STANDARD OF CARE

FOR

ENGINEERS AND OTHER PROFESSIONALS

WORKING IN TEXAS

by
The Structural Committee

of
The Foundation Performance Association

Houston, Texas

www.foundationperformance.org

Document # FPA-SC-18-0

ISSUE HISTORY (Some internal subcommittee issues omitted when published)

Rev #	Date	Description	Subcommittee Chair(s)	Subcommittee Members
A	26 Jan 11	For Subcommittee Review	William E. Morfey	Adam Bakir Francisco Carrillo David Karimi Ron Kelm Lucas Mauro Michael Skoller Robert Taylor Raghu Dass Andrew Martin
AA	7 Nov 13	For FPA Peer Review		
BB	30 Jan 14	For Subcommittee Review		
CC	4 Feb 14	For FPA Peer Review		
DD	10 Apr 14	For Subcommittee Review		
0	15 May 14	Issued for Website Publishing		

TABLE OF CONTENTS

PREFACE

This document was written by the Structural Committee and has been peer reviewed and accepted by the Foundation Performance Association (FPA). This document is published as FPA-SC-18 Revision 0 (i.e., FPA-SC-18-0) and is made freely available to the public at www.foundationperformance.org so all may have access to the information. To ensure this document remains as current as possible, it may be periodically updated under the same document number but with higher revision numbers such as 1, 2, etc.

The Structural Committee is a standing committee of the Foundation Performance Association. During the course of writing this document, the Structural Committee was chaired by Ron Kelm and had an active membership of 35 to 55. The Structural Committee sanctioned this paper on 24 February 2010 and formed an ad hoc subcommittee to write this document with attorney Bob Newman as chair. Mr. Newman fell ill shortly afterwards before the subcommittee began meeting. The Structural Committee then appointed attorney William E. Morfey to assume the chair position. The subcommittee's chair and members are listed on the cover sheet of this document and are considered this document's co-authors.

Suggestions for improvement of this document shall be directed to the current chair of the Structural Committee. If sufficient comments are received to warrant a revision, the Structural Committee may form a new subcommittee to revise this document. If the revised document successfully passes FPA peer review, it will be published on the FPA website, superseding the previous revision.

The intended audiences for the use of this document are engineers, architects, surveyors, inspectors, builders, building owners, repair contractors, attorneys, and others that may be involved in the design, construction, inspection, forensic evaluation, and litigation related to structures and other facilities located in the state of Texas.

This document was created with generously donated time in an effort to advancing the knowledge, performance, and standards of engineering, construction, and repairs related to foundations, soils, and structures. The text in this document represents the opinions of a majority of the subcommittee members and may not necessarily reflect the opinions of every subcommittee member or FPA member at the time of, or since, this document’s publication. The FPA and its members make no warranty regarding the accuracy of the information contained herein and will not be liable for any damages, including consequential damages, resulting from the use of this document. Each project should be investigated for its individual characteristics to permit appropriate application of the material contained herein. This document is intended to provide a general discussion of relevant legal concepts, but it is not intended to provide legal advice. The FPA strongly recommends that an appropriately credentialed legal professional be consulted to provide specific legal advice on any pertinent matter.

Please refer to the FPA’s website at www.foundationperformance.org for other information pertaining to this publication and other FPA publications.

1.0 INTRODUCTION

Ordinary care in the engineering/construction context is that degree of care that professionals of ordinary prudence would use under the same or similar circumstances. This level of care is often referred as the "Standard of Care." Texas courts have defined the method to determine whether professionals such as engineers, architects, and surveyors have exercised ordinary care. The goal of the subcommittee in writing this document is to provide professionals with a reliable methodology to determine their applicable standard of care. Demonstrating conformance to the standard of care is paramount whenever questions arise concerning the quality of the professional's work product.

The American Heritage College Dictionary (3rd Ed.) defines a "standard" as "an acknowledged measure of comparison for quantitative or qualitative value; a criterion." In considering the various aspects of the standard of care, as a threshold issue one might reasonably wonder about the source of the standard itself.

In actuality, there are four potential sources for the applicable standard of care: 1) the agreement between the parties to a project; 2) legislative standards (e.g., statutes, building codes, ordinances); 3) standards specified by an executive authority (such as a professional governing body or administrative agency), and; 4) standards developed by courts. The first three sources are relatively easy to account for, in the sense that they tend to be contained in discrete documents. All one needs to do is read a contract, review a book of codes, or study the applicable professional rules in order to find out what they say, if anything, about the particular matter at hand. The fourth source tends to be more problematic and thus is the focus of this paper.

Like most other jurisdictions throughout the country, Texas courts rely in part on a "common law system" for deciding cases. The term "common law" refers to the legal rules developed and handed down by courts over time, and can be contrasted with the laws enacted by a legislature or the orders implemented by an executive authority. The goal of a common law system is for courts to treat cases with similar facts consistently. Thus, under a common law scheme, courts are generally bound to follow the precedential decisions of previous courts. However, revisions in the common law can occur under compelling conditions. Generally such conditions arise when the circumstances in society (be they economic, social, technological, political, or otherwise) require the courts to adapt their decisions to be relevant to the current times. In this way, the common law evolves over time, but almost always in gradual, well-reasoned steps.

The common law is very important in Texas, because many fundamental areas of law, such as property rights, contracts, and torts, do not exist by virtue of legislative action or executive rule making. Instead these areas of law rely heavily (though not exclusively) on the common law for their existence.

Although exceptions can occur (and must be identified on a case-by-case basis by the professional, perhaps in consultation with an attorney), it is generally prudent to work through

the four sources for the standard of care in the order listed above, since earlier sources tend to take precedence over later ones. More to the point of this paper, the common-law standards of care are "catch all" provisions that generally become relevant only if no superseding standard of care has been specified by contract, statute, or executive proclamation.[1] It is worth noting that although changes in the standard of care mandated by statute or executive proclamation can occur, the publicized nature of these standard of care sources make them easier to track (i.e., the entire profession will be affected, so there is typically advance warning and discussion concerning the changes). By contrast, contractually specified standards of care can vary with each new work agreement, perhaps substantially. Additionally, a standard of care specified in a contract may supplant what would otherwise be the default standard of care under statute, executive proclamation, or the common law.[2] Thus, it is extremely important to consider all applicable contractual terms to determine if they alter the default standard of care that will come from one of the other sources.

To avoid confusion, it should be noted that in the absence of other contractually specified criteria, Texas law imposes a "standard of performance" on contractors who construct new residential property or who repair or modify existing residential property. The standard is that the work must be performed in a "good and workmanlike" manner, meaning that the contractor must perform the work in the same manner as would a generally proficient contractor engaged in similar work and performing under similar circumstances.[3] Although this standard arises in the context of a warranty (commonly referred to as the "implied warranty of good and workmanlike performance"), it is very similar to the negligence standard.[4]

The professional working in the fields of engineering, construction, and repairs must be concerned with living up to the standards required to effectively discharge the responsibility to clients and avoid protracted involvement in litigation and potential liability for damages stemming from design and/or construction defects. Identifying and understanding the applicable standard of care in a particular situation is thus critical, because that is the yardstick against which a tribunal will measure the professional's conduct to see if it was deficient or not.

This paper is intended to provide the professional with tools to identify the relevant standard of care in a given situation. It is not, however, intended to provide a "litmus test" such that a black or white answer can be developed in every case. Particularly in areas where emerging

---

[1] The subcommittee notes that situations may arise where one of the sources for the standard of care is directly at odds with another. For instance, hypothetically it is possible for a project contract to explicitly state that a design professional need not use ordinary care in his work. Such a contract may be at odds with both the standard of care that would otherwise be imposed by (say) the professional's self-governing body of peers, as well as the general common law rules. The facts and circumstances surrounding any such potential conflict are numerous and should be addressed on a case-by-case basis by the professional, in consultation with third parties as necessary.

[2] In certain instances, a provision in a contract that attempts to alter a pre-existing legal framework may be declared "void" if it conflicts with public policy concerns. A complete discussion of such potential public policy conflicts is beyond the scope of this paper.

[3] For additional information, review the case of *Centex Homes v. Buecher*, 95 S.W.3d 266, 273 (Tex. 2002).

[4] For additional information, review the case of *Coulson & Cae, Inc. v. Lake L.B.J. MUD*, 734 S.W.2d 649, 651 (Tex. 1987).

breakthroughs in knowledge and/or technology are changing the landscape of a professional's practice, the method explained in this paper may not be able to definitively select between two or more competing standards.

Section 2.0 of this paper defines the historical development of the elements of negligence. Section 3.0 discusses the "damage" element of negligence. Section 4.0 provides the legal definition of "standard of care" used in Texas. Section 5.0 presents the recommended procedure for determining the standard of care for a general situation. Section 6.0 illustrates the recommended procedure to determine the standard of care for selected hypothetical situations. And Section 7.0 describes the several survey levels available to determine a professional's standard of care.

2.0 HISTORICAL DEVELOPMENT OF THE ELEMENTS OF NEGLIGENCE

The word "negligent" is a term of general usage that is encountered in various contexts and is derived from the term "neglect." In common usage, the term is often employed to mean "careless." Within the legal field, the words "negligent" and "negligence" are terms of art that embody the notion of "carelessness," along with other formal legal considerations. Although it is beyond the scope of this paper to delve into a detailed analysis of the broad legal concept of negligence, a cursory explanation will be helpful to see how the particular notion of "standard of care" fits into the broader issue of legal negligence.

2.1 THE "REASONABLE MAN"

The concept of a "standard of care" is based on a "legal fiction," that being the creature known as the "reasonable man." The application of this standard stems from the case of *Vaughan v. Menlove*,[5] decided in England in the year 1837. In that case, the defendant had constructed a stack of hay on his property in a manner that could cause the hay to catch fire. Despite being repeatedly warned over the course of five weeks that the situation could give rise to spontaneous combustion of the hay, the defendant decided to "chance it." Ultimately the hay burst into flames, leading to a fire that consumed cottages on the adjoining land of the plaintiff.

During the ensuing trial, the judge instructed the jury that they should consider whether the fire had been caused by the defendant's negligence, adding that the defendant was "bound to proceed with such reasonable caution as a prudent man would have exercised under such circumstances." The jury found the defendant liable. The defendant appealed on the basis that the jury should not have determined the case according to a "standard of ordinary prudence, a standard too uncertain to afford any criterion." Instead, the defendant insisted that the jury should have used the test of whether the defendant had acted honestly in accordance with his best judgment.

The appellate court recognized that the case was one of "first impression," meaning that the issue had never previously been decided under English common law. Although the English courts had recognized that a standard of care governed the actions of "carriers or other bailees," (i.e., persons who contractually agreed to handle the property of another, such as for delivery or safekeeping), no universal standard of care had been found to govern people's actions generally. The *Vaughan* court would change all of that.

Recognizing the then long-established rule of law that a person "takes upon himself the duty of so dealing with his own property as not to injure the property of others," the *Vaughan* court went on to adopt the standard by which it would be judged whether or not the duty had been observed (i.e., whether or not a party was negligent). That standard was the manner in which a "man of ordinary prudence" would act.

In arguing against the application of a "one size fits all" standard of care, the defense attorney had stated that "[t]he measure of prudence varies so with the varying faculties of men, that it

[5] *Vaughan v. Menlove*, 132 ER 490; Court of Common Pleas, 1837

is impossible to say what is [negligence] with reference to the standard of what is called ordinary prudence." Thus, the defense argued, the "best judgment" standard was the rule that made the most sense. However, the *Vaughan* court applied the same logic to achieve a different result, noting that the judgment belonging to each individual was "infinitely various," and thus would create an ever differing standard, whereas juries had already been using the "ordinary prudence" standard in other types of cases.

With its decision, the *Vaughan* court released the "man of ordinary prudence" (a/k/a the "reasonable man") from his previous modest confines of matters related to bailments and delivery services, to roam within society at large and instruct everyone in the manner in which people must conduct themselves in everyday affairs, lest they subject themselves to potential liability for negligence. But as previously mentioned, the reasonable man is a fiction created by courts to decide cases; he will never be met on the street or spoken with in the workplace. Most importantly for the scope of this document, he can never be asked what he would have done in a situation where an accident has occurred and someone is being accused of negligence. Nonetheless, his actions are the yardstick by which the actions of real people will be judged.

2.2 THE ELEMENTS OF NEGLIGENCE

Most jurisdictions, including Texas, recognize four essential elements to prove a claim of negligence:

1. The first element is the *existence of a legally recognized duty* (i.e., a requirement to act or not act in a certain way) that is imposed by law upon the negligent party.
2. The second element is a *violation or "breach" of the legally recognized duty*.
3. The third element is that there must have been some sort of legally recognized *harm or "damage" to the recipient* of the negligence.
4. The fourth and final element is that the *damage to the victim must have been caused by the breach* of the legal duty.

Putting it all together, negligence can generally be defined under the law as a breach of a legal duty that causes damages to another party.

Texas courts also recognize that certain professions consist of members who hold themselves out as having superior knowledge, training, and skill. Such professionals are therefore held to a standard that embodies that superior knowledge, training, and skill, by requiring those professionals to exercise the degree of care that other members of their profession would exercise in the same or a similar situation (versus what a layman would do, for example). Negligence in this context is thus often referred to as "professional negligence" or "malpractice," to distinguish it from the more general negligence that simply looks at what a reasonably prudent person would do in a given situation.

Note that the applicable standard applies to all members of a given profession. No distinction is made between a brand new professional performing their first job and a lifetime veteran of the profession. Each of these individuals (and everyone in between) will be held to the same standard.

Some professional groups formally recognize a heightened stature among some of its members, typically based on those members meeting minimum experience requirements and also being tested for advanced knowledge in their area of expertise. For instance, doctors and lawyers can become “board certified” in certain practice areas. For purposes of determining a standard of care, such advanced certifications essentially create a new category of professionals that has its own performance standards. Thus, a board certified attorney would be measured against other attorneys who have the same board certification, versus the population of attorneys as a whole.

Narrowing the focus to the context of negligence on the part of construction and design professionals working in Texas, it can be seen that Texas law imposes a duty upon construction and design professionals to exercise ordinary care (i.e., the degree of care that professionals and other contractors working in Texas, of ordinary prudence, would use under the same or similar circumstances).

To summarize, if the professional fails to use ordinary care (which is the standard of care imposed by law), that professional can be held liable for any resulting harm. However, because the law requires a complaining party to show that the accused party failed to use ordinary care, construction and design professionals that employ ordinary care in their work will necessarily deprive a potential complaining party of the ability to prove a critical element of their negligence claim.

3.0 THE PRESENCE OF DAMAGE DOES NOT AUTOMATICALLY INDICATE NEGLIGENCE

Based on the collective experience of the subcommittee members, in instances where assessments are made to determine the cause of failures, it is frequently the case that little thought, if any, is given to determining the applicable standard of care prior to the investigator rendering a determination of whether or not "negligence" has occurred. Ironically, such an omission is likely a breach of the standard of care for the expert witness who is rendering an opinion on the matter. When it occurs, this failure to properly assess and determine the applicable standard of care can result in needless conflict and unjustified expense through litigation.

Given the nature of construction defect disputes, the "damage" element of negligence is virtually never at issue. Although the subcommittee is confident that a hypothetical could be developed where a question could arise concerning the existence of any damages, it is almost always the case that visible damage has occurred to a structure. Indeed, the observation of such damage (sloping floors, cracks in walls or finishes, sticking doors, etc.) is typically the event that precipitates allegations of construction defects.

In contravention of the old adage that "Where there is smoke, there is fire," professional negligence cannot be assumed merely from the fact that damages have occurred to a structure. Because legally actionable negligence exists only where the professional has failed to exercise ordinary care, damages that occur *despite the use of ordinary care* cannot serve as the basis for a claim of negligence. That is, the law does not require perfection; it recognizes that accidents can occur even though everyone involved was using ordinary care.

4.0 DEFINITION OF STANDARD OF CARE

Standard of care has more than one definition in the literature that is widely available on the subject. The subcommittee found no definition that had been subjected to peer review within the design professional community, though the definition by ASFE[6] has been "endorsed" by various professional organizations across the country.

It is important not to stray far from the current jury charge used in the court system since, should a lawsuit go to trial, the jury will not likely be given any of the other definitions available in the literature. For this reason the subcommittee chose to base its definition for standard of care on Texas' current jury charge, while using other sources to fill in the gaps from that jury charge so the users of this document have a complete definition that can more easily be uniformly interpreted by all. The sources used are analyzed in the next subsection.

4.1 LITERATURE ANALYSIS

4.1.1 Role of the Jury Charge in Trial

Under the Texas legal system, the role of the jury is to decide disputed issues of fact in a trial. Thus, in a case where a professional is being accused of negligence, a jury can be called upon to decide whether or not the professional met the applicable standard of care. In performing its function, the jury will receive from the judge a set of questions (with accompanying definitions and instructions) that the jury must answer based on the evidence that is presented at trial. That collection of questions, definitions, and instructions is what is known as the "jury charge."

The most authoritative source for the wording of a Texas jury charge comes from a series of books called *Texas Pattern Jury Charges*, which is published by the State Bar of Texas. The most current version of that publication is the 2012 edition, and is the source used herein.

4.1.2 Texas Pattern Jury Charge 60.1; Nonmedical Professional's Degree of Care

Texas Pattern Jury Charge 60.1[7] ("PJC 60.1") sets forth the recommended language for a court to use in a jury charge concerning a nonmedical professional's degree of care. In relevant part, PJC 60.1 reads as follows:

> *"Negligence," when used with respect to the conduct of [professionals and other contractors working in Texas], means failure to use ordinary care, that is, failing to do that which [professionals and other contractors working in Texas] of ordinary prudence would have done under the same or similar circumstances or doing that*

[6] ASFE, Inc., *Recommended Practices For Design Professionals Engaged As Experts In the Resolution of Construction Industry Disputes* (Footnote 4); www.asfe.org

[7] Texas Pattern Jury Charge; Chapter 60, pg. 97 (2012 ed.).

which [professionals and other contractors working in Texas] of ordinary prudence would not have done under the same or similar circumstances[8].

"Ordinary care," when used with respect to the conduct of [professionals and other contractors working in Texas], means that degree of care that [professionals and other contractors working in Texas] of ordinary[9] *prudence*[10] *would use under the same or similar circumstances.*

Note that the term "standard of care" does not actually appear within the standard jury charge. The term "standard of care" is merely a shorthand way of referring to "that degree of care that [a professional] of ordinary prudence would use."

4.1.3 ASFE Definition

As previously mentioned, ASFE has endorsed the following definition of standard of care:

"Standard of care is commonly defined as that level of skill and competence ordinarily and contemporaneously demonstrated by professionals of the same discipline practicing in the same locale and faced with the same or similar facts and circumstances."

The subcommittee sees no substantive difference between the ASFE definition and the definition contained in PJC 60.1. The most notable difference in phraseology is the insertion of the word "contemporaneously." However, the ASFE definition continues to use the "same or similar facts and circumstances" terminology, which is consistent with PJC 60.1. The subcommittee finds the term "contemporaneously" to be redundant of the contemporaneousness implied by the "similar facts and circumstances" portion of the definition. Thus, it is the subcommittee's opinion that ASFE and PJC 60.1 are in agreement in all relevant ways.

[8] In the subcommittee's opinion, a consideration of "same or similar circumstances" may include, but is not limited to consideration of: locale, timeframe, weather conditions, contractual relationships, code/ordinances/regulations, soil conditions, floodways/flooding, design requirements, relevant experience, environmental concerns, site/project evaluation, or the groundwater table.

[9] American Heritage College Dictionary (3rd. Ed.) defines the word "ordinary" as – (1) Commonly encountered; usual; (2) of no exceptional ability, degree or quality; average . . .

[10] Webster's Dictionary defines the word "prudence" as – "Skill and good judgment in the use of resources."

5.0 PROCEDURE FOR DETERMINING STANDARD OF CARE

The goal in assessing the standard of care is to determine "what professionals and other contractors of ordinary prudence would have done under the same or similar circumstances." For a particular set of circumstances, the easiest way to determine what other professionals have done or would do is to ask them. The best way to ask a group about their opinions or experiences is to conduct a survey.

Most everyone has participated in a survey of some sort, so the survey process is probably familiar. This section will discuss the methodological issues involved in conducting surveys. Much of the organization of this section is modeled after a treatise on conducting surveys, *A Selection from Survival Statistics*, by David S. Walonick.[11]

5.1 SURVEY METHODS

Surveys are effective at obtaining the opinions of a geographically diverse group of professionals in a short period of time. There are a number of ways to conduct surveys, each with strengths and weaknesses:

Personal interviews are a good way to get in-depth information. Personal interviews, also known as in-depth interviews or IDIs, involve one or more people interviewing one respondent. Personal interviews are expensive because of the one-on-one nature of the process, but allow follow-up questions to clarify answers to survey questions. This method would be useful for a professional to use as part of a due diligence survey of peers prior to starting a project or for a project that involved the use of construction methods or materials with which the professional has not had a lot of experience.

Telephone interviews are the fastest method of gathering information from a sample of respondents. The interviewer follows a prepared interview. Most telephone interviewing now is performed through computer assisted telephone interviewing or CATI in which the questionnaire is programmed on a computer. As the interviewer reads the questions, the respondent's answers are entered directly into the computer for analysis.

E-Mail and Regular Mail Surveys are cost effective but are also the slowest survey methods. Because there is no interviewer involved there is no possibility of interviewer bias.[12] The primary negatives are: the interviewer cannot probe the respondent for more detailed information; the respondent can read ahead and see what questions are coming next, which may bias the answer for the current question; the researcher cannot be sure who completed the survey; and the respondent can skip questions.

Online Surveys are the most cost effective and fastest method of getting questionnaires into the field. The concern when doing public opinion surveys is that the demographic profile of

[11] *A Selection from Survival Statistics*, David S. Walonick, 1997 – 2010, StatPac, Inc., 8609 Lyndale Ave. S. #209A, Bloomington, MN 55420

[12] As explained in businessdictionary.com, interviewer bias is a partiality towards a preconceived response based on the structure, phrasing, or tenor of the questions asked in the interviewing process.

Internet users does not represent the general population. Since a small group of professionals will be surveyed, this concern does not apply. Other positive features of online surveys are the ability to make them interactive and to show complex drawings, pictures or film.

5.1.1 Survey Steps

Good survey research depends on careful adherence to established scientific and procedural guidelines. All surveys will produce data. Whether the data is meaningful or not depends on careful design, execution, and analysis. For this reason, the use of a third party to design the survey and execute the data collection and analysis is recommended. A list of the steps in conducting a survey follows:

1. Determine design methodology (e.g., online survey)
2. Determine feasibility (e.g., timing, budget, sample availability)
3. Develop survey instruments (e.g., create a questionnaire)
4. Select sample (e.g., association databases, local associations)
5. Conduct pre-test
6. Revise questionnaire or collateral materials as needed
7. Collect data
8. Analyze data
9. Create report or summary

Many professionals conducting survey research for the first time underestimate the time required to complete a survey research project. The surveyor should allocate time accordingly.

5.1.2 Costs

Survey professionals have spent years learning to conduct valid and reliable survey research. The equipment and software to program questionnaires, administer the survey and analyze the data is expensive. In spite of this, survey research is the most cost effective way to collect information. If an expert witness is going to conduct a survey of local professionals to augment the expert's opinions, he or she may decide to hire a research professional. If so, some of the following cost factors will occur:

- Questionnaire design
- Sample preparation
- Preparation of email invitation
- Preparation of ancillary educational materials
- Programming questionnaire
- Hosting online questionnaire
- Follow-up with non-responders
- Incentives
- Analysis
- Report preparation
- Testifying in court, if required

5.2 QUESTIONNAIRE DESIGN

Most problems that arise in analyzing questionnaire data trace back to the design phase of the project. Defining the goals of the research is the best way to ensure good questionnaire design. In this context, the goal of the research is to determine if the actions taken by a professional in a particular situation meet the standard of care by finding out how other professionals would address the issues of a particular set of circumstances. Elements of good questionnaire design include:

- Commit the goals of your survey to writing
- Ask only questions that directly address the goals of the survey
- Avoid asking questions just because they would reveal information that would be "interesting to know."

The following sections will discuss accepted guidelines of survey design and implementation. Even though a very small sample will be surveyed, the questionnaire must follow accepted guidelines to be considered a valid measure of opinion.

5.2.1 The Invitation

The first thing to do is invite professionals to participate in the survey. The best way is to send an email to a sample of professionals. Lists can be obtained (with email addresses) from professional organizations. A member of a national, state or local professional organization can probably access the list for free. If not, lists can be purchased from list vendors.
The email should be personalized, should introduce whoever is conducting the survey, tell the respondent that a brief survey is being conducted, mention the incentive (if one is offered) and ask the respondent to participate.

The invitation should provide a link to the survey website and a password. Passwords are one-time-use passwords, so the respondent cannot share the link with others.

In designing a standard of care survey, one of the most important elements is the invitation. The invitation has to give enough information about what the survey is about to persuade the respondent to participate, but not so much information that the respondent is biased in any way.

The invitation is also the place to let the respondent know if there is a monetary or other incentive to participate in the survey. In a litigation context, it may be better to not offer a monetary incentive. Sharing the results of the survey with participants is a frequently used incentive.

If the survey is being conducted *before* a project has begun, as part of a professional's due diligence, the invitation can state just that. The following is an example:

> *Hello, I am Bob Smith, a structural engineer in Dallas, Texas. I have been asked to provide design consultation for a lightly loaded residential foundation project in Houston, Texas. Because I am not as familiar with soil conditions in the Houston*

area, I thought I would solicit some opinions from engineers more familiar with the Houston area.

I am proposing to design….

I would very much appreciate some input from you about the use of this method in the Houston area.

If you would like to participate, I am offering an honorarium as a way of saying thank you for your input.

If you would like to participate, please follow the instructions below. Your answers will be completely confidential. You may leave your name off the survey at the end if you would like, or if you don't mind if I call to discuss the project, include your name and phone number or e-mail address.

Thanks,
Bob Smith, PE

If a project has been completed and there is a question of whether or not the professional was negligent in the choice of methods or materials, the invitation becomes a bit more complicated. Here is a possible introduction:

I am Bob Smith, a consultant to engineering firms. A question has arisen about some of the methods utilized in a recent project in the Houston area.

I am conducting a brief survey of professionals who work in the Houston area to determine how they would approach some of the issues in this project.

This survey concerns foundation design for a multi-story office building in Houston, Texas.

The survey should take only about 10 minutes of your time and I am offering an honorarium for your time and input.

If you would like to participate, just follow the instructions below. Your answers to the survey will be held in strict confidence.

Respondents may remain completely anonymous if they like, or, if they would like to be available to answer other questions by phone or email, then they can provide that information.

Thanks,
Bob Smith, PE

The invitation is a chance to tell the respondent what is being done and why, and to ask the respondent to participate. It is not the place to tell respondents all about the project; that comes later.

It is important to be candid and truthful in the invitation and in the survey itself. It is likely that the professionals being surveyed will be familiar with at least some aspects of the project in question and any attempt at duplicity could result in bad data or a refusal to participate.

5.2.2 Screening the Respondent

It is important that the respondents in any standard of care survey have the necessary qualifications to provide opinions about the subject matter at hand.

The first approach to having qualified respondents is to screen respondents *before* inviting them to participate. Information from professional associations and licensing organizations is available for this purpose.

The investigating professional will have to decide what qualifies a surveyed professional to participate. Remember, the definition of standard of care requires that respondents be professionals of ordinary prudence and working in the same or similar circumstances. Screening questions would need to be designed accordingly.

At a minimum, the following should be determined for the respondent:

- The appropriate licensing or credentials
- Length of practice
- Experience with issue(s) covered in questionnaire
- Experience with specific circumstances of current subject matter

If a potential respondent does not meet the criteria to participate in the survey, it must be determined what to do with them. There are a couple of ways to handle respondents who are ‘screened out.’ One method is simply to ‘terminate’ them. If the screening questions determine that they are not qualified, they are ‘skipped’ to a screen that says, “Thank you for your time, those are all the questions we have.” Another method is to let the respondent complete the survey, but not save the data. This could be the preferred method for standard of care surveys with professionals as it ‘saves face’ by not telling the respondent that he is not qualified to give a professional opinion. It is easy to program the survey such that certain answers to screening questions trigger a code that the data will not be saved at the end of the survey.

Treat potential respondents in such a way that they are not ‘soured’ on the experience and will participate in future surveys for which they may be qualified.

5.2.3 The Introduction

The introduction usually comes after it has been determined that the respondent is qualified to participate. In some cases, the introduction may come before the screening questions. If it is important to determine whether or not the prospective respondent has enough experience with

a particular process to provide an opinion, the fact that the survey will talk about that process must be introduced. The following is an example of an introduction:

> *"This survey concerns foundation design for multi-story residential buildings in the Houston, Texas area. In particular, the survey will ask about the use of post-tensioned reinforcement. Even if you have not used that particular reinforcement method yourself, if you feel that you know enough about its use to provide an informed opinion, we would like to hear your thoughts."*

5.2.4 Educating the Respondent

This is an area where standard of care surveys differ from usual awareness and opinion surveys. In ordinary public opinion surveys, the respondent's opinions or knowledge about the issue being researched are formed by newspapers, television, the Internet, friends or other life experiences. In a standard of care survey, the factual information upon which the respondents offer an opinion must be supplied.

Think of this process like a jury trial in which jurors should not come in with an opinion already formed. Jurors should form an opinion based solely on the evidence presented.

The statement of facts (i.e., the circumstances) must be devoid of any editorializing that would bias the respondents for or against the professional or process in question. This section of the survey is one that the professional must be involved with preparing. This must be a concise enumeration of the facts. It should not involve any discussion of reasons for what was done, nor, if possible, any statements of what happened as a result of what was done.

Here are some examples of circumstances from actual negligence cases. These statements of fact are composed from case studies presented in *The Structural Engineer's Standard of Care*, Joshua B. Kardon, S.E., University of California, Berkeley, OED International Conference on Ethics in Engineering and Computer Science, March, 1999.

Case 1:

- A large condominium project was built in six phases, spread out over several years. For Phases 1 through 6, the soils engineer recommended the foundation be a drilled pier type, and that the piers be 4 feet deep.

- When construction of Phase 4 started, due to changes in local practices, the soils engineer recommended the pier depth be changed to 6 feet. The structural engineer adopted this revised recommendation for Phase 4.

- Later, during construction of Phases 5 and 6, the structural engineer specified 4 feet deep piers.

- All the buildings in all six phases were of the same design, based on the same soil conditions.

Notice that Case 1 does not mention that anything happened to any of the buildings, only that the structural engineer followed the revised pier depth for Phase 4, but reverted back to the earlier recommendation for Phases 5 and 6. The survey would only ask respondents what they would have done in these circumstances.

Case 2:

- A structural engineer provided design services to a subcontractor who was building a retaining wall for a developer.
- The subcontractor had selected a proprietary retaining wall system utilizing precast, prestressed concrete modules to be assembled into a crib wall and reinforced earth type retaining structure.
- The structural engineer had never designed such a wall before.
- The retaining wall system vendor provided sample calculations to the structural engineer as an example of how to design the wall.
- The structural engineer used the calculation method provided.
- Unknown to the vendor or the structural engineer, the method provided by the vendor included errors.
- After the wall was completed, during heavy rains, a portion of the wall failed.
- A renowned experienced forensic engineer who had designed and analyzed "thousands of these walls," and who had developed his own calculation method, described the structural engineer as negligent.

Case 2 is more difficult. The structural engineer admitted that he had not designed such a retaining wall before, so he used calculation methods supplied by the vendor of the materials. The calculation method contained an error unknown to the vendor or the engineer.

A portion of the wall failed. Later, a renowned forensic engineer claimed that the structural engineer was negligent. The forensic engineer based his opinion on calculation methods he had designed, and which showed that the wall would fail.

A survey in Case 2 would need to determine whether the renowned forensic engineer was applying too stringent of a standard. To do that, the survey would ask:

- If respondents have designed unfamiliar proprietary retaining wall systems for which they were provided formulas from the systems supplier;
- If respondents used the formulas provided by systems suppliers before;
- If respondents would have relied upon the above formulas in these circumstances;
- If respondents would have confirmed the accuracy of the supplied formulas under these circumstances.

5.2.5 Length of Survey

In general, the shorter the survey the better. Long, detailed surveys cause respondent fatigue and data quality begins to suffer. Long surveys also affect response rate, which is one of the most important factors in judging how much confidence can be placed in the data. If 15 surveys were sent out and 14 of the respondents participated, the associated confidence is much higher than if only 8 participated (leaving one to wonder what the other 7 would have said).

5.2.6 Instructions

With a paper survey it is important to include clear, concise instructions on how the respondent should navigate the survey. Alternatively, with an online survey, the programming navigates for the respondent.

5.2.7 Flow

In general, the flow of the questionnaire should follow the statements of fact to the extent that the statements of fact are part of the contentious issues. It is important that surveys do not jump around, but follow the statements of fact and move from earlier issues to later issues. This helps keep the respondent on task.

5.2.8 Question design

Gathering good data requires good questions. The following are some of the more important guidelines for writing good questions:

5.2.8.1 Avoid jargon, abbreviations and acronyms

It is important to use simple and direct language. It is best to avoid abbreviations, jargon and acronyms even if they are commonly used.

5.2.8.2 Use simple, direct language

Questions must be clearly understood by respondents. Do not use uncommon words or long sentences. Brief is better.

Make sure that each question is only one question. Even survey professionals are sometimes guilty of compound questions, such as:

Q. *Have you used this method for designing foundations, or would you use this method for this type of foundation.*

- o YES
- o NO

If the respondent answers “Yes,” we don’t know if they have used the method, or if they have not, but would use it. A good question asks for only one “bit” of information.

5.2.8.3 Do not ask leading questions

A leading question is one that implies a desired answer. Objectivity must be achieved in a survey and great care must be taken not to lead the respondent into giving an answer that the questioner would like to hear.

Examples of leading questions from the statements of fact above:

Q. Since the first 3 buildings used 4 feet piers without any problem, don't you think that using 4 feet piers on buildings 5 and 6 would not be a problem?

Q. If the formula supplied by the manufacturer (even with an error) resulted in a wall that met code, don't you think that using the formulas would be acceptable?

5.2.8.4 Don't Know/Undecided Responses

In a standard of care survey, there may be instances where the respondents do not have an opinion about a particular issue, or don't have enough information to form one. A response should be included that allows the respondent to 'opt out' of answering because online surveys will not allow respondents to skip questions as paper surveys do. In the case of the retaining wall case study (Case 2), if the question was:

Q. *"Do you know any engineers who use formulas supplied by manufacturers?"*
- YES
- NO

A respondent may not know the answer to this question, so the questioner should supply a DON'T KNOW answer.

5.2.8.5 Wording

The wording of a question is extremely important. The questioner is striving for objectivity and must be very careful not to use words that are ambiguous.

Investigators have looked into the effects of modifying adjectives and adverbs like:
- Usually
- Often
- Sometimes
- Occasionally
- Seldom
- Rarely

Although these are 'often' used in surveys, it is clear that they do not mean the same thing to all people.

The following adjectives have highly variable meanings and should be avoided in any survey:
- Most

- Numerous
- A substantial majority
- A large proportion of…
- A significant number of…
- A considerable number of…
- Several

The following adjectives generally have more shared meaning and produce less variability in responding:

- Lots
- Almost all
- Nearly all
- A majority of
- A small number of
- Not very many
- Almost none
- A couple
- A few

5.2.9 Pretest

The final test of a survey is to try it on representatives of the target audience. If possible, be present while a respondent is completing the survey and tell the respondent it is ok to ask questions for clarification, or comment on confusing items. The questions must have no ambiguity, because once the survey is in the field it is too late to correct it.

5.3 SAMPLING

Most public opinion, product awareness and usage, political polling and other marketing research quantitative survey studies use large samples of 500 – 2000 randomly selected households. That is because the researcher wants statistically reliable data. The level of significance most people are familiar with is ± 5% at a 95% level of confidence. For example, if 60% of a large sample says they are going to vote for a particular candidate in an upcoming election, then it is 95% certain that the true figure for the entire population is between 55% and 65% (if the sample is large enough).

In standard of care surveys there will be a much smaller sample because there is not as large a universe of potential participants, and because the definition says… “professionals of similar training, working in the same area.”

5.4 ANONYMITY

There is a large body of evidence that anonymity increases participation in surveys. If the respondents are assured that the opinions they give will be held in complete confidence and that their name or data cannot be subpoenaed, the questioner is in a better position to increase participation rates and collect better data. However, a countervailing concern is that a court may not permit a professional to testify about a standard of care when that professional is

relying on a survey conducted under anonymity. The issue should probably be discussed with a party's legal counsel to ensure that an appropriate balance is struck.

5.5 ANALYSIS OF RESULTS

In most research involving survey research methods, the goal is to project the results from a smaller sample of respondents to a larger universe. This would be the case in a political poll in which the voting preference of the sample surveyed would be projected to a much larger population (i.e., all voters).

In the standard of care survey, the goal is to determine what a sample of "professionals of ordinary prudence would do in same or similar circumstances" in order to augment the professional opinion of one or more expert witnesses. If the survey results show that in addition to the expert witness's opinion about the actions of the professional being charged with negligence, a random sample of professional engineers working in the same geographic location also use the same methods, it would go a long way toward showing that the professional charged with negligence was in fact "using that degree of care that a professional of ordinary prudence would use under the same or similar circumstances."

In many instances, an engineer or other construction professional will find that there is a single standard of care to be applied in a given situation. However, it is not always the case that a single standard applies. If the hypothetical "professional of ordinary prudence who is exercising ordinary care" could discharge his duty by performing a task in multiple ways, then there would be multiple standards of care applicable to that particular situation. This simply acknowledges the fact that at times there can be very different yet equally valid ways of designing or building a structure. In such a situation, so long as the professional faithfully executes one of the optional methods, there would not be a legal breach of the applicable standard of care, despite the existence of a separate (and equally valid) methodology that could have been employed.

The next section will provide two examples of surveys designed around a set of "not so hypothetical" circumstances.

6.0 EXAMPLES

The following examples are intended to illustrate the use of a survey in determining the standard of care.

6.1 EXAMPLE #1

Following are the circumstances of a negligence case in which the walls of a residence cracked within 6 years of the date of substantial completion. The owner of the residence contended that the failure was due to improper foundation design. Specifically, the owner complained that builder's piers were not structurally connected to the foundation, but should have been, given the existence of void spaces only under the slab.

6.1.1 Objective of Questionnaire

Determine whether or not in 2005, in Houston, Texas, an engineer of ordinary prudence would structurally connect grade beams to builder's piers when there are void spaces only under the slab and (if so) determine how they would have been connected.

6.1.2 Establish Qualifications

The individual being surveyed should hold the same professional license or registration as the defendant and should be knowledgeable in the area of practice of the defendant and offer opinions based on the person's knowledge, skill, experience, education, training, and practice.

6.1.3 Invitation

An invitation would be sent to a sample of structural engineers in the Houston area. Here is an example of a possible invitation:

> *I am Sam Smith, a consultant to engineering firms. A question has arisen about some of the methods utilized in a project in the Houston area.*
>
> *I am conducting a brief survey of professionals who work in the Houston area to determine how they would approach some of the issues in this project.*
>
> *This survey concerns foundation design for a residential building in Houston, Texas.*
>
> *The survey should take only about 10 minutes of your time and I am offering to share the results of the survey with the professionals who participate.*
>
> *If you would like a copy of the results, please provide full contact information.*
>
> *Sincerely,*
> *Sam Smith, P.E.*

6.1.4 Questionnaire for Example #1

Thank you for agreeing to participate in this survey.

To begin, we have a few questions about your training and experience:

1. Were you a licensed professional engineer in Texas in 2005?
   - o YES {Continue}
   - o NO {Terminate}

2. Do you currently engineer foundations for one or two family residential structures?
   - o YES {Continue}
   - o NO {Continue}

3. Did you engineer residential foundations in Houston, Texas, during the years 2004 through 2006?
   - o YES {Go to Question 5}
   - o NO {Go to Question 4}

4. Were you qualified to design residential foundations in Houston, Texas, during the years 2004 through 2006?
   - o YES {Continue}
   - o NO {Terminate}

5. Were some of the residential foundations you engineered on soil with a plasticity index greater than or equal to the mid 30's or on soil with a potential vertical rise greater than or equal to 2 inches?
   - o YES {Continue}
   - o NO {Terminate}

The subject of this survey is tying grade beams to piers. The particular circumstances of this survey are:

- Residential building in Houston, Texas
- Time frame is 2005
- Stiffened slab on ground foundation with drilled concrete piers
- Soils have an effective plasticity index of 35
- Potential Vertical Movement of the soil is 2 inches
- There were no void spaces under the grade beams
- There were void spaces under the slab

6. In these circumstances, would you structurally connect the grade beams to the piers?
   - o YES {Continue}
   - o NO {Skip to question 8}
   - o NEED ADDITIONAL INFORMATION - SPECIFY {THEN TERMINATE}

7. How would you structurally connect the grade beams to the piers?

- Extend the pier shaft rebar into the grade beam a short distance (i.e. 6 inches) specifying the rebar to be vertical and to be either smooth dowels or sleeved rebar such that the grade beam can later lift off the pier shaft but cannot move laterally with respect to the pier.
- Extend the pier shaft rebar into the grade beam at an unspecified length that may be installed less than required for minimum development length in ACI-318.
- Extend the pier steel into the grade beam specifying that it be bent 90 degrees to resist uplift.
- Extend the pier shaft rebar vertically into the grade beam sufficient to meet the minimum development length specified in ACI-318.
- Provide threaded rod dowels at the top of the pier shaft that can later be extended with more threaded rod length with anchor plates when the grade beam steel is being erected.
- Other (Please specify).

8. That completes the survey. Thank you for your participation. If you would like to receive a copy of the results of this survey, please provide your contact information in the space provided.

6.2 EXAMPLE #2

Following are the circumstances of a negligence case in which the walls of a residence in Houston, Texas, cracked within 6 years of the date of substantial completion. The owner of the residence contended that the failure was due to improper foundation design. Specifically, the owner complained that there should have been a void space under the grade beams in 2004.

6.2.1 Objective of Questionnaire

Determine whether or not in 2004, in Houston, Texas, an engineer of ordinary prudence would use void spaces under the grade beams for a stiffened concrete foundation whose grade beams are supported on deep foundations elements and whose slab is structurally isolated from the soil.

6.2.2 Establish Qualifications

The individual being surveyed should hold the same professional license or registration as the defendant, be knowledgeable in the area of practice of the defendant, and offer testimony based on the person’s knowledge, skill, experience, education, training, and practice.

6.2.3 Invitation

An invitation would be sent to a sample of structural engineers in the Houston area. Here is an example of a possible invitation:

> *I am Sam Smith, a consultant to engineering firms. A question has arisen about some of the methods utilized in a project in the Houston area.*

I am conducting a brief survey of professionals who work in the Houston area to determine how they would approach some of the issues in this project.

This survey concerns foundation design for a residential building in Houston, Texas.

The survey should take only about 10 minutes of your time and I am offering to share the results of the survey with the professionals who participate.

If you would like a copy of the results, please provide full contact information.

Sincerely,
Sam Smith, P.E.

6.2.4 Questionnaire for Example #2

Thank you for agreeing to participate in this survey.

To begin, we have a few questions about your training and experience:

1. Were you a licensed professional engineer in Texas in 2004?
   - o YES {Continue}
   - o NO {Terminate}

2. Do you currently engineer foundations for one or two family residential structures?
   - o YES {Continue}
   - o NO {Terminate}

3. Did you engineer residential foundations in Houston, Texas, at any time during 2003 to 2005?
   - o YES {Continue}
   - o NO {Terminate}

4. Were some of the residential foundations you engineered on soil with a plasticity index greater than or equal to the mid 30's or on soil with a potential vertical rise greater than or equal to 2 inches?
   - o YES {Continue}
   - o NO {Terminate}

The subject of this survey is whether or not to use a void space under the grade beams for a stiffened concrete foundation whose grade beams are supported on deep foundations elements and whose slab is a structural slab, i.e., it is cast on a void space system and is designed to span between and be fully supported by the grade beams.

The particular circumstances of this survey are:

- Residential building in Houston, Texas
- Time frame is 2004
- Grade beams supported by drilled concrete piers

- Soils have an effective plasticity index greater than 35
- Potential Vertical Movement of the soil is greater than 2 inches
- The concrete slab is separated from the expansive clay soils by a void space

5. With these circumstances, in the 2004 time frame, would your design for the foundation have provided a void space beneath the grade beams?

- o YES {Continue}
- o NO {Continue}
- o NEED ADDITIONAL INFORMATION - SPECIFY {THEN TERMINATE}

6. That completes the survey. Thank you for your participation. That is all the questions. If you would like to receive a copy of the results of this survey, please provide your contact information in the space provided.

7.0 SURVEY LEVELS

The use of survey methods to determine how a "professional of ordinary prudence" would handle a particular situation can vary from a very informal, “check with a couple of colleagues,” to a professionally executed formal survey to prepare for litigation. For ease of reference, those levels have been labeled Levels A, B, and C. If performed correctly, the results of the higher levels are more reliable.

Level A – This is the lowest level of inquiry. It can be used as part of a due diligence inquiry prior to beginning a project to find out how other professionals in the area are addressing the relevant issue(s). This can be an oral or written survey using a sample size as small as three or four professionals. If the results are not sufficiently conclusive, then use a larger sample. If an oral survey is used, it is recommended that the results be documented. This level of inquiry is probably not sufficient for use in litigation.

Level B – A written survey, not prepared or conducted by a professional research consultant, employing a larger sample than Level A and which may include a more comprehensive inquiry than Level A. The Level B survey can be used to clarify inconclusive or conflicting results of a Level A survey. An appropriately designed Level B survey may be sufficient for use in a litigation context.

Level C – A written survey generally prepared by and/or conducted by a professional research consultant. Due to the added time and expense, a Level C survey may only be cost justified for use in litigation or other high-profile situations.