identification and appraisal of ROW problems	2	6	4			6	3	3
4.2	Delays in compensation, displacement and relocation	2	8	2		3	4	5	
4.3	Delay in clearing of ROW properties after compensation (property management)	4	6	2		3	4	4	1
4.4	Limited access to property due to resistance of the property owners	4	6		2	3	3	3	3
4.5	Errors and omission in identification of ROW problems		6	4	2		4	5	3
4.6	Fencing land by property owners after taking property compensation	2	6		4		3	4	5
<b>5 Relationship with Utility Authorities</b>									
5.1	Insufficient coordination between ROW agents and utility authorities	4	6	2		6		3	3
5.2	Lack of commitment and sufficient manpower from utility authorities	4	8			4	4		4
5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	2	6	4			3	5	4
5.4	Over cost estimation by utility authorities	2	6	4			4	4	4
5.5	Delay in relocation/protection of utilities lines after compensation.	4	4	4		2	3	4	3
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	4	6	2		3	3	3	3
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	4	6	2		3	3	3	3
<b>6 Other</b>									
6.1	Lack of temporary land for subsidiary construction activities	2	6	4		3	3	3	3
6.2	Design errors by the design consultants	2	6	4			6	4	2

Table B.2 Response rate of the Contractor's group on Causes of right of way problems

No.	Factors/Causing right of way problems	Frequency of occurrences				Degree of severity			
		Always	Often	sometimes	Rarely	Extreme	Great	Moderate	little
<b>1 Project Development</b>									
1.1	Conflict of interests between different work divisions	10		4		6	4	4	
1.2	Lack of coordination and sequential hand over environment among project teams	7	7			6	7	1	
1.3	ROW plan changes and revisions due to changes in scope of Work		10	4			9	5	
1.4	Tight schedule for ROW acquisition tasks (with specified time line and limited number of staff)	5	9			7	6	1	
<b>2 Agency's Internal Capability</b>									
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	6	3	5		6		8	
2.2	Insufficient number of ROW staff or appraisers	3		11		3		11	
<b>3 Relationship with the Public</b>									
3.1	Less communication between appraiser/ ROW staff and the public including property owners		8	6		3	5	6	
3.2	Limited information provision to the public (e.g. price Disclosure)		8	6			8	6	
3.3	Property owners' distrust of agency and/or appraisal	6		8		3		11	
3.4	Property owners' refusing to accept the appraisal's decision.	3	8	3		3	11		
3.5	Absence of motivation for property owners to settle early.	3	8	3		6	5	3	
<b>4 Appraisal and Acquisition</b>									
4.1	Delay in identification and appraisal of ROW problems	5	9			8	6		
4.2	Delays in compensation, displacement and relocation	10	4			10	4		
4.3	Delay in clearing of ROW properties after compensation (property management)	5	6	3		5	6	3	
4.4	Limited access to the property due to the resistance of the property owners	3	6	5		3	3	8	
4.5	Errors and omission in identification of ROW problems		5	9			8	6	
4.6	Fencing of the land by property owners after taking property compensation		3	5	6		3	8	3
<b>5 Relationship with Utility Authorities</b>									
5.1	Insufficient coordination between ROW agents and utility authorities	5	6	3		8	3	3	
5.2	Lack of commitment and sufficient manpower from utility authorities	5	6		3	8	3		3
5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	5		6	3	3	2	6	3
5.4	Over cost estimation by utility authorities		11	3		3	5	6	
5.5	Delay in relocation/protection of utilities lines after compensation.	5	6	3		3	8	3	
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	5		9			2	12	
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	2	6	6			8	3	3
<b>6 Other</b>									
6.1	Lack of temporary land for subsidiary construction activities		5	9			8	6	
6.2	Design errors by the design consultants		3	11			3	11	

Table B.3 Response rate of the Consultant's group on Causes of right of way problems

No.	Factors/Causing right of way problems	Frequency of occurrences				Degree of severity			
		Always	Often	sometimes	Rarely	Extreme	Great	Moderate	little
<b>1 Project Development</b>									
1.1	Conflict of interests between different work divisions		9	4		4	5	4	
1.2	Lack of coordination and sequential hand over environment among project teams		9	4		4	9		
1.3	ROW plan changes and revisions due to changes in scope of Work		13			5	8		
1.4	Tight schedule for ROW acquisition tasks (with specified time line and limited number of staff)		8	5			13		
<b>2 Agency's Internal Capability</b>									
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	9		4		9	4		
2.2	Insufficient number of ROW staff or appraisers		5	8		4	5	4	
<b>3 Relationship with the Public</b>									
3.1	Less communication between appraiser/ ROW staff and the public including property owners	4	9			4	9		
3.2	Limited information provision to the public (e.g. price Disclosure)	8	5			4	9		
3.3	Property owners' distrust of agency and/or appraisal	5	4	4		5	4	4	
3.4	Property owners' refusing to accept the appraisal's decision.	4	9				9	4	
3.5	Absence of motivation for property owners to settle early.	4	5	4			13		
<b>4 Appraisal and Acquisition</b>									
4.1	Delay in identification and appraisal of ROW problems	5		8		13			
4.2	Delays in compensation, displacement and relocation	4	5	4		8	5		
4.3	Delay in clearing of ROW properties after compensation	4		9		8		5	
4.4	Limited access to the property due to the resistance of the property owners			13			9	4	
4.5	Errors and omission in identification of ROW problems			13		4	4	5	
4.6	Fencing of the land by property owners after taking property compensation			9	4	4		9	
<b>5 Relationship with Utility Authorities</b>									
5.1	Insufficient coordination between ROW agents and utility authorities	13				13			
5.2	Lack of commitment and sufficient manpower from utility authorities	9	4			13			
5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities		13				13		
5.4	Over cost estimation by utility authorities	9		4		13			
5.5	Delay in relocation/protection of utilities lines after compensation.	9	4			9	4		
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	5	8				13		
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	13				8	5		
<b>6 Other</b>									
6.1	Lack of temporary land for subsidiary construction activities		13				13		
6.2	Design errors by the design consultants	4		9		4	4	5	

Table B.4 Response rate of total collected data on Causes of right of way problems

No.	Factors/Causing right of way problems	Frequency of occurrences				Degree of severity			
		Always	Often	sometimes	Rarely	Extreme	Great	Moderate	little
<b>1 Project Development</b>									
1.1	Conflict of interests between different work divisions	12	13	12	2	12	13	12	2
1.2	Lack of coordination and sequential hand over environment among project teams	9	22	8		14	20	5	
1.3	ROW plan changes and revisions due to changes in scope of Work	4	27	8		7	21	11	
1.4	Tight schedule for ROW acquisition tasks (with specified time line and limited number of staff)	7	19	11	2	11	23	5	
<b>2 Agency's Internal Capability</b>									
2.1	Lack of ROW staff's knowledge, skills, experience and commitment	19	5	13	2	17	8	10	4
2.2	Insufficient number of ROW staff or appraisers	5	11	23		7	5	23	4
<b>3 Relationship with the Public</b>									
3.1	Less communication between appraiser/ ROW staff and the public including property owners	4	23	12		9	16	12	2
3.2	Limited information provision to the public (e.g. price Disclosure)	10	19	8	2	4	21	10	4
3.3	Property owners' distrust of agency and/or appraisal	17	10	12		13	4	19	3
3.4	Property owners' refusing to accept the appraisal's decision.	12	23	4		8	23	7	1
3.5	Absence of motivation for property owners to settle early.	11	19	9		11	21	7	
<b>4 Appraisal and Acquisition</b>									
4.1	Delay in identification and appraisal of ROW problems	12	15	12		21	12	3	3
4.2	Delays in compensation, displacement and relocation	16	17	6		21	13	5	
4.3	Delay in clearing of ROW properties after compensation	13	12	14		16	10	12	1
4.4	Limited access to the property due to the resistance of the property owners	7	12	18	2	6	15	15	3
4.5	Errors and omission in identification of ROW problems		11	26	2	4	16	16	3
4.6	Fencing of the land by property owners after taking property compensation	2	9	14	14	4	6	21	8
<b>5 Relationship with Utility Authorities</b>									
5.1	Insufficient coordination between ROW agents and utility authorities	22	12	5		27	3	6	3
5.2	Lack of commitment and sufficient manpower from utility authorities	18	18		3	25	7		7
5.3	Unexpected sub-surface conditions due to inadequate information from utility authorities	7	19	10	3	3	18	11	7
5.4	Over cost estimation by utility authorities	11	17	11		16	9	10	4
5.5	Delay in relocation/protection of utilities lines after compensation.	18	14	7		14	15	7	3
5.6	Lack of contractually binding responsibilities between the client & utility companies/ public agencies	14	14	11		3	18	15	3
5.7	Lack of legal enforcement (law) and accountability towards utility authorities	19	12	8		11	16	6	6
<b>6 Other</b>									
6.1	Lack of temporary land for subsidiary construction activities	2	24	13		3	24	9	3
6.2	Design errors by the design consultants	6	9	24		4	13	20	2

Table B.5 Response rate of Employer's group on Practices to Mitigate ROW Problems

No.	Practices to Mitigate Right Of Way Problems	Very Imp.	Important	Less Imp.	Not Imp.
1	Project Development				
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	6	5	1	
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	8	4		
1.3	Performance management planning of ROW activities	6	5	1	
2	Agency's Internal Capability				
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	2	10		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	2	8	2	
2.3	Assign sufficient number of ROW staff for projects according there experience	2	8	2	
3	Relationship with the Public				
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	8	4		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	8	2	2	
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	8	4		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	9	3		
4	Appraisal and Acquisition				
4.1	Developing a system for good property management.	6	6		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	3	9		
4.3	Creating unlimited access to the property by developing a good relation with the property owners	3	6	3	
4.4	Outsource the ROW acquisition process for licensed private agency.	1	6	5	
5	Relationship with Utility Authorities				
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	8	3	1	
5.2	Creating good communication and team work sprit with Utility Authorities	9	2	1	
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	8	2	2	
6	Other				
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)		8	3	1
6.2	Minimizing design errors through collaborating with responsible bodies	3	9		

Table B.6 Response rate of contractor's group on Practices to Mitigate ROW Problems

No.	Practices to Mitigate Right Of Way Problems	Very Imp.	Important	Less Imp.	Not Imp.
1	Project Development				
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	8	6		
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	14			
1.3	Performance management planning of ROW activities	8	3	3	
2	Agency's Internal Capability				
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	8	6		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	11	3		
2.3	Assign sufficient number of ROW staff for projects according there experience	8	3	3	
3	Relationship with the Public				
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	8		6	
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	8	3	3	
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	6	5	3	
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	2	9	3	
4	Appraisal and Acquisition				
4.1	Developing a system for good property management.	2	9	3	
4.2	Involving an experienced agent for a good and on time appraisal report delivery	5	6	3	
4.3	Creating unlimited access to the property by developing a good relation with the property owners	2	6	6	
4.4	Outsource the ROW acquisition process for licensed private agency.			8	6
5	Relationship with Utility Authorities				
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	5	6	3	
5.2	Creating good communication and team work sprit with Utility Authorities	5	9		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	8	3	3	
6	Other				
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	3	5	6	
6.2	Minimizing design errors through collaborating with responsible bodies	2	6	3	3

Table B.7 Response rate of Consultant's group on Practices to Mitigate ROW Problems

No.	Practices to Mitigate Right Of Way Problems	Very Imp.	Important	Less Imp.	Not Imp.
1	Project Development				
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	9		4	
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	5	4		4
1.3	Performance management planning of ROW activities	4	5	4	
2	Agency's Internal Capability				
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	9	4		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)		9		4
2.3	Assign sufficient number of ROW staff for projects according there experience	4	9		
3	Relationship with the Public				
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	4	9		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	4	9		
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	5	8		
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	13			
4	Appraisal and Acquisition				
4.1	Developing a system for good property management.	4	9		
4.2	Involving an experienced agent for a good and on time appraisal report delivery	9	4		
4.3	Creating unlimited access to the property by developing a good relation with the property owners		8	5	
4.4	Outsource the ROW acquisition process for licensed private agency.		9		4
5	Relationship with Utility Authorities				
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	9	4		
5.2	Creating good communication and team work sprit with Utility Authorities	9	4		
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	9	4		
6	Other				
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	4	5		4
6.2	Minimizing design errors through collaborating with responsible bodies		13		

Table B.8 Response rate of total collected data on Practices to Mitigate ROW Problems

No.	Practices to Mitigate Right Of Way Problems	Very Imp.	Important	Less Imp.	Not Imp.
1	<b>Project Development</b>				
1.1	Constitute a multi-functional/multidisciplinary project delivery team (ROW, design, environment, survey, construction.)	23	11	5	0
1.2	ROW involvement in early project stage (such as planning, programming, and preliminary design)	27	8		4
1.3	Performance management planning of ROW activities	18	13		8
2	<b>Agency's Internal Capability</b>				
2.1	Professional training and/or education program for ROW staff, appraisers, and appraisal reviewers	19	20		
2.2	Utilization of advanced technology (e.g. electronic parcel information management, GIS)	13	20	2	4
2.3	Assign sufficient number of ROW staff for projects according there experience	14	20	5	
3	<b>Relationship with the Public</b>				
3.1	Encourage ROW staff agents to meet/communicate the public and property owners	20	19		
3.2	Sufficient information sharing and discussion with property owners/public (e.g. price Disclosure)	20	14	5	
3.3	Involving the public and property owners' in the ROW acquisition process so as to develop trust on the agency.	19	17	3	
3.4	Refining the benefits of the project for the society and property owners to cooperate and settle early.	24	12	3	
4	<b>Appraisal and Acquisition</b>				
4.1	Developing a system for good property management.	12	24	3	
4.2	Involving an experienced agent for a good and on time appraisal report delivery	17	19	3	
4.3	Creating unlimited access to the property by developing a good relation with the property owners	5	20	14	
4.4	Outsource the ROW acquisition process for licensed private agency.	1	15	13	10
5	<b>Relationship with Utility Authorities</b>				
5.1	Forming contractual agreement with Utility authorities to create accountability and legal accountability.	22	13	4	
5.2	Creating good communication and team work sprit with Utility Authorities	23	15	1	
5.3	Preliminary study on already existing Utility lines (with no information) to avoid unexpected sub-surface conditions	25	9	5	
6	<b>Other</b>				
6.1	Use of special delivery method (e.g. design-build, public-private partnership, etc.)	7	18	9	5
6.2	Minimizing design errors through collaborating with responsible bodies	5	28	3	3

**APPENDIX C: SPEARMAN'S RANK TABLE**

### Critical Values of the Spearman's Ranked Correlation Coefficient ( $r_s$ )

Taken from Zar, 1984 Table B.19

$\alpha(2)$ :	0.50	0.20	0.10	0.05	0.02	0.01	0.005	0.002	0.001	$\alpha(2)$ :	0.50	0.20	0.10	0.05	0.02	0.01	0.005	0.002	0.001
$\alpha(1)$ :	0.25	0.10	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005	$\alpha(1)$ :	0.25	0.10	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
n										n									
4	0.600	1.000	1.000							51	0.096	0.182	0.233	0.276	0.326	0.359	0.390	0.426	0.451
5	0.500	0.800	0.900	1.000	1.000					52	0.095	0.180	0.231	0.274	0.323	0.356	0.386	0.422	0.447
6	0.371	0.657	0.829	0.886	0.943	1.000	1.000			53	0.095	0.179	0.228	0.271	0.320	0.352	0.382	0.418	0.443
7	0.321	0.571	0.714	0.786	0.833	0.881	0.905	1.000	1.000	54	0.094	0.177	0.226	0.268	0.317	0.349	0.379	0.414	0.439
8	0.310	0.524	0.643	0.738	0.833	0.881	0.905	0.952	0.976	55	0.093	0.175	0.224	0.266	0.314	0.346	0.375	0.411	0.435
9	0.267	0.483	0.600	0.700	0.783	0.833	0.867	0.917	0.933	56	0.092	0.174	0.222	0.264	0.311	0.343	0.372	0.407	0.432
10	0.248	0.455	0.564	0.648	0.745	0.794	0.830	0.879	0.903	57	0.091	0.172	0.220	0.261	0.308	0.340	0.369	0.404	0.428
11	0.236	0.427	0.536	0.618	0.709	0.755	0.800	0.845	0.873	58	0.090	0.171	0.218	0.259	0.306	0.337	0.366	0.400	0.424
12	0.217	0.406	0.503	0.587	0.678	0.727	0.769	0.818	0.846	59	0.089	0.169	0.216	0.257	0.303	0.334	0.363	0.397	0.421
13	0.209	0.385	0.484	0.560	0.648	0.703	0.747	0.791	0.824	60	0.089	0.168	0.214	0.255	0.300	0.331	0.360	0.394	0.418
14	0.200	0.367	0.464	0.538	0.626	0.679	0.723	0.771	0.802	61	0.088	0.166	0.213	0.252	0.298	0.329	0.357	0.391	0.414
15	0.189	0.354	0.446	0.521	0.604	0.654	0.700	0.750	0.779	62	0.087	0.165	0.211	0.250	0.296	0.326	0.354	0.388	0.411
16	0.182	0.341	0.429	0.503	0.582	0.635	0.679	0.729	0.762	63	0.086	0.163	0.209	0.248	0.293	0.323	0.351	0.385	0.408
17	0.176	0.328	0.414	0.485	0.566	0.615	0.662	0.713	0.748	64	0.086	0.162	0.207	0.246	0.291	0.321	0.348	0.382	0.405
18	0.170	0.317	0.401	0.472	0.550	0.600	0.643	0.695	0.728	65	0.085	0.161	0.206	0.244	0.289	0.318	0.346	0.379	0.402
19	0.165	0.309	0.391	0.460	0.535	0.584	0.628	0.677	0.712	66	0.084	0.160	0.204	0.243	0.287	0.316	0.343	0.376	0.399
20	0.161	0.299	0.380	0.447	0.520	0.570	0.612	0.662	0.696	67	0.084	0.158	0.203	0.241	0.284	0.314	0.341	0.373	0.396
21	0.156	0.292	0.370	0.435	0.508	0.556	0.599	0.648	0.681	68	0.083	0.157	0.201	0.239	0.282	0.311	0.338	0.370	0.393
22	0.152	0.284	0.361	0.425	0.496	0.544	0.586	0.634	0.667	69	0.082	0.156	0.200	0.237	0.280	0.309	0.336	0.368	0.390
23	0.148	0.278	0.353	0.415	0.486	0.532	0.573	0.622	0.654	70	0.082	0.155	0.198	0.235	0.278	0.307	0.333	0.365	0.388
24	0.144	0.271	0.344	0.406	0.476	0.521	0.562	0.610	0.642	71	0.081	0.154	0.197	0.234	0.276	0.305	0.331	0.363	0.385
25	0.142	0.265	0.337	0.398	0.466	0.511	0.551	0.598	0.630	72	0.081	0.153	0.195	0.232	0.274	0.303	0.329	0.360	0.382
26	0.138	0.259	0.331	0.390	0.457	0.501	0.541	0.587	0.619	73	0.080	0.152	0.194	0.230	0.272	0.301	0.327	0.358	0.380
27	0.136	0.255	0.324	0.382	0.448	0.491	0.531	0.577	0.608	74	0.080	0.151	0.193	0.229	0.271	0.299	0.324	0.355	0.377
28	0.133	0.250	0.317	0.375	0.440	0.483	0.522	0.567	0.598	75	0.079	0.150	0.191	0.227	0.269	0.297	0.322	0.353	0.375
29	0.130	0.245	0.312	0.368	0.433	0.475	0.513	0.558	0.589	76	0.078	0.149	0.190	0.226	0.267	0.295	0.320	0.351	0.372
30	0.128	0.240	0.306	0.362	0.425	0.467	0.504	0.549	0.580	77	0.078	0.148	0.189	0.224	0.265	0.293	0.318	0.349	0.370
31	0.126	0.236	0.301	0.356	0.418	0.459	0.496	0.541	0.571	78	0.077	0.147	0.188	0.223	0.264	0.291	0.316	0.346	0.368
32	0.124	0.232	0.296	0.350	0.412	0.452	0.489	0.533	0.563	79	0.077	0.146	0.186	0.221	0.262	0.289	0.314	0.344	0.365
33	0.121	0.229	0.291	0.345	0.405	0.446	0.482	0.525	0.554	80	0.076	0.145	0.185	0.220	0.260	0.287	0.312	0.342	0.363
34	0.120	0.225	0.287	0.340	0.399	0.439	0.475	0.517	0.547	81	0.076	0.144	0.184	0.219	0.259	0.285	0.310	0.340	0.361
35	0.118	0.222	0.283	0.335	0.394	0.433	0.468	0.510	0.539	82	0.075	0.143	0.183	0.217	0.257	0.284	0.308	0.338	0.359
36	0.116	0.219	0.279	0.330	0.388	0.427	0.462	0.504	0.533	83	0.075	0.142	0.182	0.216	0.255	0.282	0.306	0.336	0.357
37	0.114	0.216	0.275	0.325	0.383	0.421	0.456	0.497	0.526	84	0.074	0.141	0.181	0.215	0.254	0.280	0.305	0.334	0.355
38	0.113	0.212	0.271	0.321	0.378	0.415	0.450	0.491	0.519	85	0.074	0.140	0.180	0.213	0.252	0.279	0.303	0.332	0.353
39	0.111	0.210	0.267	0.317	0.373	0.410	0.444	0.485	0.513	86	0.074	0.139	0.179	0.212	0.251	0.277	0.301	0.330	0.351
40	0.110	0.207	0.264	0.313	0.368	0.405	0.439	0.479	0.507	87	0.073	0.139	0.177	0.211	0.250	0.276	0.299	0.328	0.349
41	0.108	0.204	0.261	0.309	0.364	0.400	0.433	0.473	0.501	88	0.073	0.138	0.176	0.210	0.248	0.274	0.298	0.327	0.347
42	0.107	0.202	0.257	0.305	0.359	0.395	0.428	0.468	0.495	89	0.072	0.137	0.175	0.209	0.247	0.272	0.296	0.325	0.345
43	0.105	0.199	0.254	0.301	0.355	0.391	0.423	0.463	0.490	90	0.072	0.136	0.174	0.207	0.245	0.271	0.294	0.323	0.343
44	0.104	0.197	0.251	0.298	0.351	0.386	0.419	0.458	0.484	91	0.072	0.135	0.173	0.206	0.244	0.269	0.293	0.321	0.341
45	0.103	0.194	0.248	0.294	0.347	0.382	0.414	0.453	0.479	92	0.071	0.135	0.172	0.205	0.243	0.268	0.291	0.319	0.339
46	0.102	0.192	0.246	0.291	0.343	0.378	0.410	0.448	0.474	93	0.071	0.134	0.171	0.204	0.241	0.267	0.290	0.318	0.338
47	0.101	0.190	0.243	0.288	0.340	0.374	0.405	0.443	0.469	94	0.070	0.133	0.171	0.203	0.240	0.265	0.288	0.316	0.336
48	0.100	0.188	0.240	0.285	0.336	0.370	0.401	0.439	0.465	95	0.070	0.133	0.170	0.202	0.239	0.264	0.287	0.314	0.334
49	0.098	0.186	0.238	0.282	0.333	0.366	0.397	0.434	0.460	96	0.070	0.132	0.169	0.201	0.238	0.262	0.285	0.313	0.332
50	0.097	0.184	0.235	0.279	0.329	0.363	0.393	0.430	0.456	97	0.069	0.131	0.168	0.200	0.236	0.261	0.284	0.311	0.331
										98	0.069	0.130	0.167	0.199	0.235	0.260	0.282	0.310	0.329
										99	0.068	0.130	0.166	0.198	0.234	0.258	0.281	0.308	0.327
										100	0.068	0.129	0.165	0.197	0.233	0.257	0.279	0.307	0.326