



RISK MISALLOCATION ON HIGHWAY TRANSPORTATION PROJECTS

Project 08-04
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16. Abstract Unfortunately, one of the most common ways to avoid risk in the highway construction industry today is by allocating it elsewhere. Risk is constantly passed around and usually to parties who are not in the best position to take on those risks. Unanticipated issues are or perils are inherent in the construction industry and therefore, they will never be eliminated completely. This is why there is a need for further research into <i>risk management</i> and <i>allocation</i> to help parties bear risks in a more appropriate manner. The first part of this research is focused on identifying the risks that are most often misallocated in the highway construction industry today. A survey was taken of contractors and DOT employees to find out what they considered the most commonly misallocated risks. Once identified, the top risks were investigated further in order to determine how those issues are currently being treated. Using past court cases, state standard specifications, and DOT claims documents, legal consideration flow charts were created. These flow charts are designed to allow parties to a contract better understand how risks are treated in most situations. The goal is that the information in these charts will help to better allocate risk up front rather than trying to deal with difficult, time consuming, expensive conflict resolution or litigation. The state of risk allocation needs to change and this research is attempting to be a starting point for that change.			
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Risk Misallocation on Highway Transportation Projects

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EXECUTIVE SUMMARY

This research is focused on identifying the risks that are most often misallocated in the highway construction industry today. The final goal is that this information, when combined with legal

consideration flow charts, will help to better allocate risk up front rather than trying to deal with difficult, time consuming, expensive conflict resolution or litigation. The state of risk allocation needs to change and this research is attempting to be a starting point for that change.

Unfortunately, one of the most common ways to avoid risk in the highway construction industry today is by allocating it elsewhere. Risk is constantly passed around and usually to parties who are not in the best position to take on those risks. Unanticipated issues or perils are inherent in the construction industry and therefore, they will never be eliminated completely. This is why there is a need for further research into risk management and allocation to help parties bear risks in a more appropriate manner.

After reviewing a wide variety of literature regarding construction risk management, several conclusions were drawn that brought the need for the subsequent research into light. To start, there is extensive literature on risk management in general, but none of the risk management literature offers specific ideas or guidelines for allocating specific risks. Also, there is quite a larger focus on the construction industry in general rather than specifically focusing on the highway construction industry. Next, while there were a few publications that did address specific allocation of risk strategies, these documents were usually focused on one specific risk rather than several risks all specific to the highway construction industry. Finally, virtually none of these previous documents make an attempt to solicit opinions about which risks are most frequently misallocated from people in the industry who are actually experiencing this misallocation.

This research is being conducted in accordance with the Midwest Regional University Transportation Center (MRUTC). The focus of this organization's research is on region five of the United States. This region encompasses Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio. For this reason, the data collection and research focus will be for the states listed. The Midwest Regional University Transportation Center (MRUTC) recognized the potential benefits of better understanding the issues with risk misallocation and funded this study in order to assist state Departments of Transportation (DOT) in risk assessment and management.

A survey was taken of contractors and DOT employees to find out what they considered the most commonly misallocated risks. A total of 28 surveys were completed and returned to the research group. Of those 28 surveys, 19 were completed by DOT district employees and 9 by contractors or subcontractors. Once identified, the top risks were investigated further in order to determine how those issues are currently being treated. Using past court cases, state standard specifications, and DOT claims documents, legal consideration flow charts were created. These flow charts are designed to allow parties to a contract to better understand how risks are treated in most situations.

The methodology of this research consists of two main parts. The first is the determination of the top misallocated risks in the industry today through a qualitative industry survey, and the second is in depth legal research into the top risks in order to determine guidelines for the best way to allocate them.

From the surveys, the top nine most commonly misallocated risks were identified. Those risks, from most commonly to least commonly misallocated, are:

- Design incomplete or in error
- Constructability of plan
- Unclear or ambiguous specifications
- Validity of construction schedule
- Inadequate geotechnical investigation
- Relocations and coordination of work activities with utilities
- Unknown or unanticipated discovery of utilities
- Differing site conditions
- Unsuitable subgrade material

Disputes often arise when the owner attempts to use exculpatory clauses to deny responsibility for an inadequate design. The responsibility of design adequacy should be thoroughly discussed and thoughtfully addressed in both the design contract and the construction contract in order to avoid disputes later in the project.

Ambiguities in specifications lead to conflicting interpretations of contract clauses which can create disputes. Sometimes ambiguities are intentional, and sometimes they are not. Either way, the conflicts that arise from ambiguities can cause delays and additional costs.

The goal is that in time, the industry will be led away from the traditional way of shifting risks to parties unable to bear them. The value of this will be seen through increased project success, better relationships among the construction team and between the contractors and owner agency, fewer claims, and reduced overall project costs.

Throughout the process of this research, many things have been learned and there are some very important take home points that need to be mentioned. Below is the advice and recommendations that have come out of the research:

- Risk will never be gone from the process of highway construction, but there is much room for improvements to risk management and allocation
- No two projects will be identical. Therefore, there will never be a prescriptive way to allocate risk that will work for every project. Much of the decision process will be based upon the specific characteristics of the project.
- Although this research identified the top risks in the industry, some projects may have risks not in the top list that are more important to focus on. Therefore, it would be beneficial for owners and contractors to identify risks on each project and attempt to rank them according to the system used in the survey in order to determine which risks need most attention on any given project.
- It has come to light that some of the issues are within the specifications themselves. The industry panel felt that, for the most part, the standard specifications do an adequate job of clearly and properly allocating risk. However, problems often arise through the addition of special provisions and additional exculpatory clauses. This could be an area for further research and investigation.

- Contractors and Owners are encouraged to review the flow charts before and during projects to help them understand where a potential misallocation could end and strive to find a way to deal with risks before the project begins.

There is much to be learned about risk management and allocation. This topic is a vast one and research should continue on all aspects of risk management. The more that can be learned about it, the more efficient projects will become in the future. Risk will never go away, but those who understand risk the best, will be in the best position to avoid conflicts and gain from their knowledge.

1.1 Introduction

Webster's Dictionary defines risk as “The possibility of loss or injury; someone or something that creates or suggests a hazard.” In the construction industry, the common practice of shifting risk to the contracting party with the least amount of bargaining power is recognized as “inappropriate risk allocation” or “risk misallocation.” Risk misallocation can be defined as “The practice of allocating risk without separately considering which party may be in the optimum position to evaluate, control, bear the cost of, and/or benefit from the assumption of the risk” (Swanson, 2006).

1.2 Purpose of Research

With the exception of a few large-scale, pioneering projects, the majority of contracts for the construction of transportation infrastructure are established through low bid and design-bid-build contracting practices. With this traditional approach, prospective contractors are given plans, standard specifications, and special provisions for the project, and they can choose to bid under those contractual terms or not. If they choose to bid, they will be responsible for many of the risks the owner passes to them through the contract. It is typical for public owner agencies to minimize their risks in construction by allocating the risks to the prime contractor through the contract documents (Swanson, 2006). The prime contractors may then attempt to push some of the risk off to lower-tier subcontractors through their contract arrangements. An example of this is a contractor holding a sub-contractor responsible for liquidated damages on delays to the overall completion date. This often results in the parties with the least amount of ability, control, and/or influence over decisions carrying the majority of the construction risk burden. This practice can be catastrophic for small firms, such as Disadvantaged Business Enterprises (DBE), should losses occur. It also results in an adversarial relationship between the contractors and the owner agencies, with more time spent on disputes, subsequent claims, and increased litigation. It can further cause more knowledgeable contractors to avoid bidding on contracts that include onerous contract terms, leaving lower quality contractors to take on the work. In addition, unnecessarily high contingencies will be inevitable if a contractor is expected to carry a large burden of risk that it does not have the means to bear. As a result, state highway agencies will pay more for work if the risk is not realized and the contingency will become profit for the contractor.

The highway construction industry feels that current risk allocation practices could be improved (FHWA, 2006). This feeling is shared by the panel of industry experts, a panel of volunteers representing both contractors and owners who have provided input into the research. However, to date, there is no widely used methodology or model for allocating risk. This causes the practice of misallocation to continue and prevail in the industry. In turn, projects continue to suffer losses in time, cost, and quality when risks are realized and the bearer is unprepared for the associated consequences (Atkinson, 2001).

Due to the current inappropriate and inefficient allocation of risk experienced in the highway construction industry, this study seeks to develop tools and methodologies that will provide guidelines for appropriately allocating risk. The tools that are developed through this research, such as flow charts, will allow owners, prime-constructors, and subcontractors to allocate risks amongst themselves in such a way that the party in the best position to accept a risk will be the one to take it on in a given project. The goal is that in time, the industry will be led away from the traditional way of shifting risks to parties unable to bear them. The value of this will be seen through increased project success, better relationships among the construction team and between the contractors and owner agency, fewer claims, and reduced overall project costs. The selection of high quality bidders will increase when the risks they are asked to bear are ones they have the capacity to bear and lower contingencies will be adequate when the risks are appropriately allocated.

1.3 Scope of Research

While risk management practices in many aspects of construction are important issues to be addressed in the industry today, the focus of this research will be specific to the highway construction industry and appropriate risk allocation practices. Although some states are beginning to test out the idea of design-build methods for public infrastructure projects, the majority of the projects still are of the design-bid-build/low bid type, we will only use design-bid-build projects for our research. This is not to say that the methods will not be applicable to design-build, but we will not specifically discuss its applicability there. Finally, when considering contractual relationships in which risks are shared and transferred, contracts between owner and designer were not considered. While risks can be shifted between owner and

designer, the main risk is design accuracy and the consequences of inaccurate design by the designer is fairly well understood in most circumstances. Therefore, further investigation of this risk situation will not be a focus of this study.

This research is being conducted in accordance with the Midwest Regional University Transportation Center (MRUTC). The focus of this organization's research is on region five of the United States. This region encompasses Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio. For this reason, the data collection and research focus will be for the states listed.

The research will attempt to encompass the following:

1. Determine the most commonly misallocated risks experienced in the highway construction industry. There are almost infinite possibilities of risks to be realized, especially with new methods and equipment developing every day. However, the scope of the research will not allow all of the possible risks to be researched in depth. It was decided that the top 5 or 6 issues will be addressed in this research.
2. From the list of top risks, in depth research will occur in order to develop a decision tree to the most appropriate allocation of the top risks based on common law and previous court rulings. Using legal research along with input from the industry expert panel, we will come up with suggestions for the most appropriate allocation of the top risks. Included in these suggestions will be guidelines that inform how a risk will be allocated absent contract language (common law) and any important information pertaining to enforceability of contract clauses. The result of this research will assist industry participants (contractors, owners) in determining the best way to allocate risks on their future projects with the intention of decreasing costs and disputes.

1.4 Methodology

The methodology of this research consists of two main parts. The first, is the determination of the top misallocated risks in the industry today through a qualitative industry survey, and the second is in depth legal research into the top risks in order to determine guidelines for the best way to allocate them.

1.4.1 Determination of Top Risks

In order to determine the top misallocated risks in the industry today, a survey was used. The survey was developed with input from all members of the research team and industry panel. Through extensive discussion, a list of 56 risks for survey participants to choose from was developed. Twenty-one of those risks were considered to be experienced during either pre or post-construction and the other 35 were considered to be experienced during construction. Participants were asked to choose the top five misallocated risks from each list and to rank their severity and frequency of being realized on a project. Other questions included what type of work the participant engaged in and the approximate dollar amount of work the company performed each year. The complete survey can be found in appendix A.

To distribute the survey, industry expert participants assisted in putting together a list of DOT district employees and highway construction contractors. The list of DOT district employees from Wisconsin was provided by a member of the WisDOT Bureau of Project Development. The list of contractors was provided by a member of the Wisconsin Transportation Builders Association. Other DOT district employees and contractors from other states were found through internet searches and contacted as well. Surveys were distributed to these participants through e-mail and returned via e-mail, fax, or postal service.

1.4.2 In Depth Legal Research on Top Risks for Guideline Development

To accomplish the second phase of the research, two main resources were used. First, claims brought to state dispute boards were obtained from Michigan, Ohio, and Wisconsin. These claims documents contained information pertaining to disputes that arose between contractors and the state DOTs on projects occurring over the past 10 years. From the documents, information pertaining to contract language and reasoning for denying or accepting various claims was collected and analyzed. The second source was actual litigation proceedings from cases that went to trial and appeals courts. Again, information pertaining to contract language and the disputes involved was collected. Legal issues and rules used to determine the outcomes of these cases were also collected. Information pertaining to common law allocation of risks when contractual clauses are absent was collected as well. This information was utilized to

develop flow charts for contractors and owners to follow when attempting to decide which party should take on a specific risk for a given project.

1.5 Layout of Paper

This chapter serves to set up the basis of the research and the reasoning why this research was chosen. The next chapter provides a literature review that illustrates the need for this research. Chapter 3 contains the methodology used in this research. Specifics of the survey used and subsequent results are found in this chapter as well as the plans for the legal research. In Chapter 4 the legal review can be found. Flow charts for the top risks are also contained in this chapter. The document concludes with a summary of the work and final recommendations in Chapter 5.

Chapter 2 – Literature Review

2.1 Literature Review

Before beginning the bulk of the research on this project, it was necessary to conduct a literature review in order to determine what research pertaining to appropriate risk allocation on highway construction projects already existed. The literature review included highway risk allocation, but was also expanded to risk management in the construction industry. This helped to better clarify what research has already been conducted and how this new research could be different in order to contribute unique information that was not previously available. The sources ranged from books on risk management to risk management manuals for state DOTs. The results follow in subsequent sections.

2.1.1 Governmental Risk Management Guides

The *Guide to Risk Assessment and Allocation for Highway Construction Management* from the Federal Highway Administration (FHWA) focuses on the broad picture of risk management as a whole. The take home point of the study is that an all encompassing, formal plan is needed in order to most effectively manage risk. The basic methodology the study proposes is a six step process that traverses a project from pre-planning stages all the way through completion. The steps are risk identification, assessment, analysis, mitigation, allocation, and tracking & updating. In the risk assessment step, the document suggests assessing the severity and frequency of the risk. This research team feels this is an important process for the ensuing research as it will allow parties to determine the most important risks needing proper allocation. In the risk allocation section, the document focuses mostly on conceptual recommendations. It cites one objective of risk allocation as allocating risks to the party best able to manage them. The research team feels this is one of the key risk allocation principles that should be considered when allocating risks. However, this research team feels this document is lacking in specific suggestions on how to determine which party is best able to manage a risk. Also, it does not discuss contract language or legal considerations. The research team feels these are imperative items for parties to become familiar with in order to more appropriately allocate risks.

In May 2007, the California department of transportation, or Caltrans, released a second edition to their *Project Risk Management Handbook*. Similar to the FHWA document, this document identifies key steps in the risk management process. According to this document, the steps are risk management planning, identification, analysis, response planning, and monitoring & control. Again, this plan is intended to specify risk management processes at all levels of a project from pre-planning through completion. The document is very thorough in identifying which member of the project team has what responsibility within the risk management plan. The document again stresses analyzing risks in the areas of frequency and severity which the research team very much supports and agrees with. However, the document provides procedures for both qualitative and quantitative risk analysis. The research team feels a qualitative analysis is much more simple and more than sufficient and will thus focus on this analysis. This document identifies allocation strategies a bit more extensively than the FHWA document. Caltrans cites the possibilities of avoidance, mitigation, transfer, and acceptance for dealing with risks. However, it once again lacks direction in how to determine which strategy to use with which risk. It also lacks the discussion of contract language and legal considerations.

The *OBO Risk Assessment Standard Operation Procedure*, developed by the U.S. Department of State Bureau of Overseas Buildings Operations (OBO), is a guide to risk assessment based on CII's International Project Risk Assessment (IPRA) tool and method. The guide provides an in depth procedure of how to identify and analyze the risks for any given project. It also provides a timeline of when IPRA evaluations should be conducted throughout the cycle of a project. The guide includes worksheets that have an extensive list of risks that are possible for OBO embassy projects along with descriptions of the various risks and categories of risks. As with many other risk management procedures, each risk is analyzed based on frequency and severity. This leads to a ranking of the risks. The ranking is used to plot each risk in a risk matrix that when completed displays the distribution of impacts and likelihoods of all risks pertinent to the project. Risk mitigation methods are identified, but are not linked to any specific risks. The user of the guide still has little guidance about how to allocate the risks. Also, while it is very useful in risk identification and analysis, it is specific to OBO embassy projects rather than highway construction projects. The research team will consider and incorporate similar concepts of

identifying frequency and severity, but for risks specific to highway construction. (March 7, 2005, G. Edward Gibson, Jr. and John A. Walewski)

2.1.2 Risk Allocation Studies

In a study conducted for the Construction Industry Institute by Dr. Awad Hanna and Justin Swanson, risk allocation is discussed very thoroughly. This study is called *Contracting to Appropriately Allocate Risk*. The study identifies 14 “hot button” risks that are most commonly misallocated. It also provides an extensive list of 107 risks that are encountered in the construction industry. The study developed worksheets for contracting parties to utilize when determining how to allocate the risks on a given project. The study also included extensive legal research for 10 of the 14 “hot button risks”. However, the focus of this study was on the industrial construction industry. Due to the fact that virtually all highway construction projects have a DOT as the owner entity which is a public governmental owner, the commonly misallocated risks have the potential to be very different than those seen in the industrial construction sector, which has many more private owner entities. This previous study was considered very successful, so the research team feels a similar study, focusing on the highway construction industry would be very beneficial.

Enlightened Risk Allocation was prepared jointly by ACEC and AGC. The document discusses various aspects of risk such as the need to be concerned about risk allocation, an example list of risks, and how owners and contractors can benefit from more appropriate allocation of risk. In discussing risk allocation strategies, it focuses only on the role of the owner. It gives the owner supreme rights to decide what risk to shift to the contractor and what risk to retain for itself. It sticks to the key themes of thoroughly identifying potential risks and allocating risks to the party best able to manage the risk as most other documents discussing risk do. It provides some examples of strategies that owners are already implementing, including how to deal with differing site conditions and how to ensure a higher quality and more complete design. In the appendix, nine specific risks are discussed according to a description of the risk, consequences of misallocating the risk, results of fair allocation of the risk, and how to properly allocate the risk. This appendix has had the most thorough and specific instructions for actually implementing appropriate allocation of risks. However, it does not appear that there was any attempt to solicit

information from owners or contractors on what risks should be discussed. It appears that the risks were chosen arbitrarily by the writers of the document. This research team intends to discuss risks identified specifically by the industry as being of high priority. Also, this document is addressing the construction industry as a whole and focuses on owner decisions only.

2.1.3 Articles on Risk Management Practices

In an article called “Construction Claims and Contracting Strategies” by Bryan Shapiro, risk management strategies from the perspective of an attorney who deals with the aftermath of misallocation on a regular basis are provided. Shapiro discusses the importance of preparing contracts that are specific to a particular project rather than trying to fit a project to a contract template. In discussing how risks should be allocated, Shapiro suggests equitable risk sharing, which is similar in concept to the idea of allocating risk to the party best able to manage it. He also discusses several “guiding principles” for allocating risk. Within these, there is quite a bit of focus on choosing an appropriate delivery system and when and how to involve the various contract entities including subcontractors and suppliers. Some other principles are cited about cost and schedule control, dispute resolution provisions, incentive programs, constructability analysis, and negotiation training. These concepts may be useful for risk management in general, but they stray from detailing ways to actually allocate the risks. He does provide some suggestions on change order provisions and cost escalation that could involve direct contractual risk allocation. He fails to thoroughly address specific risks and specifically how to allocate them between parties. He also misses an extensive legal discussion of the risks. Finally, this article discusses construction in general, whereas the research team would like to focus on highway construction projects.

Mark McCallum of the Associated General Contractors of America (AGC) wrote a brief reference called “A Quick Primer on Construction Risks and Contracting Practices”. This document again identifies the principle that a risk should be allocated to the party who is best able to manage the risk. It also talks about the importance of using contract language to achieve proper allocation of risk. The use of standard form contracts is also discussed in this document. The author feels that standard form contracts can be useful, but should always be modified in some way in order to ensure the most effective contractor language for the project at hand. Once again though, while he discusses risk allocation very broadly and the benefits associated with

proper allocation, he fails to identify key risks and discuss specifics of the allocation of those risks.

An article in *The Journal of Construction Engineering and Management* called “Programmatic Cost Risk Analysis for Highway Megaprojects” by Keith R. Molenaar discusses the methodology of the Cost Estimating Validation Process (CEVP), developed and utilized by the Washington Department of Transportation (WSDOT). The article details a comprehensive procedure of project cost estimating that involves quantifying known costs as well as producing cost ranges for uncertain and unknown costs/risks for a project. The article stresses an extensive risk identification and analysis process that is part of the estimating process of a project. The results of the risk identification and analysis are used to place cost ranges on uncertain and unknown risks. This process is intended to give contracting parties and the public a better idea of the uncertainty in a project estimate. The model also stresses how the ranges will become more specific as the project develops through design and into construction, where more unknowns can be precisely quantified. Through the implementation of the CEVP model, the author feels it has made significant improvements in risk avoidance and mitigation and is better able to express project costs to the public and other involved parties. However, the article and process does not speak to risk allocation at all. It attempts to find other routes of dealing with risk beyond alternative allocation methods. The article does not give any direction as to how to allocate an identified risk that cannot be avoided or mitigated. It also does not give an idea of what kinds of risks are in this category of unavoidable or unable to be mitigated and whether or not these risks have a high potential for misallocation. The process is very detailed and is a step in the right direction for risk management as a whole, but there is still a need for a detailed and uniform process to ensure appropriate risk allocation. (March 2005, pg. 343-353)

In an article from the National cooperative Highway Research Program’s *Legal Research Digest*, by Richard O. Jones, the risks associated specifically with written guidelines for design and performance standards were discussed. The article, “Risk Management for Transportation Programs Employing Written Guidelines as Design and Performance Standards,” surveyed all 50 states on their legal review and handling of liability issues concerning design, construction, and maintenance of highway projects. The study addressed in this article was attempting to determine if the standard of liability regarding design and performance that highway agencies are

held to has been changing in the past few years. The study concluded that permissive language should be used rather than mandatory, whenever possible, in regulations, standards, and guidelines. They should also encourage interpretation by allowing for discretion or a range of possibilities. Finally, it should be ensured that any change or even slight adjustment to plans or guidelines is documented in writing. While this study does a thorough job addressing one specific risk, it does not address other risks or identify how frequent or severe this risk of design and performance liability is in comparison to other risks experienced in the highway transportation industry.

2.1.4 Risk Allocation Principles Cited in a Risk Management for Subsurface Conditions Book

In *Subsurface Conditions: Risk Management for Design and Construction Management Professionals* edited by David J Hatem, extensive detail is provided regarding many different aspects of risk management and allocation relating to subsurface projects. The following are the important points from the book:

- Both designer and owner should thoroughly review the other before attempting to negotiate a contract.
- Determination of a designer firm should be qualifications based rather than competitively bid.
- Contracts should clearly define the parties involved, the scope of the project, the budget, and the schedule.
- Great care should be taken when considering risks and which party should carry them based on who is in the best position to manage each risk.
- It is in the best interest of the owner to have two geotechnical documents prepared by a geotechnical engineer. A Geotechnical Data Report and a Geotechnical Interpretive Report should be prepared to provide a precise delineation between geotechnical *data* collected and *interpretation* of that data.
- It is highly recommended that the geotechnical engineer continue to be a part of the project all the way through construction so any possible conflicts can be quickly and efficiently dealt with.

- Keep in mind the “25/25/25 Rule of Complexity.” If the project is more than \$25 million, 25% or more of the cost is involved with geotechnical elements, and if 25 or more interfaces are involved, then the project is complex. In this situation, it is suggested that more than ordinary risk management should be utilized to ensure project success.
- Take into consideration how much the design engineering will dictate construction means and methods. This should be considered because sometimes it is necessary for the design engineer to dictate means and methods in complex situations, but that means that they will be taking on additional risk.
- Consider the use of consulting engineers. They can be useful in the design of elements that are not included by the design engineer, such as temporary structures.
- Both parties should be clear on what responsibilities the engineer is accepting and ensure that the contract reflects those expectations.
- Procedures for mitigating disputes should be laid out in the contract documents. This is especially important on subsurface projects due to the frequency of differing site conditions claims.
- Professional liability is an important concern on subsurface projects. It is important for professionals to advise their clients as best as possible even in situations where they are not in a position to make the final decision.
- Insurance is important to consider on subsurface projects as well. It can be an effective way to better control some risks. It is always important to review the possible coverage and what it can protect against on a project.

Overall, this book is extremely detailed in dealing with and allocating risk on subsurface projects. The hopes of the research team are to provide similar detail on a wide variety of risks relating to highway transportation projects in order to help contractors, owners, and consultants avoid misallocating risks on these types of projects.

2.2 Literature Review Conclusions

After reviewing a wide variety of literature regarding construction risk management, several conclusions were drawn that brought the need for the subsequent research into light. To start, there is extensive literature on risk management in general. While this is a very important concept in the inherently risky business of construction, as mentioned in some of the reviews,

none of the risk management literature offers specific ideas or guidelines for allocating specific risks. Also, there is quite a larger focus on the construction industry in general rather than specifically focusing on the highway construction industry. Next, while there were a few publications that did address specific allocation of risk strategies, these documents were usually focused on one specific risk rather than several risks all specific to the highway construction industry. Finally, virtually none of these previous documents make an attempt to solicit opinions about which risks are most frequently misallocated from people in the industry who are actually experiencing this misallocation.

From this information, the goal is clear. This research seeks to provide specific strategies for allocating risks that are chosen by highway construction industry participants. The idea is for the tools to be useful to the current issues at hand in the industry so that immediate cost and conflict savings have the potential to be realized.

3.1 Introduction

One of the primary goals of this study was to determine the risks that are most commonly and most severely affecting the highway construction industry as a result of their misallocation. The research was most interested with determination of these risks through the perspective of various everyday participants in the industry as well as experts in the industry. This determination of commonly and severely misallocated risks would allow further investigation in an attempt to improve the state of their allocation within the industry.

This chapter lays out the overall methodology of the study and discusses how data was collected and utilized. The administration of the survey used to determine the most important risks that needed to be investigated will be discussed along with its results. Subsequently, the means of investigating and analyzing the risks will also be explained. Finally, the tools developed from the investigation and analyses will be discussed.

3.2 Industry Participant Survey

A survey was developed and administered in order to determine the most commonly misallocated risks in the highway construction industry today. The development and goals of the survey and the results of the survey will be discussed in the following sections.

3.2.1 Survey Development and Goals

The general concept of the survey was to get participants in the industry to identify risks that they felt were being misallocated in the industry. The first issue addressed was ensuring that participants understood what we meant by ‘misallocated’. Many problems and disputes can arise on a construction project, but they are not always the result of misallocation of risk. Because of this, it was decided that a clear definition and example of what was meant by misallocation should be included on the survey. Once that was clear, a list of risks was provided for the surveyed to choose from as commonly misallocated. This list was revised several times with input from the industry expert panel.

Additional pertinent information about the individual completing the survey was then added. This information included whether the individual was an owner representative or contractor or

subcontractor, how much work his or her company did in a year, and the individuals perception of how much misallocated risk affects the cost of a project. The full survey that was sent out can be found in Appendix A.

Finally, a ranking system for the risks was developed to determine how frequently and severely the individual felt the risks were affecting projects. The risks were broken into two categories in order to reduce the amount of risks an individual would have to consider at one time. The two categories used were construction risks and pre/post construction risks. The first were risks that are generally experienced while construction is in progress. The second were risks that arise either before or after construction begins or ends. For each category, the participant was asked to pick the top five risks they felt had the most potential for misallocation and rank them one (most) through five (least). Once they did this, they were then asked to give the risk a severity and frequency ranking. The severity of occurrence was described as the relative impact on cost or schedule. The frequency of occurrence was described as the likelihood that the risk is realized. The options for these two rankings are given below in Figure 3.1.

Frequency of Occurrence Rankings

- 1-Remote
- 2-Unlikely
- 3-Likely
- 4-Higly Likely
- 5-Near Certainty

Chance of Occurring

- <10%
- 10-35%
- 36-65%
- 66-90%
- >90%

Severity of Occurrence Rankings

- 1-Negligible
- 2-Minor
- 3-Moderate
- 4-Significant
- 5-Extreme

Increase in Project Cost

- <5%
- 5-10%
- 11-20%
- 21-50%
- >50%

Figure 3.1 Frequency and Severity Ranking Options From Survey (FHWA, 2006)

3.2.2 Survey Implementation

It was decided, based on discussions with the panel of experts, surveys would be sent to contractors who frequently take on DOT highway projects and DOT district employees. The lists of DOT employees and contractors from Wisconsin were provided by members of the industry expert panel, as mentioned earlier. The survey was then distributed by e-mail to these participants. Subsequently, similar participants from other states were sought out. Other DOT members from the states in region five were contacted and asked to complete the survey. Contractors were sought out through other state's builders associations. Members were contacted through e-mail and asked to send the survey on to other contractors in the state. At least one DOT member from Michigan, Wisconsin, Iowa, Minnesota, Illinois, Indiana, and Ohio responded to the survey. No contractors from other states responded.

3.2.3 Survey Results

From the completed surveys, the top misallocated risks in the industry today were able to be determined. A total of 28 surveys were completed and returned to the research group. Of those 28 surveys, 19 were completed by DOT district employees and 9 by contractors or subcontractors. The low response from contractors was discussed with the industry expert panel to determine if more contractor responses were needed. A member of the Wisconsin Transportation Research Board on our panel was very familiar with the contractors that completed the surveys. In his opinion, they were the most qualified and would understand the survey the best. In addition, the other members of the panel reviewed the responses of the contractors and all agreed that the responses were generally in line with what they anticipated. It was agreed that any additional surveys would not change the results already obtained. Therefore, the research team decided there would not be a need for additional surveys.

From the surveys, the top nine most commonly misallocated risks were identified. Those risks, from most commonly to least commonly misallocated, are:

- Design incomplete or in error
- Constructability of plan
- Unclear or ambiguous specifications
- Validity of construction schedule
- Inadequate geotechnical investigation
- Relocations and coordination of work activities with utilities
- Unknown or unanticipated discovery of utilities
- Differing site conditions
- Unsuitable subgrade material

The number of responses for each of the top risks are shown in Figure 3.2 below.

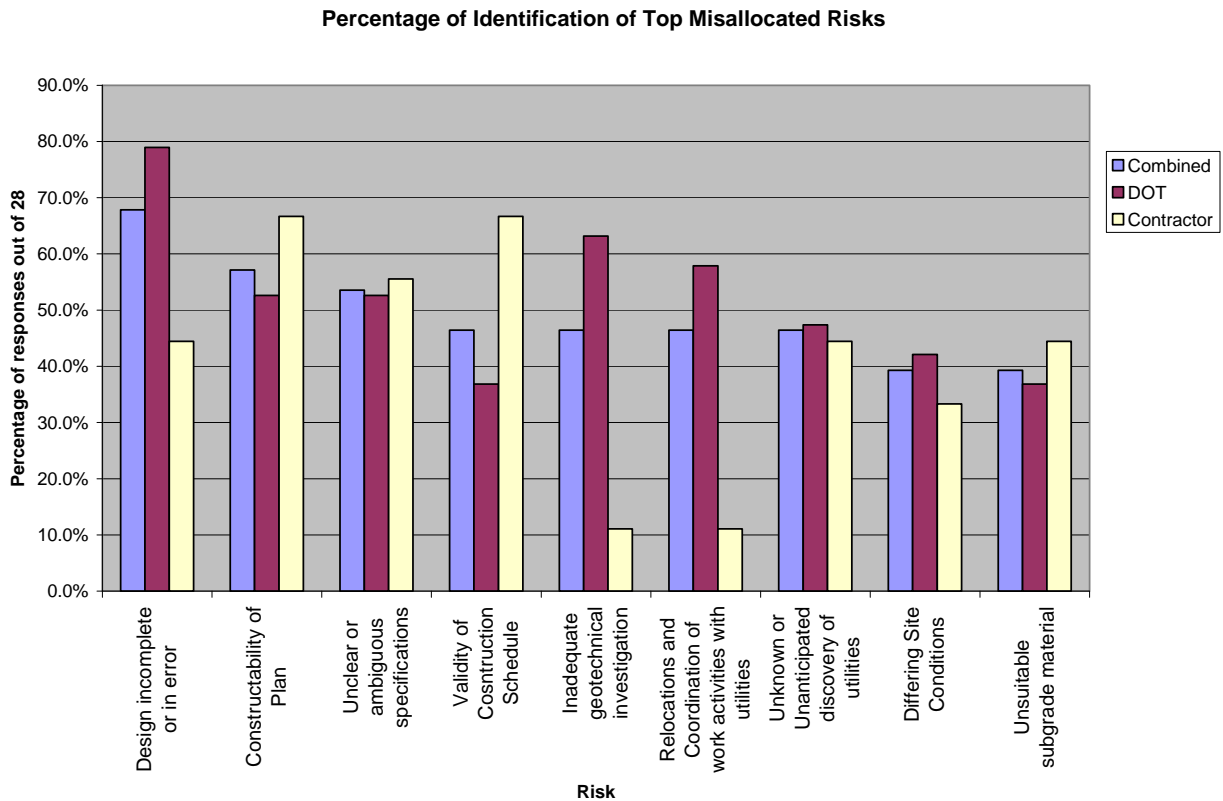


Figure 3.2 - Frequency of Identification of Top Misallocated Risks

After some additional discussion with the panel, the list of risks was revised. Some of the risks were very specific, and it was agreed that some of them could be combined into one risk. There were also some risks the panel was interested in exploring further that did not end up in the top risks according to the survey. Based on all of this, the revised list of risks is as follows:

- Validity of Schedule
- Design Adequacy
- Unclear/Ambiguous Specifications
- Differing Site Conditions
- Utilities
- Critical Design Elements to Contractor
- Pre-Court Claims Resolution
- Ambiguous Acceptance Criteria

These risks are the risks that were planned for further investigation in order to determine how to better allocate them within the highway construction industry.

3.2.4 State Dispute Resolution Documents

Once the initial surveys were completed, additional information concerning the top risks was desired. In order to better understand how to allocate the top risks more properly, the research team sought examples of actual situations where these risks were misallocated. All participants who completed the survey were contacted by e-mail and asked to provide any specific examples of misallocation that they experienced. The responses were very sparse and general. However, one respondent from the Michigan DOT provided his state's dispute resolution documentation for the past few years. These documents contained correspondence between the state and contractors trying to resolve disputes before going to litigation. The documents included a short description of the project, bid price, description of the dispute, requested compensation, contractor position, DOT's position, and the panel's decision. After receiving these, the team decided it would be useful to attempt to obtain these documents from the other region five states. DOT members from Wisconsin, Ohio, Illinois, Indiana, Iowa, and Minnesota were asked if they could provide similar documents from their respective states. Wisconsin and Ohio were able to provide us this information. Over 60 different project disputes were reviewed. From these,

another list of risks was created to reflect the disputes actually occurring in the industry over the past ten years. In order of most common occurrence, these risks are:

- Claims Process
- Specification Interpretation
- Material Testing
- Change Orders (Significant changes in the character of work)
- Delay
- Design Errors/Omissions
- Differing Site Conditions
- Utilities

3.2.5 Legal Review

The final part of the research involved conducting a legal review of the top misallocated risks. This involved extensively researching court claims cases involving the top misallocated risks. From these cases, common law treatment of the risks was identified along with how the court handles allocation of these risks through contract language. The goal of this research was to identify how claims are handled in court to help contractors and owners find a better way to allocate risk in the first place as well as how the allocations will hold up in the face of claims. The study provided general legal guidelines pertaining to contracts and how risk allocation is legally considered. Also, a legal consideration flow chart for each risk was developed. The final list was a combination of all the previous discussed resources and availability of information pertaining to those risks. The final list to be used for the legal review is:

- Changed Conditions (Including differing site conditions and significant changes in character of work)
- Third Party Delay
- Design Adequacy
- Specification Interpretation
- Claims Process

This list encompasses most of the risks discussed above. Third party delay encompasses utility risk while specification interpretation includes ambiguous acceptance criteria. Combining the

risks to make this shorter list was done based on available information for the risks. Validity of schedule was left off of the final list due to lack of information.

3.3 Conclusion

The methodology was developed to identify the most commonly misallocated risks in the industry today. Those risks were then investigated from a legal perspective in order to help determine better ways to allocate and deal with them. The subsequent chapter will discuss the detailed information of the legal research and provide recommendations and guidelines for allocating these risks.

4.1 Introduction

With the top risks identified, it was important to delve deeper into each of them in order to better understand how to appropriately allocate them. In order to do this, a legal review was conducted. A search was performed to find documented court cases that involved the top risks in the context of highway construction projects. The goal was to determine common law considerations and different legal rules that are often used in resolving disputes. Useful information was found concerning differing site conditions, changed quantities, specification interpretation, design adequacy, third party delay, and claims process. The legal reviews and considerations will be discussed in the following sections. Each section contains a flow chart, specific to each risk, showing which party carries the risk in different situations.

4.2 Legal Reviews

The legal reviews are based on available case information pertaining to highway construction projects. Some common law legal information is added where applicable. When constructing the flow charts, information from the cases as well as state standard specifications from region 5 were consulted.

4.2.1 Changed Conditions

4.2.1.1 Introduction

The risk of changed conditions can come in several forms. However, many of the problems that arise concerning the different forms are similar. On a project, changed conditions can come in the form of differing site conditions, extra work, significant change in the character of work, or a combination of the foregoing. The common issue that arises out of all of these is a contractor must perform some portion of work differently than he had anticipated when he signed the contract. Disputes arise quickly when the contractor feels he is entitled to unit price adjustments or additional compensation due to a changed condition. Most of the time, there are contract clauses detailing how a claim for changed conditions will be dealt with. For example, 23 CFR 635.109, a section of the *Code of Federal Regulations*, contains policies, requirements, and procedures for standardized “changed conditions” clauses for Federal aid highway projects. In summary, unless prohibited by State law, Part 635 requires that a “differing site condition” clause shall be made part of and incorporated into each highway project approved under Title 23, United States Code. A copy of the current federal requirement for “changed conditions” clauses is found in Appendix B.

Owners often include complementary exculpatory clauses, or clauses that free one from fault, along with and as part of the changed conditions clauses in contracts. For example, a common differing site condition situation will pertain to the discovery of a soil type that is different than expected according to the contract documents. If there is information about the soil type expected, provided by the owner, the owner will often include a clause indicating that he will not take responsibility for any differences between the information provided and what is actually encountered in the field. This is an example of an owner passing a risk down to the contractor.

The different forms of changed conditions are important to note here. The phrase “Differing Site Conditions” is often associated with subsurface conditions. An example of a Differing Site Condition description from the Michigan DOT is as follows:

“During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those

ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site,”

Note that the Michigan DOT’s clause is identical to the Differing Site Conditions clause required on federally funded highway contracts in 23 CFR 635.109(a)(1). With this, and most other definitions, there are two distinct types of Differing Site Conditions:

1. Subsurface or latent physical conditions at the site which differ materially from those indicated in the contract, or
2. Unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract (48 CFR 36.502)

The next two forms of changed conditions are significant changes in the character of work and extra work. What qualifies as a significant change in the character of work is often spelled out in the contract. Most contract specifications will denote a percentage change in quantity or anticipated price that must be met before the owner will negotiate a change in a unit price for an item. For example, a contract may specify that a major item must be increased or decreased by 25% before the owner and contractor may negotiate a different unit price for the item. The FHWA regulations also provide for a “Significant Change in the Character of Work” clause in 23 CFR 635.109(a)(3) as follows:

“ (3) Significant changes in the character of work.

(i) The engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the contractor agrees to perform the work as altered.

(ii) If the alterations or changes in quantities significantly change the character of the work under the contract, whether such alterations or changes are in themselves significant changes to the character of the work or by affecting other

work cause such other work to become significantly different in character, an adjustment, excluding anticipated profit, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the contractor in such amount as the engineer may determine to be fair and equitable.

(iii) If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the contract.

(iv) The term "significant change" shall be construed to apply only to the following circumstances:

(A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or

(B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

This or very similar language can be found in all Region 5 state's standard specifications.

Extra Work is work that is deemed necessary by the owner, but was not previously included in the terms or scope of the contract. The following is from the federal regulations relating to Extra Work for federally funded highway projects:

23 CFR 635.102 "Major change or major extra work means a change which will significantly affect the cost of the project to the Federal Government or alter the termini, character or scope of the work."

23 CFR 635.120 Changes and extra work

(a) Following authorization to proceed with a project, all major changes in the plans and contract provisions and all major extra work shall have formal approval by the [Federal Highway Administration (FHWA)] Division Administrator in advance of their effective dates. However, when emergency or unusual conditions justify, the Division Administrator may give tentative advance approval orally to such changes or extra work and ratify such approval with formal approval as soon thereafter as practicable.

.....

(d) In establishing the method of payment for contract changes or extra work orders, force account procedures shall only be used when strictly necessary, such as when agreement cannot be reached with the contractor on the price of a new work item, or when the extent of work is unknown or is of such character that a price cannot be determined to a reasonable degree of accuracy. The reason or reasons for using force account procedures shall be documented.

(e) The STD [State Transportation Department] shall perform and adequately document a cost analysis of each negotiated contract change or negotiated extra work order. The method and degree of the cost analysis shall be subject to the approval of the Division Administrator.

A typical definition for extra work is:

“The contractor shall perform authorized work, for which there is no price included in the contract, whenever necessary or desirable in order to complete the work as contemplated. Such work shall be performed in accordance with the specifications and as directed, and be paid for as provided under Section 9.5.” A-G-E Corp v. State, 2006 SD 66, P38 (S.D. 2006)

These two types of changed conditions have some room for interpretation. This is generally where disputes arise. An owner may try to interpret a change in such a way that would not require him to give additional compensation while the contractor on the other side would be interpreting the change in his favor. A more in depth discussion of this risk and some guidelines

will attempt to develop a better allocation and management process for the risk of changed conditions.

4.2.1.2 Common Law

In the absence of definitive contract clauses regarding changed conditions, there are common law rules that apply to contractors and owners involved in changed conditions disputes. Common law rules vary from state to state. In general, however, owners are held to representations they make. When an owner provides information to a contractor, in the absence of any disclaimers or exculpatory clauses, the owner is generally responsible for the accuracy of that information. Any damages in the form of increased costs or delays that a contractor experiences due to inaccurate or incomplete information from the owner will normally be the responsibility of the owner (Sweet, 2000). To be held accountable, the information provided by the owner must be in the form of a representation or affirmation of a fact, made contemporaneously with the contract, be expressly and clearly stated, and made under circumstances in which there is an expectation that the contractor will reasonably rely on the representation of fact.

However, common law also provides that unanticipated or unknown soil or site conditions are generally at the risk and responsibility of contractor. Without contractual clauses passing the risk to the owner, the contractor takes the risk of unknown subsurface conditions (Sweet, 2000).

One other consideration to keep in mind is the idea of mutual mistake. There can be situations where both the contractor and owner assumed certain conditions based on available information and site investigation that end up being vastly different than expected. In cases such as this, the remedy is often to terminate work all together. Unless stipulated otherwise in the contract, the contractor will often be entitled to payment for work he has done up until that point.

4.2.1.3 Owner Representations of Subsurface Conditions

In some contracts, the owner may use information based off of subsoil reports and testing to determine how some of the work should be done. For example, if based on subsurface data collected by the owner, the owner designates a very specific compaction method and compaction limits and the soil is unable to be compacted to those standards due to its material nature, the owner would be held responsible. By designating the strict standards and methods, the owner is essentially representing that they can be met with the soil that is there.

The courts have upheld this rule numerous times. In *S.J. Groves & Sons and Company v. State of North Carolina*, the state (owner) made representations that the work could be done with the materials provided. Because they stated that the materials would be suitable and gave specific directions on what to do with the materials, the court ruled that the owner, State, was responsible when the materials discovered on site were not suitable. The court stated,

Contract design features, specifications and requirements have been held in several instances to constitute affirmative indications that the job could be accomplished in the manner designated in the contract and completed within the prescribed time limits. See *Southern Paving Corporations*, AGBCA No. 74-103, 77-2 BCA para. 12,813 (1977); *Foster Construction C.A. and Williams Brothers Company v. United States*, 435 F2d 873, 193 Ct.Cl. 587 (1970); *Ray D. Bolander Company. Inc. v. United States*, 186 Ct. Claims 398 (1968). The Bolander opinion, in considering a differing site condition claim, is particularly instructive as it dealt with detailed contract compaction requirements and other design features similar to those present in the contract now before us. This decision held that the contractor had a valid differing site condition claim based on the positive representations concerning the soil conditions as contained in the contract documents. (*S. J. Groves & Sons & Co. v. State*, 50 N.C. App. 1, 58 (N.C. Ct. App. 1980))

The above case leads into another important point to consider. That is the idea of impossibility. It can happen that a specification is written into a contract the ends up being impossible or impractical to meet. Unless it is shown that the contractor explicitly accepted responsibility for an impossible specification, he will likely be relieved of responsibility and properly reimbursed for his attempts at an impossible specification. Adding *impractical* into the mix as well serves to release a contractor from responsibility for a possible specification that would take unreasonable amounts of time and/or money to complete (Sweet, 2000). In *Foster Wheeler Corp. v. United States*, the contractor was released from responsibility for boilers they were constructing. The boilers were supposed to be shock tested and needed to meet certain standards. After several attempts, the contractor realized that it was going to be impossible to meet the 'shock hardness' required. The contractor claimed impossibility and the government (owner) brought suit. In deciding for the contractor, the court stated,

Under this theory, it is contended that the construction of a shock-hard boiler, even if ultimately possible, could not be accomplished without commercially unacceptable costs and time input far beyond that contemplated in the contract. To design a shock-hard boiler by means of a mathematical model and dynamic analysis could...take an infinite amount of time....The evidence shows...that the...contract contained specifications which were impossible to meet, either commercially or within the state of the art. (Foster Wheeler Corp. v. United States, 206 Ct. Cl. 533; 513 F.2d 588)

The court agreed with the contractor that the specification was impossible and that at no time did the contractor agree to take responsibility for impossible specifications.

The linking of subsurface information to designs or methods by the owner will in all likelihood result in the owner being held responsible when the actual subsurface conditions cause the design or methods not to work. The contractor did not collect the subsurface information and must rely on what the owner collected. This situation results in an owner representation that the contractor is allowed to and should be expected to rely on.

4.2.1.4 Reasonable Reliance By the Contractor

Despite disclaimers by the owner regarding the accuracy of subsurface information that the owner provides, if it can be proven that the contractor relied, reasonably, upon the information, the owner may be held responsible for discrepancies in the field. If the contractor did properly investigate the site to the best of his ability in the time allowed and properly reviewed all subsurface information provided, the courts may rule that the contractor reasonably relied on the information provided. If this is the case, a contractor may be able to recover additional costs associated with encountering conditions different than were anticipated by the contract.

A contractor of public works who, acting reasonably, is misled by incorrect plans and specifications issued by the public authorities as the basis for bids and who, as a result, submits a bid which is lower than he would have otherwise made may recover in a contract action for extra work or expenses necessitated by the conditions being other than as represented. (E.g., *United States v. Spearin*, 248 U.S. 132, 136-137 [39 S.Ct. 59, 63

L.Ed. 166]; *Christie v. United States*, 237 U.S. 234, 239-242 [35 S.Ct. 565, 59 L.Ed. 933]; *McCree & Co. v. State*, 253 Minn. 295 [91 N.W.2d 713, 721-722]; see *Gogo v. Los Angeles etc. Flood Control Dist.*, 45 Cal.App.2d 334, 341 [114 P.2d 65]; 43 Am.Jur. 852; Annotation 76 A.L.R. 268.) This rule is mainly based on the theory that the furnishing of misleading plans and specifications by the public body constitutes a breach of an implied warranty of their correctness. The fact that a breach is fraudulent does not make the rule inapplicable. (*Jackson v. State*, 210 App.Div. 115 [205 N.Y.S. 658, 664] (affd. 241 N.Y. 563 [150 N.E. 556]); cf. *Chapman v. State*, supra, 104 Cal. at p. 695; *Hersey Gravel Co. v. State Highway Dept.*, 305 Mich. 333 [9 N.W.2d 567, 569, 173 A.L.R. 302].) Souza's proposed pleading states cause of action in contract on the basis of the alleged fraudulent breach by Salinas. (*Souza & McCue Constr. Co. v. Superior Court of San Benito County*, 57 Cal. 2d 508, 511 (Cal. 1962))

Specifically, in *Hash Construction Co. v. R. J. Sundling & Son, Inc.*, the subcontractor experienced excessive soil moisture which increased costs of excavation. The court stated based on a previous case that,

The test of whether or not such contractor is entitled to additional compensation is whether or not he justifiably relied upon the plans and specifications for the construction in making his bid and entering into the contract. *Sandkay Const. Co. v. The State Highway Commission*, 145 Mont. 180, 399 P.2d 1002; *Haggart Const. Co. v. State of Montana*, 149 Mont. 422, 427 P.2d 686. The reason for this rule is that if unanticipated conditions not reasonably foreseeable are actually encountered in the work and vary substantially from anticipated conditions reasonably foreseeable by the parties at the time they entered into the contract, the contractor is performing an entirely different contract than the one agreed upon and in such case is entitled to the reasonable value of his additional services. (*Hash v. R. J. Sundling & Son*, 150 Mont. 388, 395 (Mont. 1967))

Hash was entitled to rely upon the plans and specifications for the job, the profiles of the subgrade, and the grade stakes in determining the depth of the required excavation in submitting his bid and entering into the excavation subcontract. There was no indication that Hash should have reasonably foreseen and anticipated the wetness that would be encountered in excavating to

the subgrade below the surface of the highway established by the plans, specifications and grade stakes. Hence, Hash, the subcontractor, was entitled to recover the additional costs. Hash, *supra*, at 396.

The principal of reasonable reliance can be applied to verbal representations as well as written ones. In *Thorn Construction Company, Inc. v. Utah Department of Transportation*, a contractor was found to have been misled by the statements of an engineer's aide. The statement led to reliance on the availability of a borrow pit close to the construction site, the material from which, ended up not meeting specifications. The court cited the same rule cited above to back up its ruling in this case. The contractor had computed its unit cost for loading, hauling and unloading the borrow material based upon the close pit. After the owner conducted certain tests on the material, it was discovered it did not meet the minimum standards, and contractor had to obtain suitable borrow material from a pit that was 1.7 miles farther from the construction site (*Thorn Constr. Co. v. Utah Dep't of Transp.*, 598 P.2d 365, 367 (Utah 1979)).

It is critical to emphasize the importance of the idea of *reasonable* reliance. If the contractor could have reasonably discovered the mistake or difference before bidding, the contractor will not be able to recover any increased costs associated with the mistake later in the project. The courts state, "The "changed conditions" clause permits recovery when the geological problem is latent and denies it when the contractor's predicament stems from a failure to inform itself of reasonably observable physical factors," (*Leal v. United States*, 276 F.2d 378, 383-384).

Further:

Leal v. United States, 149 Ct. Cl. 451, 276 F.2d 378 (Ct. Cl. 1960) *v. United States*, 149 Ct. Cl. 451, 276 F.2d 378 (Ct. Cl. 1960), [is cited] for the proposition that a contractor has a duty to inquire "in light of specific warnings included in [the] contract documents." However, Randa does not assert, and these cases do not hold, that a duty to inquire only arises with a specific warning. As discussed above, *Hunt & Willett* states that "where the contract incorporates [a site investigation clause], the contractor has no claim if the missing information would have been obtained through the inquiries contemplated." *Hunt & Willett*, 351 F.2d at 985 (citing *Flippin*, 312 F.2d at 413-15). And in *Leal*, the Court of Claims looked outside of the actual contract in determining that the contractor knew or

should have known about the presence of a water table, despite the government's withholding of some relevant information. *Leal*, 276 F.2d at 383-84, 276 F.2d at 383-84. Therefore, both *Hunt & Willett* and *Leal* support our conclusion that Randa had a duty to examine the gradation curves and other information referred to and made available for inspection by the contract documents. (*Randa/Madison Joint Venture III v. Dahlberg*, 239 F.3d 1264, 1272 (Fed. Cir. 2001))

Reasonable reliance is the key and must be proven in order for the contractor to be compensated for increased costs.

In order to prevail on such a site conditions claim, a contractor must establish four elements. First, the contractor must prove that a reasonable contractor reading the contract documents as a whole would interpret them as making a representation as to the site conditions. See *Renda Marine*, 509 F.3d at 1376 ("[A] contractor must first prove, as a threshold matter, that the contract contained some identification of the conditions to be encountered at the site."); *H.B. Mac, Inc. v. United States*, 153 F.3d 1338, 1345 (Fed. Cir. 1998) (explaining that the court "place[s] itself into the shoes of a reasonable and prudent contractor and decide[s] how such a contractor would act in interpreting the contract documents"). This is a question of contract interpretation reviewed *de novo* on appeal. *H.B. Mac*, 153 F.3d at 1345.

Second, the contractor must prove that the actual site conditions were not reasonably foreseeable to the contractor, with the information available to the particular contractor outside the contract documents, i.e., that the contractor "reasonably relied" on the representations. *Renda Marine*, 509 F.3d at 1376 ("[T]he contractor must demonstrate that the conditions encountered were not reasonably foreseeable in light of contract," and Type II claims, which involve "unknown physical conditions at the site, of all information available to the contractor when bidding[and] that the contractor reasonably relied upon its original interpretation of the contract."). This issue is factual in nature, and review is deferential. See *id.* at 1378.

Third, the contractor must prove that the particular contractor in fact relied on the

contract representation. See *id.* at 1376. Again, this is a fact issue reviewed under a deferential standard. See *id.* at 1378.

Fourth, the contractor must prove that the conditions differed materially from those represented and that the contractor suffered damages as a result, which is again a fact question. See *id.* at 1376. (*Int'l Tech. Corp. v. Winter*, 523 F.3d 1341, 1348-1349 (Fed. Cir. 2008))

If the agency makes a "positive and material representation as to a condition presumably within the knowledge of the government, and upon which . . . the plaintiffs had a right to rely" the agency is deemed to have warranted such facts despite a general provision requiring an on site inspection by the contractor. (*Hollerbach v. United States* (1914) 233 U.S. 165, 172 [58 L.Ed. 898, 34 S.Ct. 553].) But if statements "honestly made" may be considered as "suggestive only," expenses caused by unforeseen conditions will be placed on the contractor, especially if the contract so stipulates. (Note 76 A.L.R. (1932) 268, 273; see *Inland Constr. Co. v. City of Pendleton* (1926) 116 Ore. 668 [242 P. 842]; *T. E. Kelly & Sons, Inc. v. City of Los Angeles* (1935) 6 Cal.App.2d 539 [45 P.2d 223].) Thus, in *C. W. Blakeslee & Sons, Inc. v. United States* (1939) 89 Ct. Cl. 226, cert. den. (1940) 309 U.S. 659 [84 L.Ed. 1007, 60 S.Ct. 512], the specifications provided that the materials to be removed were "believed to be mostly sand, with large and small boulders and gravel." Bidders were advised to study the borings data, examine the site and to decide for themselves what conditions actually prevailed. The court held that the government had not misrepresented the conditions of work when more boulders than anticipated were found at the site. (*Wunderlich v. State*, 65 Cal. 2d 777, 783 (Cal. 1967))

4.2.1.5 Is all Available Information Provided?

In some cases, the owner will provide only some of the subsurface information he has. Other times the owner will provide none at all. In either case, if the owner has information concerning subsurface information that the contractor does not, the owner has a duty to disclose this information. This puts the owner in a position to know more than the contractor when the contractor is the one doing the work and thus could be damaged by the lack of information. In

situations such as this, the courts most often hold the owner responsible for not providing information that the contractor could not have collected on his own, but needs to properly do the work. One court states, “The contracting agency's disclaimer does not protect it from liability for deliberate misrepresentation or concealment,” (United States v. Spearin, 248 U.S. 132, 136-137 [39 S.Ct. 59, 63 L.Ed. 166]).

In *Public Constructors, Inc., v. State of New York*, the state, prior to sending out bid packages, had made two separate subsurface investigations. Only the results of one of the investigations was included in the contract. The contract indicated that all information that the state had concerning subsurface information was provided. Later, it was found that the second report indicated drastically different information than that provided. The court, in citing the following cases, decided that the state misrepresented information and the contractor was awarded their additional costs.

In *A. S. Wikstrom, Inc. v State of New York* (52 AD2d 658, 660), we said: ‘In *Rusciano Constr. Corp. v State of New York* (37 AD2d 745, 746, mod 37 AD2d 789), one of the questions involved the State's failure to make available all soil testing information and to provide in the contract plans for the possibilities of unstable subsurface material which contributed to a delay in completing the project. We held that 'the exculpatory clauses in the contract and in the invitations to bid do not insulate the State from liability where the conditions are not as represented in the contract and inspection by the contractor would not reveal the representations to be false.' In *County Asphalt v State of New York* (40 AD2d 26) we applied this reasoning. Additionally, in *Warren Bros. Co. v New York State Thruway Auth.* (34 AD2d 97, 99, affd 34 NY2d 770), we said: 'In a construction contract between the State and an individual, which contains representations as to existing conditions affecting work thereunder as well as an exculpatory clause relieving the State of liability and requiring personal inspection of the contract site, liability, nevertheless, may attach to the State if said conditions are not as represented and (1) inspection would have been unavailing to reveal the incorrectness of the representations (*Foundation Co. v State of New York*, 233 N. Y. 177, 184-185; *Faber v. City of New York*, 222 N. Y. 255, 260), or (2) the representations were made in bad faith (*Young*

, 265 App. Div. 61; Jackson v. State of New York, 210 App. Div. 115, affd. 241 N. Y. 563)".

In our view, the Court of Claims was clearly correct in finding that the contract documents furnished to the bidders contained misrepresentations, and in rejecting the State's contention that claimant must bear the responsibility as the result of an inadequate prebid investigation. With regard to the latter point, we again refer to the findings in the decision of the Court of Claims, and also point out that bidders could not reasonably have been expected to discover in a period of approximately three and one-half weeks the kind of information which the State possessed, after testing for that information over a period of many years. (Public Constructors, Inc. v. State, 55 A.D.2d 368, 372 (N.Y. App. Div. 3d Dep't 1977))

The opposite result was reached in a more recent New York case. The court concluded as follows:

To rely on fraudulent misrepresentation, claimant had to prove that the additional work performed resulted directly from the State's concealment or nondisclosure of material facts either known to it or within its possession (see, Mount Vernon Contr. Corp. v State of New York, York, 56 AD2d 952, 953-954, lvs dismissed 42 NY2d 803, 889; Public Constructors Constructors v State of New York, York, 55 AD2d 368, 372; A. S. Wikstrom, Inc. v State of New York, York, 52 AD2d 658, 660). Claimant's vice president, Daniel Elia, testified that its bid had assumed that the bid documents were based on an accurate field inspection of the piers by means of recent hammer soundings. The bid documents, however, do not make this representation but, rather, warn that only major repair areas are indicated and that they are approximations subject to actual field conditions. Claimant's own expert witness, Douglas Pressley, testified that the bid documents' depiction of a small number of large areas indicated that the piers had not been hammer sounded. Since the contract advised bidders to conduct their own inspections and claimant failed to do so, it could not reasonably rely on the bid documents for anything more than an approximation of the repair areas (see, Depot Constr. Corp. v State of New York, York, supra, at 114).

In the alternative, claimant argues that the contract's exculpatory clauses should not be enforced because it did not have enough time to thoroughly inspect the piers. Although this Court has stated that such clauses will not be given effect if an inspection would not have revealed the inaccuracy of the contract's representations (see, *Public Constructors Constructors v State of New York, York, supra*, at 372), this principle is inapplicable here because there is no evidence that a sufficiently thorough inspection could not have been made before claimant submitted its bid. (*D.A. Elia Constr. Corp. v. N.Y. State Thruway Auth.*, 289 A.D.2d 665, 666-667 (N.Y. App. Div. 3d Dep't 2001))

In, *Earl Alpert, trustee in bankruptcy, v. Commonwealth*, the state (owner) provided quantities of materials to be removed, including amounts of suitable and unsuitable material. The amount of unsuitable material was overrun by 400%. The state did not provide the soil borings or reports that they used to determine the quantities they provided in the contract. If the contractor had been able to see the boring reports, they may have bid in a different manner, knowing that there was more unsuitable material than the state indicated. Because of this, the state was held responsible for their failure to disclose pertinent information. In order to avoid situations like this, the state must provide all subsurface information in their possession. That way, the contractor has the same knowledge as the owner and the owner will not be liable for misrepresentations.

Nondisclosure by the Department of Public Works to a contractor on a highway construction project of information indicating inadequate borings which the department had taken, and its "positive" representations to the contractor of the precise amount of "unsuitable" material to be excavated from the construction site, in the circumstances constituted a breach of warranty which entitled the contractor to damages from the Commonwealth where it appeared that the department's "Notice to Contractors" expressly stated that "complete information" was available, that prior to submitting his bid the contractor requested all information and was informed "that all information was contained in the plans and specifications" furnished him, that his decision to bid and the amount of

his bid was based on the information given, that he actually excavated almost four hundred per cent more unsuitable material than the amount represented, and that he suffered financial loss as a result of relying on the representations made. (Alpert v. Commonwealth, 357 Mass. 306 (Mass. 1970))

4.2.1.6 Duty of Contractor to Perform Subsurface Evaluation

Many contracts include a clause that imposes a duty on the contractor to make their own site investigation in order to satisfy themselves of the conditions they will experience. Many owners attempt to use a clause like this to relieve themselves from responsibility for subsurface information that they provide in the contract. It has become common, however, to see courts not enforce these clauses or for courts to interpret them narrowly. The reasoning courts give is that the state or owner usually has several months to years in which to perform soil tests and collect subsurface data. The contractors on the other hand usually only have a few weeks to put a bid together and do not have the time to make the same investigations. If, however, the contractor has more time to prepare its bid and would have enough time to do soil testing, the courts will hold the clauses enforceable. One court stated:

Where a bidder is allowed insufficient time within which to make a personal study, the State cannot invoke the general exculpatory clauses to exonerate itself from liability. Particularly is this true in a case such as this where no specific warning is given in connection with the particular item the representation of which is in question; or in a situation like that in the case at bar where the bidder has not time to make a personal and detailed inspection. (John Arborio, Inc v. State, 41 Misc. 2d 145, 148 (N.Y. Ct. Cl. 1963))

In *Hersey Gravel Co. v. State Highway Department*, the contractor experienced much more difficult soil conditions than were indicated in the plans. The state (owner) included the note, "Soil notations shown on the plans are for information only and shall not be construed to relieve bidders of their responsibility to satisfy themselves by examining the site of the proposed work as to the actual soil conditions." in their plans and specifications. Despite this statement, the court cited,

Undoubtedly the commission's knowledge of subsoil conditions was superior to that of the plaintiffs, and they tried to acquire this knowledge from it. It is equally true that these facts were not within the fair reasonable reach of the plaintiffs, and there was lack of time for them to obtain this information by an independent investigation before the letting...

The duty rested on the sewer commission to furnish to the plaintiffs in this case all the material information it had in its possession, obtained either by borings or from past experience, as to subsoil conditions in the sewer line, and if it failed to do so, and as a result thereof the plaintiffs were put to large additional expense in completing the contract, they are entitled to recover the reasonable damages sustained by them. *Davis v. Commissioners of Sewerage*, 13 Fed. Supp. 672, 681. (*Hersey Gravel Co. v. State Highway Dep't*, 305 Mich. 333, 340-341 (Mich. 1943))

Due to this past ruling, the court held the state responsible for the increased costs the contractor experienced.

An example of a situation where the court did hold the contractor responsible was in *Eastern Contractors Inc., v. South Carolina State Highway Department*. The state directed the bidders to take soil borings of their own and gave them the time to do so. The low bid Eastern Contractors knew other bidders were taking soil borings of their own, but Eastern Contractors did not take any. When conditions turned out different than expected, the contractor was not able to recover because it did not make a thorough enough site investigation prior to bidding.

The Department had no reason to estimate the amount of rock because it was an "unclassified excavation" contract. It did have reason to estimate the amount of unclassified excavation, which it did with reasonable accuracy. On the other hand, it was imperative that the Contractors estimate the amount of rock and estimate the amount of common excavation in order to arrive at an intelligent, balanced bid. The Contractors simply failed to make sufficient tests and investigations. Those who did make their own tests bid at least \$ 800,000.00 more than the Contractors. (*L-J, Inc. v. South Carolina State Highway Dep't*, 270 S.C. 413, 431 (S.C. 1978))

4.2.1.7 Change in Quantity Clauses

When changes in quantities of items already included in the contract occur, changes in price will be based on the clauses included in the contract. There have been claims in court that illustrate both contractors and owners attempting to go against these types of clauses. In all cases, the court has held the clause enforceable.

An example where the contractor tries wrongfully to recover is in *Charles J. Rogers, Inc. v. Department of State Highways*. In this case, the amount of compacted embankment was overestimated by approximately 17.5%. The contractor sought to recover for a difference in unit price. However, according to the following specification, the contractor was not allowed an adjustment.

Should the quantity of any adjustable item of work be decreased more than 25 per cent from the original quantity, compensation will be made upon completion of the item involved based on the contractor's actual extra cost by reason of such decrease below the original contract quantity. Such adjustment in unit price shall be made on the basis of labor, material and equipment cost plus a proportionate amount of overhead and plant charges and not including anticipated profits, but in no case shall the product of the adjusted unit price and the number of units of work performed exceed the product of the contract unit price and 75 per cent of the contract quantity. When the final contract cost, the sum of the regular and extra estimates, is greater than the original contract price, overhead and plant charges will not be considered in arriving at the adjusted unit price. (The Michigan Department of State Highways Standard Specifications for Road and Bridge Construction, 1965)

The obvious conclusion is that, as the decrease in the instant case is only about 17.5 per cent, plaintiffs are precluded, by the language of the contract itself, from compensation at other than the contract unit price and for other than actually performed work. (*Charles J. Rogers, Inc. v. State*, 36 Mich. App. 620, 625 (Mich. Ct. App. 1971))

An example of where the state tries to wrongfully deny a change in price came in *Ray D. Lowder, Inc. v. North Carolina State Highway Commission*. Undercut excavation was overrun by more than 2,000%. The state originally only paid for the additional work at the original contract unit price. According to the following specification, the contractor was entitled to and received an adjustment in unit price.

Whenever it is anticipated that the quantity of any major contract item may overrun or underrun the original bid quantity by more than 15 percent of such original bid quantity, or that the quantity of any minor contract item may overrun the original bid quantity by more than 200 percent of such original bid quantity, the Engineer may, either at his own volition or at the written request of the Contractor, issue an authorized modification covering the overrun or underrun and payment therefor will be made as provided below:

1. Where the Contractor and the Engineer are in agreement on the increase or decrease to be made in the contract unit price, then a supplemental agreement covering the revised contract unit price will be issued in conjunction with the authorized modification.
2. Where the Contractor and the Engineer are not in agreement on the increase or decrease to be made in the contract unit price, then a force account notice will be issued in conjunction with the authorized modification. (North Carolina Standard Specifications) (*Ray D. Lowder, Inc. v. North Carolina State Highway Com.*, 26 N.C. App. 622, 641-642 (N.C. Ct. App. 1975))

Change in Quantities and similar clauses for making adjustments using objective and quantifiable data are enforceable and often included in highway construction contracts.

4.2.1.8 Conclusion

In most highway transportation projects, the owner will be in the party who conducts the subsurface investigation and provides that information to bidding contractors. Subsurface conditions are still extremely unpredictable, even with investigation and testing. When owners attempt to shift the risk of unknown subsurface conditions, and the claims for changed conditions associated

with that, to the contractor, the owners will not always be successful. In the situations where contractors are not able to perform their own investigation in the time given to bid and when they reasonably rely on the information provided by the owner, contractors will not be held responsible for increased costs associated with conditions different than expected. Contractors will also not be held responsible when owners make representations that the materials available will be suitable for the project or when owners do not provide all the subsurface information they possess. In most state highway construction work, state departments of transportation include the standard federal “Differing Site Conditions” clause in their contracts that provides a procedure for addressing situations where (1) subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or (2) if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized are encountered at the site. While this clause is clear and properly allocates risk, special provisions are often added where the owner tries to shift risk back to the contractor by disclaiming the accuracy of soil information. Aside from all of this, both parties need to work together when changed conditions occur and specifications should be as prescriptive as possible on how to deal with a situation when it arises. This issue includes notice and claim requirements that will be discussed further in a subsequent section. Figures 4.1 and 4.2 contain the differing site conditions flow chart. This flow chart illustrates how the differing site condition risk will be allocated in most scenarios.

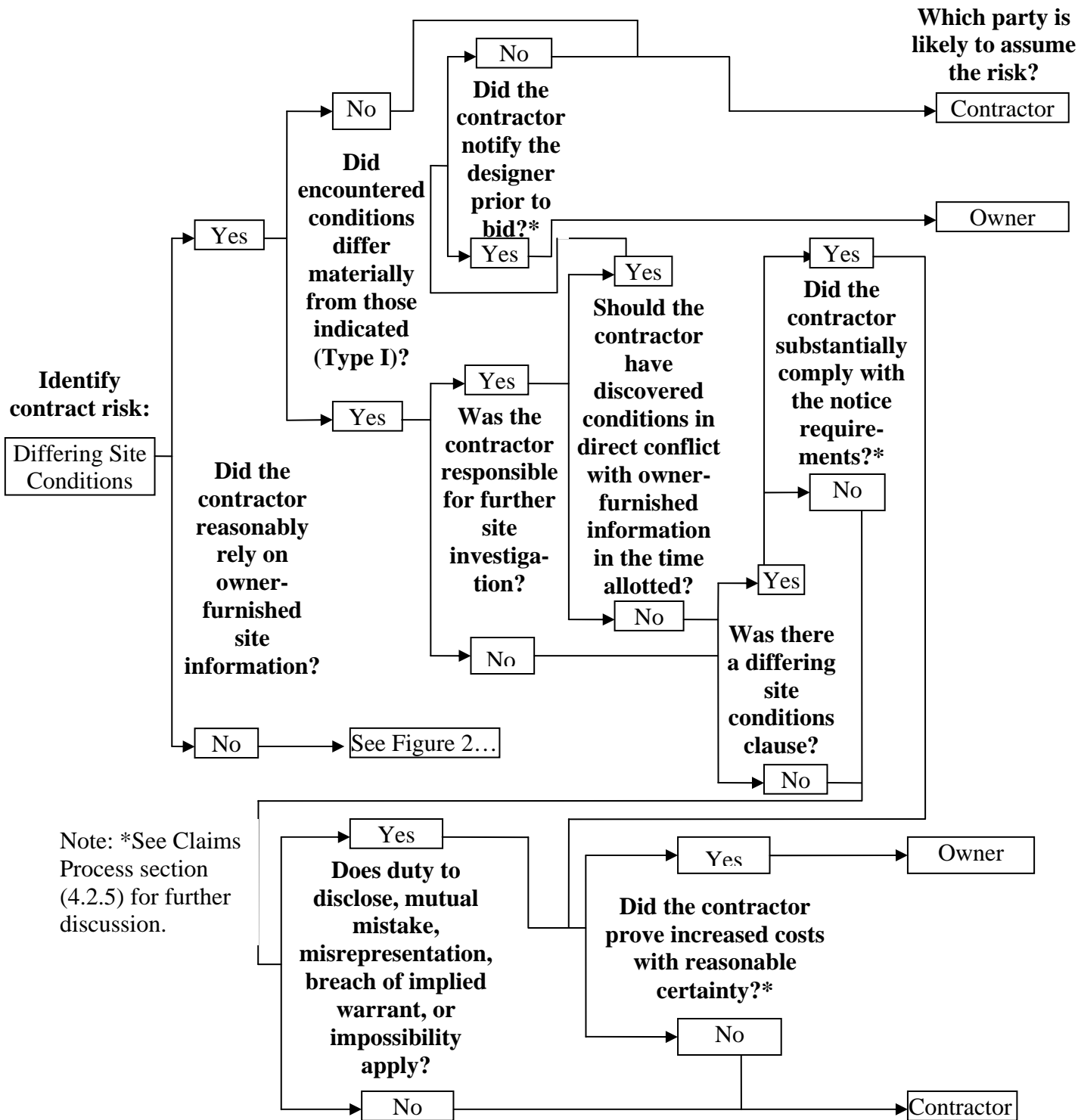


Figure 4.1 – Differing Site Conditions Flow Chart (Part 1)

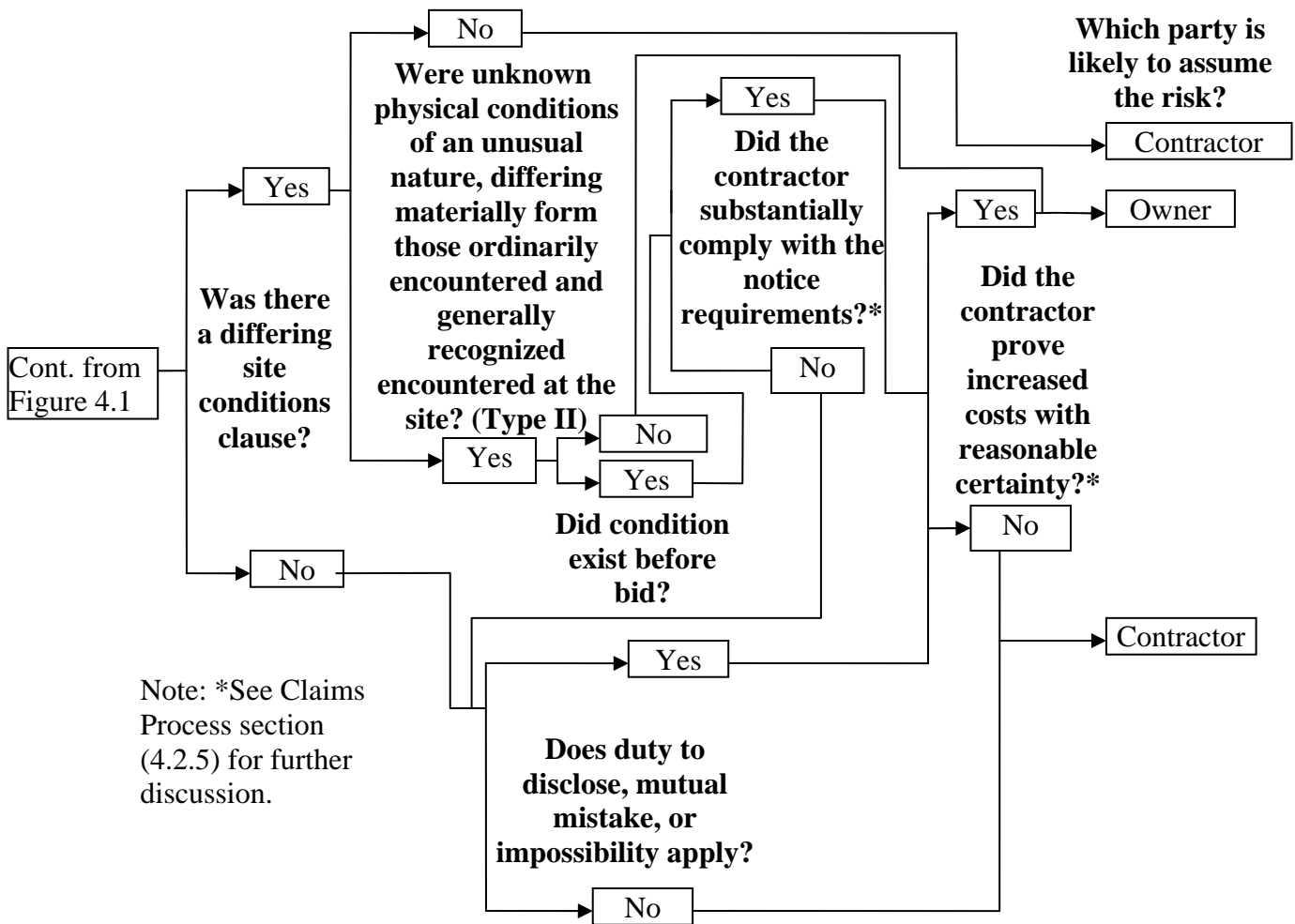


Figure 4.2 – Differing Site Conditions Flow Chart Cont’d (Part 2)

In Figure 4.3, the flow chart for significant changes in the character of work can be found. These flow charts can be used by both owners and contractors to help determine who will be responsible for a differing site condition based on different situations. The hope is that this will allow both parties to allocate the risk up front, based on a cooperative agreement of how it should be carried. If parties are better acquainted about how the risk will be carried and how possible disputes will be resolved, they have a better opportunity to avoid the dispute in the first place and hopefully eliminate unnecessary contingencies. These flow charts do not represent absolute legal fact. They are meant as suggestive guidelines based on legal information.

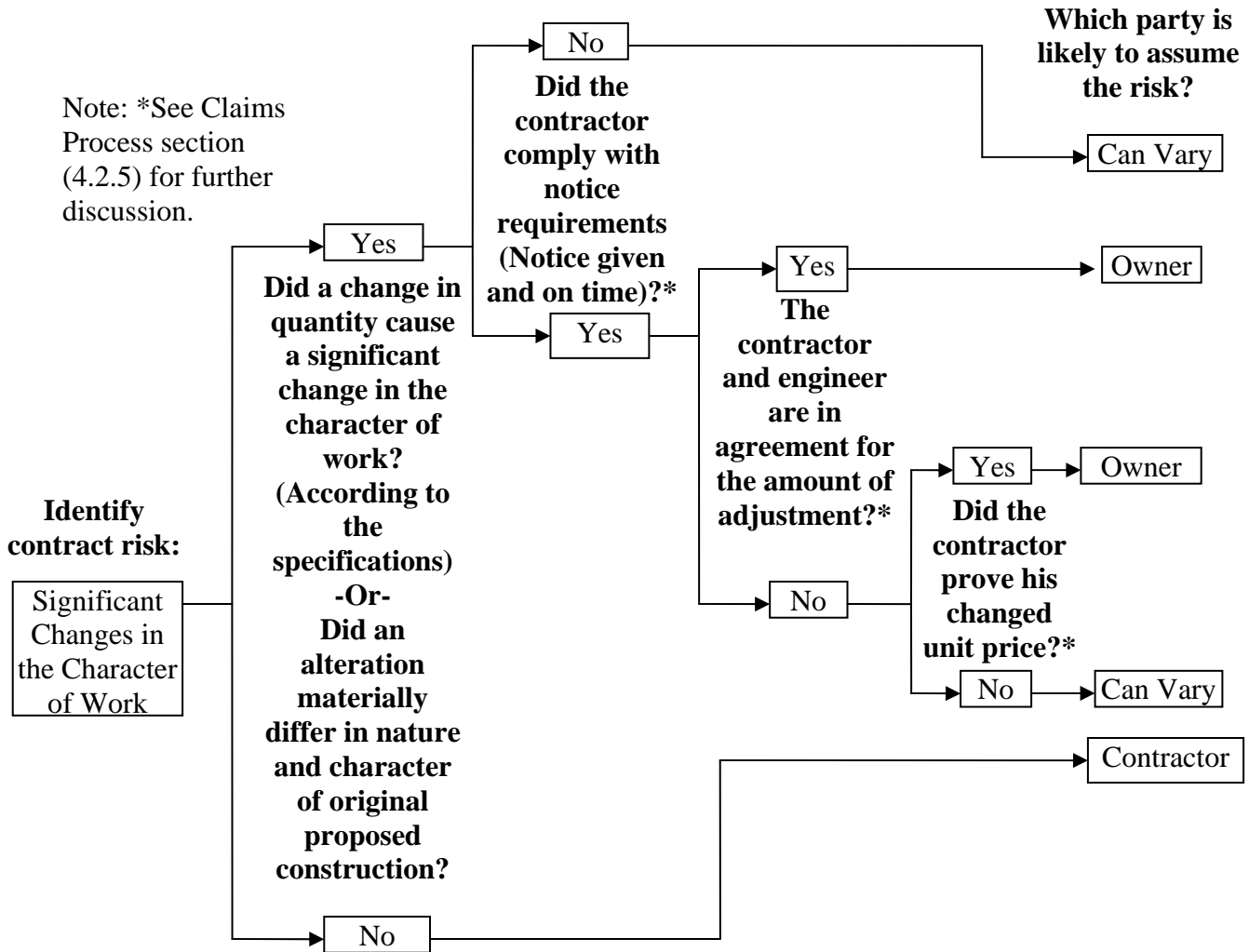


Figure 4.3 – Significant Change in the Character of Work Flow Chart

4.2.2 Third Party Delay

4.2.2.1 Introduction

Third party delay generally refers to delays caused by parties that the contractor is not in a contract with. The most common third parties that cause delays are utilities and other contractors (not subcontractors of the contractor). Any delay in a project can cause added costs to both contractors and owners. Owners often attempt to pass the risk of third party delay to the contractor through exculpatory clauses that disclaim their responsibility in the face of a delay.

This can be extremely detrimental to a contractor. Delays in work can cause a contractor to have to pay for workers and equipment that are not productive. It can also keep contractors from bidding and accepting other work that they would have taken if they weren't delayed by their project at the time. There are some situations where a contractor may be compensated for delays. These situations will be discussed below.

4.2.2.2 Interference by the Owner

In some cases, an owner may actively interfere with a contractor's work. This may be done by the owner directing the contractor to do something such as begin a certain part of the work or to stop some portion of the work. When an owner does this, it may affect the enforceability of a clause disclaiming the owner's responsibility for delays. In *Gasparini Excavating Company v. Pennsylvania Turnpike Commission*, other work was being done on the same site the contractor was to perform his work. The contractor was made aware of this other work through the contract. One part of the special conditions read:

Cooperation With Slushing Contract. During the time that the Contractor is carrying on his operations under this contract, other contractors will be engaged in slushing operations on the site. The Contractor shall, therefore, plan and conduct his operations in such a manner as to cause a minimum of interference with the slushing operation. In order that the slushing may be completed in the least time, the Contractor will be required to schedule excavation in the slushing areas first. No embankment will be placed in areas that are to be slushed until slushing is completed. No claims for damages or extra costs due to delay to the Contractor's work caused by the work of slushing contracts will be allowed and it is hereby agreed that the contract prices are submitted on this basis.

By including this clause, the owner attempted to shift the risk of delays due to the slushing operation to the contractor even though the contractor has no control over the slushing. The owner directed the contractor to begin work. However, when the contractor attempted to begin, he found the slushing operation made it difficult to do work in a fluent manner. The contractor had to do pieces of work and jump from place to place. This greatly increased the contractor's costs and caused delay. Despite the exculpatory clause above, the court stated,

But such provisions have no reference to an affirmative or positive interference on the part of the owner or his representative apart from the contract, or ordinarily to failure to act in some essential matter necessary to the prosecution of the work unless delay in performance is contemplated by the contract; ... Where a party under a delay and time extension provision on entering a contract foresees or should foresee that the work might be delayed by the failure of the owner or another contractor to perform, 'the remedy therefor ... [is an] extension of time on the part of those who perform the work, and the presumption arises that this was intended to measure the rights of the contractor thereunder':

In the instant case there was interference by the appellee [owner] after ordering appellant [the contractor] to begin performance of work and then denying access to the work area occupied by another contractor. (*Gasparini Excavating Co. v. Pennsylvania Turnpike Com.*, 409 Pa. 465, 475 -476 (Pa. 1963))

The court saw the owner's actions as positive interference. Since the owner interfered, the court found him responsible for the delays and damages experienced by the contractor.

Owners may similarly passively interfere with the contractors work. The owner holds certain duties on highway construction projects. If the owner fails to complete his duties, it is said to be passively interfering with the work. One example, illustrated in the following case, is when the owner fails to obtain permits for all the work. In *C. J. Langenfelder & Son, Inc. v. Commonwealth of Pennsylvania, Department of Transportation*, a road and bridges were to be built through a marsh that was a resting ground for migratory birds, waterfowl, and other wildlife. After signing the contract and getting ready to begin work, the contractor was notified that the state had not obtained a broad enough permit for the work off existing right of way. The contractor was delayed in beginning his work and experienced additional costs associated with this delay. The contract did not contain any clauses pertaining to relieving the owner of responsibility for delays associated with inadequate permits.

The [owner] Department [of Transportation] next says that the Board erred in placing the onus of the delay in obtaining permits for dredging on the Department rather than on [the contractor] Langenfelder. The argument runs counter to the Board of Arbitration of Claims' findings of fact that during the planning stages of the project, the Department assured concerned citizens and environmental groups that all construction activities in Tinicum Marsh would be limited to the highway right-of-way; that the Department nevertheless approved Langenfelder's plans to deposit sediment and to borrow fill outside of the highway right-of-way; that the Department failed to inform Langenfelder of these assurances it had given to others; and that as a direct result of the Department's actions, the groups and individuals opposed Langenfelder's dredging permit applications before the Army Corps of Engineers causing delay. These findings are supported by the record. They support the conclusion that the Department breached the contract by failing to provide access to the site. (C. J. Langenfelder & Son, Inc. v. Commonwealth, Dep't of Transp., 44 Pa. Commw. 585, 593 (Pa. Commw. Ct. 1979))

In public highway construction it is typically the owner's responsibility to obtain permits for the highway project itself. Many standard highway contracts contain language that attempt to define with some specificity what delays are the clear responsibility of the owner and which are not. Excusable delays by a contractor are also defined for which contract time extensions may be permitted.

4.2.2.3 Clauses Disclaiming Owner Responsibility

Clauses may be written into contracts that act to relieve the owner from responsibility in the face of delays. The more specific these clauses, the more weight the court will place on them. In the same respect, the courts will only construe what the clause specifically states and not attempt to allow the clause to cover delays not specifically laid out in the clause. Barring any interference by the owner, the court will often enforce a clause that disclaims the owner's responsibility for a specific third party delay. In *Scoccolo Construction, Inc. v. City of Renton*, the court did not enforce a no damages for delay clause because it did not encompass the specific delay in question. It was the contractor's responsibility to coordinate utility relocations with the utility companies. The no damages for delay clause stated that the contractor would not be allowed to

claim damages for delays caused by any of the utilities. It turned out that the owner contracted with one of the utility companies and that specific company caused a delay to the contractor. Since it was within the owner's power to get the utility to relocate in a timely manner, the owner was responsible for the delay. Because the no damages clause did not address owner caused delays, the owner was held responsible for delaying the project. The clause was very specific to what delays the contractor would not be allowed to recover from and the court did not construe any damages outside of those specifics.

A similar situation occurred in *Atlantic Coast Mechanical v. R.W. Allen Beers Construction*. A contractor included a no damages for delay clause in a contract with one of his subcontractors. The sub incurred extra costs because he was forced to perform work in a drastically different manner than he had originally expected. This was mostly due to coordination by and actions of the contractor. When the sub tried to recover his increased costs, the court ruled in his favor because the clauses

- 1) Applied only to delays and hindrances the subcontractor could have foreseen when it entered into the subcontract
- 2) Were silent on the subcontractor's right to additional compensation for costs caused by the contractor's actions

Again, in this case the clause was specific and thus held enforceable for the specific delays it stipulated.

4.2.2.4 Owner Investigation

In some cases, delays are reasonably foreseeable before they actually occur. When delays are foreseeable before the contract is executed, the owner has a duty to investigate the possible delay and inform the contractor of it. If an owner attempts to enter a contract where a delay is possible, but does not inform the contractor, the owner will be held responsible for the delay and subsequent damages. This can be seen in *Cooke Contracting Co. v. State*, 55 Mich. App. 479, 484 (Mich. Ct. App. 1974) where a contractor entered a contract which involved a work site that was currently occupied by another project. The bidding documents and plans indicated that this project was going on. The Cooke contract included the following two specifications:

1. The Contractor shall take due account of all such work and shall arrange his construction plant layout and equipment and his methods of operation so as to cause a minimum of interference with work to be performed by others. The Contractor's attention is called to the requirement of cooperation with others as covered in Article 1.05.06 of the Standard Specifications.

2. No claims for extra compensation or adjustments in contract unit prices will be allowed on account of deletions of work items or delay or failure of others to complete work units as scheduled.

From these clauses, the contractor assumed he would be able to work simultaneously with the project going on. It turned out this was not the case, but that fact was not included in the contract. There was, however, a meeting before the contract was signed at which the contractor was informed he would not be able to begin work until the other project was completed. The contractor signed the contract with no changes anyway. The other project was greatly delayed and the contractor attempted to recover costs associated with the delay. Since the contractor was aware before signing the contract that he would not be able to begin until the other work was completed, the contractor was not awarded compensation. This case illustrates the owner's duty to inform the contractor of a potential delay. If he had not done so, it is likely that the contractor would have had a right to delay damages.

4.2.2.5 Common Law

When a contractor agrees to a completion date, he assumes the risk of delays keeping him from that date unless otherwise stated in the contract. However, this does not mean the contractor is subject to excessive delays or owner interference without remedy. Basically, barring extenuating circumstances, the contractor is ordinarily responsible for timely completing the project if the contract does not state otherwise (Sweet, 2000).

4.2.2.6 Conclusion

Exculpatory clauses made by the owner concerning delays are enforceable if they are specific. However, if the owner actively interferes with the work of the contractor, then the owner in all

likelihood will be held responsible for the delay. When the owner actively interferes, the exculpatory clause will not be upheld. Otherwise a contractor will not be compensated by the owner for delays if there is an exculpatory clause. In the absence of any exculpatory clause in the contract for delays, the sole remedy may be an extension of time to complete the contract and waiver of liquidated damages. Using these rules, a flow chart depicting how third party delay will be dealt with in different situations was created. Figure 4.4 depicts this flow chart.

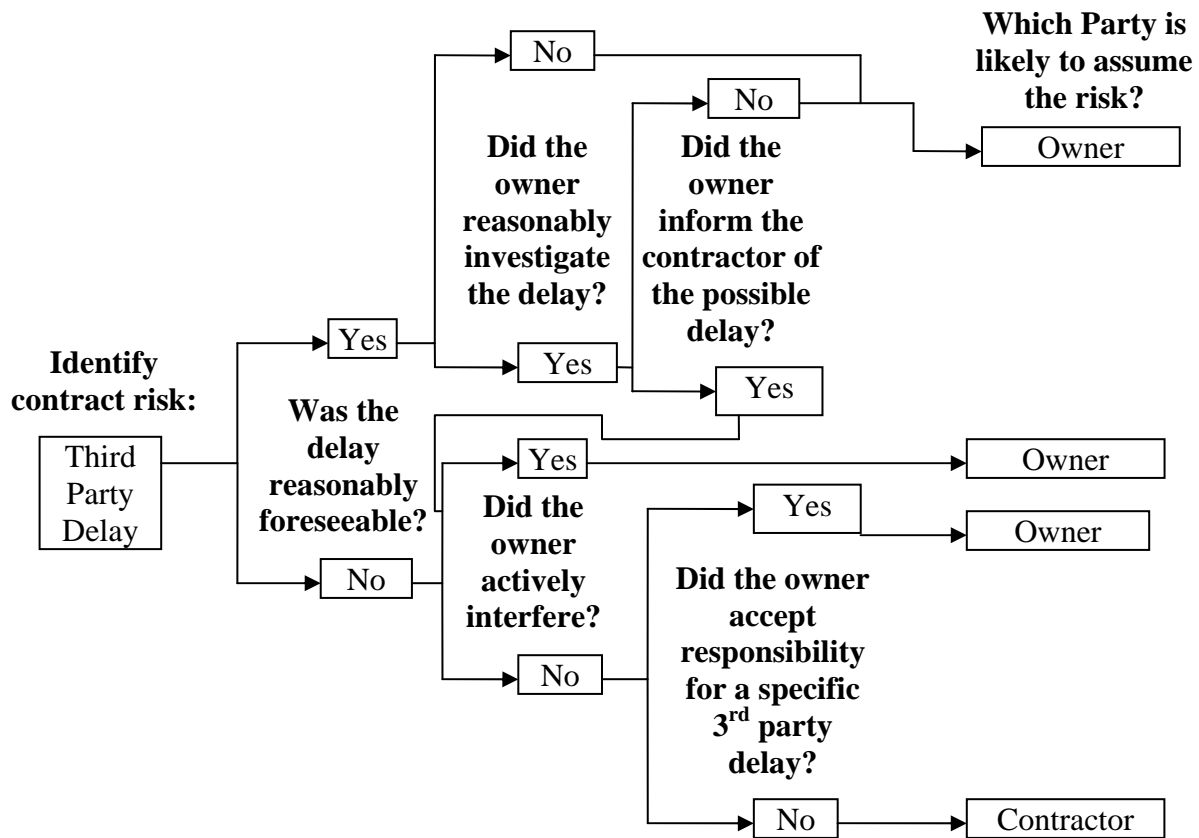


Figure 4.4 – Third Party Delay flow chart

4.2.3 Design Adequacy

4.2.3.1 Introduction

Design professionals are held to a standard of care that requires them to create designs that are accurate and complete. When designs provided by the owner are inaccurate or incomplete, the contractor experiences problems that are generally out of his control. Design errors or omissions

can often cause delays and/or rework. At the end of the project, either situation will have caused extra expenses to the contractor that he will want to recover. Owners may attempt to pass the risks associated with the accuracy of the owner's designs on to the contractor by disclaiming the accuracy of the designs. This happens often when the design is dependent upon soil conditions and the state disclaims the accuracy of the information pertaining to soil conditions. Then, if the design fails due to soil conditions, the owner may use the disclaimer pertaining to soil conditions to disclaim the accuracy of the design altogether. There are several considerations that pertain to design adequacy that are further illustrated by example cases below.

4.2.3.2 Common Law

The design professional has a duty to provide accurate plans that do not misrepresent information. Misrepresentations can be intentional or negligent. Obviously, intentional misrepresentations will be held against the design professional, but negligent misrepresentations are treated differently. The general rule is that if a misrepresentation is made unintentionally, the question is asked, 'Would other design professionals, acting under similar circumstances, reasonably have made the same mistake?' If the answer is yes, the designer will likely not be held responsible as the mistake was not one that would have been caught by another designer. If the answer is no, then the designer will likely be held responsible for his mistake because as a design professional, the designer should have caught the mistake or misrepresentation (Sweet, 2000). Because there is some subjectivity in this type of situation, the exact situation and the individual and law of the jurisdiction ruling on the case will have an effect on the outcome.

Other common law considerations are whether a design defect is patent or latent and whether project specifications are performance based or design based. If a defect is patent, it is one that a reasonable person should have discovered upon a reasonable investigation of the plans. In contrast, a latent defect is one that a reasonable investigation would not have discovered (Sweet, 2000). The reason for the distinction is to keep contractors from allowing obvious defects to make it through to construction and then trying to bring claims for money when the defect could have been fixed long before.

The last consideration is the difference between design and performance specifications. If the designer provides specifications that require the contractor to do the work in a very specific manner, those are design specifications. On the other hand, if the designer only provides information concerning how the final product should look and act, but not necessarily how the contractor should perform the work to reach those results, those are performance specifications (Sweet, 2000). Design specifications are the ones that carry more risk of liability for the designer. This is because if the contractor follows the specifications pertaining to how to do the work, and the work does not come out correctly, the designer or owner or both will often be held responsible. Along with the idea of design and performance specifications, the doctrine of impossibility apply again. As discussed earlier, if a specification is objectively impossible to meet, the owner may be unable to require performance of the contract or to impose liquidated damages on the contractor. The doctrine, narrow in scope, excuses a party from liability where "the means of performance makes performance objectively impossible." [Carrollton Bank v. Fujitsu Transaction Solutions, Inc., 56 Fed. Appx. 603, 607 \(4th Cir. Md. 2003\)](#)

4.2.3.3 Design Specifications and Reasonable Reliance by the Contractor

When the owner provides a design that requires specific methods by the contractor, as long as the contractor follows the design as laid out in the specifications, the contractor in all probability will not be held responsible if the design fails. For example, assume the designs of different elements of a highway construction project are based upon the quality of the soil on the project site. When this happens, an incorrect soil analysis can cause design failure. When the owner denies responsibility for the accuracy of soil conditions represented in the contract, the owner's denial will not be successful when the conditions are linked to design elements approved and submitted by the owner. In *Kensington Corporation v. Department of State Highways* the plans provided by the state included a design that was specific to a certain type of soil. It was found that the actual soil was worse than that indicated by the design in the plans. The state (owner) had subsoil information that indicated the true nature of the soil. Therefore the court determined that the construction contract information, provided by the state, was inaccurate and the contractor was owed compensation for the expenses associated with the failed original design. The court stated,

Factual inaccuracy in the state's plans and specifications for a proposed highway construction project may give rise to a cause of action for misrepresentation if the inaccuracies have been relied upon by a contractor to his detriment. See *Valentini v City of Adrian*, 347 Mich 530; 79 NW2d 885 (1956), *W H Knapp Co v State Highway Department*, 311 Mich 186; 18 NW2d 421 (1945), *Hersey Gravel Co v State Highway Department*, 305 Mich 333; 9 NW2d 567 (1943), and generally 65 Am Jur 2d, *Public Works and Contracts*, § 177, pp 58-60. No one quarrels with the existence of this rule and the state herein admits that it erred in its soil classifications. Furthermore, the state had an engineer on the job who knew of the true nature of the soil condition. (*Kensington Corp. v. State*, 74 Mich. App. 417, 424-425 (Mich. Ct. App. 1977))

Similarly, in *Midwest Dredging Company v. McAninch Corporation and Iowa State Department of Transportation*, the contractor was required to hydraulically pump material across a road in order to avoid hauling it over the road. It became impossible to accomplish this due to excessive amounts of rock in the soil. The contractor attempted to request an alternate method of transporting the material. The state repeatedly denied and then finally agreed to allow hauling after much delay to the contractor who then sought compensation. In making its decision in favor of the contractor, the court stated

While DOT does not become an insurer of subsoil conditions merely by providing certain test information to bidders, see *McKee*, 414 F. Supp. at 959, DOT did not merely provide test boring results to Midwest. It went a step further. DOT drew up plans based on its tests, and required that a specific dredging and piping technique be employed. By so doing, DOT impliedly represented that material from borrow C could be hydraulically dredged and piped in accordance with its plans and SP-244. DOT went beyond mere presentation of boring results, and an implied warranty consequently arose. Cf. *McNulty*, 187 N.W.2d at 619 (line between mere presentation of results of borings and the representation of general conditions based on such borings is crossed when owner's engineers show profile maps, or notations on plans, purporting to give subsoil conditions [**18] in general); *Condon-Cunningham, Inc. v. Day*, 22 Ohio Misc. 71, 83, 258 N.E.2d 264, 272 (1969) ("If the contractor is bound to build according to plans and

specifications prepared by owner, the contractor will not be responsible for the consequences of defects in the plans and specification."). (Midwest Dredging Co. v. McAninch Corp., 424 N.W.2d 216, 222 (Iowa 1988))

The court summarized its decision with the following statement,

The trial court found that DOT warranted the accuracy of its plans and specifications through its representation that hydraulic dredging and piping was feasible, and in so doing, assumed the risks of exigencies which would make hydraulic dredging impossible. Substantial evidence in the record supports this finding, and we agree with the trial court.

Our conclusion here does not ignore the DOT's disclaimers in its standard specifications. As the court in McKee noted, "general exculpatory clauses which disclaim any responsibility for the accuracy of that data have been held to be of no effect when the positive specifications made by the government were obviously intended to be used by the bidding contractors in formulating their bids." 414 F. Supp. at 959 (citing Hollerbach, 233 U.S. at 172, 34 S. Ct. at 556, 58 L. Ed. at 901). (Midwest Dredging Co. v. McAninch Corp., 424 N.W.2d 216, 222 (Iowa 1988))

The preceding cases may have been decided differently if information pertaining to soil conditions were provided that clearly indicated the designs would not work. However, since the designs coordinated with any soil information provided and were prescriptive instructions for how the contractor was to perform his work, the contractor was not liable for the defects that arose.

4.2.3.4 Additional Examples

For illustrative purposes, two other examples of disputes related to design adequacy are provided. One example favors of the owner and one favors of the contractor. In the State of Texas v. F & C Engineering Company, a concrete mix design was developed by the state for use on a highway construction project. The contractor was required to provide suitable materials that met standards set by the state and were included in the contract documents. The specification pertaining to the mix design stated, "(5) Mix Design. It is the intent of this specification to

Based on the materials being used, it was common in the industry at the time for this type of concrete mix to use 5 or less bags of cement per cubic yard of concrete. The design ended up requiring 6 ½ bags of cement per cubic yard of concrete in order to meet the concrete mix requirements. The contractor wanted additional compensation for redesigning the mix so only 5 bags of cement would be needed. The contractor's claim for additional compensation was denied because nowhere in the contract did the state promise to make a mix using only 5 bags of cement. The court stated,

The fact that its performance of the contract would be more expensive to the contractor than it had expected neither excused its non-performance of the contract nor entitled it to more compensation than that provided in the contract. *City of Dallas v. Shortall*, (Tex.Comm.App.), 131 Tex. 368, 114 S.W.2d 536. There is nothing in the contract that guarantees that the Texas Highway Department engineers will furnish the contractor with a design that will, using the materials furnished by the contractor, give a strength of 650 pounds on five sacks of cement per cubic yard of concrete. The most that can be implied from the language "most economical design" is a duty to furnish the most economical design that will, using the materials furnished, produce the strength of 650 pounds and the required workability. (*State v. F & C Engineering Co.*, 438 S.W.2d 647, 651-652 (Tex. Civ. App. Houston 14th Dist. 1969))

The next example involves the design of a temporary road. In *C. J. Langenfelder & Son, Inc. v. Commonwealth of Pennsylvania, Department of Transportation*, a temporary road was needed and would be built over some pipelines. It was discovered that the design of the road would not be able to adequately protect the pipes during construction. Therefore, the road had to be redesigned. According to the contract, the contractor was responsible for coordination with the owners of the pipeline during construction. The state attempted to use this stipulation to hold the contractor responsible for the protection of the pipes. The court stated,

While it is true that the contract required Langenfelder to cooperate with pipeline owners in protecting their property, this provision cannot be read to relieve the Department of its obligation to provide an adequate design. (*C. J. Langenfelder & Son, Inc. v. Commonwealth, Dep't of Transp.*, 44 Pa. Commw. 585, 595 (Pa. Commw. Ct. 1979))

The state was required to take responsibility for the redesign and subsequent delays, as the defect was latent and there was no specific disclaimer for the accuracy of the temporary road design. The above examples of design adequacy disputes, may help distinguish when the owner, the contractor, or the designer will be responsible.

4.2.3.5 Conclusion

“It is well established that where one party furnishes plans and specifications for a contractor to follow in a construction job, and the contractor in good faith relies thereon, the party furnishing such plans impliedly warrants their sufficiency for the purpose intended.” (*M. L. Shaloo, L. Shaloo, Inc. v. Ricciardi & Sons & Sons Constr. Inc.* 348 Mass. 682, 687-688. *Hollerbach v. United States*, 233 U.S. 165, 169-172. *Christie v. United States*, 237 U.S. 234, 239-242. *United States v. Spearin*, 248 U.S. 132. *Faber v. New York*, 222 N. Y. 255, 259-261.” *Alpert v. Commonwealth*, 357 Mass. 306, 320 (Mass. 1970)). Disputes often arise when the owner attempts to use exculpatory clauses to deny responsibility for an inadequate design. The responsibility of design adequacy should be thoroughly discussed and thoughtfully addressed in both the design contract and the construction contract in order to avoid disputes later in the project.

Although well-established in Massachusetts as stated in the quotation above, the so-called Spearin doctrine, that the party that furnishes plans and specifications for a contractor to follow in a construction job warrants their sufficiency for the purpose, is not expressly adopted in other reported State cases. Other decisions actually turn on the facts and specifications. In one such case, a homeowner sued a contractor for damages because the trusses for a house were not high enough. The homeowner collected the cost of the original short trusses from the contractor because, although the homeowner had provided the truss plans, they did not include the height,

the height had been supplied by the contractor. The contractor mentioned the Spearin doctrine as a defense, but the Court rejected its applicability. .

It [the contractor] argues that it did not breach the special order contract with the Morgans because it properly constructed the trusses using the faulty design supplied by the Morgans and Stock Lumber. Midwest quotes *United States v. Spearin*, 248 U.S. 132, 136 (1918), for the proposition that “if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications.” However, this case is distinguished from *Spearin* because here Midwest did not follow the plans and specifications supplied by the owner but, instead, inserted the element of height, which was missing from the plans. (*Morgan v. Midwest Mfg.*, 168 Wis. 2d 776 (Wis. Ct. App. 1992))

Hence it is likely that specific provisions in contracts and the facts are more important than whether the Spearin doctrine applies or the extent to which courts might apply it in a specific case. *Spearin* was litigated in the federal courts, the federal courts would be more likely to apply to *Spearin* doctrine to a design lawsuit or would at least decide whether it applied to the case at hand. State courts are not similarly bound by the decision in *Spearin*.

The flow chart in Figure 4.4 should aid both parties to a contract in understanding which responsibilities lie with each party.

4.2.4 Specification Interpretation

4.2.4.1 Introduction

It is common for the parties to a contract to interpret parts of the contract differently. This can lead to disputes before, during, and after a project is completed. These disputes can cost time and money. Specification interpretation issues often are a result of ambiguities. If ambiguities are common for a contractor, the contractor will likely increase his contingency estimate and the owner will thus end up paying more for not using clear specifications. There are common law rules that govern in the face of ambiguities.

4.2.4.2 Common Law

Generally, the issue revolving around specification interpretation is ambiguity. There are certain common law considerations involved with ambiguities. If an ambiguity is patent, it is one that a reasonable person should have discovered upon a reasonable investigation of the contract. In contrast, a latent ambiguity is one that a reasonable investigation would not have discovered. The reason for the distinction is to keep owners and contractors from using obvious ambiguities to manipulate contracts to their respective unfair advantage. If an ambiguity is patent, then it cannot be used as a defense or to support a claim. However, if the ambiguity is latent, then it is subject to differing or reasonable interpretation in support of a claim or a defense.

Contracts are to be read as a whole. This is a universal contract common law rule for interpreting contract language. This means that clauses in a contract should be interpreted in a manner that would make them fit with the rest of the clauses in the contract to determine the intent of the parties. In *J.H. Berra Construction Co., Inc. v. Missouri Highway & Transportation Commission* the court cited, “The terms of a contract are read as a whole to come to the intention of the parties.” (*Village of Cairo v. Bodine Contracting Co.*, 685 S.W.2d 253, 264 (Mo.App. 1985)) Additionally,

Each term is construed to avoid an effect which renders other terms meaningless: a construction which attributes a reasonable meaning to all the provisions of the agreement is preferred to one which leaves some of them without function or sense. *Id.* When several documents make up the agreement between the parties, "the parties' intent

and the meaning of those documents must be determined from the entire transaction and not simply from isolated portions of particular documents." (Norcomo Corp. v. Franchi Constr. Co., 587 S.W.2d 311, 317 (Mo.App. 1979))

4.2.4.3 Reading the Contract as a Whole

In most cases, when a contractor or owner attempts an ambiguity claim, their attempt may be futile if the interpretation is not consistent with the contract as a whole. In *Girardeau Contractors, Inc., v. Missouri Highway and Transportation Commission*, there were some conflicting specifications. However, based on the nature of the work, there were some specifications that were implied over others and they implied that the state was entitled to the salvaged guardrail material. In making their decision in favor of the state, the court stated, "Even if the contract could be considered ambiguous, that does not necessarily mean that there is a jury question. The court itself must still declare the meaning of the contract unless the evidence admitted raised a real issue of fact to be resolved by the jury." (*Girardeau Contractors, Inc. v. Missouri Highway & Transp. Com.*, 644 S.W.2d 360, 363 (Mo. Ct. App. 1982)). This shows how the courts will scrutinize the entire claim in order to determine if an interpretation is consistent with the contract as a whole and not substantiate ambiguities that would cause parts of the contract to be meaningless.

Another good example of this can be found in *J.P. Theisen & Sons, Inc v. Omni Engineering Inc.* where the main contract was incorporated by reference into all subcontracts. The main contract included a time frame of 160 days to complete the project. This time frame was thus incorporated into the subcontracts. The contractor brought a claim that the sub took too much time and caused him to be delayed. However, the sub did not take more than 160 days and since his contract stated he had 160 days to work, he was not held responsible for the delay. In finding for the subcontractor, the court had a couple insights to justify its decision. They stated, "In short, we do not rewrite contracts or speculate as to the terms of the contract which the parties may not have seen fit to set forth or which are contrary to the express terms of the contract. (*J.P. Theisen & Sons, Inc. v. Omni Eng'g, Inc.*, 1999 Neb. App. LEXIS 243, 21-22 (Neb. Ct. App. Aug. 31, 1999)). The court also added, "An instrument is ambiguous if a word, phrase, or provision therein has or is susceptible of at least two reasonable but conflicting interpretations or

meanings.” (J.P. Theisen & Sons, Inc. v. Omni Eng'g, Inc., 1999 Neb. App. LEXIS 243, 21-22 (Neb. Ct. App. Aug. 31, 1999)). Courts read the contract as written and as a whole, only interpreting ambiguities if they actually exist.

4.2.4.4 Failed Ambiguity Attempts

As parties can often fail to substantiate an ambiguity claim if it does not fit with the contract as a whole, they will fail just as easily if their interpretation is not a reasonable one or is not relevant to the resolution of the conflicting interpretation. In *Thomas M. Durkin & Sons, Inc v. Department of Transportation*, the owner attempted to enforce a specification from a Project Office Manual that was not explicitly incorporated in the contract. The owner claimed that procedures for payment for idle equipment should be according to the manual. The court found favorably on the following argument made by the contractor:

....if contract language is clear and unequivocal, its meaning must be determined solely by the contents of the contract. *Department of Transportation of Transportation v. Brozzetti*, 684 A.2d 658 (Pa. Cmwlth. 1996). Moreover, the courts may not rewrite the terms of an agreement that is in dispute. *Banks Engineering Co., Inc. v. Polons*, 697 A.2d 1020 (Pa. Super. 1997), appeal granted, 550 Pa. 715, 706 A.2d 1210 (1998). (*Thomas M. Durkin & Sons, Inc. v. DOT*, 742 A.2d 233, 237 (Pa. Commw. Ct. 1999))

The court ruled the manual was never explicitly incorporated into the contract.

A final example is *ORR Construction Company vs. State of Illinois, Department of Public Works and Buildings*. In this case there was a statement stating that the contractor ‘may’ use unsuitable material in embankments. The contractor based his bid on the assumption that he would waste unsuitable material and bring in suitable material for embankments. Once work started, the engineer ordered the contractor to use the unsuitable material, saying it was his ultimate decision, not the contractors. It was determined that the word ‘may’ should be taken as its literal meaning of a choice and that there were no ambiguities. The court said, “‘May’ does not mean ‘shall’ and it is not so construed in private contracts.” (*Northwestern Traveling Men's Association v. Crawford*, 126 Ill. App. 468, 480 (1906)). In justifying its decision as to whether an ambiguity existed, the court emphasized the following;

This venerable rule of contract construction, firmly established in Illinois, is restated in I.L.P. Contracts § 221 as follows:

"Words which are ambiguous or of doubtful construction are to be construed most strongly against the party who prepared the contract, for the reason that he chose the language and is responsible for the ambiguities in his own expression.

"This rule obtains not only in grants, but extends in principle to all other engagements and undertakings; and in construing reservations or conditions inserted in a contract for the benefit of the party who makes them, where there are clauses which are doubtful or ambiguous, that construction will be adopted which is least favorable to the party making them." (ORR CONSTR. CO. v. STATE, 30 Ill. Ct. Cl. 266, 273 (Ill. Ct. Cl. 1975))

4.2.4.5 Conclusion

Ambiguities in specifications lead to conflicting interpretations of contract clauses which can create disputes. Sometimes ambiguities are intentional, and sometimes they are not. Either way, the conflicts that arise from ambiguities can cause delays and additional costs. All efforts should be made to eliminate all ambiguities in a contract. Furthermore, as owners and contractors experience ambiguities, they should strive to eliminate those ambiguities in future work. Both parties need to thoroughly understand contract language before entering a contract and attempt to clarify any possible ambiguities before the contract is let for bids or signed. To help parties keep these considerations clear, the flow chart in Figure 4.5 can be used.

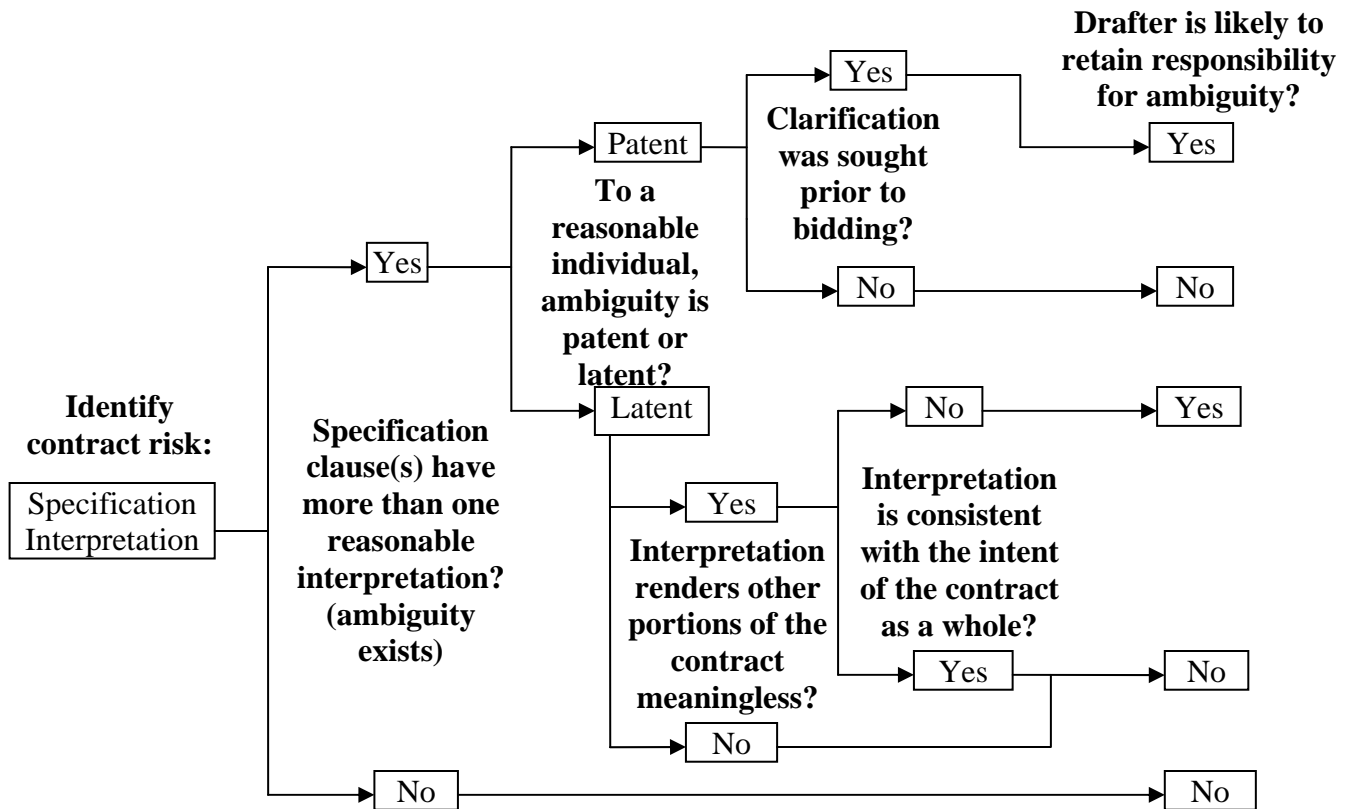


Figure 4.5 – Specification Interpretation flow chart

4.2.5 Claims Process

4.2.5.1 Introduction

Given the current state of risk allocation that this research addresses, claims situations are not uncommon in the highway construction industry. This fact gives the justification for the following discussion of the claims process. This discussion is meant to address the claims process prior to litigation. When problems or disputes arise, it is very difficult to remedy them in a satisfying manner to both sides of the dispute if one of those sides is not aware of the problem or dispute. For this reason, notification of problems and claims are necessary and are often governed by contract language. One of the driving motivations for notice requirements is so both sides of a dispute can keep track of decisions and directions provided and the work that follows in order to equitably determine any changes in compensation or other contract stipulations such as time deadlines. While specifications can be very prescriptive as to the

method of notification, such as written or oral, contractors often feel they have adequately informed the owner of a change even if it was not by the prescriptive method set forth in the specification. This can lead to disputes as to whether or not the contractor is entitled to pursue his claim. It will be shown in the following discussion that it is not uncommon for owners to at least consider a claim even if he feels the contractor did not comply completely with the notice requirements. In the end, the decision often comes down to whether adequate records were kept and can be provided that prove a change in cost or time adequately.

After notice of a changed condition is given, specifications sometimes set time limits for actually filing a claim if an agreement is not reached. The contractor should adhere to these requirements to avoid having their claim denied without review.

4.2.5.2 Standard Specification Language

A review of the standard specifications of the states in region five reveals that there is some mention of notification requirements and/or claims requirements in all of them. All states have a requirement of either a written or oral notification if some sort of changed condition is encountered. This notification is required before work pertaining to the changed condition begins. As briefly mentioned earlier, the reason the notice needs to come before work begins is so the owner or owner's engineer can keep adequate work records to determine if there is indeed an increased cost due to the alleged changed condition. Some states require the contractor to keep records, while others require the records to be kept by the owner's engineer. Some states require both. This step of the claims process is extremely important in later stages of a claim, as these steps provide the basis for a claim to be proven.

4.2.5.3 State Resolution Documents

This section will present some examples from state resolution documents between contractors and state DOT departments, illustrating how claims process conflicts have been treated. These examples come from Michigan, Wisconsin, and Ohio. Not all of this information is public information. Therefore, specific references to the parties and states involved will not be made.

In several of the documents reviewed, the proceedings made mention of the fact that the contractor did not give proper notice of a changed condition and cited applicable contract language to substantiate the denial of the contractor's claim. However, despite the fact that the contractor did not give proper notice, the state department or reviewing board almost always at least reviewed the claim anyway. Most of the time, since the state (owner) was not able to keep adequate records, due to lack of proper notice, the claim was still denied because it was not proven with reasonable certainty. In one specific case, the contractor devised and enacted a remedy to the problem without consulting the state. When the contractor made his claim for additional compensation, the state reviewed what had been done and felt they could have come up with a less expensive alternative and therefore denied the contractor's claim. Alternatively, in another case, the contractor did not give proper notice, but the state was able to substantiate the contractor's claim based on records provided by the contractor and awarded the contractor due compensation for increased costs. These examples illustrate the necessity for reasonable notification and the varying results of improper notification.

4.2.5.4 Conclusion

In dispute or potential dispute situations, communication is key. Specifications are written in attempt to facilitate the communication process. However, it can be important for owners to consider other forms of communication than those specifically stipulated in the contract. On the other side, contractors should make every effort to ensure that the owner is fully apprised of any changed conditions that are occurring. Furthermore, keeping proper records is equally important. When a claim is considered at the end of a project, the contractor will be hard pressed to recover if records are not sufficient enough to substantiate their claim. Throughout the project, the more the two parties communicate, the more likely they are to be on the same page concerning the changed condition or contract claim at the end of the project. The following flow chart in Figure 4.6 will help both parties understand how the risk of a claims situation will be allocated

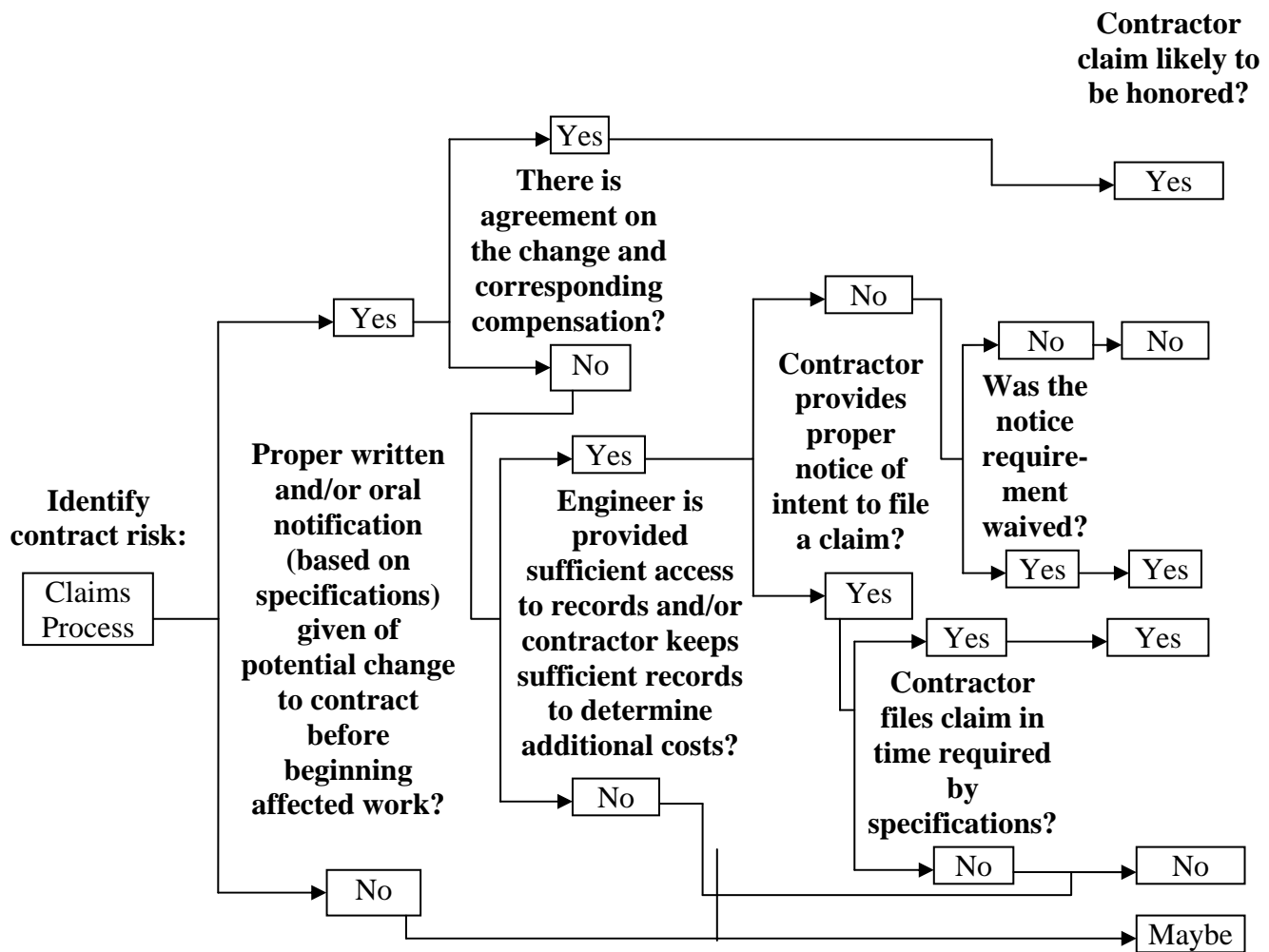


Figure 4.6 – Claims Process flow chart

4.3 Conclusion

The information in this chapter is intended to better inform parties to highway construction contracts about the top risks facing them today. Using the information given along with the corresponding flow charts, it is hoped that parties will better understand risk allocation. With this better understanding, parties will hopefully be able to better anticipate the results of disputes. Eventually, it is hoped that this will lead to fewer disputes through better upfront allocation. When both parties can understand how the combination of specifications and common law currently allocates risks, they will be able to make better decisions about how to use contracts to allocate risks more efficiently and appropriately.

5.1 Introduction

Risks are inherent in the construction industry and will never be completely eliminated. That being said, there is still room for change in the way risks are dealt with. Specifically, this research was designed in attempt to improve risk allocation. There is a great deal to be learned about how risk is currently allocated and what is causing the most problems with the current allocation in highway construction projects. This research has brought to light many of the current issues with risk allocation in the highway construction industry and begins to seek ways to help correct those issues.

5.2 Methodology Summary

In order to begin to unveil some of the problems with the current process of risk allocation in the construction industry today, it was necessary to involve parties that work in the industry on a regular basis. The industry expert panel provided necessary insight into the research that was conducted. On top of that, a survey was used to gain insight from DOT members (owners) and contractors who currently work in the highway transportation field. This survey was used to determine which risks were causing the most problems from their misallocation in the industry today.

Once identified, the top risks were investigated further. This was done to better identify what sorts of issues arise with misallocation of the top risks and how those issues are being resolved. When parties can see common outcomes of conflicts associated with misallocation, it will aid them in making better upfront decisions concerning allocation. This was accomplished by doing a legal review of the top risks. Along with the legal review, flow charts were developed to show as many scenarios concerning the risks as possible and their subsequent outcomes. The idea for these flow charts was modeled after similar flow charts that were developed in previous research. *Contracting to Appropriately Allocate Risk* was a study performed by Justin Swanson and Dr. Awad Hanna for the Construction Industry Institute. The concept and appearance of the flow charts were used, but the information provided in the them was developed in accordance with the legal review performed in this study, state highway specifications, and expert input from the industry panel.

5.3 Results

This study has produced two key contributions to the industry. These are the top seven risks whose misallocation is most affecting the industry today and legal reviews with flow charts to help the industry better understand the risks and how they are allocated.

A combination of survey results, industry expert panel input, and state DOT claim documents were used to construct the list of top risks. These risks are the ones that are most likely to be misallocated in the highway construction industry today. As a recap, these risks are:

- Validity of Schedule
- Design Adequacy
- Ambiguous Specifications
- Differing Site Conditions
- Third Party Delay
- Pre-Court Claims Process
- Changed Conditions

The flow charts were developed in accordance with information obtained from court decisions and state specifications. It is the hope of this research that the flow charts will be used to better understand how risk conflicts will be resolved. With the understanding that the risks listed are some of the most important ones to be concerned with in most situations, hopefully, contractors and owners will strive to focus on the allocation of these risks with the aide of the flow charts. It is important to note that all situations are going to be different. That being said, there will be projects that will have risks that are not in the top list that will need more attention at times due to the nature of the project. Also, it is important to note here that the flow charts do not represent hard legal facts. They are to be used as guidelines for the most typical situations. A lawyer should be consulted for absolute legal advice. Please refer to Chapter 4 to review the flow charts.

5.4 Recommendations

Throughout the process of this research, many things have been learned and there are some very important take home points that need to be mentioned. Below is the advice and recommendations that have come out of the research:

- Risk will never be gone from the process of highway construction, but there is much room for improvements to risk management and allocation
- No two projects will be identical. Therefore, there will never be a prescriptive way to allocate risk that will work for every project. Much of the decision process will be based upon the specific characteristics of the project.
- Although this research identified the top risks in the industry, some projects may have risks not in the top list that are more important to focus on. Therefore, it would be beneficial for owners and contractors to identify risks on each project and attempt to rank them according to the system used in the survey in order to determine which risks need most attention on any given project.
- It has come to light that some of the issues are within the specifications themselves. The industry panel felt that, for the most part, the standard specifications do an adequate job of clearly and properly allocating risk. However, problems often arise through the addition of special provisions and additional exculpatory clauses. This could be an area for further research and investigation.
- Contractors and Owners are encouraged to review the flow charts before and during projects to help them understand where a potential misallocation could end and strive to find a way to deal with risks before the project begins.

5.5 Closing

There is much to be learned about risk management and allocation. This topic is a vast one and research should continue on all aspects of risk management. The more that can be learned about it, the more efficient projects will become in the future. Risk will never go away, but those who understand risk the best, will be in the best position to avoid conflicts and gain from their knowledge.

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Gary Whited

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Appendix A
Risk Allocation Industry Survey



CONTRACTING TO APPROPRIATELY ALLOCATE RISK

University of Wisconsin – Madison,
The Midwest Regional University Transportation Center,
and The Construction and Materials Support Center

DEFINITIONS

Risk: An uncertain event or condition that, if occurs, has a positive or negative effect on at least one project objective.

Misallocated Risk: A risk that is contracted / allocated to a party that is not the contract party best able to manage / control the risk. Misallocation commonly occurs via the contract language.

Example: Contractual language may be used to unfairly push the risk of differing site conditions from one party to another. Specifically, it is generally the responsibility of the contractor to perform a site investigation prior to bid submittal. If after performing an acceptable investigation, the contractor finds groundwater conditions at the time of construction to be different than expected, yet, the contractor is held responsible to complete the work at the bid price via the contract.

SECTION A: ORGANIZATIONAL CHARACTERISTICS

1) What is your position within the company?

2) What is your approximate average construction volume, in dollars, including prime and subcontract work for the last 3 years:

3) Which of the following best describes your company? *Check all that apply.*

Owner/Owner Rep Prime Contractor Subcontractor

4) Which of the following best describes the type of work that your company performs?

Check all that apply.

Bridges Concrete Paving Asphalt Paving
 Traffic Control Suppliers Grader/Earthwork
 Landscaping Other _____

5) For projects where there is a misallocated risk, what percentage cause a fluctuation in project cost greater than 5%?

- None 11-25% 51%-75%
 Less than 5% 26%-50% 76%-100%

SECTION B: INDUSTRY RISK ALLOCATION

Based on a preliminary survey distributed throughout the construction industry, an initial analysis of commonly misallocated risks was developed. Think about your role within the highway construction industry. Based on the list of commonly misallocated risks as well as on your experience, please identify the top 5 risks you feel have the most potential for misallocation in the following areas: Pre/Post-Construction and Construction, with 1 being high and 5 being low. After you have identified the risks you feel are potentially misallocated, please identify your perception of the Frequency and Severity of each of those risks. A definition of these terms can be found below:

Frequency of Occurrence: Likelihood of risk realization.

Severity of Occurrence: Relative impact on cost and/or schedule.

Frequency of Occurrence Rankings

- 1-Remote
- 2-Unlikely
- 3-Likely
- 4-Highly Likely
- 5-Near Certainty

Chance of Occurring

- <10%
- 10-35%
- 36-65%
- 66-90%
- >90%

Severity of Occurrence Rankings

- 1-Negligible
- 2-Minor
- 3-Moderate
- 4-Significant
- 5-Extreme

Increase in Project Cost

- <5%
- 5-10%
- 11-20%
- 21-50%
- >50%

Example: If you thought the risk of “availability of disposal and borrow sites” had the most potential for misallocation and it was likely to happen on projects and that when it did, it increased costs by 10-20%, the form should resemble the following:

Rank	Misallocated Construction Risk (Number)	Frequency	Severity
1	8	3	3

PART 1: PRE/POST-CONSTRUCTION RISKS

<i>Pre-Construction Risks</i>		<i>Post-Construction Risks</i>	
1	Hazardous waste site analysis incomplete or in error	16	Warranty provisions
2	Design incomplete or in error	17	Ambiguous acceptance criteria
3	Permits or regulatory agency actions/inactions	18	Applications of liquidated damages for completed operations or substantial completion (beneficial use)
4	Mandated subcontractor requirements by owner	19	Identification and completion of punch list items
5	Validity of construction schedule	20	Finals processes
6	Constructability of plan	21	Claims Resolution Process
7	Unclear or ambiguous specifications	22	Resolution of disputes by owner
8	Availability of disposal and borrow sites	23	Retainage held by owner or prime contractor
9	Mandated insurance coverage	24	Other
10	Inadequate geotechnical investigation	25	Other
11	Presence of archeology sites		
12	Contractor required site investigation prior to bidding		
13	Ability to obtain bonding		
14	Other		
15	Other		

Rank	Misallocated Construction Risk (Number)	Frequency	Severity
1			
2			
3			
4			
5			

Frequency of Occurrence Rankings

1	Remote
2	Unlikely
3	Likely
4	Highly Likely
5	Near Certainty

Chance of Occurring

<10%
10-35%
35-65%
65-90%
>90%

Severity of Occurrence Rankings

1	Negligible
2	Minor
3	Moderate
4	Significant
5	Extreme

Increase in Project Cost

<5%
5-10%
10-20%
20-50%
>50%

PART 2: CONSTRUCTION RISKS

Construction Risks			
1	Ambiguous acceptance criteria	20	Erosion control and environmental protection
2	Unknown or unanticipated discovery of utilities	21	Measurement and payment for work performed
3	Relocation and coordination of work activities with utilities	22	Labor cost escalation during delay
4	Unsuitable subgrade materials	23	Damage to 3rd parties
5	Shortages or delayed delivery of materials	24	Maintenance of traffic in construction work zone
6	Planned staging and sequencing of work	25	Communication/Coordination with adjoining property owners
7	Extreme weather conditions or seasonal effects	26	Coordination with adjoining contracts
8	Traffic control plans	27	Quantity fluctuations
9	Presence of archeology sites	28	Materials cost escalation
10	Groundwater conditions	29	Nonconforming materials from QMP testing
11	Hazardous materials	30	Differing site conditions
12	Delay from 3rd party involvement-other than utilities	31	Availability of disposal and borrow sites
13	Design and construct type provisions	32	Repair of haul roads and detour routes
14	Man-made buried objects	33	Local codes and ordinances
15	Contract change order provisions	34	Owner supplied materials or equipment
16	Coordination and performance of work with railroads	35	Application of disincentives, penalties, lane rentals, and interim liquidated damages
17	Contractor performed survey and staking	36	Other
18	Resolution of disputes by owner	37	Other
19	Delays in approvals and reviews of submittals such as shop drawings or erosion control plans	38	Other

Rank	Misallocated Construction Risk (Number)	Frequency	Severity
1			
2			
3			
4			
5			

Frequency of Occurrence Rankings	Chance of Occurring
1 Remote	<10%
2 Unlikely	10-35%
3 Likely	35-65%
4 Highly Likely	65-90%
5 Near Certainty	>90%

Severity of Occurrence Rankings	Increase in Project Cost
1 Negligible	<5%
2 Minor	5-10%
3 Moderate	10-20%
4 Significant	20-50%
5 Extreme	>50%

SECTION C: CONTACT INFORMATION

Think about your past experience with the misallocation of risk in the construction industry and the information you would be willing to share with the research team. If you would be willing to discuss past projects and share contractual language that has proven to be successful or unsuccessful at dealing with misallocated risk, please identify how you would like to be contacted.

Telephone: _____ Visited by a research member
 Email: _____ Other: _____

Your Name: _____

.....

THANK YOU FOR PARTICIPATING IN OUR SURVEY!

Please return the self-addressed stamped envelope or fax to 608-263-5705.

Appendix B

Excerpts from the *Code of Federal Regulations*

¹ 23 CFR Section 635.109 - Standardized changed condition clauses.

(a) Except as provided in paragraph (b) of this section, the following changed conditions contract clauses shall be made part of, and incorporated in, each highway construction project approved under 23 U.S.C. 106:

(1) Differing site conditions.

(i) During the progress of the work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.

(ii) Upon written notification, the engineer will investigate the conditions, and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the contract, an adjustment, excluding anticipated profits, will be made and the contract modified in writing accordingly. The engineer will notify the contractor of the determination whether or not an adjustment of the contract is warranted.

(iii) No contract adjustment which results in a benefit to the contractor will be allowed unless the contractor has provided the required written notice.

(iv) No contract adjustment will be allowed under this clause for any effects caused on unchanged work. (This provision may be omitted by the STD's at their option.)

(2) Suspensions of work ordered by the engineer.

(i) If the performance of all or any portion of the work is suspended or delayed by the engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the contractor believes that additional compensation and/or contract time is due as a result of such suspension or delay, the contractor shall submit to the engineer in writing a request for adjustment within 7 calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.

(ii) Upon receipt, the engineer will evaluate the contractor's request. If the engineer agrees that the cost and/or time required for the performance of the contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the engineer will make an adjustment (excluding profit) and modify the contract in writing accordingly. The contractor will be notified of the engineer's determination whether or not an adjustment of the contract is warranted.

(iii) No contract adjustment will be allowed unless the contractor has submitted the request for adjustment within the time prescribed.

(iv) No contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided or excluded under any other term or condition of this contract.

(3) Significant changes in the character of work.

(i) The engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the surety, and the contractor agrees to perform the work as altered.

(ii) If the alterations or changes in quantities significantly change the character of the work under the contract, whether such alterations or changes are in themselves significant changes to the character of the work or by affecting other work cause such other work to become significantly different in character, an adjustment, excluding anticipated profit, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the contractor in such amount as the engineer may determine to be fair and equitable.

(iii) If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the contract.

(iv) The term "significant change" shall be construed to apply only to the following circumstances:

(A) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or

(B) When a major item of work, as defined elsewhere in the contract, is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed.

(b) The provisions of this section shall be governed by the following:

(1) Where State statute does not permit one or more of the contract clauses included in paragraph (a) of this section, the State statute shall prevail and such clause or clauses need not be made applicable to Federal-aid highway contracts.

(2) Where the State transportation department has developed and implemented one or more of the contract clauses included in paragraph (a) of this section, such clause or clauses, as developed by the State transportation department may be included in Federal-aid highway contracts in lieu of the corresponding clause or clauses in paragraph (a) of this section. The State's action must be pursuant to a specific State statute requiring differing contract conditions clauses. Such State developed clause or clauses, however, must be in conformance with 23 U.S.C., 23 CFR and other applicable Federal statutes

and regulations as appropriate and shall be subject to the Division Administrator's approval as part of the PS&E.

(c) In the case of a design-build project, STDs are strongly encouraged to use "suspensions of work ordered by the engineer" clauses, and may consider "differing site condition" clauses and "significant changes in the character of work" clauses which are appropriate for the risk and responsibilities that are shared with the design-builder.

[56 FR 37004, Aug. 2, 1991; 57 FR 10062, Mar. 23, 1992, as amended at 67 FR 75925, Dec. 10, 2002]

¹48 CFR. 52.236-2 Differing Site Conditions, as prescribed in 48 CFR 36.502:

Differing Site Conditions (APR 1984)

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or

(2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

(b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

(c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.

(d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract."

[48 FR 42478, Sept. 19, 1983, as amended at 60 FR 34761, July 3, 1995]