

0-4997-P2

USER GUIDE FOR THE DECISION SUPPORT TOOL FOR COMBINED TRANSPORTATION AND UTILITY CONSTRUCTION STRATEGY

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Project 0-4997: Effectiveness of Combined Utility Relocation/Highway Construction Projects

AUGUST 2006

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Performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration.

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1. Overview of the CTUC Decision Support Tool

1.1 Introduction

This document is the user's guide for the Decision Support Tool (DST) developed to help officials in the Texas Department of Transportation (TxDOT) decide when the Combined Transportation and Utility Construction (CTUC) approach should be pursued. By definition, the CTUC approach makes the highway contractor responsible for the bulk of the construction of major utility-related appurtenances, such as underground duct banks, vaults, manholes, sanitary sewers, or poles (O'Connor et al. 2004). Recent research studies have indicated that the CTUC approach might be an effective remedy for utility adjustment delays (GAO 1999) (AASHTO 2004) (Ellis et al. 2003); however, CTUC challenges such as utility service reliability, utility adjustment quality, and how to best sell to reluctant utility owners usually frustrate TxDOT decision-makers as to when to apply the CTUC approach. Thus, this tool, developed using Microsoft® Visual Basic for Application (VBA) and Microsoft® Excel, aims to create an interactive decision support environment so that not only TxDOT decision-makers, but also utility representatives can easily enter analysis data of their utility adjustments into CTUC DST. CTUC DST can then feed back the corresponding opinions from both TxDOT and the utility industry experts, who have extensive experience in managing utility adjustments, in order to facilitate communication and coordination between both parties.

1.2 CTUC Decision-Making Process

Establishing the CTUC decision-making process was the first step in developing a beneficial decision support tool. Figure 1.1 shows the proposed CTUC decision-making process (O'Connor et al 2005). Each rectangle represents an activity and contains a description of that activity. The bottom portion of the rectangle indicates which party is responsible for each activity (i.e. utility owner or TxDOT). The two actual meetings to be held for CTUC decision-making purposes (Activities #1 and #4) are indicated with bolded rectangles.

The proposed CTUC decision-making process was designed to be implemented as early in the project as possible, but it cannot begin until the necessary information on project parameters, constraints, etc. are available. Consequently, Activity #1 of the process, CTUC Phase 1 Analysis, is scheduled to occur at approximately 0 percent Plan, Specification, and Estimate (PS&E). At this point on the project timeline, it is generally assumed that TxDOT will have a rough idea of which utilities will require adjustments, the approximate level of complexity, etc. CTUC Phase 1 Analysis is performed by TxDOT alone. The goal of this analysis is for TxDOT to use CTUC DST to separate utilities that are definitely not suitable for the CTUC approach from those which may be appropriate for it.



Figure 1.1 Proposed CTUC Decision-Making Process

Following CTUC Phase 1 Analysis, those utilities deemed *not suitable* for the CTUC approach are then adjusted by the conventional method (Activity #2). Those utilities that *may be suitable* for the CTUC approach are invited (Activity #3) to CTUC Phase 2 Analysis (Activity #4), at which time both TxDOT decision-makers and the utility representatives are expected to negotiate with each other about the applicability of the CTUC approach.

CTUC Phase 2 Analysis is performed as a combined effort by TxDOT decision-makers and the utility representatives, at approximately 30 percent PS&E. This analysis activity is performed during a meeting in which both the utility representatives and TxDOT staff provide information as prompted by CTUC DST. As indicated by the name, this phase requires more comprehensive information input from the stakeholders than in the previous phase and is thereby able to produce more thorough results. Once CTUC DST has gathered the necessary information from each party, it will provide outputs to guide each utility adjustment, recommending whether the CTUC approach would be beneficial for the given adjustment.

Following CTUC Phase 2 Analysis, Activity 5 requires each utility representative to meet individually with TxDOT to review CTUC analysis results and negotiate. This activity provides the utility and TxDOT the opportunity to discuss potential project-specific challenges that can be met through effective coordination, as well as rectify possible concerns associated with the CTUC approach and give participants the chance to consider procedural changes that could result in a more effective adjustment process. The ideal result of Activity #5 would be either a CTUC agreement between TxDOT and the utility owner, or a decision for the utility to perform the conventional adjustment approach (Activity #7). The actual CTUC decision is made during Activity #6.

Once the utility owner and TxDOT are able to establish a CTUC agreement that pleases both parties, Activities #8 and #9 are executed. These activities simply make the acceptance of the CTUC agreement official and initiate the inclusion of the utility adjustment scope in the final PS&E.

In sum, CTUC DST is designed to provide assistance in CTUC Phase 1 and Phase 2 Analyses. In Chapter 2, the instructions of each step provided by CTUC DST for Phase 1 Analysis will be detailed. Chapter 3 will focus on CTUC Phase 2 Analysis from a utility assessor's perspective, while Chapter 4 will explain how to complete CTUC Phase 2 Analysis from a TxDOT assessor's perspective.

1.3 CTUC Knowledge Base Sources

Six CTUC decision drivers assessment workshops were conducted in TxDOT San Antonio, Houston, and Dallas districts to establish the CTUC knowledge base. Three of the six workshops were conducted to invite TxDOT experts knowledgeable about the CTUC approach, and twenty-eight TxDOT experts with an average of 13.8 years of work experience attended. The other three workshops were conducted to invite utility experts knowledgeable about the CTUC approach, and twenty-four utility experts with an average of 12.1 years of work experience representing water, wastewater, communication, power, and gas types of utilities attended. In addition, the following evaluative scheme was used to obtain the numeric value of each decision driver's impact level:

- Use "-4" to represent "Show-Stopper"
- Use "-3" to represent "Anti-CTUC and high impact"

- Use "-2" to represent "Anti-CTUC and medium impact"
- Use "-1" to represent "Anti-CTUC and low impact"
- Use "0" to represent "Neutral"
- Use "1" to represent "Pro-CTUC and low impact"
- Use "2" to represent "Pro-CTUC and medium impact"
- Use "3" to represent "Pro-CTUC and high impact"
- \Box Do not include the experts who chose "Impact Level = Don't Know"

The complete comparison tables of both parties' assessment results will be published in the research final report. Basically, between the two parties' assessments, only one decision driver was found to have significantly different impact levels – the consideration of handling hazardous materials. Labeled "HAZMAT" on the questionnaire, the issue is whether hazardous materials-related work only applies to the utility adjustment work. This difference is understandable since hazardous materials are extremely difficult to handle, and utility owners would want to use the CTUC approach because it will be the highway contractor's responsibility to handle hazardous materials. On the other hand, TxDOT would naturally want to exclude this difficult work from the contract. Thus, the average impact level of HAZMAT from TxDOT experts' perspective is -2.93, while the average impact level of HAZMAT from all utility experts' perspective is +1.9.

1.4 System Requirements

The following system requirements are recommended for operating CTUC DST:

- 1) Operating System: Microsoft Windows 98, Me, 2000, XP, or 2003. Windows XP or 2003 recommended.
- 2) Microsoft Excel Version: Microsoft Excel 2000 or higher. Microsoft Excel 2003 recommended.

1.5 Installation and Setup

The complete tool is provided on CDROM as an EXCEL file, "CTUCDST.xls." Please copy "CTUCDST.xls" to your local hard disk. Prior to use of CTUC DST, Excel macro security levels must be set to medium or the tool will not run. To accomplish this, go to the "Tool" menu then scroll down to "Macro" and then over to "Security." Once the security dialog box will open, choose the "Security Level" tab. Within this box, select the "Medium" level radio button. Each time CTUC DST is deployed to a new computer environment, this macro security level must be maintained. On subsequent uses of the tool, the "Enable Macros" dialog box will automatically appear when the tool is opened; press the "Enable Macros" button at the beginning of each session.

2. CTUC Phase 1 Analysis

2.1 Overview of CTUC Phase 1 Analysis

This chapter describes use of CTUC DST for performing CTUC Phase 1 Analysis, a part of the process geared primarily for TxDOT assessors. Step-by-step instructions are given, and all the steps are illustrated in Figure 2.1. The first step involves either creating a new project or retrieving previous CTUC analysis records (explained further in Section 2.2). Then, CTUC DST will guide the assessor to the configuration form for all utility adjustments involved in the highway project (explained further in Section 2.3). After completing these project information forms, the assessor will be asked a series of yes/no questions concerning project-specific issues and characteristics (explained further in Section 2.4). In Step 4, the assessor will first specify the knowledge base source, and CTUC DST will then show the graphical analysis results. The assessor will see expert opinions regarding the applicability of CTUC for the selected utility adjustment in a series of bar charts (explained further in Section 2.5). In Step 5, CTUC DST will show the text report listing all decision drivers ranked according to their impact levels (explained further in Section 2.6). Finally, as mentioned in Section 1.2, the assessor will need to specify which utilities are to be analyzed further in CTUC Phase 2 Analysis (explained further in Section 2.7).



Figure 2.1 Steps of CTUC Phase 1 Analysis

2.2 Creating/Retrieving a CTUC Phase 1 Analysis

Once CTUC DST is opened, the computer will display the front page, as shown in Figure 2.2. On this page, the assessor can press the "Start CTUC Analysis" button if this is the first time he or she performs CTUC Phase 1 Analysis for the project. Creating a new CTUC analysis will be discussed in Section 2.2.1.



Figure 2.2 The Front Page of CTUC DST

However, if the project has been analyzed before, the assessor can press the "View Previous CTUC Analysis" button to retrieve one of the previous analysis records. The assessor can press the "About This Research" button to see the background information of this research project. The "About CTUC Decision-Making Process" button is linked to the CTUC decisionmaking process diagram. By clicking the "View User Guide" button, the assessor can see this manual, and the "Exit" button closes the tool.

For example, an assessor who has finished CTUC Phase 1 Analysis for the project at 0 percent PS&E may want to perform CTUC Phase 2 Analysis at 30 percent PS&E. Or an assessor who has finished CTUC Phase 1 Analysis at 0 percent PS&E may want to perform CTUC Phase 1 Analysis again for the same project at 15 percent PS&E. As long as the assessor wants to review previous CTUC analysis records, CTUC DST will ask the assessor to pick the TxDOT district and the project (discussed further in Section 2.2.2). Then, CTUC DST will ask the

assessor to pick one of these previous analysis records in order to review the real analysis data the assessor had entered before (discussed further in Section 2.2.3).

2.2.1 Start a New CTUC Phase 1 Analysis

Pressing the "Start CTUC Analysis" button will prompt CTUC DST to display a form for the project and assessor information. As shown in Figure 2.3, there are three information blocks within the form. The first two blocks are straightforward. In the combo box labeled "1.1 Your TxDOT District," the assessor can click the drop-down arrow to show a list of all TxDOT districts and then select the district by clicking its name. The assessor can also find the TxDOT district of interest by typing in the first letter of the district's name and allowing the computer to pull up the district name(s) that begin with that letter. After answering Question 1.1, the assessor will see all area offices' names shown inside the next combo box labeled "1.2 Your TxDOT Area Office." The assessor then simply picks the area office in which the project is located. If the project belongs to two or more area offices, or if the area office is unknown, the assessor can select the last item in the combo box and enter the area office information in the text box below.

Phase 1 Analysis: New TxDOT Highway Project and	Assessor Information - CTUC Decision Support Tool	X
New TxDOT Highway Project and As	sessor Information	
1. Project Information 1.1 Your TxDOT District:	San Antonio	
1.2 Your TxDOT Area Office:	Bexar 410	
1.3 Highway Project Name:	IH 410 a	
1.4 Highway Construction CSJ:	1234 - 56 - 789	
1.5 Highway ROW CSJ:	9876 - 54 - 321	
2. Assessor Information		
2.1 Name of Individual Completing This Form:	Mike Test	
2.2 Date Completed:	2006 💌 July 💌 14 💌 12:00 AM 💌	Now
2.3 Your Job Title:	Test Engineer	
2.4 Your Phone Number:	512 - 471 - 8417	
2.5 Your Email Address:	test@test.com	
3.1 Would you like to create a password to restrict unauthorized access to your analysis records?		
3.2 Password:	***	
3.3 Confirm New Password:	***	
Next Page: Project	: Configuration of All Utility Adjustments	Save & Exit

Figure 2.3 New Project and Assessor Information Form

The remaining text boxes in the first two blocks are easy to fill. Note that when the assessor enters numbers in the text boxes labeled "1.4 Highway Construction CSJ," "1.5 Highway ROW CSJ" and "2.4 Your Phone Number," the digit sequences the assessor can type in

each one are constrained by their respective formats. In addition, the assessor can press the "Now" button to automatically enter the current system date and time into Question 2.2.

Questions 3.1 to 3.3 are about whether to create a password to protect the analysis data. Assessors can select "No" in Question 3.1 to avoid the login process in the future. The assessor can select "Yes" in Question 3.1 and enter a password in Questions 3.2 and 3.3 to prevent unauthorized access to the analysis data.

Finally, assessors can press the "Next Page: Project Configuration of All Utility Adjustments" button to save the newly created data and go to the next step, which will be described in Section 2.3.

2.2.2 Retrieve a Previous CTUC Phase 1 Analysis: Select a District and a Project

If the "View Previous CTUC Analysis" button is pressed, shown in Figure 2.2, CTUC DST will ask the assessor to select a TxDOT district, as shown in Figure 2.4. After selecting the district, the assessor can press the "OK" button to see the list of all projects in the district, as shown in Figure 2.5. There are two list-boxes in Figure 2.5. The list-box on the left displays all projects CTUC DST has recorded in this TxDOT district. The list-box on the right is for utility assessors and will be discussed in Chapter 3.

ipport Tool 🛛 🔀
trict:
<u>•</u>
Cancel

Figure 2.4 Select a TxDOT District

Figure 2.5 shows how six columns are presented in the left hand list-box: 1) Highway Project Name and Its CCSJ; 2) Area Office; 3) CTUC Phase; 4) Password Needed?; 5) Last Assessor; and 6) Assessment Date. The assessor can either select any line item and press the "Login as a TxDOT User" button or simply double-click the line item in order to retrieve the project analysis data. Note that if a project needs password protection, CTUC DST will show "Yes" in the "Password Needed?" column for this project and will prompt the assessor to enter the password in a dialog box, as shown in Figure 2.6. If the password the assessor enters is correct, CTUC DST will then proceed to process future assessors' requests.

• For Demonstration Purposes

Because CTUC DST is equipped with some sample data, the essential steps of this section's functions will be explained here for demonstration purposes.

1) After pressing the "View Previous CTUC Analysis" button shown in Figure 2.2, assessors will see the page shown in Figure 2.4.

- 2) Assessors can select the "San Antonio District" shown in Figure 2.4 to see two projects in the left list-box shown in Figure 2.5.
- *3)* Assessors can select the first line item, the project name of which is "IH 410 A," to go through the login process (see Figure 2.6).
- 4) Assessors can enter "abc" as the password to go to the step described in the next section.
- 5) Assessors can also select the second line item, the project name of which is "IH 10," to go to the next step without experiencing the login process.

List of All Highway Projects and	Utility Adjustments i	n This District	- CTUC Decision	Support T	ool			
List of All Highway Projects and Utility Adjustments in the <u>TxDOT San Antonio District</u>								
1. Highway Projects in This Distr	ict:				2. Utility Ad	justments in the 9	Selected Highway Proje	ect:
Highway Project Name (CCSJ)	Area Office	CTUC Phase	Password Needed?	Last A Micho	Utility Adjus	stment Name	Utility Type Pas	sword Needed
I-10 (1234-56-789)	Bexar Metro	Phase 2 Phase 2	No	John '				
1					1			•
Previous Page	2		Login as a TxDOT	User		Lo	gin as a Utility User	

Figure 2.5 List of All Projects within the TxDOT District

Login - CTUC Decision	Support Tool	X
Password:		-
Login	Cancel	1

Figure 2.6 Login Form for a Project with Password Protection

2.2.3 Retrieve a Previous CTUC Phase 1 Analysis: Select an Analysis Record

Since one project may have been analyzed many times, this section will describe the form layout and the actions required to retrieve one of the previously entered CTUC analysis records. After the assessor enters the correct password for the project or the assessor selects a project that does not require a password, CTUC DST will show the list of all previously entered analysis records for this project, as shown in Figure 2.7.

History of CTUC Analysis Records - CTUC	Decision Support Tool		X
History of CTUC Analysis Reco	rds		
1. Basic Project Information			
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789	1.5 Current CTUC Ana	ysis Phase: Phase 2 Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321	1.6 Number of Utility Adjustments Involved in T	his Project: 3
1.3 Highway Project Name:	IH 410 A		
1.4 TxDOT District:	San Antonio (Bexar 410)		
Please Select One of the Follow	ing Analysis Records to Co	ntinue:	
2. Previous CTUC Analysis Records for This Highw	vay Project:		
Date Completed	Assessor's Name	CTUC Phase of This Analysis	Number of Questions Answered
7/8/2006 3:0:0 PM 7/10/2006 2:0:0 PM	Michael Test Michael Test	Phase 1 Phase 2	150 229
4			>
Previous Page	Retrieve This Analysis	New Analysis	Delete This Analysis
		·	

Figure 2.7 History of Previous CTUC Analysis Records

Figure 2.7 shows six unchangeable project information fields and one list-box of all analysis records within the project. In CTUC DST, all information fields that are unchangeable are highlighted in yellow. These fields can remind assessors of the data they have entered for the current project. The list-box on the bottom half of the page shows four columns associated with each analysis record: 1) Date Completed; 2) Assessor's Name; 3) CTUC Phase of This Analysis; and 4) Number of Questions Answered. The first two columns provide basic information from each analysis, and the contents can be changed via the "Project and Assessor Information" form discussed at the end of this section. The third column provides the current CTUC phase of each analysis, and the value will be "Phase 1" or "Phase 2." Note that the information field labeled "1.5 Current CTUC Analysis Phase" in Figure 2.7 means the current CTUC phase of *the project*, and this field will be changed from "Phase 1" to "Phase 2" whenever a new CTUC Phase 2 Analysis record is created. The final column reflects how many questions the assessor has answered.

Four buttons are shown at the bottom of the page shown in Figure 2.7 that help the assessor navigate to the either previous or the next page. If the assessor selects an analysis record

in the list-box and presses the "Retrieve This Analysis" button, or if the assessor double-clicks any analysis record, CTUC DST will show the project and assessor information form of the selected analysis record (see Figure 2.8). If the assessor selects an analysis record and presses the "New Analysis" button, CTUC DST will copy all the internal data from the selected analysis record onto a new CTUC analysis form. The assessor can thus begin a new CTUC analysis (either Phase 1 or Phase 2) based on previously entered work. If the assessor only presses the "New Analysis" button without selecting any analysis record, a blank form will be created. Finally, if the assessor selects an analysis record and presses the "Delete This Analysis" button, CTUC DST will delete all data associated with this analysis record.

Figure 2.8 shows the "Project and Assessor Information" form and is similar to the form in Figure 2.3. The assessor can change the name of the project, CCSJ, ROWCSJ, etc. Only the project's TxDOT district and area office cannot be changed. In other words, the assessor must select the correct district and area office whenever a new project is created.

• For Demonstration Purposes

- 1) Assume assessors selects "IH 410 A" as the project in the previous section, as Figure 2.7 shows.
- 2) Assessors can double-click the first line item, which is for CTUC Phase 1 Analysis, to retrieve the analysis data as shown in Figure 2.8.
- 3) Assessors can fill out all questions and press the "Next Page: Project Configuration of All Utility Adjustments" button to save the data and to proceed to the page described in the next section.

TxDOT Highway Project and Assessor Information - CTUC De	cision Support Tool	X
TxDOT Highway Project and Assessor Inform	ation	
1. Project Information 1.1 Your TYDOT District:		
1.2 Your TyDOT Area Office:	San Antonio	
1.2 Highway Breist Name	Bexar 410	
1.5 Highway Project Name.		
1.4 Highway Construction CSJ:	1234 - 56 - 789	
1.5 Highway ROW CSJ:	9876 - 54 - 321	
2. Assessor Information		
2.1 Name of Individual Completing This Form:	Michael Test	
2.2 Date Completed:	2006 • July • 8 • 03:00 PM	▼ Now
2.3 Your Job Title:	Test Engineer	
2.4 Your Phone Number:	512 - 471 - 8417	
2.5 Your Email Address:	mike@test.com	
		1
3.1 Would you like to create a password to restrict unauthorized access to your analysis records?	Yes Password: *** Change C No	
Previous Page: History of CTUC Analysis Records	Next Page: Project Configuration of All Utility Adjustments	Save & Exit

Figure 2.8 TxDOT Highway Project and Assessor Information

2.3 Setting Up Utility Adjustments for the Project

Before performing any CTUC analysis, the assessor needs to set up the configuration of all utility adjustments involved in the project. Figure 2.9 shows the steps required to set up the configuration of utility adjustments. Basically, the assessor needs to create one utility adjustment at a time and then add it to the project. Sections 2.3.1 to 2.3.3 will describe in detail the steps of the process, and will provide procedural descriptions for setting up the configuration for a sample project.



Figure 2.9 Steps to Set Up the Configuration of Utility Adjustments

2.3.1 DST Shows Project Information and Types of Adjustment Work

After the assessor fills out the form for project and assessor information (see Figure 2.8), CTUC DST will show the configuration form (see Figure 2.10). There are three major blocks on this form. The first block, labeled "1. Basic Project Information," lists key information for the project and the assessor. The information fields in this block are fixed because the assessor will have already specified both the project and the CTUC analysis record. The second block, labeled "2. Please Input Information of the Utility Adjustment," provides a place for assessors to enter the principal information of a utility adjustment. Note that when the form first appears, most fields are empty except the list-box labeled "2.6 Please Select the Types of Utility Adjustment Work." This box shows all possible types of utility adjustment work to be selected by the assessor later in the process. The third block, labeled "3. List of All Utilities within the Limits of the Project," shows the current list of all utilities within the limits of the project. If the project is newly created, there will be no data in this list-box; however, if the project has been analyzed before, there must be at least one utility adjustment record shown here.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) Assessors can scroll up or down to view all possible types of adjustment work in the list-box 2.6.
- 2) If assessors select the sample project, "IH 410 A" in the previous step, there will be three utility adjustments shown in the third block of questions.

2.3.2 Assessor Enters Utility Adjustment Data

After Figure 2.10 is shown, the assessor can begin to enter information on only one utility adjustment at a time. Basically, creating a utility adjustment requires that the second block's six information fields all be filled:

2.1 Utility Adjustment Name

The name of the utility adjustment should be entered in this field. In addition to the name of the utility facility, including the *range* or *station* information in this field is recommended. This field is required for each utility adjustment and cannot be modified once created.

2.2 Subject Utility Number

The utility number of the utility adjustment should be entered in this field. This field is optional for each utility adjustment.

2.3 Is the utility a Local Public Agency (LPA)?

If the utility is a LPA, the assessor can check the box and the text next to the checkbox will change the default "No" value to "Yes."

2.4 Is the eligibility ratio of this utility adjustment 100 percent or nearly 100 percent?

A "nearly 100 percent" reimbursable utility adjustment means the costs the utility owner should pay is not a factor that will influence the CTUC decision. The assessor should select one of the three options in the CTUC Phase 1 Analysis, which are "Yes," "No," and "Don't know." The "Don't know" option will be meaningless and disappear in the CTUC Phase 2 Analysis because the decision-makers should already know the eligibility ratio of the utility adjustment before negotiating the CTUC decision in CTUC Phase 2 Analysis. This field is *required* for each utility adjustment.

2.5 Description

This field is optional and supplements the description of each utility adjustment.

2.6 Please Select the Types of Utility Adjustment Work

If a utility adjustment includes one or more types of adjustment work, this list-box can help assessors accurately record such information. Eighteen types of adjustment work are listed here and originate from the TxDOT Utility Database. Selecting at least one type of adjustment work in this list-box is *required* for each utility adjustment.

Project Configuration of All Utility Adjustmen	ts - CTUC Decision	Support Tool			×
Project Configuration of All Utility	Adjustments				
- 1. Basic Project Information					
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 Current CTUC Analysis Phase:	Phase 1	Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		1.6 Assessor's Name:	Minh and Tank	
1.3 Highway Project Name:	IH 410 A			Michael Tesc	
1.4 TxDOT District:	San Antonio (Bexar 4	10)	1.7 Date Completed	7/17/2006 1:0:0 AM	
2. Please input information of the Utility Adju	<u>scment:</u>	3. LIST O	ALL UTILITIES WITHIN T	HE LIMITS OF THE	= PROJECT:
2.1 Utility Adjustment Name:		In Phase 2?	Utility Type Type of Adjustment Work	Reimbursability Utility	y Adjustment Name
2.2 Subject Utility Number:					
2.3 Is the utility a LPA? 🔽 No					
2.4 Is the eligibility ratio of this utility adjustment 10	10% or				
NEARLY 100%? C Yes C No C D	ion't know				
2.5 Description:					
	>				
2.6 Diance Select the Tunes of Likity Adjustment W.					
Litility Type Type of Adjustment Work	JEK;				
W/WW Water					
W/WW Wastewater					
W/WW Water Well					
Comm. Overhead Communication					
Comm. Microwave Tower					
Distr. Overhead Distribution Power Line					
Trans. Transmission Pole					
Trans. Underground Transmission Power Lin	e _				
J Trans. Transmission Tower	•	•			Þ
Previous Page: TxDOT Highway Pri. & Ass	sessor Info.	Next Page:	Characteristics of This Highway Pro	ject	Save & Exit

Figure 2.10 Initial Status of the Configuration Form for a New Project

In addition, if the assessor wants to select more than one type of adjustment work, he or she can press the "Ctrl" key and click those line items of the types of adjustment work. After the assessor has finished fields 2.1-2.6, the assessor can press the " \rightarrow " button to add the utility adjustment's information to the project.

After having created one utility adjustment, as shown in Figure 2.11, CTUC DST will list the newly created utility adjustment in the list-box in the third block of the form, as shown in Figure 2.12. Five columns are displayed in the list-box:

1. In Phase 2?

If the utility adjustment does not need CTUC Phase 2 Analysis, "No" will be shown here. This field is controlled by the last step of the CTUC Phase 1 Analysis, which will be described in detail in Section 2.7.

2. Utility Type

Currently, six utility types exist in CTUC DST. They are: Water and/or wastewater (W/WW) Communication (Comm.) Distribution Power Line (Distr.) Transmission Power Line (Trans.) Natural Gas (Gas) Other (Other) 3. Type of Adjustment Work Currently, eighteen utility types exist in CTUC DST. They are: Water and/or Wastewater Category: Water Wastewater Wastewater Pump Station Water Well Communication Category: **Overhead Communication Underground Communication** Microwave Tower **Distribution Power Line Category: Overhead Distribution Power Line** Underground Distribution Power Line Transmission Power Line Category: Transmission Pole **Underground Transmission Power Line** Transmission Tower Natural Gas Category: High Pressure Gas Line Low Pressure Gas Line Liquid Petroleum Line Other Category: **Irrigation Pipeline Irrigation Canal** Other

4. Reimbursability

This field represents the answer to Question 2.4. It can be "Reimbursable," "Non-Reimbursable," or "Don't Know."

5. Utility Adjustment Name

This field shows the name of the utility adjustment. Note that the utility adjustment name should be unique among the names of the other utility adjustments of the same type within one project.

• For Demonstration Purposes

- 1) In 2.1, assessors enter "Water Line (Range/Station A-B)" in this field.
- 2) In 2.2, assessors enter "U10001" in this field.
- *3)* In 2.3, assessors check the box.

- 4) In 2.4, assessors check "Yes."
- 5) In 2.5, assessors enter "Additional information can be entered here. For example, utility positions, contact persons, etc." Figure 2.11 shows the result of this entry.
- 6) In 2.6, assessors select the "Water" line item.
- 7) Assessors press the " \rightarrow " button. Figure 2.12 shows the result of this action.
- 8) Assessors can press the "Previous Page: TxDOT Highway Prj. & Assessor Info." button to save the current configuration and to visit the form for editing project and assessor information.

Project Configuration of All Utility Adjustmen	ts - CTUC Decision S	upport Tool			
Project Configuration of All Utility	Adjustments				
- 1. Basic Project Information					
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 Current CTUC Analysis Phase:	Phase 1	Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		1.6 Assessor's Name:	Michael Test	
1.3 Highway Project Name:	IH 410 A			- Michael resc	
1.4 TxDOT District:	San Antonio (Bexar 41	.0)	1.7 Date Completed:	7/17/2006 1:0:0 AM	
2 Please Input Information of the Utility Adju	ctment:	2 1107 0			
	<u>schenc.</u>	3. LIST OF	- ALL UTILITIES WITHIN TH	ELIMITSOFTHE	PROJECT
2.1 Utility Adjustment Name: Water Line (Range/Si	ation A-B)	In Phase 2?	Utility Type Type of Adjustment Work	<u>Reimbursability</u> Utility	Adjustment Name
2.2 Subject Utility Number: U10001					
2.3 Is the utility a LPA? 🔽 Yes					
2.4 Is the eligibility ratio of this utility adjustment 10	0% or				
NEARLY 100%? • Yes C No C D	on't know				
2.5 Description: Additional information entered here. For example, utility p contact persons, etc.	ositions,				
2.6 Please Select the Types of Utility Adjustment Wo					
Utility Type Type of Adjustment Work					
Distr. Overhead Distribution Power Line	<				
Distr. Underground Distribution Power Line Trans Transmission Pole					
Trans. Underground Transmission Power Line	•				
Trans. Transmission Tower					
Gas Low Pressure Gas Line					
Gas Liquid Petroleum Line					
Other Irrigation Canal					
Other Other	•	•			•
Previous Page: TxDOT Highway Prj. & Ass	essor Info.	Next Page:	Characteristics of This Highway Proje	ect S	iave & Exit

Figure 2.11 Filling Out One Utility Adjustment's Information

2.3.3 Repeat Until All Adjustment Data Are Entered

If the project is new, the assessor needs to serially enter each utility adjustment's information until all the information has been entered.

If the assessor finds typos or other errors in the utility adjustment data, he or she can select the line item with errors in the third block, and CTUC DST will render this utility adjustment's information in the second block. At this time, the assessor can modify the error data in the second block directly and then press the " \rightarrow " button to reflect the changes. Note that "2.1 Utility Adjustment Name" cannot be modified once created.

Assume that a utility adjustment has many types of adjustment work. If the assessor would like to delete only some types of adjustment work, he or she can select those types of adjustment work in the third block by pressing the "Ctrl" key and selecting these line items and then press the " \leftarrow " button to delete them. Note that if a project has more than one utility adjustment, the assessor can delete a utility adjustment by deleting all of this utility adjustment's types of adjustment work. However, if the assessor has already performed any CTUC analysis, deleting the utility adjustment will cause CTUC DST to display "[Delete]" in the first column of the line item in the third block even though the actual data will not be deleted.

Project Configuration of All Utility Adjustm	ients - CTUC Decis	tion Support To	ol		X
Project Configuration of All Utility	Adjustments				
- 1. Basic Project Information					
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 Current CTUC Analysis Phase:	Phase 1	Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		1.6 Assessor's Name:	Michael Test	
1.3 Highway Project Name:	IH 410 A			Michael resc	
1.4 TxDOT District:	San Antonio (Bexar 4	410)	1.7 Date Completed:	7/17/2006 1:0:0 AM	
2 Please Input Information of the Utility Adju	istment:	2 LIST OF			
		J. LIST OF			PROJECT.
2.1 Utility Adjustment Name: Water Line (Range/S	tation A-B)	No No	V/WW Water	Reimbursable Water	Line (Range/Station A
2.2 Subject Utility Number: U10001					
2.3 Is the utility a LPA? 🔽 Yes					
2.4 Is the eligibility ratio of this utility adjustment 10	10% or				
NEARLY 100%? • Yes C No C D	von't know				
2.5 Description: Additional information	n can be				
entered here.		1			
For example, utility p contact persons, etc	ositions,				
	-				
2.6 Please Select the Types of Utility Adjustment Wo	ork:				
Utility Type Type of Adjustment Work	_	1			
W/WW Water W/WW Watewater	- <				
W/WW Wastewater Pump Station					
W/WW Water Well					
Comm. Underground Communication					
Comm. Microwave Tower					
Distr. Overhead Distribution Power Line					
Trans. Transmission Pole					
Trans. Underground Transmission Power Lin	e _				
Trans. Transmission Tower	•				Þ
Previous Page: TxDOT Highway Pri. & Ass	sessor Info.	Next Page: (haracteristics of This Highway Proje	ect s	ave & Exit

Figure 2.12 One Utility Adjustment Has Been Created for the Project

• For Demonstration Purposes

Assume the sample project has three utility adjustments, as shown in Figure 2.13; the assessor wants to change the reimbursability of "Water Line (Range/Station A-B)" from "Reimbursable" to "Non-Reimbursable." The essential steps of this section's functions are summarized as follows:

- 1) Assessors can select "Water Line (Range/Station A-B)" in the third block.
- 2) CTUC DST will show this utility adjustment's information in the second block.
- 3) Assessors can select "No" in Question 2.4.
- 4) Assessors can press the " \rightarrow " button.
- 5) CTUC DST will reflect the change in the third block.

6) Assessors can press the "Next Page: Characteristics of This Highway Project" button to save the information and to visit the next page.



Figure 2.13 A Project with Three Utility Adjustments

2.4 Filling Out Project and Utility Questionnaires

This section describes the main activities of CTUC DST. When the assessor has finished setting up the utility adjustments for the project, the assessor can begin to analyze the applicability of CTUC for each utility adjustment. In the CTUC Phase 1 Analysis, CTUC DST will ask assessors a series of questions, which includes project-scope, utility-scope, and contract-related questions. Section 2.4.1 will discuss the project-scope questions. Section 2.4.2 will discuss the utility-scope questions.

2.4.1 Project-Scope Questions

Figure 2.14 shows the five project-scope questions. Usually the assessor can only respond "Yes," "No," or "Don't know yet" to a question. But for Question 2.5, the assessor needs to consider the current project situation regarding schedule pressures and select only one option that best describes the current circumstance.

Phase 1 Analysis: Characteristics of This Highway Project (Step 1 / 7) - CTUC Decision Support Tool	\mathbf{X}		
Characteristics of This Highway Project (Step 1 / 7)	Highway Project Name:		
2.1 Do you expect HEAVY traffic conditions at the project location (e.g. in metropolitan or urban areas)? 💽 Yes 🖸 No 🕤 Don't know yet	Assessor's Name:		
2.2 Will CTUC require substantially FEWER lane closures than the Conventional approach during the project C Yes C No C Don't know yet	Michael Test		
2.3 Do physical interferences EXIST between 2 or more adjusted utilities on the project? 💽 Yes C No C Don't know yet	Assessment Input Steps: #(FilledIn?) Form Type Utility Ad		
If so, which ones? Interferences: ATT lines and CPS lines	1 (Yes) Prj.Scope IH 410 A 2 (Yes) Util.Scope Water Lin		
2.4 Can the adjustment be performed ONLY during the CONSTRUCTION PHASE (e.g. permit issues or utility adjustment work is contingent upon some level of construction work completion)?	3 (No) Contract Water Lin 4 (No) Util.Scope West Con 5 (No) Contract West Con 6 (No) Util.Scope High-V Po 7 (No) Contract High-V Po		
2.5 Please select which of the following options that can best describe the current project circumstance regarding schedule pressures:	7 (NO) CONTract High-V PO		
 (1) The project HAS severe schedule pressures, and CTUC can lead to EARLIER project completion. 			
 (2) The project HAS severe schedule pressures, and the utility adjustment scope CANNOT be well defined at approximately 60% PS&E. 			
C (3) The project HAS schedule pressures, BUT not severely.			
Elaborate:			
C (4) The project DOES NOT HAVE severe schedule pressures.			
(5) Don't know yet.			
	▲		
Go to Previous Page Go to Next Page	Save & Exit		

Figure 2.14 A Project with Three Utility Adjustments

Note that on the right side of the form shown in Figure 2.14, CTUC DST shows the project name, the assessor's name, and a list-box displaying all pages or steps that will be presented later. Because one project can have many utility adjustments, CTUC DST will prepare only one page regarding all project-scope issues. The assessment results for the project-scope issues will be applied to all utility adjustments within that project.

CTUC DST will show two pages for each utility adjustment in the CTUC Phase 1 Analysis. One page contains utility-scope issues, and the other page contains contract-related issues. Therefore, if a project has three utility adjustments, seven steps are required for assessors to complete the CTUC Phase 1 Analysis.

The list-box labeled "Assessment Input Steps" in Figure 2.14 can be used as a shortcut to any of the page. The assessor can press the "Go to Previous Page" or "Go to Next Page" button several times to reach the desired page. With use of the shortcut, however, assessors can double-click the line item of the desired step to visit that page directly. In addition, the list-box also shows whether the assessor has already completed the page. If the assessor fails to answer any of the questions on a page and presses the "Go to Next Page" or "Go to Previous Page" button directly, "Don't know yet" will be presumed as the answer to the blank questions on that page.

• For Demonstration Purposes

- 1) Assume the assessor selects the sample project data from CTUC Phase 1 Analysis of IH 410 A. CTUC DST will show three utility adjustments for the project.
- 2) Assessors can answer the five project-scope questions shown in Figure 2.14.
- 3) Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

2.4.2 Utility-Scope Questions

As Figure 2.15 shows, the questions presented on this page, are about the specific utility adjustment, the name of which will be displayed at the top of the page. Note that CTUC DST will highlight the step that the assessor is currently working on in the list-box on the right side of the page. In the text boxes for Questions 3.2 and 3.6, assessors can enter more than one line of words to comment on the project.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) Assessors can answer the ten questions, as shown in Figure 2.15.
- 2) Assessors can press the "Go to Next Page" to save the information and to proceed to the next page.

2.4.3 Contract-Related Questions

As mentioned in Section 2.3, the reimbursability of a utility adjustment can be coded as "Reimbursable," "Non-Reimbursable," or "Don't know." Hence, the contract-related questions are presented in accordance with the type of reimbursability the assessor selects in Section 2.3. Figure 2.16 shows the page with contract-related questions for reimbursable utility adjustments; Figure 2.17 shows the page with contract-related questions for non-reimbursable utility adjustments; Figure 2.18 shows the page with contract-related questions for the utility adjustment with unknown reimbursability.

Phase 1 Analysis: Water Line (Range/Station A-B) (W/WW) : Phy	sical Characteristics (Step 2 / 7) - CTUC Decision Sup	port Tool 🛛 🔀
Water Line (Range/Station A-B) (W/WW) : Physical C	haracteristics (Step 2 / 7)	Highway Project Name:
3.1 Does the utility adjustment work include extensions BEYOND the TxDOT ROW project limits?	or outside the construction $\begin{tabular}{c} \end{tabular}$ Yes $\end{tabular}$ No $\end{tabular}$ Don't know yet	IH 410 A Assessor's Name:
3.2 Please comment on this adjustment scope:	You can enter further scope information here.	Michael Test
		Assessment Input Steps:
3.3 To what degree does the utility have PAST CTUC EXPERIENCE?	C None C Some C Only Recently © Extensive	#(FilledIn?) Form Type Utility Ad 1 (Yes) Prj.Scope IH 410 A 2 (Yes) Util.Scope Water Lin
3.4 What is the likelihood that the utility will PARTICIPATE in CTUC for this adjustment?	High C Medium C Low C Don't Know	3 (Yes) Contract Water Lin 4 (No) Util.Scope West Con 5 (No) Contract West Con
3.5 Will this utility likely allow the TxDOT contractor to ONLY install utility INFRASTRUCTURE (e.g. manholes, poles, conduit, etc.)?		6 (No) Util.Scope High-V Po 7 (No) Contract High-V Po
3.6 Which elements of this adjustment can the pool of likely Can Do: TxDOT contractors perform?	Everything	
Which elements can they not perform? Can't Do:	Almost nothing	
3.7 Is it possible that the pool of likely TxDOT contractors will be WILLING to HIRE pre-qualified contractors provided by the utility?	a subcontractor from a list of C Yes 🏵 No C Don't know yet	
3.8 Does HAZMAT-related work (e.g. asbestos, leaking underground storage tan contaminated groundwater, or unknown substances) apply ONLY to the utility adj	s, contaminated soils, ustment work? © Yes © No © Don't know yet © Not applicable	
3.9 Can only the UTILITY's CREW perform the utility adjustment?		
3.10 Does the utility adjustment work include any detrimental changes to the proj	ect's environmental clearance?	
		•
Go to Previous Page	Go to Next Page	Save & Exit

Figure 2.15 Utility-Scope Questions in CTUC Phase 1 Analysis

Phase 1 Analysis: Water Line (Range/Station A-B) (W/WW) : Contract Characteristics (Step 3 / 7) - CTUC Decision Support Tool 🛛 🛛 🔀							
Water Line (Range/Station A-B) (W/WW) : Contract Characteristics (Step	317)	Highway Project Name:					
Reimbursement Type		IH 410 A Assessor's Name:					
Since this is a REIMBURSABLE adjustment:		Michael Test					
4.1 Will increased utility adjustment costs likely occur due to the TxDOT contractor's FRONT-END LOADING (UNBALANCED BIDDING)? 4.2 Will there be increased contractor CHANGE ORDER frequencies or markups?	Yes ∩ No ∩ Don't know yet Yes ∩ No ∩ Don't know yet	Assessment Input Steps: #(Filledin?)) Form Type Utility Ad' 1 (Yes) Prj.Scope IH 410 A 2 (Yes) Util.Scope West Con 3 (Yes) Contract Water Lin 5 (No) Contract West Con 6 (No) Util.Scope High-V Po 7 (No) Contract High-V Po					
	Clean						
Go to Previous Page Go to Nex	xt Page	Save & Exit					

Figure 2.16 Contract-Related Questions for Reimbursable Adjustment

• For Demonstration Purposes

- 1) If the utility adjustment is 100 percent reimbursable, assessors can answer the two questions, as shown in Figure 2.16.
- 2) If the utility adjustment is non-reimbursable, assessors can answer the five questions, as shown in Figure 2.17.
- 3) If the reimbursability of the utility adjustment is unknown, assessors can answer the seven hypothetical questions, as shown in Figure 2.18.
- 4) Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

Phase 1 Analysis: West Comm. Cable (412 - 416) (Comm.) : Contract Characteristics (Step 5 / 7) - CTUC Decision Support Tool							
West Comm. Cable (412 - 416) (Comm.) : Contract Characteristics (Step 5 / 7)	Highway Project Name:						
Reimbursement Type	IH 410 A						
Since this is a NON PEIMELIPSARI E adjustment	Michael Test						
	Assessment Input Steps:						
5.2 Can the utility pay for adjustments in advance? Yes No Don't know yet 5.3 If the utility is NOT ABLE to make 100% of the funding available in escrow before construction, can it QUALIFY for State Infrastructure Bank funding? Yes No Don't know yet S.4 Will increased utility adjustment costs likely occur due to the TxDOT contractor's FRONT-END LOADING Yes Yes	#(FilledIn?) Form Type Utility Ad' 1 (Yes) Prj.Scope IH 410 A 2 (Yes) Util.Scope Water Lin 3 (Yes) Contract Water Lin 4 (Yes) Util.Scope West Contract 5 (Yes) Contract West Contract 6 (Yes) Util.Scope High-V Po 7 (No) Contract High-V Po						
Clean							
Go to Previous Page Go to Next Page	Save & Exit						

Figure 2.17 Contract-Related Questions for Non-Reimbursable Adjustment

Phase 1 Analysis: High-V Power Line (Sta.410) (Trans.) : Contract Characteristics (Step 7 / 7) - CTUC Decision Support Tool						
High-V Power Line (Sta.410) (Trans.) : Contract	Characteristics (Step 7	<u>17)</u>	Highway Project Name:			
Reimbursement Type			IH 410 A			
Assume this is a REIMBURSABLE adjustment	t:		Michael Test			
6.1 Will increased utility adjustment costs likely occur due to the TyDOT	contractor's ERONT-END LOADING		Assessment Input Steps:			
(UNBALANCED BIDDING)?		● Yes © No © Don't know yet	#(FilledIn?) Form Type Utility Ad			
6.2 Will there be increased contractor CHANGE ORDER frequencies or m	arkups?		2 (Yes) Util.Scope Water Lin 3 (Yes) Contract Water Lin			
			4 (Yes) Util.Scope West Con 5 (Yes) Contract West Con			
Assume this is a NON-REIMBURSABLE adjus	<u>tment:</u>		6 (Yes) Util.Scope High-V Po 7 (Yes) Contract High-V Po			
6.3 If some of the adjustment work is reimbursable, what is the ELIGIBIL	LITY RATIO for this utility adjustment?	%				
6.4 Can the utility hav for adjustments in advance?						
or real and daily pay for dejastificities in devances		C Yes C No C Don't know yet				
6.5 If the utility is NOT ABLE to make 100% of the funding available in e	scrow before construction, can it	C Yes • No C Don't know yet				
QUALIFY for State Infrastructure Bank funding?						
6.6 Will increased utility adjustment costs likely occur due to the TxDOT (UNBALANCED BIDDING)?	contractor's FRONT-END LOADING					
6.7 Will there be increased contractor CHANCE ODDED from uppring or m	- selence					
6.7 Will there be increased contractor Chalvac OKDER frequencies of in	larkups?	● Yes ○ No ○ Don't know yet				
		Clean				
	· · · · · · · · · · · · · · · · · · ·					
Go to Previous Page	Go to Ne	ext Page	Save & Exit			

Figure 2.18 Contract-Related Questions for Reimbursability Unknown Adjustment

2.5 Reviewing Top Six CTUC Decision Drivers

CTUC DST produces two different types of reports. One is the graphical report and the other is the text report. After the assessor has answered all questions in the previous sections, CTUC DST generates the reports in order to reflect the experts' opinions with regard to the applicability of the CTUC approach for each utility adjustment. This section focuses on how to generate the graphical report of the analysis results, while Section 2.6 will describe the production of the detailed text report for each utility adjustment.

2.5.1 Report Setting for CTUC Phase 1 Analysis

There are two questions for report setting of the CTUC Phase 1 Analysis, as shown in Figure 2.19. The first question requires the assessor to select one of the utility adjustments involved in the project, and the other requires the selection of the knowledge base source to be applied to interpret the analysis results.



Figure 2.19 Report Setting for CTUC Phase 1 Analysis

Because the reports generated by CTUC DST aim at explaining the explanation of the applicability of CTUC for one utility adjustment, the assessor first needs to select one of the utility adjustments involved in the project first so that CTUC DST can incorporate the relevant information into the report.

The second report setting question requires the selection of the CTUC knowledge base source. CTUC DST users may want to review opinions only from their district's experts, or from all TxDOT experts whose opinions have been collected and stored in CTUC DST. Presently, the knowledge base of CTUC DST includes the opinions of the TxDOT experts from the San Antonio, Houston, and Dallas districts who attended the CTUC decision drivers assessment workshops. Hence, if the assessor is from one of the three districts, he or she can select the knowledge base source from all three districts or from one district only. Additionally, if the assessor is not from one of the three districts, regardless of the assessor's choice.

• For Demonstration Purposes

- 1) Assessors can select the first utility adjustment shown on the page represented in Figure 2.19.
- 2) Assessors can select the option entitled "TxDOT CTUC experts from San Antonio, Houston, and Dallas districts."
- 3) Assessors can press the "OK" button to generate the graphical report.

2.5.2 Graphical Report of the CTUC Phase 1 Analysis

Figure 2.20 shows the graphical report. The six major areas in this report are: 1) Report Title; 2) Report Info.; 3) Control Panel; 4) Top 6/6 Decision Drivers; 5) Level of Pro-CTUC; and 6) Level of Anti-CTUC. The following paragraphs will describe each area in more detail.

1. Report Title (at the top of the report)

CTUC DST will show the project name and district information in the first line of the report title. The name of the utility adjustment and the abbreviation of the utility type involved will be shown in the second line of the report title.

2. Report Info. (on the upper left side of the report)

CTUC DST will show the name of the assessor, the analysis date, and the print date. In the field titled "Knowledge Base Source," CTUC DST will show the knowledge base source the assessor selected in Section 2.5.1. Finally, the color used to reflect the impact level of the given project circumstance will be shown in the field titled "Legend."

3. Control Panel (on the lower left side of the report)

Five buttons are provided in this area. The button labeled "Report Setting" will invoke the report setting form, as shown in Figure 2.19. The button labeled "Previous Page" will trigger the contract-related form mentioned in Section 2.4.3. The button labeled "Next: Detailed Rpt." will invoke the text report discussed in the next section. The button labeled "Print" will prompt the active printer name to print the current page. The button labeled "Exit" will save all data and close CTUC DST.

4. Top 6/6 Decision Drivers (in the middle column of the report)

This area lists twelve decision drivers that will most influence the CTUC decision, either in a positive or negative way. Each decision driver is enclosed by a gray box, and is underlined and correlated with one of the questions asked in Section 2.4. The abbreviated description of the project circumstance is shown below the decision driver. This description is the best answer to the question from the assessor's perspective. The assessor can click any box in this area to get further explanation, as shown in Figure 2.21. For example, the first Pro-CTUC decision driver is "Schedule Pressures" and its project circumstance is "Severe schedule pressure," as shown in Figure 2.20. If the assessor wonders why CTUC DST shows such a result, he or she can click the "Schedule Pressures" box to show a detailed explanation, which includes the original question and the assessor's answer to the question (see Figure 2.21).



Figure 2.20 Graphical Report of One Utility Adjustment Analysis Results

5. Level of Pro-CTUC (in the second left column of the report)

The level of Pro-CTUC for each decision driver is derived from the average opinion of the experts concerning the given project circumstance listed in the middle of the form. Basically, in order to develop the knowledge base, these experts have been asked to use "High Impact," "Medium Impact," "Low Impact," or "No Impact" to assess the given project circumstance's impact level on the CTUC decision. Furthermore, CTUC DST uses "3" to represent "High Impact," "2" to represent "Medium Impact," "1" to represent "Low Impact," and "0" to represent "No Impact," as is shown in the bottom line of the form. Therefore, a project circumstance with a lengthy green bar means almost all experts think the current situation will influence the CTUC decision in a positive way, i.e., Pro-CTUC. Note that the level of Pro-CTUC is primarily determined by the *experts*, not by the assessor. However, the assessor can decide which group of experts to be used as the knowledge base source for a given CTUC decision. If the assessor selects the combination of the San Antonio, Houston, and Dallas districts as the knowledge base source, the total number of experts should be 28 (N=28) in current CTUC DST. For example, the impact level of the top Pro-CTUC decision driver is "+2.8 (N=27)," which means most of the twenty-seven experts believe that the given project circumstance is Pro-CTUC and has "High Impact" on the CTUC decision. The experts' "Don't Know" values for the project circumstance are excluded from the impact level calculation.

Explanatio	n of the CTUC Decision Driver - CTUC Decision Support Tool	×
– Explai	nation of the CTUC Decision Driver	
Question:	#2.5 Does the project HAVE severe schedule pressures?	
Answer:	Yes, the project HAS severe schedule pressures, and CTUC can lead to EARLIER project completion.	
	Close	

Figure 2.21 Short Explanation of the CTUC Decision Driver

6. Level of Anti-CTUC (in the right column of the report)

The format for the level of Anti-CTUC for each decision driver is similar to that for the level of Pro-CTUC. Basically, CTUC DST uses "-4" to represent "Show Stopper," "-3" to represent "High Impact," "-2" to represent "Medium Impact," "-1" to represent "Low Impact," and "0" to represent "No Impact", as shown in the bottom line of the form. Therefore, a project circumstance with a lengthy red bar means almost all experts think the current situation will influence the CTUC decision in a negative way, i.e., Anti-CTUC. The last blue column represents the resolvability of each decision driver. Because the experts have been asked to assess whether or not process changes could facilitate the use of CTUC, CTUC DST is able to show the resolvability results by displaying "Yes" for such project circumstances identified by the experts.

• For Demonstration Purposes

- 1) After assessors have answered all questions in the previous section, they can see the report setting form, as shown in Figure 2.19.
- 2) Assessors can select "Water Line Section I (W/WW)" as the utility adjustment to generate the report.
- *3)* Assessors can choose the first option as the knowledge base source in Figure 2.19 and press the "OK" button.
- 4) CTUD DST will generate the graphical report as shown in Figure 2.20.
- 5) Assessors can click the decision driver box at the top of the page to prompt the dialog box shown in Figure 2.21.

2.6 Reviewing the Text Report of the CTUC Decision

Because the graphical report can only show the top six Pro-CTUC and Anti-CTUC decision drivers, the text report described in this section is designed to provide other important opinions regarding the CTUC applicability to a given utility adjustment. For example, some questions described in Section 2.4 are currently unanswerable by the assessor but have been found by the experts to have significant impact levels on the CTUC decision. Hence, the text report will list all impact level types of CTUC decision drivers to allow the assessor to comprehend the CTUC applicability to the given utility adjustment and to learn lessons from the experts.

2.6.1 Text Report of the CTUC Phase 1 Analysis

Figure 2.22 shows the text report of the CTUC Phase 1 Analysis for a sample utility adjustment. The layout of this report is similar to the graphical one; therefore, only the portions that differ between the two reports are described below:

Text Report: Decision A	nalysis Result - CTUC D	ecision Support Tool					
Explanation of CTUC Decision Analysis for Highway Projec: IH 410 A (San Antonio)							
		isument: water Line (Range/Station A	-В) (W/W	(W)			
Report Info.	Pro-CTUC:	(Double-Click Any Line Item for M	ore Explanati	on)			
Assessor:	Decision Variable	Project Circumstance	Impact Level				
Michael Test (TxDOT-F	#2.5 Schedule Pressures #2.4 Utility Adjustment Ti	Yes, the project HAS severe schedule pressures, and CTUC can lear Yes, the adjustment can be performed ONLY DURING the constructi	2.81				
Date of Analysis:	#2.1 Traffic Condition	Yes, the traffic condition at the project location IS HEAVY.	2.27				
7/17/2006 1:0:0 AM	#2.3 Physical Interferenc #4.0 (R)Eligibility	Yes, physical interferences EXIST between 2 or more adjusted utiliti Yes, the eligibility ratio of the adjustment IS 100% or NEARLY 100%	1.92 1.74				
Date of Print:							
8/3/2006 1:7:9 PM							
Knowledge Base Source:	Anti-CTUC:						
Experts are from	Decision Variable	Project Circumstance	Impact Level	Resolvable?	Controlling Party		
TXDOT SAT, HOU,	#3.09 Utility Crew Limitati #3.01 Util Work Beyond P	Yes, only the UTILITY's crew can perform the utility adjustment.	-3.75	Yes	TxDOT(21.4%) Utility(71.4 TxDOT(46.4%) Utility(35.1		
DAL Districts.	#3.08 HAZMAT	Yes. HAZMAT-related work ONLY applies to the utility adjustment w	-2.93	Yes	TxDOT(50.0%) Utility(33.		
	#3.10 Added Environ. Scc	Yes, the utility adjustment work includes a detrimental change to the	-2.29	No			
	#4.2 (R)Change Order Ma	Yes, increased contractor CHANGE ORDER frequencies and markup:	-2.13	Yes	TxDOT(39.3%) Utility(39.:		
	#4.1 (R)Front End Loadin	Yes, increased utility adjustment costs WILL likely occur due to the "	-1.92	Yes	TxDOT(50.0%) Utility(27.:		
	,						
	Neutral:						
- Control Panel	Decision Variable	Project Circumstance					
<u>control unor</u>	#3.07 Contractor Capabil	No, the pool of likely TXDOT contractors IS NOT WILLING to HIRE a s	subcontractor from	n a list of pre-qua	alified contractors provided		
Report Settings							
Previous:							
Graphical Report	Don't Know:						
Next Page	Dori e Kilow.	During Characteria	Town or the Law and	Due (Marchael / Ar	E CTUC		
	#2.2 Lane Closures	Yes, CTUC WILL require substantially FEWER lane closures than the	2.3	Pro/Neutral/Al			
1							
Exit							
	1						

Figure 2.22 Text Report of One Utility Adjustment Analysis Results

1. Pro-CTUC (in the first list-box)
This table has three columns described as follows: 1) Decision Variable: manifests the name of each Pro-CTUC decision driver; 2) Project Circumstance: manifests the current project circumstance specified by the assessor; 3) Impact Level: manifests the numerical impact level assessed by the experts for the project circumstance. Note that these Pro-CTUC decision drivers are ranked according to their impact levels. The assessor can double-click any line item to show the detailed experts' opinions, as shown in Figure 2.23.

2. Anti-CTUC (in the second list-box)

This table has five columns described as follows: 1) Decision Variable: shows the name of each Anti-CTUC decision driver; 2) Project Circumstance: shows the current project circumstance specified by the assessor; 3) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 4) Resolvable?: shows whether or not the project circumstance could be resolved to facilitate CTUC by any process change according to the experts; 5) Controlling Party: shows what percentage of each controlling party is responsible for such process changes. Note that these Anti-CTUC decision drivers are ranked according to their impact levels. The assessor can double-click any line item to show the detailed experts' opinions, as shown in Figure 2.23.

3. Neutral (in the third list-box)

This table has two columns described as follows: 1) Decision Variable: shows the name of each Neutral decision driver, which by definition will not influence the CTUC decision; 2) Project Circumstance: shows the current project circumstance specified by the assessor. Note that these Neutral decision drivers are ranked according to their original question numbers and can help decision-makers make the CTUC problem simper by eliminating unnecessary factors. The assessor can double-click any line item to show the detailed experts' opinions, as shown in Figure 2.23.

4. Don't Know (in the fourth list-box)

This table has four columns described as follows: 1) Decision Variable: shows the name of each decision driver, which corresponds to a question unknown to the assessor; 2) Project Circumstance: shows one of the possible answers to this unknown question; 3) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 4) Pro/Neutral/Anti-CTUC: shows "Pro" if the impact level is positive, "Anti" if the impact level is negative, and "Neutral" if the impact level is zero. Note that these "Don't Know" decision drivers are ranked according to their absolute values of the impact levels. The assessor can double-click any line item to show the detailed experts' opinions, as shown in Figure 2.23.

• For Demonstration Purposes

- 1) After assessors have reviewed the graphical report, assessors can press the "Next: Detailed Rpt." button to generate the text report.
- 2) Assessors can double-click the first line item in "Pro-CTUC" to show the dialog box represented in Figure 2.23.
- *3)* Assessors can double-click the second line item in "Anti-CTUC" to show the dialog box represented in Figure 2.24.

2.6.2 Review of Detailed Experts' Opinions

If assessors double-click any line item in any of the list-boxes in Figure 2.22, CTUC DST will display the dialog box containing detailed experts' opinions, as shown in Figure 2.23 or 2.24. There are three blocks in this form. The first block, titled "Review of Project Circumstance," shows the question and answer for the decision driver and the project circumstance, respectively. For some project circumstances, CTUC DST will also show the suggestion from experts, as shown in Figure 2.24.

Review of Experts' Opinions - CT	JC Decision Support Tool		
Review of Project Circur	nstance		
Question: #2.5 Does the project HA	VE severe schedule pressures?		
Answer: Yes, the project HAS seve	ere schedule pressures, and CTUC can lead	d to EARLIER project completion.	
- Experts' Opinions			
Data Sample Attributes:	Pro-CTUC:	Anti-CTUC:	
Type: TxDOT	High Impact %: 78,57	Show Stopper %: 0.00	
District: SAT/HOU/DAL	Medium Impact %: 0.00	High Impact %: 0.00	
# of Experts: 28	Low Impact %: 17.86	Medium Impact %: 0.00	
Years of Work 387	Don't Know %: 3,57	Low Impact %: 0.00	
Experience:		Neutral %: 0.00	
What % of Experts Think the 21.4 Situation Is Resovable?	3 Responsible Party 50.00 Utility TxDOT %:	%: 50.00 Others %: 0.00	
Your Opinion Do You Agree W	ith It? • Yes C No		Temporarily
From your perspective, the situation is	: The impact level is:		overwrite experts'
C Pro-CTUC C Neutral	C Anti-CTUC C Show-Stopper	C High C Medium C Low	opinions?
Who is/are responsibile for possible pr	ocess changes to facilitate CTUC: 🕅 No	One 🗖 TxDOT 🗖 Utility 🗖 Others	
Comment:			
			Cancel

Figure 2.23 Detailed Explanation of the CTUC Decision Driver: Without Any Change

The second block, titled "Experts' Opinions," lists basic attributes of the expert group and shows the distribution of the experts' opinions for impact level and resolvability. For example, as shown in Figure 2.23, assessors can see that one (28*3.57%=1) of the twenty-eight

experts cannot judge the impact level, i.e., select "Don't Know" on CTUC, based on the given project circumstance. Six (28*21.43%=6) of the twenty-eight experts thought the given project circumstance could be resolved to facilitate CTUC, and one-half of the six experts thought that TxDOT is responsible for process changes, while the other half thought the utility owners are.

Review of E	xperts' Opinions - CTU	C Decision Support Tool			
Review	v of Project Circum	istance		1	
Question:	#3.01 Does the utility adju construction project limits?	stment work include extensions BEYOND	the TxDOT ROW or outside the		
Answer:	Yes, the utility adjustment project limits.	work includes extensions BEYOND the Tx	DOT ROW or outside the construction		
Suggestion:	Currently, no adjustment v	vork should be performed by TxDOT contr	ractors outside TxDOT ROWs.		
– Expert	s' Opinions			1	
Data Sam	ple Attributes:	Pro-CTUC:	Anti-CTUC:		
Ту	pe: TXDOT	High Impact %: 3.57	Show Stopper %: 67.86		
Distr	ict: SAT/HOU/DAL	Medium Impact %: 0.00	High Impact %: 17.86		
# of Exper	rts: 28	Low Impact %: 0.00	Medium Impact %: 7.14		
Years of W	ork 387	Don't Know %: 0.00	Low Impact %: 0.00		
Experien	ce:		Neutral %: 3,57		
What % of Situal	Experts Think the 96.43 tion Is Resovable?	Responsible Party 46.43 Utility TxDOT %:	%: 35.71 Others %: 17.86		
– Your O	pinion			1	
	Do You Agree Wit	hilt? Ci Yes 💿 No		Temporarily	
From your	perspective, the situation is:	The impact level is:	:	overwrite	
C Pro-C	TUC C Neutral	Anti-CTUC Show-Stopper	C High C Medium C Low	opinions?	
Who is/are responsibile for possible process changes to facilitate CTUC: VINO One TXDOT Utility Others					
Comment:				ОК	
				Cancel	

Figure 2.24 Detailed Explanation of the CTUC Decision Driver: With Changes

The third block, titled "Your Opinion," provides a text box for the assessor's own opinion. Figure 2.23 demonstrates a case in which the assessor agrees with the experts' opinions; hence, the assessor cannot select any option or enter any comment in this block. The "OK" button and the "Cancel" button provide the same function, which is to close the dialog box without modifying any data. Note that if the assessor has double-clicked the decision drivers that are "Don't Know" or originally "Neutral," the assessor cannot select "No" as the answer to "Do You Agree with It?"

Figure 2.24 illustrates a case in which the assessor does not agree with the experts' opinions. The assessor can then answer the three assessment questions and enter some comments in the text box at the bottom of the form. Finally, if the assessor wants to temporarily overwrite the experts' opinions, which means the impact level associated with this project circumstance will be changed, he or she can check the box labeled "Temporarily overwrite experts' opinions?". In this case, the assessor will see the change of this impact level reflected in both the graphical report and the text report. Note that the knowledge base source will be unaltered. The assessor can use the following steps to get back the original experts' opinions: 1) the assessor can select another group as the knowledge base source; 2) CTUC DST can generate a new report in order to overwrite current opinions; 3) the assessor can then select the original expert group as the knowledge base source; 4) CTUC DST can thus generate the original report.

If the assessor gives his or her own comments without checking the box labeled "Temporarily overwrite experts' opinions?", both experts' opinions and the assessor's comments will be stored in CTUC DST, and the assessor's opinion can be retrieved later in order to retrospect to project situations.

2.7 Selecting the Utility Adjustments to Be Included in the Phase 2 Analysis

After the assessor has reviewed the two report results of CTUC Phase 1 Analysis, the assessor needs to indicate which of the utility adjustments should be analyzed further in the CTUC Phase 2 Analysis, which will be performed jointly by TxDOT and utility decision-makers. Figure 2.25 shows the initial form, if the sample project is used. There are three blocks in the form. The first block, titled "1. Highway Project Information," shows basic highway project information. The second block, titled "Utility Adjustment Information," will not show any information unless the assessor clicks any line item in any of the list-boxes in the third block.

Phase 1 Analysis: Utility Adjustments to Be	Included in CTUC	Phase 2 Analys	is - CTUC Decision Support Tool	X
Utility Adjustments to Be Included	in CTUC Phas	e 2 Analysis		
1. Highway Project Information 1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 Current CTUC Analysis Phase:	Phase 1 Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		1.6 Assessor's Name:	Michael Test
1.3 Highway Project Name:	IH 410 A		1.7 Date Completed:	7/17/2006_1:0:0.4M
1.4 TXDOT District:	San Antonio (Bexar 4	10)		1172000 11010 HM
2. Utility Adjustment Information 2.1 Utility Adjustment Name: 2.2 Utility Type Involved:		2.4 Description:		2.6 Password Needed?
		2.5 IS LPA?		Overwrite
Utility Adjustments Not Considered in Phase 2			Utility Adjustments That Need CT	UC Phase 2 Analysis
Utity Adjustment Name Utity Type Water Line (Range/Station A-B) W/WW West Comm. Cable (412 - 416) Comm. High-V Power Line (Sta. 410) Trans.	e # of Show-Stopp 2 1 3	>	Utility Adjustment Name	Utility Type T # of Show-Stoppers in Phase
Go to Previous Page			Go to Next Page	Save & Exit

Figure 2.25 Initial Form for Determining Utilities to Be Included in CTUC Phase 2 Analysis

Initially, the left list-box, titled "Utility Adjustments Not Considered in Phase," will show all utility adjustments involved in the highway project. The assessor can select any line item to show detailed information of the utility adjustment in the second block. CTUC DST will also show in the third column in the left list-box the number of show-stoppers, defined as the number of the average impact levels greater than "-3."

The assessor can select one utility adjustment at a time and press the " \rightarrow " button to move this line item to the right list-box, labeled "Utility Adjustments That Need CTUC Phase 2 Analysis." If the assessor still wants this utility adjustment to stay in CTUC Phase 1 Analysis, he or she can press the " \leftarrow " button to move the line item in the right list-box to the left list-box, as shown in Figure 2.26.

Phase 1 Analysis: Utility Adjustments to Be	Included in CTU	IC Phase 2 Ana	lysis - CTUC Decision Support Tool	
Utility Adjustments to Be Included	l in CTUC Pha	se 2 Analysi	s	
 Highway Project Information 1.1 Highway Project Construction CSJ (CCSJ): 	1234-56-789		1.5 Current CTUC Analysis Phase:	Phase 1 Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		1.6 Assessor's Name:	Michael Tect
1.3 Highway Project Name:	IH 410 A			
1.4 TxDOT District:	San Antonio (Bexar	410)	1.7 Date Completed:	7/17/2006 1:0:0 AM
2. Utility Adjustment Information				
2.1 Utility Adjustment Name: Water Line (Range)	'Station A-B)	2.4 Description:	Additional information can be entered here	2.6 Password Needed? No
2.2 Utility Type Involved: Water and/or Wast	ewater		Por example, utility positions, contact persons, etc.	2.7 Utility's Password:
2.3 Utility Number: U10001		2.5 Is LPA?	Yes	Overwrite
Utility Adjustments Net Considered in Dhase 2			Utility Adjustments That Need CI	
Utility Adjustment Name Utility Typ	e # of Show-Stop	ppers in Phase	Utility Adjustment Name	Utility Type # of Show-Stoppers in Phase
High-V Power Line (Sta.410) Trans.	3		Water Line (Range/Station A-B) West Comm. Cable (412 - 416)	Comm. 1
			1	
		>	>	
		_		
•		Þ	<u>ا</u>	
Go to Previous Page			Go to Next Page	Save & Exit

Figure 2.26 Form for Determining Utilities to Be Included in CTUC Phase 2 Analysis

• For Demonstration Purposes

- 1) After assessors have reviewed the text report, assessors can press the "Next Page" button to see the form shown in Figure 2.25.
- 2) Assessors can select "Water Line Section I" and press the "→" button to move to the right-hand list-box.
- *3)* Assessors can select "West Communication Cable II" and press the "→" button to move to the left hand list-box.

2.8 End of CTUC Phase 1 Analysis

When the assessor has determined which of the utility adjustments involved in the CTUC Phase 1 Analysis should be analyzed further in CTUC Phase 2 Analysis, CTUC Phase 1 Analysis is considered complete. Hence, the assessor can print all analysis results, simply close the tool, or visit previous pages to make modifications (see Figure 2.27). Figure 2.28 shows a portion of the final report for the highway project.

End of Analysis - CTUC Decision Support Tool	×
CTUC Phase 1 Analysis Is Now Completed.	
Print All Analysis Results	i
Save & Exit	
Go to Previous Page	

Figure 2.27 End of CTUC Phase 1 Analysis

× 1	Aicrosoft Excel - 060831CTUC	DST.xls											
:B)	<u>Eile Edit View Insert Form</u>	at <u>T</u> ools <u>D</u> ata	Window	Help Ado	be PDF(<u>B</u>)								
10	12 2 2 3 3 4 2 1 7 1	1 × 1 1	- 🛷 🗐	+ [* +]	$\Sigma \cdot \frac{1}{2}$	I XI I 🛍 4	90% 🔸	0 📮 🖬	C 🚰 🖓	🗹 🖬 🛲	•		A 🖪 🗄
Tim	es New Roman 🛛 👻 12 🔹 🖪	I <u>U</u> ≣≣	= -	\$ % ,	€.0 .00 ₹ 0.€ 00.	F 🔃 🗉 🛛	3 - A	- 2 : 🗹 -	21-		- 👱 📮 🗄	12 12 13	
	A2 🔹 🎜												
	A	В	С	D	E	F	G	H	Ι	J	K	L	М
1	-	Assess	sment	Results	of CTI	UC Phas	se 1 Ana	alysis				Back to To	ol
2			1				1						
3	Section 1: Project Inform	mation										14	
4	1. TxDOT District:	San Antonio											
5	2. TxDOT Area Office:	Bexar 410											
б	3. Highway Project Name:	IH 410 A											
7	4. Highway CCSJ:	1234-56-789											
8	5. Highway ROW CSJ:	9876-54-321											

Figure 2.28 Excel Worksheet for CTUC Phase 1 Analysis Final Report

When the assessor presses the "Print All Analysis Results" button shown in Figure 2.27, CTUC DST will display an Excel worksheet with the CTUC analysis results. The assessor can print or print-preview this preformatted worksheet just like a standard Excel worksheet. The assessor can also return to CTUC DST by pressing the "Back to Tool" button in the top row of the worksheet, as Figure 2.28 shows.

• For Demonstration Purposes

- 1) After assessors have determined which of the utility adjustments involved should be analyzed further in the CTUC Phase 2 Analysis, they can press the "Go to Next Page" to complete CTUC Phase 1 Analysis (see Figure 2.26).
- 2) Assessors can press the "Print All Analysis Results" button to view the Excel worksheet report.
- *3) CTUC DST will prompt a message box, which alerts the user that the report has been generated successfully.*
- 4) Assessors can print the Excel worksheet report, as shown in Figure 2.28.
- 5) Assessors can press the 'Back to Tool" button shown in Figure 2.28.
- 6) Assessors can press the "Save & Exit" button to save and close CTUC DST.

3. CTUC Phase 2 Utility Analysis

3.1 Overview of CTUC Phase 2 Utility Analysis

This chapter describes the use of CTUC DST for performing the CTUC Phase 2 Utility Analysis, which is conducted solely by utility assessors. Step-by-step instructions are shown below in Figure 3.1. The first step involves retrieving one of the CTUC analysis records created by TxDOT assessors in CTUC Phase 1 Analysis (explained further in Section 3.2). Then, CTUC DST will guide the utility assessor to the questionnaire forms. The assessor will be asked a series of yes/no questions concerning the utility-specific issues and characteristics (explained further in Section 3.3). In Step 3, the assessor will first specify the knowledge base source he or she will use, and CTUC DST will display the graphical analysis results. The assessor will see experts' opinions regarding the applicability of the CTUC approach for a given utility adjustment, formatted as bar charts (explained further in Section 3.4). In Step 4, CTUC DST will show the text report listing all decision drivers according to the ranking of their impact levels (explained further in Section 3.5).



Figure 3.1 Steps of CTUC Phase 2 Utility Analysis

3.2 Retrieving a CTUC Phase 2 Utility Analysis

After CTUC DST is opened, the computer will display the front page, as shown in Figure 3.2. On this page, the utility assessor can press the "View Previous CTUC Analysis" button to retrieve one of the CTUC analysis records created by TxDOT assessors in CTUC Phase 1 Analysis. In addition, the utility assessor can press the "About This Research" button to view the background information of this research project. The "About CTUC Decision-Making Process" button is linked to the CTUC decision-making process diagram. The "View User Guide" button will show this manual, and the "Exit" button will close the tool.



Figure 3.2 The Front Page of CTUC DST

3.2.1 Retrieve a CTUC Phase 2 Utility Analysis: Select a District and a Project

If the "View Previous CTUC Analysis" button is pressed, CTUC DST will ask the assessor to select a TxDOT district, as shown in Figure 3.3. After selecting the district, the assessor can press the "OK" button to see the list of all projects in the district, as shown in Figure 3.4. There are two list-boxes in Figure 3.4. The list-box on the left displays all projects CTUC DST has in this TxDOT district. The list-box on the right displays all utility adjustments included in the selected project.

Login - CTUC Decision Su	upport Tool 🛛 🔀
Please select your TxDOT dis	strict:
San Antonio	2
<u>OK</u>	Cancel

Figure 3.3 Select a TxDOT District

List of All Highway Projects a	nd Utility Adjustme	ents in This D	istrict - CTUC Dec	ision Sup	port Tool			
List of All Highway Projects and Utility Adjustments in the <u>TxDOT San Antonio District</u>								
1. Highway Projects in This Dist	rict:				2. Utility A	djustments in the Se	lected Highway	Project:
Highway Project Name (CCSJ)	Area Office	CTUC Phase	Password Needed?	Last A	Utility Adju	istment Name	Utility Typ	Password Needed
I-10 (1234-56-789)	Bexar Metro	Phase 2	No	John '	West Com High-V Pov	m. Cable (412 - 416) ver Line (Sta.410)	Comm. Trans.	No N/A
•				•	•			Þ
Previous Pag	je		Login as a TxDO	T User		Logi	in as a Utility U	ser

Figure 3.4 List of All Projects and Utility Adjustments within the TxDOT District

Six columns are presented in the list-box on the left: 1) Highway Project Name and Its CCSJ; 2) Area Office; 3) CTUC Phase; 4) Password Needed?; 5) Last Assessor; and 6) Assessment Date. The assessor can select any line item in the left-hand list-box, and the corresponding utility adjustments involved in the project will be displayed in the right-hand list-box. Five columns are presented in the right-hand list-box: 1) Utility Adjustment Name; 2) Utility Type; 3) Password Needed?; 4) Last Assessor; and 5) Assessment Date. Initially, because the utility assessor has not entered any data, the fourth and fifth columns will not contain any

information and the third column will always be "No," which means no password is needed for retrieving this utility adjustment's information. Note that assessors should not select any line item other than their utility adjustment name.

If the utility assessor has selected his or her utility adjustment in the right-hand list-box, the assessor can then press the "Login as a Utility User" button, or simply double-click the line item in the right list-box to retrieve the utility analysis data. Note that if a utility adjustment needs the password protection, CTUC DST will show "Yes" in the "Password Needed?" column for this utility adjustment and will provide a dialog box for the assessor to enter the password, as shown in Figure 3.5. If the password the assessor enters is correct, CTUC DST will allow the assessor's future requests.

Login - CTUC Decision	Support Tool	X
Password:	_	-
Login	Cancel	

Figure 3.5 Login Form for a Utility Adjustment with Password Protection

• For Demonstration Purposes

Because CTUC DST is equipped with some sample data, the essential steps of this section's functions will be explained here for demonstration purposes.

- 1) After pressing the "View Previous CTUC Analysis" button in Figure 3.2, assessors will see the window represented in Figure 3.3.
- 2) Assessors can select the "San Antonio District" option shown in Figure 3.3 to see two projects in the left-hand list-box shown in Figure 3.4.
- *3)* Assessors can select the first line item, whose project name is "IH 410 A," in the left list-box.
- 4) Assessors can see the list of all utility adjustments involved in the selected project, as shown in the right-hand list-box shown in Figure 3.4.
- 5) Assessors can double-click the first line item, whose utility adjustment name is "Water Line (Range/Station A-B)" to visit the step described in the next section. If assessors double-click the third line item, "High-V Power Line (Sta.410)" (a utility adjustment that needs no further CTUC analysis according to TxDOT assessors), utility assessors will see the message box shown in Figure 3.6.

Microsoft Excel	X
This utility adjustment does not need CTUC Phase 2 Analysis. Please s	elect another one.
ОК	

Figure 3.6 Message Box of Double-Clicking a Wrong Utility Adjustment

3.2.2 Retrieve a Previous CTUC Phase 2 Utility Analysis: Select an Analysis Record

One utility adjustment may have been analyzed many times. This section will describe the form layout and the actions required to retrieve one of the previously entered CTUC analysis records. Once the assessor has entered the correct password for the project, or has selected a utility adjustment that does not need any password, CTUC DST will show the list of all previous analysis records for this utility adjustment, as shown in Figure 3.7. Note that initially there should be no record in the list-box because the assessor has not yet analyzed this utility adjustment. In this case, the assessor can press the "New Analysis" button to show the form seen in Figure 3.8, in order to enter utility adjustment and assessor information.

History of CTUC Analysis Records - CTUC	Decision Support Tool		X
History of CTUC Analysis Reco	ords		
1. Basic Project Information			
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789	1.5 Current CTUC Anal	ysis Phase: Phase 2 Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321	1.6 Utility Adjustr	nent Name: Water Line (Range/Station A
1.3 Highway Project Name:	IH 410 A	1.7 Utility Typ	e Involved: Water and/or Wastewater
1.4 TxDOT District:	San Antonio (Bexar 410)		
Plassa Salast One of the Faller	ving Analysia Reports to Car	ntinuo	
2. Previous CTUC Analysis Records for This Utility	Adjustment:	nunue.	
Date Completed	Assessor's Name	Assessor's Email	Number of Questions Answered
8/3/2006 2:0:0 PM	Test Utility	utility@test.com	0
<u> • </u>			
Previous Page	Retrieve This Analysis	New Analysis	Delete This Analysis

Figure 3.7 History of Previous CTUC Analysis Records

Figure 3.7 shows seven unchangeable project information fields and one list-box of all analysis records within the utility adjustment. In CTUC DST, all information fields that are unchangeable are highlighted in yellow. These fields remind assessors of the current project and utility adjustment they are working on. The list-box at the bottom of the page shows four columns associated with each analysis record: 1) Date Completed; 2) Assessor's Name; 3) Assessor's Email; and 4) Number of Questions Answered. The first three columns convey basic information of each analysis, and the contents can be changed via the form discussed at the end of this section. The fourth column shows the number of questions answered by the assessor. Four buttons are shown in the bottom of Figure 3.7; these buttons can help the assessor navigate to the previous or next page. If there is at least one record in the list-box, and if the assessor selects an analysis record in the list-box and presses the "Retrieve This Analysis" button, or if the assessor double-clicks any analysis record, CTUC DST will show the utility adjustment and assessor information form of the selected analysis record, as shown in Figure 3.8. If the assessor selects an analysis record and presses the "New Analysis" button, CTUC DST will copy all internal data of the selected analysis record into the form shown in Figure 3.8 so that the assessor can begin a new CTUC analysis based on previous work. Finally, if the assessor selects an analysis record and presses the "Delete This Analysis" button, CTUC DST will delete all data associated with this analysis record.

Figure 3.8 shows the utility adjustment and assessor information. The assessor can change the utility number, whether or not it is a LPA, the description of the utility adjustment, and all assessor information fields. The utility adjustment name, the utility type, and the types of adjustment work cannot be changed. In other words, the TxDOT assessor must enter the correct information in the CTUC Phase 1 Analysis so that the utility assessor can obtain correct data in Figure 3.8.

• For Demonstration Purposes

- 1) Assume assessors select "Water Line (Range/Station A-B)" as the utility adjustment in the previous section, as Figure 3.7 shows.
- 2) If assessors do not see any record in the list-box, assessors can press the "New Analysis" button to show the form shown in Figure 3.8. Otherwise, assessors can double-click the any line item to retrieve the analysis data, as shown in Figure 3.8.
- 3) Assessors can fill out all questions and press the "Next Page: Questionnaire of This Utility Adjustment" button to save and visit the page described in the next section.

Phase 2 Utility Analysis: Utility Adjustment and Assessor	Information - CTUC Decision Support Tool	X
Utility Adjustment and Assessor Information	on	
1. Adjustment Information	[]	
1.1 Export District:	San Antonio (Bexar 410)	
1.2 Highway Project Name:	IH 410 A	
1.3 Utility Adjustment Name:	Water Line (Range/Station A-B)	
1.4 Otimity Type Involved:	Water and/or Wastewater	
1.5 Types of Utility Adjustment Work Involved:	Water	
1.6 Subject Utility Number		
1.0 Subject Stilly Namber.		
1.7 Is LPA?	Ves	
1.8 Description:	Additional information can be entered here.	
	For example, utility positions, contact persons, etc.	
2. Assessor Information		
2.1 Name or Individual Completing This Form:	Test Utility	
2.2 Date Completed:	2006 • August • 3 • 02:00 PM •	Now
2.3 Your Job Title:	Test Engineer	
2.4 Your Phone Number:	512 - 471 - 8417	
2.5 Your Email Address:		
	durcy@cest.com	
3.1 Would you like to create a password to restrict unauthoriz	red access to your analysis records? C Yes Password:	Change 🕞 No
Previous Page: History of CTUC Analysis Records	Next Page: Questionnaire of This Utility Adjustment	Save & Exit

Figure 3.8 Utility Adjustment and Assessor Information

3.3 Filling Out Project and Utility Questionnaires

This section describes the main activities of CTUC DST. When the assessor has finished entering utility adjustment and assessor information, the assessor can begin to analyze the applicability of CTUC for this utility adjustment. In the CTUC Phase 2 Utility Analysis, CTUC DST will ask assessors a series of questions, which include project-scope, utility-scope, and contract-related questions. Section 3.3.1 will discuss the project-scope questions. Section 3.3.2 will discuss the utility-scope questions.

3.3.1 Project-Scope Questions

There are five questions in Figure 3.9. Usually the assessor can only respond "Yes," "No," or "Don't know yet" to a question. For Question 2.5, the assessor needs to consider the current project situation regarding schedule pressures and select only one option that best describes the current circumstance.

Phase 2 Uti	Phase 2 Utility Analysis: Characteristics of This Highway Project (Step 1 / 5) - CTUC Decision Support Tool								
Charact	eristics of This Highway Project (Step ´		Highway Project Name:						
2.1 Do you e	expect HEAVY traffic conditions at the project location (e.g. ir) metropolitan or urban areas)?	C Yes 🖲 No C Don't know yet	IH 410 A					
2.2 Will CTU	C require substantially FEWER lane closures than the Conven	Test Utility							
execution? 2.3 Do physi	ical interferences EXIST between 2 or more adjusted utilities /	Assessment Input Steps:							
Theo w			Yes (* No C Don't know yet	#(FilledIn?) Form Type					
11 50, 14				2 (Yes) Utility Scope 1 3 (Yes) Utility Scope 2					
2.4 Can the adjustment v	adjustment be performed ONLY during the CONSTRUCTION P work is contingent upon some level of construction work comp	PHASE (e.g. permit issues or utility letion)?	Yes ⊂ No ⊂ Don't know yet	4 (Yes) Utility Scope 3 5 (Yes) Contract Issues					
2.5 Please se	elect which of the following options that can best describe the	e current project circumstance regarding	g schedule pressures:						
С	(1) The project HAS severe schedule pressures, and CTUC	can lead to EARLIER project completion	n.						
c	(2) The project HAS severe schedule pressures, and the u PS&E.	tility adjustment scope CANNOT be well	defined at approximately 60%						
С	(3) The project HAS schedule pressures, BUT not severely								
	Elaborate:								
	1								
۰	(4) The project DOES NOT HAVE severe schedule pressure	s.							
c	(5) Don't know yet.								
				I					
	Go to Previous Page	Go to Nex	kt Page	Save & Exit					
L	_	·							

Figure 3.9 Project-Scope Questions in CTUC Phase 2 Utility Analysis

Note that on the right side of Figure 3.9, CTUC DST will show the project name, the assessor's name, and a list-box displaying all pages or steps that will be presented later. CTUC DST will prepare only one page regarding all project-scope issues and will produce three pages for utility-scope questions and one page for contract-related questions.

The right list-box can be used as a shortcut to the other page. Traditionally, the assessor can press the "Go to Previous Page" or "Go to Next Page" button several times to go to the desired page. With use of the shortcut, assessors can also double-click the line item of the desired step to visit that page directly. In addition, the list-box also shows whether or not the assessor has filled in the page before. If the assessor does not answer any questions in a page and presses the "Go to Next Page" or "Go to Previous Page" button directly, CTUC DST will presume "Don't know yet" as the answer to all questions on that page.

• For Demonstration Purposes

- 1) Assume assessors represent "Water Line (Range/Station A-B)" and have finished the utility adjustment and assessor information page.
- 2) Assessors can answer these five project-scope questions, as shown in Figure 3.9.
- *3)* Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

3.3.2 Utility-Scope Questions

There are three pages of questions pertaining to this utility-scope group. As shown in Figures 3.10, 3.11 and 3.12, the utility adjustment name will be displayed at the top of the three pages. If the subject utility adjustment can have underground facilities that will be shared with other utility owners, Question 3.9 with two sub-questions will show. In other words, if the subject utility adjustment only includes the types of utility adjustment work such as overhead communication lines, overhead distribution power lines, and transmission poles, Question 3.9 will not show. Furthermore, if the assessor answers "No" to Question 3.9, Question 3.9.1 and Question 3.9.2 do not need to display because no shared facilities exist in the utility adjustment.

Figure 3.11 presents Questions 3.10 and 3.11, whose appearances are contingent on the certain types of utility adjustment work, e.g., relocating poles. Hence, because the type of utility adjustment work analyzed in Figure 3.11 is to relocate water lines, Questions 3.10 and 3.11 will be shown in a gray color and assessors cannot provide answers. Questions 3.14 and 3.15 are for analyzing the current condition of hazardous materials (HAZMAT). If the assessor thinks there is no HAZMAT in the site, he or she will select "No" to all of the sub-questions in Question 3.14. CTUC DST will then disable Question 3.15, which means the hypothetical circumstance is not applicable to the utility adjustment.

Note that CTUC DST will highlight the step that the assessor is currently working on in the list-box on the right side of the page. For Questions 3.2, 3.6, 3.9.1, 3.10, and 3.24, assessors can enter more than one line of words in the text boxes as comments on the project or utility adjustment.

• For Demonstration Purposes

- 1) Assessors can answer these ten questions, as shown in Figure 3.10, 3.11, and 3.12.
- 2) Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

Phase 2 Utility Analysis: Water Line (Range/Station A-B) : Physical Characteristics-1 (Step 2 / 5) - CTUC Decision Support Tool								
Water Line (Range/Station A-B)	: Physical Character	ristics-1	(Step 2 / 5)		Highway Proje	ct Name:		
3.1 Please indicate which of the listed utility adjustment scope descriptions are applicable	(1) Any extended casing?	Yes	C No	C Don't know yet	IH 410 A Assessor's Nar	ne:		
to this project:	(2) Any demolition/removal?	• Yes	C No	C Don't know yet	Test Utility			
3.2 Please comment on this adjustment scope:					Assessment In	put Steps:		
3.3 To what degree does the utility have PAST CT	UC EXPERIENCE?	None	C Some	Only Recently C Extensive	#(FilledIn?) 1 (Yes) 2 (Yes) 3 (Yes)	Highway Project Sco Utility Scope 1 Utility Scope 2		
3.4 What is the likelihood that the utility will PART. adjustment?	ICIPATE in CTUC for this	• High	C Medium	C Low C Don't Know	4 (Yes) 5 (Yes)	Utility Scope 3 Contract Issues		
3.5 Will this utility likely allow the TxDOT contractor INFRASTRUCTURE (e.g. manholes, poles, conduit	or to ONLY install utility , etc.)?	Yes	C No	C Don't know yet				
3.6 Which elements of this adjustment can the po TxDOT contractors perform?	ol of likely Can Do:							
Which elements can they not perform?	Can't Do:							
3.7 Is it possible that the pool of likely TxDOT con HIRE a subcontractor from a list of pre-qualified c utility?	tractors will be WILLING to ontractors provided by the	• Yes	C No	C Don't know yet				
3.8 Can only the UTILITY's CREW perform the util	ity adjustment?	Yes	C No	C Don't know yet				
3.9 Does the utility share the same underground p vaults, trenches at different depths, multi-duct co other utilities?	ohysical facilities (e.g. utility nduits, or utility corridors) with	Yes	C No	C Don't know yet				
 If the utility being analyzed is sha utility(s) share that facility? 	aring a physical facility, which							
(2) Will CTUC increase utility adjustment benefits to all involved utilities?	ent coordination and provide	• Yes	C No	C Don't know yet				
Go to Previous Page			Go to Nex	kt Page	Sav	e & Exit		

Figure 3.10 Utility-Scope Questions in CTUC Phase 2 Utility Analysis: Part 1

Phase 2 Utilit	y An	llysis: Water Line (Range/Station A-B) : Physical Cha	racteristics-2 (St	ep 3 / 5) - CTUC Decision Sup	port Tool	X
Water Line	(Ra	nge/Station A-B) : Physical Characteristics	-2 (Step 3 / 5)		Highway Proj	ect Name:
3,10 Does the ut		are a set of poles with other utilities?		C Ves C No. C Dop't know yet	IH 410 A	
				Test Utility	,	
IF	the u]			
3.11 If the utility circumstance?	bein	analyzed is sharing a set of poles, please select which of the follow	ing options that can b	pest describe the current project	#(FilledIn?) 1 (Yes)	Form Type Highway Project Sco
	С	(1) Both the pole owner and tenant utilities are willing to join CTUC		2 (Yes) 3 (Yes)	Utility Scope 1 Utility Scope 2	
	0	(2) The pole owner IS NOT willing to join CTUC, but the others ARE	4 (Yes) 5 (Yes)	Utility Scope 3 Contract Issues		
	0	(3) The pole owner IS willing to join CTUC but the pole tenants ARE	NOT,			
	0	(4) All utilities ARE NOT willing to comply with the CTUC schedule.				
	$^{\circ}$	(5) Don't know yet.				
3.13 Is the utility 3.14 Are HAZMA	/-adju .T con	tment-related site clearing and grubbing SUBSTANTIAL on the proje itions expected for this utility adjustment?	ect?	Yes ○ No ○ Don't know yet		
(1	l) Asb	istos:	C No 🔍 Small (⊂ Medium ⊂ Large ⊂ Don't know		
(2	2) Lea	ing underground storage tanks:	C No 📀 Small (Medium C Large C Don't know		
(3	3) Cor	aminated soils:	C No 📀 Small (○ Medium ○ Large ○ Don't know		
(4	i) Cor	aminated groundwater:	C No 📀 Small (🗧 Medium 🤍 Large 🔍 Don't know		
(5	5) Oth	er:	C No 📀 Small (🛇 Medium 🔿 Large 🌀 Don't know		
3.15 Does HAZM	IAT-re	, ated work apply ONLY to the utility adjustment work?		☞ Yes ∩ No ∩ Don't know yet	•	
		Go to Previous Page	Go to Ne	ext Page	Sa	ive & Exit

Figure 3.11 Utility-Scope Questions in CTUC Phase 2 Utility Analysis: Part 2

Phase 2 Utility Analysis: Water Line (Range/Station A-B) : Physical Characteristics-3 (Step 4 / 5) - CTUC Decision Support Tool 🛛 🛛 🔀							
Phase 2 Utility Analysis: Water Line (Range/Station A-B) : I Water Line (Range/Station A-B) : Physical Char 3.16 Will the CTUC contractor (who will do both utility adjustment and high more EFFECTIVE at controlling traffic for the project (vs. Conventional)? 3.17 Will the CTUC approach have better safety control (e.g. better use of the conventional paper and will have better safety control (e.g. better use of the conventional approach will have better safety control (c) The Convent	Physical Characteristics-3 (Ste acteristics-3 (Step 4/5) way construction) be significantly of barricades, traffic control, etc.)? trol. 'ety control. he project and the TxDOT	Yes C No C Don't know yet Yes No C Don't know yet	port Tool Highway Project Name: IH 410 A Assessor's Name: Test Utility Assessment Input Steps: #(FilledIn?) Form Type 1 (Ves) Highway Project Sco 2 (Ves) Utility Scope 1 3 (Ves) Utility Scope 3 5 (Ves) Contract Issues				
3.19 Can the utility provide a set of specifications that are acceptable to T responsibility, liability, and risk? 3.20 What is the utility's attitude toward design specifications for the proj. () The utility is willing to ADOPT TXDOT design specifications (compr () The utility will USE utility design specifications for (4) Don't know yet.	XDOT in terms of assignment of ect? cifications for the project. ised of the utility and TXDOT provision r the project.	Yes No C Don't know yet					
 3.21 Will the utility's crews be FREED UP for other projects as a result of C 3.22 Does the utility adjustment include an extensive amount of utility factorsportation work? 3.23 Does the utility adjustment work include any detrimental changes to t 3.24 Please list any ADDITIONAL APPROVAL required prior to utility adjust 	:TUC? Ility upgrades in relation to the the project's environmental clearance? ment (e.g. Transmission adjustments r	Yes O No O Don't know yet Yes No O Don't know yet Yes No O Don't know yet Yes No O Don't know yet					
Reliability Council of Texas before beginning adjustment work.): Go to Previous Page	Go to Nex	xt Page	Save & Exit				

Figure 3.12 Utility-Scope Questions in CTUC Phase 2 Utility Analysis: Part 3

3.3.3 Contract-Related Questions

As noted before, the reimbursability of a utility adjustment can be reimbursable or non-reimbursable. Hence, the contract-related questions will be presented in accordance with the type of reimbursability the assessor selects in Question 4.1, as shown in Figure 3.13 and 3.14. Figure 3.13 shows contract-related questions for reimbursable utility adjustments, while Figure 3.14 shows contract-related questions for non-reimbursable utility adjustments.

• For Demonstration Purposes

- 1) If the utility adjustment is 100 percent reimbursable, assessors can answer these two questions, as shown in Figure 3.13.
- 2) If the utility adjustment is non-reimbursable, assessors can answer these nine questions as shown in Figure 3.14.
- *Assessors can press the "Go to Next Page" to save the information and proceed to the next page.*

Phase 2 Utility Analysis: Water Line (Range/Station A-B) : Contract Characteristics (Step 5 / 5) - CTUC Decision Support Tool								
Water Line (Range/Station A-B) : Contract Cha	racteristics (Step 5 / 5)		Highway Project Name:					
4.1 Is the eligibility ratio of the adjustment 100% or NEARLY 100%?	IH 410 A							
	Assessor's Name:							
Reimbursement Type								
Since this is a REIMBURSABLE adjustment:			Assessment Input Steps: #(FilledIo?) Form Type					
 4.2 How will the utility's cost of adjustment be affected (CTUC vs. Com (1) CTUC adjustment costs will be more than 15% (2) CTUC adjustment costs will be 5%-15% CHEA (3) CTUC adjustment costs will be 5%-15% MORI (4) CTUC adjustment costs will be 5%-15% MORI (5) CTUC adjustment costs will be 5%-15% MORI (6) Don't know yet. 4.3 Will possible UTILITY DELAY COSTS be reduced due to the adjustme contractor? 	1 (Ves) Highway Project Sco 2 (Yes) Utility Scope 1 3 (Yes) Utility Scope 2 4 (Yes) Utility Scope 3 5 (Yes) Contract Issues							
		Clean						
Go to Previous Page	Go to Nex	kt Page	Save & Exit					

Figure 3.13 Contract-Related Questions for Reimbursable Adjustment

P	hase 2 Utility An	alysis: West Comm. Cable (412 - 416) : Contract Characteristics (Step	o 5 / 5) - CTUC Decision Supp	ort Tool 🛛 🔀
1	West Comm. C	Cable (412 - 416) : Contract Characteristics (Step 5 / 5)		Highway Project Name:
	4.1.Ts the eligibility rat	IH 410 A		
	rit to cho oligiolicy rac	Assessor's Name:		
	Reimbursem	ent Type		Test 2
	Since this is	Assessment Input Steps:		
				1 (Yes) Highway Project Sco
	5.1 If some of the a	djustment work is reimbursable, what is the ELIGIBILITY RATIO for this utility adjustment	? %	2 (Yes) Utility Scope 1 3 (Yes) Utility Scope 2
	5.2 Can the utility pa	ay for adjustments in advance?	C Yes 🖲 No. C Don't know vet	4 (Yes) Utility Scope 3 5 (Yes) Contract Issues
				S (Tes) Conduct Issues
	5.3 If the utility is N QUALIFY for State I	OT ABLE to make 100% of the funding available in escrow before construction, can it nfrastructure Bank funding?	C Yes 🖲 No 🔿 Don't know yet	
	5.4 Will increased ut (UNBALANCED BIDD	ility adjustment costs likely occur due to the TxDOT contractor's FRONT-END LOADING ING)?	Yes ○ No ○ Don't know yet	
	5.5 Will there be incr	reased contractor CHANGE ORDER frequencies or markups?	Yes ○ No ○ Don't know yet	
	5.6 Will increased co	osts result from the ADDED CONTRACTUAL TIER of subcontractors?		
	5.7 Will possible UTI contractor?	LITY DELAY COSTS be reduced due to the adjustment schedule controlled by the CTUC		
	5.8 Will increased IN result from CTUC?	IDIRECT COSTS to utilities from TxDOT charges for Engineering and Contingency fees		
	5.9 Based on the ab	ove cost drivers, how will the utility's cost of adjustment be affected (CTUC vs. Conventi	ional)?	
	۲	(1) CTUC adjustment costs will be more than 15% CHEAPER than the Conventional app	roach for the project.	
	0	(2) CTUC adjustment costs will be 5%-15% CHEAPER than the Conventional approach	for the project.	
	C	(3) CTUC adjustment costs will be approximately the same as the Conventional approac	h for the project.	
	С	(4) CTUC adjustment costs will be 5%-15% MORE EXPENSIVE than the Conventional ap	proach for the project.	
	0	(5) CTUC adjustment costs will be more than 15% MORE EXPENSIVE than the Convention	onal approach for the project.	
	С	(6) Don't know yet.	Clean	
[(Go to Previous Page Go to Ne	ext Page	Save & Exit

Figure 3.14 Contract-Related Questions for Non-Reimbursable Adjustment

3.4 Reviewing Top Six CTUC Decision Drivers

CTUC DST has two different types of reports. One is the graphical report and the other is the text report. After the assessor has answered all questions in the previous section, CTUC DST is able to generate the reports in order to demonstrate the experts' opinions with regard to the applicability of the CTUC approach for the utility adjustment. This section focuses on how to generate the graphical report of the analysis results, while Section 3.5 will describe the production of the detailed text report for the utility adjustment.

3.4.1 Report Setting for the CTUC Phase 2 Utility Analysis

There are two questions for report setting of the CTUC Phase 2 Utility Analysis, as shown in Figure 3.15. The first question is about selecting the scope of the expert group to be incorporated into the knowledge base. The second question is about selecting which types of utility experts to be incorporated into the knowledge base. The knowledge base will be applied to interpret the analysis results; hence, the assessor needs to specify the source of the knowledge base.

More Report Settings - CTUC Decision Support Tool
Report Settings for Utility Analysis
Which knowledge base source would you like to use in order to generate the report?
C Utility CTUC experts from San Antonio, Houston, and Dallas districts.
C Utility CTUC experts from your district (if available).
Utility CTUC experts from all types of utilities.
C Utility CTUC experts from your type of utilities.
\bigcirc Utility CTUC experts from either W/WW or Non-W/WW types of utilities.
OK Cancel

Figure 3.15 Report Setting for CTUC Phase 2 Utility Analysis

Because the reports in CTUC DST are dedicated to the explanation of the applicability of CTUC for the utility adjustment, the utility assessor may want to review opinions from utility experts in their districts only or from all Texas utility experts, whose opinions have been collected and stored in CTUC DST. Presently, the knowledge base of CTUC DST includes the opinions of utility experts who had attended the CTUC decision drivers assessment workshops in the San Antonio, Houston, and Dallas districts. Hence, if the assessor is from one of the three districts, he or she can select the knowledge base source with either three districts, CTUC DST will use the default value, which is the knowledge base source with the three districts combined, regardless of the assessor's choice.

For the second question, the utility assessor may want to review the opinions from their types of utility experts only. In some situations, the assessor may want to review the opinions from all types of utility experts so that he or she can get a general idea regarding a specific issue. In addition, because most past CTUC projects belong to the water and wastewater types of utilities, if the assessor would like to know the general idea from the utility companies who have occasionally applied the CTUC approach before, the assessor can select the third option in the second question, which is "utility CTUC experts from either W/WW or Non-W/WW types of utilities."

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) Assessors can select the option entitled "Utility CTUC experts from San Antonio, Houston, and Dallas districts."
- 2) Assessors can select the option entitled "Utility CTUC experts from all types of utilities."
- 3) Assessors can press the "OK" button to see the graphical report.

3.4.2 Graphical Report of CTUC Phase 2 Utility Analysis

Figure 3.16 shows the graphical report. There are six major areas in this report: 1) Report Title, 2) Report Info., 3) Control Panel, 4) Top 6/6 Decision Drivers, 5) Level of Pro-CTUC, 6) Level of Anti-CTUC. The following paragraphs will describe each area in more detail.

1. Report Title (at the top of the report)

CTUC DST will show the project name and district information in the first line of the report title. The name of the utility adjustment and the abbreviation of the utility type involved will be shown in the second line of the report title.

2. Report Info. (in the upper left side of the report)

CTUC DST will show the name of the assessor, the analysis date, and the print date. In the file named "Knowledge Base Source," CTUC DST will show the knowledge base source the assessor selected in Section 3.4.1. Finally, the color used to reflect the impact level of the given project circumstance will be shown in the file named "Legend."

3. Control Panel (in the lower left side of the report)

Five buttons are provided in this area. The button labeled "Report Setting" will invoke the report setting form as shown in Figure 3.15. The button labeled "Previous Page" will trigger the contract-related form mentioned in Section 3.3.3. The button labeled "Next: Detailed Rpt." will invoke the text report discussed in the next section. The button labeled "Print" will

prompt the active printer name and print the current page. The button labeled "Exit" will save all data and close CTUC DST.

4. Top 6/6 Decision Drivers (in the middle column of the report)

This area lists twelve decision drives that will most influence the CTUC decision, either in a positive or negative way. Each decision driver is enclosed by a gray box with underline and correlates with one question mentioned in Section 3.3. The abbreviated description of the project circumstance, which was specified by the assessor as the best answer to the question, is shown below the decision driver. The assessor can click any box in this area to get more explanation, as shown in Figure 3.17. For example, the first Pro-CTUC decision driver is "(R)Utility Delay Costs" and its project circumstance is "Reduced costs with CTUC," as shown in Figure 3.16. If the assessor wonders why CTUC DST shows such a result, he or she can click the box of "(R)Utility Delay Costs" to show a detailed explanation, as shown in Figure 3.17, which displays the original question and the assessor's answer to the question.



Figure 3.16 Graphical Report of the Analysis Results from Utility Perspective

5. Level of Pro-CTUC (in the second left column of the report)

The level of Pro-CTUC for each decision driver is derived from the average opinion of the experts concerning the given project circumstance listed in the middle of the form. Basically, in order to develop the knowledge base, these experts have been asked to use "High Impact," "Medium Impact," "Low Impact," or "No Impact" to assess the given project circumstance's

impact level on the CTUC decision. Furthermore, CTUC DST uses "3" to represent "High Impact," "2" to represent "Medium Impact," "1" to represent "Low Impact," and "0" to represent "No Impact," as shown in the bottom line of the form. Therefore, a project circumstance with a lengthy green bar means almost all experts think the current situation will influence the CTUC decision in a positive way, i.e., Pro-CTUC. Note that the level of Pro-CTUC is primarily determined by the *experts, not* by the *assessor*. However, the assessor can decide the group of experts to be used as the knowledge base source. If the assessor selects the combination of San Antonio, Houston, and Dallas districts as the knowledge base source, the total number of experts should be 24 (N=24) in current CTUC DST. For example, the impact level of the top Pro-CTUC decision driver is "+2.6 (N=18)," which means most of the eighteen experts think the given project circumstance is Pro-CTUC and has "High Impact" on the CTUC decision. Experts who select "Don't Know" for the project circumstance will be excluded from the impact level calculation.

Explanatio	n of the CTUC Decision Driver - CTUC Decision Support Tool	×				
– Explai	nation of the CTUC Decision Driver					
Question:	#4.3 If the adjustment is reimbursable, will possible UTILITY DELAY COSTS be reduced due to the adjustment schedule controlled by the CTUC contractor?					
Answer:	Yes, possible UTILITY DELAY COSTS could be reduced due to the adjustment schedule controlled by the CTUC contractor.					
	Close					

Figure 3.17 Short Explanation of the CTUC Decision Driver

6. Level of Anti-CTUC (in the right column of the report)

The format of the level of Anti-CTUC for each decision driver is similar to that of the level of Pro-CTUC. Basically, CTUC DST uses "-4" to represent "Show Stopper," "-3" to represent "High Impact," "-2" to represent "Medium Impact," "-1" to represent "Low Impact," and "0" to represent "No Impact", as shown in the bottom line of the form. Therefore, a project circumstance with a lengthy red bar means almost all experts think the current situation will influence the CTUC decision in a negative way, i.e., Anti-CTUC. The last blue column represents the resolvability of each decision driver. Since the experts have been asked to assess whether or not process changes could facilitate the use of CTUC, CTUC DST is able to show the resolvability results by displaying "Yes" for such project circumstances identified by the experts.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

1) Assessors can click the top decision driver box to show the dialog box in Figure 3.17, which is the most Pro-CTUC decision driver.

3.5 Reviewing the Text Report of the CTUC Decision

Because the graphical report can show only the top six Pro-CTUC or Anti-CTUC decision drivers, the text report is designed to supplement other important opinions regarding the CTUC applicability of the given utility adjustment. For example, some questions described in Section 3.3 are currently unknown to the assessor but have significant impact levels on the CTUC decision from the experts' perspectives. Hence, the text report will list all impact level types of CTUC decision drivers in order for the assessor to comprehend the CTUC applicability of the given utility adjustment and to learn lessons from experts.

3.5.1 Text Report of CTUC Phase 1 Analysis

Figure 3.18 shows the text report of CTUC Phase 2 Utility Analysis for the sample utility adjustment. The layout of this report is similar to the graphical one; therefore, only the portions that vary between the two reports are described:



Figure 3.18 Text Report of Utility Adjustment Analysis Results

1. Pro-CTUC (in the first list-box)

This table has three columns described as follows: 1) Decision Variable: manifests the name of each Pro-CTUC decision driver; 2) Project Circumstance: manifests the current project

circumstance specified by the assessor; 3) Impact Level: manifests the numerical impact level assessed by the experts for the project circumstance. Note that these Pro-CTUC decision drivers are ranked according to their impact levels. The assessor can double-click any line item to show the detailed experts' opinions, as shown in Figure 3.19.

2. Anti-CTUC (in the second list-box)

This table has five columns described as follows: 1) Decision Variable: shows the name of each Anti-CTUC decision driver; 2) Project Circumstance: shows the current project circumstance specified by the assessor; 3) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 4) Resolvable?: shows whether or not the project circumstance could be resolved to facilitate CTUC by any process change from experts' views; 5) Controlling Party: shows what percentage of each controlling party is responsible for such process changes. Note that these Anti-CTUC decision drivers are ranked according to their impact levels. The assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 3.19.

3. Neutral (in the third list-box)

This table has two columns described as follows: 1) Decision Variable: shows the name of each Neutral decision driver, which by definition will not influence the CTUC decision; 2) Project Circumstance: shows the current project circumstance specified by the assessor. Note that these Neutral decision drivers are ranked according to their original question numbers and can help decision-makers make the CTUC problem simper by eliminating unnecessary factors. The assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 3.19.

4. Don't Know (in the fourth list-box)

This table has four columns described as follows: 1) Decision Variable: shows the name of each decision driver which corresponds to a question unknown to the assessor; 2) Project Circumstance: shows one of the possible answer to this unknown question; 3) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 4) Pro/Neutral/Anti-CTUC: shows "Pro" if the impact level is positive, "Anti" if the impact level is negative, and "Neutral" if the impact level is zero. Note that these "Don't Know" decision drivers are ranked according to their absolute values of the impact levels. The assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 3.19.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) After assessors have reviewed the graphical report, assessors can press the "Next: Detailed Rpt." button to show the text report.
- 2) Assessors can double-click the first line item in "Pro-CTUC" to show the dialog box of Figure 3.19.
- *3)* Assessors can double-click the second line item in "Anti-CTUC" to show the dialog box of Figure 3.20.

3.5.2 Review of Detailed Experts' Opinions

If assessors double-click any line item in any of the list-boxes in Figure 3.18, CTUC DST will display the dialog box containing detailed experts' opinions as shown in Figure 3.19 or 3.20. There are three blocks in this form. The first block, titled "Review of Project Circumstance,"

shows the question and answer for the decision driver and project circumstance respectively. For some project circumstances, CTUC DST will also show the suggestion from experts.

Review of Experts' Opinions - CTUC	Decision Support Tool								
Review of Project Circumstance									
Question: #4.3 If the adjustment is adjustment schedule contr	#4.3 If the adjustment is reimbursable, will possible UTILITY DELAY COSTS be reduced due to the adjustment schedule controlled by the CTUC contractor?								
Answer: Yes, possible UTILITY DEL CTUC contractor.	Yes, possible UTILITY DELAY COSTS could be reduced due to the adjustment schedule controlled by the CTUC contractor.								
– Experts' Opinions									
Data Sample Attributes:	Pro-CTUC:	Anti-CTUC:							
Type: All Utilities	High Impact %: 58.33	Show Stopper %: 0.00							
District: SAT/HOU/DAL	Medium Impact %: 4.17	High Impact %: 0.00							
# of Experts: 24	Low Impact %: 8.33	Medium Impact %: 0.00							
Years of Work 291	Don't Know %: 25.00	Low Impact %: 0.00							
Experience:		Neutral %: 4.17							
What % of Experts Think the 16.67 Situation Is Resovable?	Responsible Party 44.44 Utility TxDOT %:	%: 33.33 Others %: 22.22							
Your Opinion									
Do You Agree Wi	thit? ③ Yes C No		Temporarily						
From your perspective, the situation is	: The impact level is:		overwrite experts'						
C Pro-CTUC C Neutral	C Anti-CTUC C Show-Stopper	C High C Medium C Low	opinions?						
Who is/are responsibile for possible process changes to facilitate CTUC: No One TxDOT Utility Others									
Comment:									
			Cancel						
,									

Figure 3.19 Detailed Explanation of the CTUC Decision Driver: Without Any Change

The second block, titled "Experts' Opinions," will list basic attributes of the expert group and show distribution of the experts' opinions for impact level and resolvability. For example, as shown in Figure 3.19, assessors can realize that six (24*25%=6) of the 24 experts can not judge the impact level, i.e., select "Don't Know," on CTUC based on the given project circumstance. Four (24*16.67%=4) of the 24 experts thought the given project circumstance could be resolved to facilitate CTUC, and almost one-half of the four experts thought TxDOT is responsible for process changes.

Review of E	Experts' Opinions - CTUC	Decision Support Tool							
Review	w of Project Circum	istance							
Question:	#3.08 Can only the UTILITY's CREW perform the utility adjustment?								
Answer:	Yes, only the UTILITY's crew can perform the utility adjustment.								
– Expert	s' Opinions								
Data Sam	ple Attributes:	Pro-CTUC:	Anti-CTUC:						
Ту	/pe: All Utilities	High Impact %: 0.00	Show Stopper %: 54.17						
Dist	rict: SAT/HOU/DAL	Medium Impact %: 0.00	High Impact %: 25.00						
# of Expe	erts: 24	Low Impact %: 0.00	Medium Impact %: 0.00						
Years of W	/ork 291	Don't Know %: 12 50	Low Impact %: 0 00						
Experier	nce:	12.00	Neutral %: 8.33						
What % ol Situa	f Experts Think the 29.17 ation Is Resovable?	Responsible Party 22.22 Utility TxDOT %:	%: 77.78 Others %: 0.00						
- Your C	pinion								
	Do You Agree Wit	h It? C Yes 💿 No		Temporarily					
From your	perspective, the situation is:	The impact level is:		overwrite					
C Pro-C	TUC C Neutral	Anti-CTUC Show-Stopper	• High C Medium C Low	opinions?					
Who is/ar	e responsibile for possible pro	cess changes to facilitate CTUC: 🔲 No	One 🔽 TxDOT 🔽 Utility 🗖 Others						
Comment:				OK					
				Cancel					

Figure 3.20 Detailed Explanation of the CTUC Decision Driver: With Changes

The third block, titled "Your Opinion," provides a place to enter the assessor's own opinion. Figure 3.19 demonstrates the case where the assessor agrees with the experts' opinions; hence, the assessor cannot select any option or enter any comment in this block. The "OK" button and the "Cancel" button provide the same function, which is to close the dialog box without modifying any data. Note that if the assessor has double-clicked the decision drivers that are "Don't Know" or originally "Neutral," the assessor cannot select "No" as the answer to "Do You Agree with It?"

Figure 3.20 illustrates a case in which the assessor does not agree with the experts' opinions. The assessor can then answer the three assessment questions and enter some comments in the bottom text box. Finally, if the assessor wants to temporarily overwrite the experts' opinions, which means the impact level associated with this project circumstance will be

changed, he or she can check the box labeled "Temporarily overwrite experts' opinions?". In this case, the assessor will see the change of this impact level in both the graphical report and the text report. Note that the knowledge base source is still unaltered. The assessor can use the following steps to get back the original experts' opinions: 1) the assessor can select another group as the knowledge base source; 2) CTUC DST can generate a new report in order to overwrite current opinions; 3) the assessor can then select the original expert group as the knowledge base source; 4) CTUC DST can thus generate the original report.

If the assessor gives his or her own comments without checking the box labeled "Temporarily overwrite experts' opinions?", both experts' opinions and the assessor's comments will be stored in CTUC DST, and the assessor's opinion can be retrieved later in order to retrospect to project situations.

3.6 End of CTUC Phase 2 Utility Analysis

When the assessor has reviewed both the graphical and text reports, the CTUC Phase 2 Utility Analysis is complete. Hence, the assessor can print all analysis results, just close the tool, or visit previous pages to make modifications. Figure 3.21 shows the form that presents those options. Figure 3.22 shows a portion of the final report for the utility adjustment.

End of Analysis - CTUC Decision Support Tool
CTUC Phase 2 Utility Analysis Is Now Completed.
Print All Analysis Results
Save & Exit
Go to Previous Page

Figure 3.21 End of CTUC Phase 2 Utility Analysis

31	dicrosoft Excel - 060831CTUCD	ST .xls										
:8	Eile Edit Yiew Insert Form	at Iools Data	Window	Help Ad	obe PDF					Туре а que	stion for help	8
10	S 2 4 3 3 4 7	11 × 4 18 •	310	+ 12 +]	😓 Σ - 👌	+ 31 📖	46 90%	• 🔞 🛓 🗄	828.			
Tit	nes New Roman 👻 12 👻 🖪	<i>I</i> <u>U</u> ≣ ≣ :	= m	\$ % 1	00. 0.	# # I 🗉	• 🕅 • A	- 15	Security	12 * 210		
1	A2 -	fx						_	_		-	
	A	В	С	D	E	F	G	Н	I	J K	L	M
1		Assessme	nt Res	ults o	f CTUC	Phase	2 Utility	/ Analys	sis		Backto	Tool
2												
3	Utility Adjustment Nam	e: Water Line	(Range	Statio	1 A-B)							
4											<	
5	Section 1: Project Infor	mation										
6	1. TxDOT District:	San Antonio										
7	2. TxDOT Area Office:	Bexar 410										
8	3. Highway Project Name:	IH 410 A		1								

Figure 3.22 Excel Worksheet for CTUC Phase 2 Utility Analysis Final Report

When the assessor presses the "Print All Analysis Results" button in Figure 3.21, CTUC DST will display an Excel worksheet to list the CTUC analysis results. The assessor can print or print-preview this preformatted worksheet just like a normal Excel worksheet. The assessor can also go back to CTUC DST by pressing the "Back to Tool" button in the top row in the worksheet as Figure 3.22 shows.

• For Demonstration Purposes

- 1) After assessors have reviewed the text report, assessors can press the "Go to Next Page" in Figure 3.18 to complete CTUC Phase 2 Utility Analysis.
- 2) Assessors can press the "Print All Analysis Results" button to view the Excel worksheet report.
- *3) CTUC DST will prompt a message box to alert that the report has been generated successfully.*
- 4) Assessors can print the Excel worksheet report as shown in Figure 3.21.
- 5) Assessors can press the 'Back to Tool" button in Figure 2.22.
- 6) Assessors can press the "Save & Exit" button to save and close CTUC DST.

4. CTUC Phase 2 TxDOT Analysis

4.1 Overview of CTUC Phase 2 TxDOT Analysis

This chapter describes use of CTUC DST for performing CTUC Phase 2 TxDOT Analysis, which is primarily operated by TxDOT assessors. Step-by-step instructions are given as shown in Figure 4.1. The first step is about retrieving one CTUC Phase 2 TxDOT Analysis record and reviewing the project configuration information (explained further in Section 4.2). After completing these project information forms, the TxDOT assessor will be asked a series of yes/no questions concerning the project-specific issues and characteristics (explained further in Section 4.3). In Step 3, because generating comparison reports require that the utility assessors finish their analyses, the TxDOT assessor should review their responding status and select the appropriate utility analysis record (explained further in Section 4.4). In Step 4, the TxDOT assessor will specify the knowledge base sources, and CTUC DST will show the graphical analysis results for both parties. The assessor will see both parties' experts' opinions regarding the applicability of CTUC for the selected utility adjustment in the format of bar charts (explained further in Section 4.5). Finally, CTUC DST will show the text report listing all decision drivers in accordance with the ranking of their impact levels for both parties (explained further in Section 4.6).



Figure 4.1 Steps of CTUC Phase 2 TxDOT Analysis

4.2 Retrieving a CTUC Phase 2 TxDOT Analysis

After CTUC DST is opened, the computer will display the front page as shown in Figure 4.2. This is the same page as in CTUC Phase 1 Analysis. The following sections will describe the steps required to perform CTUC Phase 2 TxDOT Analysis.



Figure 4.2 The Front Page of CTUC DST

4.2.1 Retrieve a CTUC Phase 2 TxDOT Analysis: Select a District and a Project

Pressing the "View Previous CTUC Analysis" button in Figure 4.2 is the starting point of CTUC Phase 2 TxDOT Analysis. CTUC DST will ask the assessor to select a TxDOT district as shown in Figure 4.3. After selecting the district, the assessor can press the "OK" button to see the list of all projects in the district as shown in Figure 4.4. There are two list-boxes in Figure 4.4. The left list-box displays all projects CTUC DST has in this TxDOT district. The right list-box is for utility assessors, as discussed in Chapter 3.

Six columns are presented in the left list-box in Figure 4.4: 1) Highway Project Name and Its CCSJ, 2) Area Office, 3) CTUC Phase, 4) Password Needed?, 5) Last Assessor, 6) Assessment Date. The assessor can either select any line item whose CTUC Phase is equal to 2 and press the "Login as a TxDOT User" button, or simply double-click the line item in order to retrieve the project analysis data. Note that if a project needs the password protection, CTUC

DST will show "Yes" in the "Password Needed?" column for this project and will prompt a dialog box for the assessor to enter the password as shown in Figure 4.5. If the password the assessor enters is correct, CTUC DST will then be allowed to process future assessors' requests.

ogin -	CTUC Decision Su	pport Tool	
Please	select your TxDOT dist	rict:	
	San Antonio		-
	ок	Cancel	1

Figure 4.3 Select a TxDOT District



Figure 4.4 List of All Projects within the TxDOT District

• For Demonstration Purposes

Since CTUC DST is equipped with some sample data, the essential steps of this section's functions will be explained here for demonstration purposes.

- 1) After pressing the "View Previous CTUC Analysis" button in Figure 4.2, assessors will see Figure 4.3.
- 2) Assessors can select the "San Antonio District" in Figure 4.3 to see two projects in the left list-box in Figure 4.4.
- 3) Assessors can select the first line item, whose project name is "IH 410 A," to experience the login process as shown in Figure 4.5.
- 4) Assessors can enter "abc" as the password to go to the step described in the next section.
- 5) Assessors can also select the second line item, whose project name is "IH 10," to go to the next step without experiencing the login process.

upport Tool	X
_	-
Cancel	
	upport Tool Cancel

Figure 4.5 Login Form for a Project with Password Protection

4.2.2 Retrieve a Previous CTUC Phase 2 TxDOT Analysis: Select a Analysis Record

One project may have been analyzed many times. This section will describe the form layout and the actions required to retrieve one of the previous CTUC analysis records. After the assessor enters the correct password for the project, or the assessor selects the project that does not need any password, CTUC DST will show the list of all previous analysis records for this project as shown in Figure 4.6.

Figure 4.6 shows six, unchangeable project information fields and one list-box of all analysis records within the project. In CTUC DST, all unchangeable information fields are marked in yellow. These fields can remind assessors of the current project they have worked on. The bottom list-box shows four columns associated with each analysis record: 1) Date Completed, 2) Assessor's Name, 3) CTUC Phase of This Analysis, 4) Number of Questions Answered. The first two columns are about basic information of each analysis, and the contents can be changed via the form discussed in the end of this section. The third column is about the current CTUC phase of each analysis, and the value can be "Phase 1" or "Phase 2." Note that the information field labeled "1.5 Current CTUC Analysis Phase" in Figure 4.6 means the current CTUC phase of *the project*, and this field will be changed from "Phase 1" to "Phase 2" as long as the CTUC Phase 2 TxDOT Analysis has been performed. The final column is about how many questions the assessor has answered.

Four buttons are shown in the bottom of Figure 4.6; these buttons can help the assessor navigate to the previous or next page. If the assessor selects an analysis record in the list-box and presses the "Retrieve This Analysis" button, or if the assessor double-clicks any analysis record, CTUC DST will show the project and assessor information form of the selected analysis record as shown in Figure 4.7. If the assessor selects an analysis record and presses the "New Analysis" button, CTUC DST will copy all internal data from the selected analysis record into the form of

Figure 4.7 so that the assessor can begin a new CTUC analysis (either Phase 1 or Phase 2) based on previous work. If the assessor just presses the "New Analysis" button without selecting any analysis record, a blank form of Figure 4.7 will be created. Finally, if the assessor selects an analysis record and presses the "Delete This Analysis" button, CTUC DST will delete all data associated with this analysis record.

History of CTUC Analysis Records - CTUC Decision Support Tool								
History of CTUC Analysis Reco	rds							
1. Basic Project Information								
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789	1.5 Current CTUC Anal	ysis Phase: Phase 2 Explain					
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321	1.6 Number of Utility Adjustments Involved in T	his Project: 3					
1.3 Highway Project Name:	IH 410 A							
1.4 TxDOT District:	San Antonio (Bexar 410)							
Please Select One of the Following Analysis Records to Continue: 2. Previous CTUC Analysis Records for This Highway Project:								
7/8/2006 3:0:0 PM	Assessor's Name Michael Test	CTUC Phase of This Analysis Phase 1	Number of Questions Answered 150					
•			•					
Previous Page	Retrieve This Analysis	New Analysis	Delete This Analysis					

Figure 4.6 History of Previous CTUC Analysis Records

Figure 4.7 shows the project and assessor information. The assessor can change the name of project, CCSJ, ROWCSJ, et al. Only the project's TxDOT district and area office cannot be changed. In other words, the assessor must select the correct district and area office whenever a new project is created.

• For Demonstration Purposes

- 1) Assume assessors selects "IH 410 A" as the project in the previous section as Figure 4.6 shows.
- 2) Assessors can double-click the second line item, which is for CTUC Phase 2 TxDOT Analysis, to retrieve the analysis data as shown in Figure 4.7.

3) Assessors can fill out all questions and press the "Next Page: Project Configuration of All Utility Adjustments" button to save and visit the page described in the next section.

TxDOT Highway Project and Assessor Inform	nation	
1. Project Information		
1.1 Your TxDOT District:	San Antonio	
1.2 Your TxDOT Area Office:	Bexar 410	
1.3 Highway Project Name:	IH 410 A	_
1.4 Highway Construction CS3:	1234 - 56 - 789	
1.5 Highway ROW CSJ:	9876 - 54 - 321	
2. Assessor Information		
2.1 Name of Individual Completing This Form:	Michael Test	_
2.2 Date Completed:	2006 v July v 8 v 03:00 PM	▼ Now
2.3 Your Job Title:	Test Engineer	
2.4 Your Phone Number:	512 - 471 - 8417	
2.5 Your Email Address:	mike@test.com	
3.1 Would you like to create a password to restrict unauthorized access to your analysis records?	Yes Password: **** Change	
	C No	
Previous Page: History of CTUC Analysis Records	Next Page: Project Configuration of All Utility Adjustments	Save & Exit

Figure 4.7 TxDOT Highway Project and Assessor Information

4.2.3 Update the Reimbursability for Each Utility Adjustment

After selecting one CTUC analysis record in CTUC Phase 2 TxDOT Analysis and filling out project and assessor information in the previous section, the assessor will be asked to review the configuration information for all utility adjustments involved in the project and update the reimbursability for each utility adjustment. Because CTUC Phase 1 Analysis is performed at approximately 0 percent PS&E, the reimbursability, i.e., whether or not a utility adjustment is 100 percent or nearly 100 percent reimbursable, of the utility adjustment may be changed when CTUC Phase 2 TxDOT Analysis will be performed. Hence, the assessor needs to update this information as shown in Figure 4.8 and 4.9.

Figure 4.8 shows the initial form when the assessor has finished the steps in the previous section. Basically, the assessor will see the reimbursability for each utility adjustment displayed in the fourth column in the right list-box labeled "3. List of all utilities within the limits of the project." The assessor can select any line item in the right list-box, and CTUC DST will show
the corresponding information of that utility adjustment selected in the second block labeled "2. Please Input Information of the Utility Adjustment."

Project Configuration of All Utility Adjustmen	ts - CTUC Decision S	apport Tool				
Project Configuration of All Utility	Adjustments					
1. Basic Project Information 1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 O	urrent CTUC Analysis Phase:	Phase 2	Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321			1.6 Assessor's Name:	Michael Test	
1.3 Highway Project Name:	IH 410 A			1.7 Data Campleted	michaerresc	
1.4 TxDOT District:	San Antonio (Bexar 41)	D)		1.7 Date Completed:	8/6/2006 4:0:0	PM
2. Please Input Information of the Utility Adjustment: 3 IST OF ALL UTILITIES WITHIN THE LIMITS OF THE PROJECT						
2.1 Utility Adjustment Name: 2.2 Subject Utility Number: 2.3 Is the utility a LPA? No 2.4 Is the eligibility ratio of this utility adjustment 10 NEARLY 100%? Yes No 2.5 Description: 2.5 Description: 2.6 Please Select the Types of Utility Adjustment Work Utility Type Type of Adjustment Work W/WW Waster W/WW Wasterwater W/WW Wasterwater W/WW Wasterwater W/WW Wasterwater W/WW Wasterwater W/WW Wasterwater W/WW Wasterwater W/WW	0% or on't know	<u>In Phase 27</u> Yes Yes No	Utities Type I W/WW Comm. Trans.	Type of Adjustment Work Water Overhead Communication Transmission Tower	l Reimbursability Don't know Don't know Don't know	<u>Utity Adjustment Name</u> Water Line (Range/Station A- West Comm. Cable (412 - 41t High-V Power Line (Sta.410)
Trans. Underground Transmission Power Lin Trans. Transmission Tower	e 🗾	•				J D
Previous Page: TxDOT Highway Prj. & Ass	sessor Info.	Next Page:	Characteris	itics of This Highway Proj	ect	Save & Exit

Figure 4.8 Initial Form of Project Configuration



Figure 4.9 Updating the Reimbursability for Each Utility Adjustment

As noted in Section 2.3, the assessor can update any information of the utility adjustment other than utility adjustment name using the following steps: 1) select the desired line item in the right list-box; 2) CTUC DST show the corresponding information in the second block; 3) update the necessary fields other than Question 2.1 in the second block; 4) press the " \rightarrow " button to update the utility adjustment.

Note that the assessor does not need to update the reimbursability of the utility adjustment whose CTUC Phase is equal to 1 because the current CTUC Phase is equal to 2. The first column in the right list-box displays whether or not the utility adjustment belongs to CTUC Phase 2 TxDOT Analysis. Therefore, the assessor does not need to update the reimbursability of the third utility adjustment as shown in Figure 4.8 and 4.9.

• For Demonstration Purposes

Assume the sample project has three utility adjustments as shown in Figure 4.8; the assessor wants to change the reimbursability of "Water Line (Range/Station A-B)" from "Don't know" to "Reimbursable." The essential steps of this section's functions are summarized as follows:

- 1) Assessors can select "Water Line (Range/Station A-B)" in the third block.
- 2) CTUC DST will show this utility adjustment's information in the second block.
- 3) Assessors can select "Yes" in Question 2.4. Note that the "Don't know" option has been disabled because assessors have to select either "Yes" or "No" in CTUC Phase 2 Analysis.
- 4) Assessors can press the " \rightarrow " button.

- 5) CTUC DST will reflect the change in the third block.
- 6) Assessors can press the "Next Page: Characteristics of This Highway Project" button to save the information and proceed to the next page.

4.3 Filling Out Project and Utility Questionnaires

This section describes the main activities of CTUC DST. When the assessor has finished setting up the utility adjustments for the project, the assessor can begin to analyze the applicability of CTUC for each utility adjustment. In CTUC Phase 2 TxDOT Analysis, CTUC DST will ask assessors a series of questions, which include project-scope, utility-scope, and contract-related questions. Section 4.3.1 will discuss the project-scope questions. Section 4.3.2 will discuss the utility-scope questions. Section 4.3.3 will discuss the contract-related questions.

4.3.1 Project-Scope Questions

There are five questions in Figure 4.10. Usually the assessor can respond only "Yes," "No," or "Don't know yet" to a question. For Question 2.5, the assessor needs to consider the current project situation regarding schedule pressures and select only one option that can best describe the current circumstance.

Phase 2 TxDOT Analysis: Characteristics of This Highway Project (Step 1 / 9) - CTUC Decision Support Tool	
Characteristics of This Highway Project (Step 1 / 9)	Highway Project Name:
2.1 Do you expect HEAVY traffic conditions at the project location (e.g. in metropolitan or urban areas)?	C Don't know yet Assessor's Name:
2.2 Will CTUC require substantially FEWER lane closures than the Conventional approach during the project	C Don't know yet
execution? 2.3 Do physical interferences EXIST between 2 or more adjusted utilities on the project?	C Doo't know yet Assessment Input Steps:
If so, which ones? Interferences:	#(FilledIn?) Form Type Utility Ad 1 (Yes) Prj.Scope IH 410 A
 2.4 Can the adjustment be performed ONLY during the CONSTRUCTION PHASE (e.g. permit issues or utility adjustment work is contingent upon some level of construction work completion)? 2.5 Please select which of the following options that can best describe the current project circumstance regarding schedule pressure (1) The project HAS severe schedule pressures, and CTUC can lead to EARLIER project completion. 	2 (Yes) Util.Scope 1 Water Lin 3 (Yes) Util.Scope 2 Water Lin Don't know yet V(Yes) Util.Scope 3 Water Lin 5 (Yes) Contract Water Lin S(Yes) Water Lin 6 (Yes) Util.Scope 1 Water Lin S(Yes) Water Lin 6 (Yes) Util.Scope 2 Water Con Yes Util.Scope 2 West Con 7 (Yes) Util.Scope 2 West Con 8 (Yes) Util.Scope 3 West Con 9 (Yes) Contract West Con Yes) Yes Yest Con
(C) The project HAS severe schedule pressures, and the utility adjustment scope CANNOT be well defined at appro PS&E.	ximately 60%
 (3) The project HAS schedule pressures, BUT not severely. 	
Elaborate:	
(4) The project DOES NOT HAVE severe schedule pressures.	
(5) Don't know yet.	
	4
Go to Previous Page Go to Next Page	Save & Exit

Figure 4.10 Project with Two Utility Adjustments in CTUC Phase 2 TxDOT Analysis

Note that in the right side of Figure 4.10, CTUC DST will show the project name, the assessor's name, and a list-box displaying all pages or steps that will be presented later. Since one project can have many utility adjustments, CTUC DST will prepare only one page regarding all project-scope issues. The analysis results for the project-scope issues will be applied to all utility adjustments within that project.

CTUC DST will show four pages for each utility adjustment in CTUC Phase 2 Analysis. Three pages contain utility-scope issues and the fourth page contains contract-related issues. Therefore, if a project has two utility adjustments in CTUC Phase 2 TxDOT Analysis, nine steps are required for assessors to complete CTUC Phase 2 TxDOT Analysis.

The list-box in the right side of Figure 4.10 can be used as a shortcut to the other page. Traditionally, the assessor can press the "Go to Previous Page" or "Go to Next Page" button several times to go to the desired page. With use of the shortcut, assessors can also double-click the line item of the desired step to visit that page directly. In addition, the list-box also show whether or not the assessor has filled in the page before. If the assessor does not answer any question in a page and press the "Go to Next Page" or "Go to Previous Page" button directly, CTUC DST will presume "Don't know yet" as the answer to all questions in that page.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) Assume the assessor selects the sample project data, which is "IH 410 A" and "Phase 2 Analysis," during the previous pages, so CTUC DST will show two utility adjustments for the project.
- 2) Assessors can answer these five project-scope questions as shown in Figure 4.10.
- *3)* Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

4.3.2 Utility-Scope Questions

As shown in Figure 4.11, 4.12, and 4.13, the questions presented here are about the specific utility adjustment, whose name will be displayed in the top of the page. If the subject utility adjustment can have underground facilities that will be shared with other utility owners, Question 3.9 with two sub-questions in Figure 4.11 will show. In other words, if the subject utility adjustment only includes the types of utility adjustment work such as overhead communication lines, overhead distribution power lines, and transmission poles, Question 3.9 will not show. Furthermore, if the assessor answers "No" to Question 3.9, Question 3.9.1 and Question 3.9.2 do not need to display because no shared facilities exist in the utility adjustment.

Figure 4.12 presents Question 3.10 and 3.11 whose appearances are contingent on the certain types of utility adjustment work, e.g. relocating poles. Hence, because the type of utility adjustment work analyzed in Figure 4.12 is to relocate water lines, Question 3.10 and 3.11 will be shown in a gray color and assessors cannot provide answers. Question 3.14 and 3.15 are for analyzing the current condition of hazardous materials (HAZMAT). If the assessor thinks there is no HAZMAT in the site, he or she will select "No" to all of the sub-questions in Question 3.14. CTUC DST will then disable Question 3.15, which means the hypothetical circumstance is not applicable to the utility adjustment.

Note that CTUC DST will highlight the step that the assessor is currently working on in the list-box in the right side of the page. For Question 3.2, 3.6, 3.9.1, 3.10, and 3.24, assessors can enter more than one line of words in these text boxes as comments on the project or utility adjustment.

Phase 2 TxDOT Analysis: Water Line (Rang	e/Station A-B) (₩/	WW):Ph	rysical Ch	aracteristics-	1 (Step 2 / 9) - C	TUC Decision S	upport Tool		×
Water Line (Range/Station A-B)	(W/WW) : Phys	ical Ch	naracter	istics-1 (S	tep 2 / 9)		Highway Pro	oject Name:	
3.1 Please indicate which of the listed utility	(1) Any extended ca	sing?	Yes	C No	C Don't kn	ow yet	IH 410 A	Name:	
to this project:	(2) Any demolition/re	emoval?	Yes	C No	C Don't kn	ow yet	Michael 1	fest	
3.2 Please comment on this adjustment scope:		Ē					Assessment	t Input Steps	
							#(FilledIn?)	Form Type Pri.Scope	Utility Ad IH 410 A
3.3 To what degree does the utility have PAST CTI	UC EXPERIENCE?		None	C Some	C Only Recently	C Extensive	2 (Yes) 3 (Yes)	Util.Scope 1 Util.Scope 2	Water Lin Water Lin
3.4 What is the likelihood that the utility will PARTI adjustment?	CIPATE in CTUC for this	s	High	C Medium	C Low	C Don't Know	5 (Yes) 6 (Yes)	Contract Util.Scope 1	Water Lin Water Lin West Con
3.5 Will this utility likely allow the TxDOT contracto INFRASTRUCTURE (e.g. manholes, poles, conduit,	r to ONLY install utility , etc.)?		Yes	C No	🔿 Don't kn	ow yet	7 (Yes) 8 (Yes) 9 (Yes)	Util.Scope 2 Util.Scope 3 Contract	West Con West Con West Con
3.6 Which elements of this adjustment can the poor TxDOT contractors perform?	ol of likely C	an Do:							
Which elements can they not perform?	c	an't Do:							
3.7 Is it possible that the pool of likely TXDOT cont HIRE a subcontractor from a list of pre-qualified co utility?	ractors will be WILLING intractors provided by (to	Yes	⊂ No	🔿 Don't kn	ow yet			
3.8 Can only the UTILITY's CREW perform the utili	ty adjustment?		• Yes	C No	🔿 Don't kn	ow yet			
3.9 Does the utility share the same underground p vaults, trenches at different depths, multi-duct co other utilities?	hysical facilities (e.g. u nduits, or utility corrido	tility rs) with	• Yes	C No	🔿 Don't kn	ow yet			
(1) If the utility being analyzed is sha utility(s) share that facility?	ring a physical facility,	which							
(2) Will CTUC increase utility adjustm benefits to all involved utilities?	ent coordination and pr	ovide	Yes	C No	🔿 Don't kn	ow yet		_	
Go to Previous Page				Go to M	iext Page			5ave & Exit	

Figure 4.11 Utility-Scope Questions in CTUC Phase 2 TxDOT Analysis: Part 1

Phase 2 TxDOT A:	Phase 2 TxDOT Analysis: Water Line (Range/Station A-B) (W/WW) : Physical Characteristics-2 (Step 3 / 9) - CTUC Decision Support Tool					
<u>Water Line (F</u>	Range/Station A-B) (W/WW) : Physi	ical Characteristics-2 (Step 3 / 9)	Highway Project Name:			
3.10 Does the utility	share a set of poles with other utilities?	C Ves C No. C Don't know yet	IH 410 A			
			Michael Test			
If the	e utility being analyzed is sharing a set of poles, which	utility(s) share that facility?	Assessment Input Steps:			
3.11 If the utility bei circumstance?	ing analyzed is sharing a set of poles, please select wl	hich of the following options that can best describe the current project	#(FilledIn?) Form Type Utility Ad 1 (Yes) Prj.Scope IH 410 A 2 (Yec) Utility Scope II Water Lip			
0	(1) Both the pole owner and tenant utilities are will	ling to join CTUC,	3 (Yes) Util.Scope 2 Water Lin 4 (Yes) Util.Scope 3 Water Lin			
0	(2) The pole owner IS NOT willing to join CTUC, bu	t the others ARE.	5 (Yes) Contract Water Lin			
0	(3) The pole owner IS willing to join CTUC but the p	7 (Yes) Util.Scope 2 West Con				
0	(4) All utilities ARE NOT willing to comply with the C	8 (Yes) Util.Scope 3 West Con 9 (Yes) Contract West Con				
0	(5) Don't know yet.					
3.12 Does the utility project limits? 3.13 Is the utility-ad 3.14 Are HAZMAT co	3.12 Does the utility adjustment work include extensions BEYOND the TxDOT ROW or outside the construction Yes C No C Don't know yet 3.13 Is the utility-adjustment-related site clearing and grubbing SUBSTANTIAL on the project? Yes C No C Don't know yet 3.14 One MOMOT conditions expected for this utility adjustment?					
(1) A:	sbestos:	C No ⓒ Small C Medium C Large C Don't know				
(2) Le	eaking underground storage tanks:	C No 📀 Small C Medium C Large C Don't know				
(3) Ci	ontaminated soils:	C No 📀 Small C Medium C Large C Don't know				
(4) Ci	ontaminated groundwater:	⊂ No . ● Small ⊂ Medium ⊂ Large ⊂ Don't know				
(5) 0	ther:	C No 📀 Small C Medium C Large C Don't know				
3.15 Does HAZMAT-	related work apply ONLY to the utility adjustment wor	k? 🕼 Yes C No C Don't know yet				
	Go to Previous Page	Go to Next Page	Save & Exit			

Figure 4.12 Utility-Scope Questions in CTUC Phase 2 TxDOT Analysis: Part 2

Phase 2 TxDOT Analysis: Water Line (Range/Station A-B) (W/WW) : Physical Characteristics-3 (Step 4 / 9) - CTUC Decision Support Tool							
Water Line (Range/Station A-B) (W/WW) : Physical Characteristics-3	3 (Step 4 / 9)	Highway Project Name:					
3.16 Will the CTUC contractor (who will do both utility adjustment and highway construction) be significan more EFFECTIVE at controlling traffic for the project (vs. Conventional)?	tly 💽 Yes C No C Don't know yet	IH 410 A Assessor's Name:					
3.17 Will the CTUC approach have better safety control (e.g. better use of barricades, traffic control, etc	:.)?	Michael Test					
 (1) The CTUC approach will have better safety control. (2) The Conventional approach will have better safety control. (3) They are about the same. (4) Don't know yet. 		Assessment Input Steps: #(FilledIn?) Form Type Utility Adi 1 (Yes) Prj.Scope II + 410 A 2 (Yes) Util.Scope 1 Water Lin 3 (Yes) Util.Scope 2 Water Lin 4 (Xes) Util.Scope 2 Water Lin					
3.18 Can the utility provide a set of plans that meet the requirements of the project and the TxDOT accommodation rules?	🎯 Yes 🔍 No 🖤 Don't know yet	5 (Yes) Contract Water Lin 6 (Yes) Util.Scope 1 West Con 7 (Yes) Util.Scope 2 West Con					
3.19 Can the utility provide a set of specifications that are acceptable to TxDOT in terms of assignment of responsibility, liability, and risk?		8 (Yes) Util.Scope 3 West Con 9 (Yes) Contract West Con					
3.20 What is the utility's attitude toward design specifications for the project? (1) The utility is willing to ADOPT TXDOT design specifications for the project. (2) A new COMPOSITE set of specifications (comprised of the utility and TXDOT pr (3) The utility will USE utility design specifications for the project. (4) Don't know yet.	ovisions) is needed for the project.						
3.21 Will the utility's crews be FREED UP for other projects as a result of CTUC?	I Yes ⊂ No ⊂ Don't know yet						
3.22 Does the utility adjustment include an extensive amount of utility facility upgrades in relation to the transportation work?	\odot Yes \subset No \subset Don't know yet						
3.23 Does the utility adjustment work include any detrimental changes to the project's environmental clea	rance? 💽 Yes 🔿 No 🖓 Don't know yet						
3.24 Please list any ADDITIONAL APPROVAL required prior to utility adjustment (e.g. Transmission adjust Reliability Council of Texas before beginning adjustment work.):	ments need to get approval from Electric						
Go to Previous Page Go	to Next Page	Save & Exit					

Figure 4.13 Utility-Scope Questions in CTUC Phase 2 TxDOT Analysis: Part 3

• For Demonstration Purposes

- The essential steps of this section's functions are summarized as follows:
- 1) Assessors can answer these ten questions as shown in Figure 4.11, 4.12 and 4.13.
- 2) Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

4.3.3 Contract-Related Questions

As mentioned in Section 4.2.3, the reimbursability of a utility adjustment can be reimbursable or non-reimbursable. Hence, the contract-related questions will be presented in accordance with the type of reimbursability the assessor selects in Section 4.2.3. Figure 4.14 shows contract-related questions for reimbursable utility adjustments; Figure 4.15 shows contract-related questions for non-reimbursable utility adjustments.

• For Demonstration Purposes

- 1) If the utility adjustment is 100% reimbursable, assessors can answer these questions as shown in Figure 4.14.
- 2) If the utility adjustment is non-reimbursable, assessors can answer these questions as shown in Figure 4.15.
- *3)* Assessors can press the "Go to Next Page" to save the information and proceed to the next page.

Phase 2 TxDOT Analysis: Water Line (Range/Station A-B) (W/WW) : Contract Characteristics (Step 5 / 9) - CTUC Decision Support Tool						
<u>Water Line (F</u>	Range/Station A-B) (W/WW) : Contr	act Characteristics (Ste	p 5 / 9)	Highway Project Name:		
Deimburger	nent Type			IH 410 A		
Reinburser	nent Type			Assessor's Name:		
Since this is	s a REIMBURSABLE adjustment:			Michael Test		
4.1 Will increased (UNBALANCED BID	4.1 Will increased utility adjustment costs likely occur due to the TxDOT contractor's FRONT-END LOADING (UNBALANCED BIDDING)?					
4.2 Will there be in	4.2 Will there be increased contractor CHANGE ORDER frequencies or markups?					
4.3 Will increased	costs result from the ADDED CONTRACTUAL TIER of :	subcontractors?	C Yes C No . ● Don't know yet	3 (Yes) Util.Scope 2 Water Lin 4 (Yes) Util.Scope 3 Water Lin 5 (Yes) Contract Water Lin		
4.4 Will possible U contractor?	TILITY DELAY COSTS be reduced due to the adjustme	nt schedule controlled by the CTUC	${igodot}$ Yes ${igodot}$ No ${igodot}$ Don't know yet	6 (Yes) Util.Scope 1 West Con 7 (Yes) Util.Scope 2 West Con 9 (Yes) Util.Scope 2 West Con		
4.5 Based on the	4.5 Based on the above cost drivers, how will the utility's cost of adjustment be affected (CTUC vs. Conventional)?					
C	(1) CTUC adjustment costs will be more than 15%	CHEAPER than the Conventional app	roach for the project.			
C	(2) CTUC adjustment costs will be 5%-15% CHEA	PER than the Conventional approach	for the project.			
С	(3) CTUC adjustment costs will be approximately t	he same as the Conventional approac	h for the project.			
C	(4) CTUC adjustment costs will be 5%-15% MORE	EXPENSIVE than the Conventional ap	pproach for the project.			
С	(5) CTUC adjustment costs will be more than 15%	MORE EXPENSIVE than the Convention	onal approach for the project.			
C	(6) Don't know yet.					
			Clean			
	Go to Previous Page	Go to No	ext Page	Save & Exit		

Figure 4.14 Contract-Related Questions for Reimbursable Adjustment



Figure 4.15 Contract-Related Questions for Non-Reimbursable Adjustment

4.4 Reviewing Each Utility Responding Status

CTUC DST can compare the TxDOT assessor's analysis results with the utility assessor's and generate comparison reports so that CTUC decision-makers from both parties can review their experts' opinions jointly. Generating comparison reports require that the utility assessors finish their analyses; hence, the TxDOT assessor should review their responding status and select the appropriate utility analysis record to be used in the comparison reports.

When the TxDOT assessor has finished answering all questions in the previous section, he or she will see the form as shown in Figure 4.16. There are three blocks in the form. The first block labeled "1. Highway Project Information" shows the highway and TxDOT assessor information." The second block labeled "2. Utility Adjustments Involved in CTUC Phase 2 Analysis" displays all utility adjustments involved in CTUC Phase 2 Analysis. Three columns are displayed in this block, and the TxDOT assessor can select any one of the line items in this block to retrieve all utility assessors' analysis records pertaining to this utility adjustment as shown in Figure 4.17.

The TxDOT assessor can then select one of the utility analysis records in the third block labeled "3. Utility Adjustment Information" as shown in Figure 4.18." If the selected utility analysis record contains the complete set of answers to all utility questions, also shown in the fourth block labeled "4. Questionnaire Responding Status," CTUC DST will be able to generate the comparison reports, which will be described in Section 4.5 and 4.6.

TxDOT assessors can press the "Generate TxDOT Report" button at any time to review the graphical report, followed by the text report, for displaying all decision drivers of CTUC Phase 2 TxDOT Analysis. The steps to manipulate the reports and the report layouts are the same as TxDOT Phase 1 Analysis, which were described in Section 2.5 and 2.6. In addition, only when the TxDOT assessor has selected one of the utility analysis records completed by the utility assessor are the "Generate Utility Report" and "Compare Two Parties' Opinions" buttons enabled. In other words, the TxDOT assessor can review the TxDOT-only reports, utility-only reports, or the comparison reports as long as the appropriate analysis record is selected.

• For Demonstration Purposes

- 1) If the TxDOT assessor wants to review the TxDOT-only reports, he or she can press the "Generate TxDOT Report" button. CTUC DST will ask the TxDOT assessor to select one of the utility adjustments involved in CTUC Phase 2 Analysis and the knowledge base source as described in Section 2.5.1.
- 2) *TxDOT Assessors can select the first line item in the second block in Figure* 4.16.
- 3) In Figure 4.17, CTUC DST will show only one analysis record pertaining to this utility adjustment.
- 4) In Figure 4.18, TxDOT assessors can select this utility analysis record so that CTUC DST will show its responding status in the fourth block.
- 5) TxDOT assessors can press the "Generate Utility Report" button to review the selected utility analysis record from utility experts' perspectives as described in Section 3.4 and 3.5.
- 6) *TxDOT assessors can press the "Compare Two Parties' Opinions" button as described in the next two sections.*

Phase 2 TxDOT Analysis: Responding Status fo	or Each Utility Questionnaire - CTU	C Decision Support Tool	X			
Responding Status for Each Utilit	y Questionnaire					
1. Highway Project Information						
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789	1.5 Current CTUC Analysis Phase:	Phase 2 Explain			
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321	1.6 Assessor's Name:	Michael Test			
1.3 Highway Project Name:	IH 410 A	1 7 Pate Caralitada				
1.4 TxDOT District:	San Antonio (Bexar 410)	1.7 Date Completed:	8/6/2006 4:0:0 PM			
2. Utility Adjustments Involved in CTUC Phase 2 Analysis:						
Litility Adjustment Name	Litility Type	# of Analy	rsis Records			
Water Line (Range/Station A-B)	Water and/or Wastewater	1				
West Comm. Cable (412 - 416)	Communication	1				
- 3. Utility Adjustment Information			- 4. Questionnaire Responding Status			
	3.1 Utility Adjustment N	lame:	4.1 Highway Questions Completed?			
	3.2 Utility Type Invo	lived:	4.2 Utility Scope-1 Questions Completed?			
	3.3 Utility Nur	nber:	4.3 Utility Scope-2 Questions Completed?			
	3.4 Assessor's N	lame:	4.4 Utility Scope-3 Questions Completed?			
1	3.5 Date Compl	eted:	4.5 Contract Questions Completed?			
	1					
Previous Page Generate	TxDOT Report Generate U	tility Report Compare Two Partie	s' Opinions Exit			

Figure 4.16 Initial Form of Responding Status for Each Utility Assessor

Phase 2 TxDOT Analysis: Responding Stat	as for Each Utility	Questionnaire - CTU	C Decision Sup	port Tool		X
Responding Status for Each U	tility Question	naire				
1. Highway Project Information	1): 4004 56 700		1.5 Curren	t CTLIC Analysis Phase:	Dhave 0	
1 2 Highway Project ROW CS1 (ROWCS	1234-56-769				Phase 2	Explain
1.2 Highway Hojocctow Cos (Kowes	9876-54-321			1.6 Assessor's Name:	Michael Te	st
	IH 410 A			1.7 Date Completed:	8/6/2006	4:0:0 PM
1.4 1xb01 bistr	ct: San Antonio (B	exar 410)			ofofcooo	
2. Utility Adjustments Involved in CTUC Phase 2 Analysis:						
Utility Adjustment Name Utility Type # of Analysis Records						
Water Line (Range/Station A-8) West Comm, Cable (412 - 416)	Water Comm	and/or Wastewater unication		1		
3. Utility Adjustment Information					<u>4. Questi</u>	onnaire Responding Status
Utility Assessor's Name Utility Date Test Utility 8/3/2006	Completed 2:0:0 PM	3.1 Utility Adjustment Na	ame: Water Line	e (Range/Station A-B)	4.1 Hig	hway Questions Completed?
		3.2 Utility Type Invol	ved: W/WW		4.2 Utility Sc	ope-1 Questions Completed?
		3.3 Utility Num	ber: U10001		4.3 Utility Sci	ope-2 Questions Completed?
		3.4 Assessor's Na	ame:		4.4 Utility Sci	ope-3 Questions Completed?
		3.5 Date Comple	ted:		4.5 Cor	ntract Questions Completed?
Previous Page Gen	erate TxDOT Report	Generate Ut	lity Report	Compare Two Parties	s' Opinions	Exit
·						

Figure 4.17 Selecting One Utility Adjustment to Show Its Utility Analysis Records

Phase 2 TxDOT Analysis: Responding Status for Each Utility Questionnaire - CTUC Decision Support Tool						
Responding Status for Each Util	ity Questionna	ire				
1. Highway Project Information	-		1.5.0	CTUC As abusis Phases		
1.1 Highway Project Construction CSJ (CCSJ):	1234-56-789		1.5 Current	: CTUC Analysis Phase:	Phase 2	Explain
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321			1.6 Assessor's Name:	Michael Te	st
1.3 Highway Project Name:	IH 410 A			1.7 Date Completed:	a la lagar	10.00
1.4 TxDOT District:	San Antonio (Bexa	ar 410)		1.7 Date Completed.	8/6/2006	4:U:U PM
2. Utility Adjustments Involved in CTUC Phase 2 Analysis:						
Utility Adjustment Name Utility Type # of Analysis Records						
Water Line (Range/Station A-B) West Comm. Cable (412 - 416)	Water an Communid	d/or Wastewater		1		
3. Utility Adjustment Information					— 4. Questi	onnaire Responding Status
Utility Assessor's Name Utility Date Co	mpleted 3.1	Utility Adjustment Name:	Water Line	(Range/Station A-B)	4.1 Hig	hway Questions Completed? Yes
Test Utility 8/3/2006 2:0	O PM	3.2 Utility Type Involved:	w/ww		4.2 Utility Sci	ope-1 Questions Completed? Yes
		3.3 Utility Number:	U10001		4.3 Utility Sci	ope-2 Questions Completed? Yes
		3.4 Assessor's Name:	Test Utility		4.4 Utility Sci	ope-3 Questions Completed? Yes
		3.5 Date Completed:	8/3/2006 2	2:0:0 PM	4.5 Cor	ntract Questions Completed? Yes
Previous Page Genera	e TxDOT Report	Generate Utility F	leport	Compare Two Partie	s' Opinions	Exit

Figure 4.18 Selecting One Utility Analysis Record to Show Its Responding Status

4.5 Reviewing Top Six CTUC Decision Drivers

CTUC DST has two different types of comparison reports. One is the graphical comparison report and the other is the text comparison report. After both parties' assessors has answered all questions, CTUC DST is thus able to generate the comparison reports in order to demonstrate the experts' opinions with regard to the applicability of the CTUC approach for each utility adjustment. This section focuses on how to generate the graphical comparison report of the analysis results while Section 4.6 will describe the production of the detailed text comparison report for each utility adjustment.

4.5.1 Report Setting for CTUC Phase 2 Analysis

There are three portions of questions for report setting of CTUC Phase 2 Analysis as shown in Figure 4.19. The first portion is to select the knowledge base source for interpreting TxDOT analysis results, while the second portion is for interpreting utility analysis results. The third portion is to specify the party whose impact levels will serve as the ranking criterion.

IXDOTICTUC experts from San An	itonio, Houston, and Dallas Districts.
Utility CTUC experts from San Anti	onio, Houston, and Dallas districts.
Utility CTUC experts from your dis	trict.
Utility CTUC experts from all types	; of utilities.
Utility CTUC experts from your typ	be of utilities.
Utility CTUC experts from either W	//WW or Non-W/WW types of utilities.
ank	
Sort by TxDOT impact level	Sort by utility impact level

Figure 4.19 Report Setting for CTUC Phase 2 Analysis

Since the report compares both parties' analysis results, the TxDOT assessor is responsible for specifying the appropriate knowledge base sources of both parties. In the first portion titled "for TxDOT," the TxDOT assessor needs only to specify the scope of the knowledge base source, which could be either one district or the three districts combined as described in Section 2.5.1.

In the second portion, since the comparison reports in CTUC DST are dedicated to explanation of the applicability of CTUC for one utility adjustment, which was determined in the previous section, the TxDOT assessor may want to review opinions from utility experts in their district only or from all Texas utility experts whose opinions have been collected and stored in CTUC DST. Presently, the knowledge base of CTUC DST includes opinions of utility experts who had attended the CTUC decision drivers assessment workshops in San Antonio, Houston, and Dallas districts. Hence, if the TxDOT assessor is from one of the three districts, he or she can select the knowledge base source with either three districts, CTUC DST will use the default value, which is the knowledge base source with the three districts combined, regardless of the TxDOT assessor's choice.

In the next question, the TxDOT assessor may want to review the opinions from the subject utility adjustment's type of experts only. In some situations, the TxDOT assessor may want to review the opinions from all types of utility experts so that he or she can get a general idea regarding a specific issue. In addition, since most past CTUC projects belong to the water and wastewater type of utilities, if the TxDOT assessor would like to know the general idea from the utility companies who occasionally apply the CTUC approach before, the TxDOT assessor can select the third option in this question, which is "utility CTUC experts from either W/WW or Non-W/WW types of utilities."

In the third portion, the TxDOT assessor needs to indicate either TxDOT or utility impact levels to be used as the ranking criterion. Figure 4.20 shows the results if utility impact levels are chosen as the ranking criterion, which means each utility decision driver will be sorted by its impact level and the corresponding TxDOT decision driver will be displayed below the utility decision driver. Figure 4.21 shows the results if TxDOT impact levels are chosen as the ranking criterion.

• For Demonstration Purposes

- 1) TxDOT assessors can select the option entitled "TxDOT CTUC experts from San Antonio, Houston, and Dallas districts." in Figure 4.19.
- 2) TxDOT assessors can select the option entitled "Utility CTUC experts from San Antonio, Houston, and Dallas districts." in Figure 4.19.
- 3) TxDOT assessors can select the option entitled "Utility CTUC experts from all types of utilities." in Figure 4.19.
- 4) *TxDOT assessors can select the option entitled "Sort by utility impact level" In Figure 4.19.*
- 5) *TxDOT assessors can press the "OK" button to see the graphical comparison report.*

4.5.2 Graphical Comparison Report of CTUC Phase 2 Analysis

Figure 4.20 shows the graphical comparison report. There are six major areas in this report, which are: 1) Report Title, 2) Report Info., 3) Control Panel, 4) Top 6/6 Decision Drivers, 5) Level of Pro-CTUC, 6) Level of Anti-CTUC. The following paragraphs will describe each area in more detail.



Figure 4.20 Graphical Comparison Report of the Analysis Results: Utility-First Perspective

1. Report Title (in the top of the report)

CTUC DST will show the project name and district information in the first line of the report title. The name of the utility adjustment and the abbreviation of the utility type involved, as well as the assessors' names of both parties will be shown in the second line of the report title.

2. Report Info. (in the upper left side of the report)

CTUC DST will show the analysis dates of both parties and the print date. In the field named "Knowledge Base Source," CTUC DST will show the knowledge base sources of both parties the TxDOT assessor selected in Section 4.5.1. Finally, the color used to represent the party will be shown in the field named "Legend." For example, Figure 4.20 uses "RED" to represent utility analysis results and "BLUE" to represent TxDOT analysis results, while Figure 4.21 uses "RED" to represent TxDOT analysis results and "BLUE" to represent utility analysis results. Note that CTUC DST always uses "RED" to represent the primary party whose impact levels serve as the ranking criterion.



Figure 4.21 Graphical Comparison Report of the Analysis Results: TxDOT-First Perspective

3. Control Panel (in the lower left side of the report)

Five buttons are provided in this area. The button labeled "Report Setting" will invoke the report setting form as shown in Figure 4.19. The button labeled "Previous Page" will trigger the utility responding status form mentioned in Section 4.4. The button labeled "Next: Detailed Rpt." will invoke the text comparison report discussed in the next section. The button labeled "Print" will prompt the active printer name and print the current page. The button labeled "Exit" will save all data and close CTUC DST.

4. Top 6/6 Decision Drivers (in the middle column of the report)

This area lists 12 decision drives that will most influence the CTUC decision either in a positive or negative way. Each decision driver is enclosed by a gray box with underline and correlates with one question for both parties. The abbreviated description of the circumstance answered by one party assessor is shown below the decision driver, followed by the other party's circumstance for the same question. The TxDOT assessor can click any box in this area to get more explanation as shown in Figure 4.22. For example, the first Pro-CTUC decision driver is "Schedule Pressures" from TxDOT-first perspective as shown in Figure 4.21, and the circumstance answered by the utility assessor is "No severe schedule." If the TxDOT assessor might wonder why CTUC DST shows such the result, he or she can click the

box of "Schedule Pressures" to show the detailed explanation as shown in Figure 4.22, which displays the original question and the two answers to the question from both parties.



Figure 4.22 Short Explanation of the CTUC Decision Driver for Both Parties

5. Level of Pro-CTUC (in the second left column of the report)

The level of Pro-CTUC for each decision driver is derived from the average opinion of the experts concerning the give project circumstance listed in the middle of the form. Basically, in order to develop the knowledge base, these experts have been asked to use "High Impact," "Medium Impact," "Low Impact," or "No Impact" to assess the given project circumstance's impact level on the CTUC decision. Furthermore, CTUC DST uses "3" to represent "High Impact," "2" to represent "Medium Impact," "1" to represent "Low Impact," and "0" to represent "No Impact" as shown in the bottom line of the form. Therefore, a project circumstance with a lengthy Pro-CTUC bar means almost all experts think the current situation will influence the CTUC decision in a positive way. Note that the level of Pro-CTUC is primarily determined by the *experts*, not by the assessor. However, the TxDOT assessor can decide the group of experts to be used as the knowledge base source. If the TxDOT assessor selects the combination of San Antonio, Houston, and Dallas districts as the knowledge base source, the total number of TxDOT experts should be 28 (N=28) while the total number of utility experts should be 24 (N=24) in current CTUC DST. For example, the TxDOT impact level of the top Pro-CTUC decision driver is "+2.8 (N=27)" as shown in Figure 4.21, which means most of the twenty seven TxDOT experts think the given project circumstance is ProCTUC and has "High Impact" on the CTUC decision. Experts who select "Don't Know" for the project circumstance will be excluded from the impact level calculation.

6. Level of Anti-CTUC (in the right column of the report)

The format of the level of Anti-CTUC for each decision driver is similar to that of the level of Pro-CTUC. Basically, CTUC DST uses "-4" to represent "Show Stopper," "-3" to represent "High Impact," "-2" to represent "Medium Impact," "-1" to represent "Low Impact," and "0" to represent "No Impact" as shown in the bottom line of the form. Therefore, a project circumstance with a lengthy Anti-CTUC bar means almost all experts think the current situation will influence the CTUC decision in a negative way. The last blue column represents the resolvability of each decision driver. Since the experts have been asked to assess whether or not process changes could facilitate the use of CTUC, CTUC DST is able to show the resolvability results by displaying "Yes" for such project circumstances identified by the experts.

• For Demonstration Purposes

The essential steps of this section's functions are summarized as follows:

- 1) After TxDOT assessors have finished configuring the comparison report setting, they will se the graphical comparison report as shown in Figure 4.20 or 4.21.
- 2) TxDOT assessors can click the top decision driver box to access the dialog box in Figure 4.22, which is the most Pro-CTUC decision driver from TxDOT's perspective.

4.6 Reviewing the Text Comparison Report of the CTUC Decision

Because the graphical comparison report can show only the top six Pro-CTUC or Anti-CTUC decision drivers, the text comparison report described in this section is designed to supplement other important opinions regarding the CTUC applicability of the given utility adjustment. For example, some questions described in Section 4.3 are currently unknown to the assessor but have significant impact levels on the CTUC decision from experts' perspectives. Hence, the text comparison report will list all impact level types of CTUC decision drivers in order for the TxDOT assessor to comprehend the CTUC applicability of the given utility adjustment and to learn lessons from experts.

4.6.1 Text Comparison Report of CTUC Phase 2 Analysis

Figure 4.23 shows the text comparison report of CTUC Phase 2 Analysis for the sample utility adjustment. The layout of this report is similar to the graphical one; therefore, only the portions that vary between the two reports are described:

Phase 2 TxDOT Analysis:	Text Report: Decision Ar	alysis Result - CTUC Decision Support Tool						
Ex	Explanation of Two Parties' Opinions for "IH 410 A" Project in San Antonio							
''Water	Line (Range/Statior	n A-B)'' Adjustment. Assessors: Michae	l Test (TxDOT) /	Test Utility (W/WW)				
Report Info. TxDOT's Date of Analysis: 8/6/2006 4:0:0 PM Utility's Date of Analysis:	Pro-CTUC: Decision Variable #4.3 (R)Utility Delay Cost	(Double-Click Any Line Item Project Circumstance Yes, possible UTILITY DELAY COSTS could be reduced due t Yes, the adjustment can be performed ONLY DURING the o	for More Explana Who? Impact Le Utility 2.61 (TxDOT) 2.44 Utility 2.56	tion) wel				
8/3/2006 2:0:0 PM Date of Print:			(TxDOT) 2.73	_				
8/7/2006 7:4:56 PM	Anti-CTUC: Decision Variable	Project Circumstance	Who? Impact Le	evel Resolvable? Controlling Party				
Knowledge Base Source: Utility:Experts who have extensive experience in	#3.08 Utility Crew Limitati #3.12 Util Work Beyond R	Yes, only the UTILITY's crew can perform the utility adjustrr Yes, the utility adjustment work includes extensions BEYON	Utility -3.33 (TxDOT) -3.75 Utility -2.33 (TxDOT) -3.29	No Yes TxDOT(21.4%) L Yes TxDOT(68.0%) L Yes TxDOT(46.4%) L				
adjusting all types of utilities are from SAT, HOU, DAL Districts.	TxDOT/Utility Misalig	nment:						
TxDOT:Experts are from TxDOT SAT,	#3.15 HAZMAT #4.2 (R)Cost Comparison	Yes, HAZMAT-related work ONLY applies to the utility adjus Yes, HAZMAT-related work ONLY applies to the utility adjus CTUC adjustment costs will be more than 15% MORE EXPEN- CTUC adjustment costs will be more than 15% MORE EXPEN-	Who? Impact Le Utility 1.9 (TxDOT) -2.93 Utility -2.26 (TxDOT) -2.26	Pro/Neutral/Anti-CTUC Pro Anti Anti				
Control Panel	1	CIUC adjustment costs will be more than 15% CHEAPER th	(TXDOT) 2.11	Pro				
Report Settings	Neutral: Decision Variable #2.1 Traffic Condition	Project Circumstance No, the traffic condition at the project location IS NOT HEA'	Who? Utility					
Previous: Graphical Report		No, the traffic condition at the project location 15 NOT HEA'	(IXDOT)					
Next Page	Don't Know:							
Print	Decision Variable #3.17 Safety Control	Project Circumstance No, the Conventional approach will have better safety cont	Who? Impact Le Utility -1.83	vel Pro/Neutral/Anti-CTUC Anti				
Exit	#3.17 Safety Control	Yes, the CTUC approach will have better safety control.	(TXDOT) -2 Utility 1.58 (TXDOT) 2.22	Anti Pro Pro				

Figure 4.23 Text Comparison Report of the Analysis Results: Utility-First Perspective

1. Pro-CTUC (in the first list-box)

This table has four columns described as follows: 1) Decision Variable: manifests the name of each Pro-CTUC decision driver; 2) Project Circumstance: manifests the current project circumstance specified by the assessor; 3) Who?: manifests the party who performed the analysis; 4) Impact Level: manifests the numerical impact level assessed by the experts for the project circumstance. Note that this table lists only the circumstances analyzed by both parties with positive impact levels. The table will not include: 1) one party's impact level is positive while the other party's is negative, or vice versa; 2) the two parties select different project circumstances for the same question. Additionally, the selected party's Pro-CTUC decision drivers are ranked according to their impact levels, followed by the other party's Pro-CTUC decision driver. The TxDOT assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 4.25.

Phase 2 TxDOT Analysis:	Text Report: Decision An	alysis Result - CTUC Decision Support Tool						
Ex	Explanation of Two Parties' Opinions for "IH 410 A" Project in San Antonio							
''Water I	Line (Range/Station	n A-B)'' Adjustment. Assessors: Michae	l Test (TxDOT)	/ Test Utility (W/W	'W)			
Report Info. TxDOT's Date of Analysis: 8/6/2006 4:0:0 PM Utility's Date of Analysis:	Pro-CTUC: Decision Variable #2.4 Utility Adjustment Ti	(Double-Click Any Line Iten Project Circumstance Yes, the adjustment can be performed ONLY DURING the o	for More Explana Who? Impact L TxDOT 2.73 (Utility) 2.56	ation) evel	_			
8/3/2006 2:0:0 PM	#4.4 (R)Utility Delay Cost	Yes, possible UTILITY DELAY COSTS could be reduced due t	TxDOT 2.44 (Utility) 2.61		•			
Date of Print: 8/7/2006 7:5:58 PM	Anti-CTUC:							
Knowledge Base Source: TxDOT:Experts are	Decision Variable #3.08 Utility Crew Limitati	Project Circumstance Yes, only the UTILITY's crew can perform the utility adjustm	Who? Impact L TxDOT -3.75 (Utility) -3.33	<u>evel Resolvable? Co</u> Yes Ta No	ontrolling Party xDOT(21.4%) L			
from TxDOT SAT, HOU, DAL Districts.	#3.12 Util Work Beyond R	Yes, the utility adjustment work includes extensions BEYON	TxDOT -3.29 (Utility) -2.33	Yes To Yes To	xDOT(46.4%) L xDOT(68.0%) L_▼			
Utility:Experts who have extensive experience in	TxDOT/Utility Misalig	nment:						
adjusting all types of utilities are from SAT,	#3.15 HAZMAT #4.5 (R)Cost Comparison	Project Circumstance I Yes, HAZMAT-related work ONLY applies to the utility adjus Yes, HAZMAT-related work ONLY applies to the utility adjus CTUC adjustment costs will be more than 15% CHEAPER th	Who? Impact L TxDOT -2.93 (Utility) 1.9 TxDOT 2.11	<u>evel Pro/Neutral/Ant</u> Anti Pro Pro Pro				
Control Panel	1	CTUC adjustment costs will be more than 15% MORE EXPEN	(Utility) -2.26	Anti	<u> </u>			
Report Settings	Neutral: Decision Variable	Project Circumstance	Who?					
Previous: Graphical Report	#2.1 Traffic Condition #4.2 (R)Change Order Ma	No, the traffic condition at the project location IS NOT HEA' No, the traffic condition at the project location IS NOT HEA' No, increased contractor CHANGE ORDER frequencies and	TxDOT (Utility) TxDOT					
Next Page	Don't Know:							
Print	Decision Variable #3.17 Safety Control	Project Circumstance Yes, the CTUC approach will have better safety control.	Who? Impact L TxDOT 2.22 (Ubility) 1.58	evel Pro/Neutral/Ant Pro Pro	i-CTUC			
Exit	#3.17 Safety Control	No, the Conventional approach will have better safety cont	(Utility) 1.38 TxDOT -2 (Utility) -1.83	Anti Anti	•			

Figure 4.24 Text Comparison Report of the Analysis Results: TxDOT-First Perspective

2. Anti-CTUC (in the second list-box)

This table has six columns described as follows: 1) Decision Variable: shows the name of each Anti-CTUC decision driver; 2) Project Circumstance: shows the current project circumstance specified by the assessor; 3) Who?: manifests the party who performed the analysis; 4) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 5) Resolvable?: shows whether or not the project circumstance could be resolved to facilitate CTUC by any process change from experts' views; 6) Controlling Party: shows what percentage of each controlling party is responsible for such process changes. Note that this table lists only the circumstances analyzed by both parties with negative impact levels. The table will not include: 1) one party's impact level is negative while the other party's is positive, or vice versa; 2) the two parties select different project circumstances for the same question. Additionally, the selected party's Anti-CTUC decision drivers are ranked according to their impact levels, followed by the other party's Anti-CTUC decision driver. The TxDOT assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 4.25.

3. TxDOT / Utility Misalignment (in the third list-box)

This table has five columns described as follows: 1) Decision Variable: shows the name of each misalignment decision driver, which means both parties selected two different circumstances as the answers to the same question; 2) Project Circumstance: shows the

current project circumstance specified by the assessor; 3) Who?: manifests the party who performed the analysis; 4) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 5) Pro/Neutral/Anti-CTUC: shows "Pro" if the impact level is positive, "Anti" if the impact level is negative, and "Neutral" if the impact level is zero. Note that this table lists: 1) one party's impact level is negative while the other party's is positive, or vice versa; 2) both parties select different project circumstances for the same question. Additionally, this table will sort these decision drivers by the difference between the decision driver's two impact levels. The TxDOT assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 4.25.

4. Neutral (in the fourth list-box)

This table has three columns described as follows: 1) Decision Variable: shows the name of each Neutral decision driver, which by definition will not influence the CTUC decision; 2) Project Circumstance: shows the current project circumstance specified by the assessor; 3) Who?: manifests the party who performed the analysis. Note that the selected party's Neutral decision drivers are ranked according to their original question numbers, followed by the other party's Neutral decision driver. These Neutral decision drivers can help decision-makers make the CTUC problem simper by eliminating unnecessary factors. The TxDOT assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 4.25.

5. Don't Know (in the fifth list-box)

This table has five columns described as follows: 1) Decision Variable: shows the name of each decision driver which corresponds to a question unknown to the assessor; 2) Project Circumstance: shows one of the possible answer to this unknown question; 3) Who?: manifests the party who performed the analysis; 4) Impact Level: shows the numerical impact level assessed by the experts for the project circumstance; 5) Pro/Neutral/Anti-CTUC: shows "Pro" if the impact level is positive, "Anti" if the impact level is negative, and "Neutral" if the impact level is zero. The selected party's "Don't Know" decision drivers are ranked according to their absolute values of the impact levels, followed by the other party's "Don't Know" decision driver. The TxDOT assessor can double-click any line item to show the detailed experts' opinions as shown in Figure 4.25.

• For Demonstration Purposes

- 1) After TxDOT assessors have reviewed the graphical comparison report, they can press the "Next: Detailed Rpt." button to show the text comparison report as shown in Figure 4.23.
- 2) TxDOT assessors can press the "Report Settings" button in order to use TxDOT impact levels as the ranking criterion.
- 3) As shown in Figure 4.19, TxDOT assessors can select the option entitled "Sort by TxDOT impact level" and press the "OK" button.
- 4) TxDOT assessors can review the new report as shown in Figure 4.24. They can also double-click the first line item in "Pro-CTUC" to show the dialog box of Figure 4.25.
- 5) *TxDOT assessors can double-click the first line item in "Anti-CTUC" to show the dialog box of Figure 4.26.*

4.6.2 Review of Detailed Experts' Opinions

If TxDOT assessors double-click any line item in any of the list-boxes in Figure 4.23 or 4.24, CTUC DST will display the dialog box containing detailed experts' opinions as shown in Figure 4.25 or 4.26. There are three blocks in this form. The first block, titled "Review of Project Circumstance," shows the question and answer for the decision driver and project circumstance respectively. For some project circumstances, CTUC DST will also show the suggestion from experts.

Reviev	v of Project Circun	nstance		1				
Question:	#2.4 Can the adjustment be performed ONLY during the CONSTRUCTION PHASE (e.g. permit issues or utility adjustment work is contingent upon some level of construction work completion)?							
Answer:	Yes, the adjustment can be performed ONLY DURING the construction phase.							
Expert	s' Opinions	1	1	1				
Data Sam	ple Attributes:	Pro-CTUC:	Anti-CTUC:					
Ty	rpe: TxDOT	High Impact %: 75.00	Show Stopper %: 0.00					
Distr	rict: SAT/HOU/DAL	Medium Impact %: 7.14	High Impact %: 0.00					
# of Expe	rts: 28	Low Impact %: 10.71	Medium Impact %: 0.00					
Years of W Experien	ork 387	Don't Know %: 7.14	Low Impact %: 0.00					
Experien			Neutral %: 0.00					
What % of Situa	Experts Think the 17.86 tion Is Resovable?	; Responsible Party 57.14 Utility TxDOT %:	%: 42.86 Others %: 0.00					
Your O	pinion			7				
	Do You Agree Wi	th lt? ⊙ Yes ⊂ No		Tempora				
From your	perspective, the situation is	: The impact level is	:	overwri				
C Pro-C	TUC C Neutral	C Anti-CTUC C Show-Stoppe	r C High C Medium C Low	opinions				
Who is/are	e responsibile for possible pr	ocess changes to facilitate CTUC: 🧮 No	One 🗖 TxDOT 🗖 Utility 🗖 Others					
Comment:								
				Cancel				
	1			Cance				

Figure 4.25 Detailed Explanation of the CTUC Decision Driver: Without Any Change

The second block, titled "Experts' Opinions," will list basic attributes of the expert group and show distribution of the experts' opinions for impact level and resolvability. For example, as shown in Figure 4.25, TxDOT assessors can realize that two (28*7.14%=2) of the 28 experts can not judge the impact level, i.e., select "Don't Know," on CTUC based on the given project circumstance. Five (28*17.86%=5) of the 28 experts thought the given project circumstance could be resolved to facilitate CTUC, and approximately one-half of the five experts thought TxDOT is responsible for process changes.

Review of E	xperts' Opinions - CTUC	Decision Support T	ool						
Reviev	v of Project Circun	nstance				1			
Question:	#3.08 Can only the UTILITY's CREW perform the utility adjustment?								
Answer:	Yes, only the UTILITY's crew can perform the utility adjustment.								
Evpert	e' Oninione -								
Data Sam	ple Attributes:	Pro-CT	UC:	Anti-	CTUC:				
Ту	pe: TxDOT	High Impact %:	0.00	Show Stopper %:	82.14				
Distr	rict: SAT/HOU/DAL	Medium Impact %:	0.00	High Impact %:	14.29				
# of Expe	rts: 28	Low Impact %: 0.00		Medium Impact %:	0.00				
Years of W	ork 387	Don't Know %:	0.00	Low Impact %:	3.57				
Experien	ice:			Neutral %:	0.00				
What % of Situa	FExperts Think the 42.86 tion Is Resovable?	Responsible Party TxDOT %:	21.43 Utility	%: 71.43 Other:	5 %: 7.14				
- Your O	pinion					1			
	Do You Agree Wi	th It? 🔿 Yes	• No			Temporarily			
From your	perspective, the situation is	T	he impact level is:			overwrite experts'			
C Pro-C	TUC C Neutral	Anti-CTUC	Show-Stopper	C High C Medi	um 🔿 Low	opinions?			
Who is/are	e responsibile for possible pro	cess changes to facilitat	e CTUC: 🔲 No	One 🔽 TxDOT 🔽 I	Jtility 🔽 Others	I Yes			
Comment:									
						Cancel			

Figure 4.26 Detailed Explanation of the CTUC Decision Driver: With Changes

The third block labeled "Your Opinion" provides a place to enter the TxDOT assessor's own opinion. Figure 4.25 demonstrates the case where the TxDOT assessor agrees with the experts' opinions; hence, the TxDOT assessor cannot select any option or enter any comment in this block. The "OK" button and the "Cancel" button provide the same function, which is to close the dialog box without modifying any data. Note that if the TxDOT assessor has double-clicked the decision drivers that are "Don't Know" or originally "Neutral," the TxDOT assessor cannot select "No" as the answer to "Do You Agree with It?"

Figure 4.26 is the case where the TxDOT assessor does not agree with the experts' opinions. The TxDOT assessor can then answer the three assessment questions and enter some comments in the bottom text box. Finally, if the TxDOT assessor wants to temporarily overwrite the experts' opinions, which means the impact level associated with this project circumstance will be changed, he or she can check the box labeled "Temporarily overwrite experts' opinions?". In this case, the TxDOT assessor will see the change of this impact level in both the graphical and text comparison report. Note that the knowledge base source is still unaltered. The TxDOT assessor can use the following steps to get back the original experts' opinions: 1) the TxDOT assessor can select another group as the knowledge base source; 2) CTUC DST can generate a new report in order to overwrite current opinions; 3) the TxDOT assessor can then select the original expert group as the knowledge base source; 4) CTUC DST can thus generate the original report.

If the TxDOT assessor gives his or her own comments without checking the box labeled "Temporarily overwrite experts' opinions?", both experts' opinions and the TxDOT assessor's

comments will be stored in CTUC DST, and the TxDOT assessor's opinion can be retrieved later in order to retrospect to project situations.

4.7 End of CTUC Phase 2 Analysis

When the TxDOT assessor has reviewed both the graphical and text comparison reports, the CTUC Phase 2 Analysis for the subject utility adjustment is complete. Hence, the TxDOT assessor can print all analysis results, just close the tool, or visit previous pages in order to analyze additional utility adjustments. Figure 4.27 shows the form that presents those options. Figure 4.28 shows a portion of the final report for the utility adjustment.



Figure 4.27 End of CTUC Phase 2 Analysis

N 1	ficrosoft Excel - 060831CTUCI	slx.T2C											
·•	<u>File Edit View Insert Forn</u>	nat <u>T</u> ools <u>D</u> ata	Window	Help Add	be PDF(<u>B</u>)						Type a quest	ion for help	8
10	SB23334	13 1X 1 18.	3 9	- re (2, Σ + ≙↓	AL 1	90%	0.					
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	A2 -	fx											
	А	В	С	D	E	F	G	Н	I	J	К	L	М
1		Assess	ment	Result	s of CTU	C Phas	se 2 Ana	alysis				Back to Te	lool
2	I have a second second							-			-		
3	Utility Adjustment Nam	ne: Water Line	e (Range	Station	A-B)							0	
4													
5	Section 1: Project Infor	mation											
6	1. TxDOT District:	San Antonio											
7	2. TxDOT Area Office:	Bexar 410											
8	3. Highway Project Name:	IH 410 A											

Figure 4.28 Excel Worksheet for CTUC Phase 2 Analysis Final Report

When the TxDOT assessor presses the "Print All Analysis Results" button in Figure 4.27, CTUC DST will display an Excel worksheet to list the CTUC analysis results. The TxDOT assessor can print or print-preview this preformatted worksheet just like a normal Excel

worksheet. The TxDOT assessor can also go back to CTUC DST by pressing the "Back to Tool" button in the top row in the worksheet as Figure 4.28 shows.

• For Demonstration Purposes

- 1) After TxDOT assessors have reviewed the text comparison report, they can press the "Go to Next Page" in Figure 4.23 or 4.24 to complete CTUC Phase 2 Analysis.
- 2) TxDOT assessors can press the "Print All Analysis Results" button in Figure 4.27 to view the Excel worksheet report.
- *3) CTUC DST will prompt a message box to alert that the report has been generated successfully.*
- 4) *TxDOT assessors can print the Excel worksheet report as shown in Figure 4.28.*
- 5) *TxDOT assessors can press the "Save & Exit" button to save and close CTUC DST.*
- 6) If TxDOT assessors want to review the other utility adjustments involved in CTUC Phase 2 Analysis, they can press the 'Back to Tool" button in Figure 4.28 and press the "Previous Page" button twice to go to the utility responding status form as shown in Figure 4.16 in Section 4.4. They can select another utility adjustment's analysis record to generate its final report.

5. System User Guide

5.1 Change of TxDOT Assessor's Password

If TxDOT assessors have enabled the password protection for one highway project, they should always use the same password to access all of this highway project's analysis records. If they think these analysis records contain no confidential data, they can select "No" in Question 3.1 to stop the password protection, as highlighted in Figure 5.1.

DOT Highway Project and Assessor Information	ation	
Project Information		
1.1 Your TxDOT District:	San Antonio	
1.2 Your TxDOT Area Office:	Bexar 410	
1.3 Highway Project Name:	TH 410 A	_
1.4 Highway Construction CS1:		
	1234 56 789	
1.5 Highway ROW CSJ:	9876 54 321	
Assessor Information		
2,1 Name of Individual Completing This Form:	Michael Test	-
2.2 Date Completed:	2006 - July - 17 - 01:00 AM	- Now
2.3 Your Job Title;	Test Engineer	
2.4 Vour Phone Number:	512 . 471 . 8417	
2.5 Your Email Address:	mike@test.com	_
3.1 Would you like to create a password to restrict unauthorized	€ Yes Password: Change	
access to your analysis records?	C No	
	[

Figure 5.1 Password Protection in the TxDOT Project and Assessor Information Page

However, if TxDOT assessors forgot the password, they cannot go to the project and assessor information form to disable the password protection as shown in Figure 5.1. If they still want to access this project's analysis records, they can use the following steps to disable the password protection:

- (1) Open CTUC DST as shown in Figure 5.2.
- (2) Double-click the "C" as shown in the orange circle in Figure 5.2.

(3) An Excel workbook will be shown. Find the worksheet named "HighwayPrj" and click it as shown in Figure 5.3.



Figure 5.2 Double-Click the "C" in the Orange Circle

- (4) In this worksheet, the third column will show the name of each highway project. Find the highway project's row.
- (5) In this row, its ninth column named "IsPublic" must be "FALSE." Change it to "TRUE."
- (6) Do not modify any other data. Save the Excel workbook and close it.
- (7) Re-open CTUC DST. The password protection for this highway project will be removed.

M 🖻	icrosoft Exc	el - 060831	CTUCDST.x	s										
團	Eile Edit	View Insert	Format To	ols <u>D</u> ata	Window Help	Adobe PDF(B)				Ţ	ype a question	For help 👻	- 8 ×
10	68	a a 0	100 00 1	the state	3 9 - 11	- 🚊 E	- 41 1	00% 👻 🔞	11 1 12 1				A	一次上
新組	明體	+ 12 +	BIU		5 %	.0.0	(建建)	- 0 - A	-	21-	-	- 2 . 1 1	1	N2 1
	13	- fx	TRUE											-
	A	B	С	D	E	F	G	H	I	J	K	L	М	~
1	OID	to Area	Name	CCSJ	ROWCSJ		Other Area	CurrentPha	IsPublic					
2	2	: 18	I-10	1234-56-	789876-54-32			2	FALSE					
3	5	i 17	IH 410 A	1234-56-	789876-54-32			2	TRUE					
4														
5														
6														
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9	-	-	-			-								
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20			1				1,	1.2.2.1.2.1						*
14 4	H / Dec	isionContext	/ UtilAdjPrjL	.og / Highv	wayPrjLog / Ir	ncWorkType	/ UtilAdjPrj), HighwayPr	j/UT/UWC	rkT /D		100		2
Read	/											1 - 1	_	

Figure 5.3 Change "IsPublic" Cell from "FALSE" to "TRUE"

5.2 Change of Utility Assessor's Password

If utility assessors have enabled the password protection for one utility adjustment, they should always use the same password to access all of this utility adjustment's analysis records. If they think these analysis records contain no confidential data, they can select "No" in Question 3.1 to stop the password protection, as highlighted in Figure 5.4.

	Can Antonia (Pause 410)	
1.2 Hinbway Project Name:	San Antonio (bexar 410)	
1.31 billy Adjustment Names		
1.5 Guildy August merit mane.	West Comm. Cable (412 - 416)	
1.4 Uplicy Type Involved:	Communication	
 Types of Utility Adjustment Work Involved: 	Overhead Communication	
1.6 Subject Utility Number:	U10002	
1.7 Is LPA?	□ No	
1.6 Description:		
Assessor Information		
Assessor Information 2.1 Name of Individual Completing This Form:	Test 2	
Assessor Information 2.1 Name of Individual Completing This Form: 2.2 Date Completed:	Test 2 2006 • August • 4 • 10:00 AM • Now	
Assessor Information 2.1 Name of Individual Completing This Form: 2.2 Date Completed: 2.3 Your Job Title:	Test 2 2006 • August • 4 • 10:00 AM • Now Test Engineer	
Assessor Information 2.1 Name of Individual Completing This Form: 2.2 Date Completed: 2.3 Your Job Title:	Test 2 2006 • August • 4 • 10:00 AM • Now Test Engineer	
Assessor Information 2.1 Name of Individual Completing This Form: 2.2 Date Completed: 2.3 Your Job Title: 2.4 Your Phone Number:	Test 2 2006 August 4 10:00 AM Now Test Engineer 512 471 8417	

Figure 5.4 Password Protection in the Utility Adjustment and Assessor Information Page

However, if utility assessors forgot the password, they cannot go to the utility adjustment and assessor information form to disable the password protection as shown in Figure 5.4. If they still want to access this utility adjustment's analysis records, they can ask TxDOT users to perform the following steps to disable the password protection for them:

- (1) Open CTUC DST. Select the district and the project.
- (2) Double-click the "Phase 1" analysis record as shown in Figure 5.5.
- (3) Press the button to go to the next page several times until Figure 5.6 shows.
- (4) Select the utility adjustment where utility assessors forgot the password.
- (5) If the utility adjustment does not need CTUC Phase 2 Analysis, its password protection is automatically disabled.

- (6) If the utility adjustment's password protection has been disabled by utility assessors, the "Overwrite" button will be also disabled as shown in Figure 5.6, which means utility assessors do not need any password to access their analysis data.
- (7) Enter the new password, which cannot be an empty string, for the utility adjustment whose password is unknown before. Press the "Overwrite" button. Be sure to press "Save & Exit" button to save and close CTUC DST so that utility assessors can re-open CTUC DST and login successfully.

History of CTUC Analysis Records - CT	UC Decision Support Tool		×
History of CTUC Analysis Rec	ords		
1. Basic Project Information			
1.1 Highway Project Construction CSJ (CCSJ): 1234-56-789	1.5 Current CTUC Ana	lysis Phase: Phase 2 Explain
1.2 Highway Project ROW CSJ (ROWCSJ): 9876-54-321	1.6 Number of Utility Adjustments Involved in 1	'his Project: 3
1.3 Highway Project Name	e: IH 410 A		
1.4 TxDOT Distric	t: San Antonio (Bexar 410)		
Please Select One of the Follo 2. Previous CTUC Analysis Records for This Hig	wing Analysis Records to Con hway Project:	ntinue:	
Date Completed	Assessor's Name	CTUC Phase of This Analysis	Number of Questions Answered
7/17/2006 1:0:0 AM	Michael Test	Phase 1	62
•			<u> </u>
Previous Page	Retrieve This Analysis	New Analysis	Delete This Analysis

Figure 5.5 Double-Click the "Phase 1" Analysis Record

Utility Adjustments to Be Included in CTUC Phase 2 Analysis 1. Highway Project Information 1.1 Highway Project Construction CSJ (CCSJ): 1234-56-789 1.5 Current CTUC Analysis Phase: Phase 1 Explain 1.2 Highway Project ROW CSJ (ROWCSJ): 9876-54-321 1.6 Assessor's Name: Michael Test 1.1 Explain 1.3 Highway Project ROW CSJ (ROWCSJ): 9876-54-321 1.6 Assessor's Name: Michael Test 1.7 Date Completed: 7/17/2006 1:0:0 AM 2. Utility Adjustment Information 2.4 Description: Additional information can be entered here. For example, utility positions, contact persons, etc. 2.6 Password Needed? No 2.1 Utility Adjustment Name: Water Line (Range/Station A-B) 2.4 Description: Additional information can be entered here. For example, utility positions, contact persons, etc. 2.6 Password Needed? No 2.3 Utility Adjustments Not Considered in Phase 2 Utility Adjustments Not Considered in Phase 2 Overwrite Utility Adjustment Name Utility Type If of Show-Stoppers in Phase High-V Power Line (Sta 410) Utility Adjustment Name Utility Type If of Show-Stoppers in Phase West Comm. Cable (412 - 416) Utility Type If of Show-Stoppers in West Comm. 1	Phase 1 Analysis: Utility Adjustments to	Be Included in CTUC Phase 2 Ana	lysis - CTUC Decision Support Tool									
	Utility Adjustments to Be Includ	d in CTUC Phase 2 Analysi	s									
1.2 Highway Project ROW CSJ (ROWCSJ): 9976-54-321 1.6 Assessor's Name: Michael Test 1.3 Highway Project Name: IH 410 A 1.7 Date Completed: 7/17/2006 1:0:0 AM 2. Utility Adjustment Information 2.1 Utility Adjustment Information 2.6 Password Needed? No 2.1 Utility Adjustment Name: Water and/or Wastewater 2.4 Description: Additional information can be entered here. 2.6 Password Needed? No 2.2 Utility Type Involved: Water and/or Wastewater 2.5 Is IPA? Yes Overwrite Utility Adjustment Name Utility Type & # of Show-Stoppers in Phase Utility Adjustment Name Utility Adjustment Name Utility Adjustment Name Utility Type & # of Show-Stoppers in Phase Utility Adjustment Name Utility Type & # of Show-Stoppers in Phase West Comm. Cable (412 - 416) Comm. 1	1. Highway Project Information 1.1 Highway Project Construction CSJ (CCSJ	1234-56-789	1.5 Current CTUC Analysis Phase:	Phase 1 Explain								
1.3 Highway Project Name: IH 410 A 1.7 Date Completed: 7/17/2006 1:0:0 AM 1.4 TxDOT District: San Antonio (Bexar 410) 1.7 Date Completed: 7/17/2006 1:0:0 AM 2. Utility Adjustment Information 2.1 Utility Adjustment Name: Water Line (Range/Station A-B) 2.4 Description: 2.1 Utility Adjustment Name: Water and/or Wastewater 2.6 Password Needed? No 2.2 Utility Type Involved: Water and/or Wastewater 2.5 Is IPA? Yes 2.3 Utility Number: U10001 2.5 Is IPA? Yes Overwri Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Water Comm. Cable (412 - 416) Comm. 1	1.2 Highway Project ROW CSJ (ROWCSJ	9876-54-321	1.6 Assessor's Name:	Michael Tost								
1.4 TxDOT District: San Antonio (Bexar 410) 1.7 Date Collipted: 7/17/2006 1:0:0 AM 2. Utility Adjustment Information 2.1 Utility Adjustment Name: Water Line (Range/Station A-B) 2.4 Description: Additional information can be entered here. For example, utility positions, contact 2.6 Password Needed? No 2.1 Utility Adjustment Name: Water and/or Wastewater 2.5 Is LPA? Yes 2.7 Utility's Password: 2.3 Utility Number: U10001 2.5 Is LPA? Yes Overwri Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Utility Adjustment Information 3 3 Water Line (Sta.410) Yes	1.3 Highway Project Name	IH 410 A	1.7 Data Canalitada	Michael Tesc								
2.1 Utility Adjustment Information 2.1 Utility Adjustment Name: Water Line (Range/Station A-B) 2.4 Description: Additional information can be entered here. For example, utility positions, contact persons, etc. 2.3 Utility Number: U10001 2.5 Is LPA? Yes Versons, etc. Utility Adjustments Not Considered in Phase 2 Utility Adjustment Name Utility Type # of Show-Stoppers in Phase High-V Power Line (Sta,410) Trans. 3	1.4 TxDOT District	San Antonio (Bexar 410)	1.7 Date Completeu:	7/17/2006 1:0:0 AM								
2.1 Utility Adjustment Name: Water Line (Range/Station A-B) 2.4 Description: Additional information can be entered here. For example, utility positions, contact 2.6 Password Needed? No 2.2 Utility Type Involved: Water and/or Wastewater 2.5 Is LPA? Yes 2.7 Utility's Password:	2. Utility Adjustment Information											
2.2 Utility Type Involved: Water and/or Wastewater 2.5 user postories of the construction of the construc	2.1 Utility Adjustment Name: Water Line (Ran	e/Station A-B) 2.4 Description:	Additional information can be entered here.	2.6 Password Needed? No								
2.3 Utility Number: U10001 2.5 Is LPA? Yes Utility Adjustments Nat Considered in Phase 2 Utility Adjustment Name Utility Type # of Show-Stoppers in Phase Utility Adjustment Name Utility Type # of Show-Stoppers in Phase High-V Power Line (Sta.410) Trans. 3	2.2 Utility Type Involved: Water and/or W	stewater	persons, etc.	2.7 Utility's Password:								
Utility Adjustments Not Considered in Phase 2 Utility Adjustment Name Utility Type # of Show-Stoppers in Phase High-V Power Line (Sta.410) Trans. 3 Utility Adjustment Name Utility Type # of Show-Stoppers in Phase West Comm. Cable (412 - 416) Comm. 1	2.3 Utility Number: U10001	2.5 Is LPA?	Yes	Overwrite								
Utility Adjustment Name Utility Type # of Show-Stoppers in Phase High-V Power Line (Sta.410) Trans. 3	Utility Adjustments Not Considered in Phas	Illility Adjustments Not Considered in Phase 2 Illility Adjustments That Need (TIIC Phase 2 Analysis										
West Comm. Cable (412 - 416) Comm. 1	Utility Adjustment Name Utility High-V Power Line (Sta 410) Trans	/pe # of Show-Stoppers in Phase	Utility Adjustment Name Water Line (Ranne (Station A-B)	Utility Type # of Show-Stoppers in Phase								
			West Comm. Cable (412 - 416)	Comm. 1								
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		_										
Go to Previous Page Go to Next Page Save & Exit	Go to Previous Page		Go to Next Page	Save & Exit								

Figure 5.6 Select the Utility Adjustment That Does Not Need Password

hase 1 Analysis: Utility Adjustments to B	e Included in CT	UC Phase 2 Ana	lysis - CTUC Decision Support Tool	ļ	D
Utility Adjustments to Be Include	d in CTUC Ph	ase 2 Analysi	is		
1. Highway Project Information 1.1 Highway Project Construction CSJ (CCSJ);	1224 54 790		1.5 Current CTUC Analysis Phase:	Bhara 1	Fuelsia
1.2 Highway Project ROW CSJ (ROWCSJ):	9876-54-321		 	Filase I	Explain
1.3 Highway Project Name:	TH 410 A		1.6 Assessor's Name:	Michael Test	
1.4 T×DOT District:	San Antonio (Bex	ar 410)	1.7 Date Completed:	7/17/2006 1:0:0 AM	
- 2. Utility Adjustment Information					
2.1 Utility Adjustment Name: West Comm. Cable	e (412 - 416)	2.4 Description:		2.6 Password Neede	d? Yes
2.2 Utility Type Involved: Communication				2.7 Utility's Passwor	d: *
2.3 Utility Number: U10002		2.5 Is LPA?	No		Overwrite
Utility Adjustments Not Considered in Phase Utility Adjustment Name Utility Ty	2 ne #ofShow-Si	tonners in Phase	Utility Adjustments That Need C	TUE Phase 2 Analysis Utility Type # of Sho	w-Stoppers in Phas
High-V Power Line (Sta.410) Trans.	3		Water Line (Range/Station A-B)	W/WW 2	
		2	> <		
4	1	_		1	
Go to Previous Page			GO TO NEXT Page	Save	

Figure 5.7 Enter the New Password in Question 2.7 and Press "Overwrite"

References

- AASHTO. (2004). *Right of Way and Utilities: Guidelines and Best Practices*, American Association of State and Highway Transportation Officials, Washington, D.C.
- Ellis, R.D., and Thomas, H.R. (2003). "The Root Causes Of Delays in Highway Construction." 82nd Annual Meeting of the Transportation Research Board, Transportation Research Board, Washington, D.C.
- GAO. (1999). "Transportation and Infrastructure: Impacts of Utility Relocations on Highway and Bridge Projects." *GAO/RCED-99-131*, United States General Accounting Office, Washington, DC.
- O'Connor, J.T., C.H. Caldas, and et al. (2004) "Effectiveness of Combined Utility Relocation/Highway Construction Projects." *TxDOT Project 0-4997-Proposal*, Center for Transportation Research, The University of Texas at Austin, Austin, TX.
- O'Connor, J.T., C.H. Caldas, and et al. (2005) "Combined Transportation and Utility Construction: Analysis of Approach." *TxDOT Project 0-4997-P1*, Center for Transportation Research, The University of Texas at Austin, Austin, TX.