Draft

Training Materials

Identifying and Managing Utility Conflicts (R15B)

October 2015

The second Strategic Highway Research Program (SHRP2) is a national partnership of key transportation organizations: the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners are deploying products that will help the transportation community enhance the productivity, boost the efficiency, increase the safety, and improve the reliability of the nation's highway system.

These training materials are a work product of the SHRP2 Solution, Identifying and Managing Utility Conflicts (R15B). The product leads are Matthew DeMarco, Federal Highway Administration, and Keith Platte, American Association of State Highway and Transportation Officials. The training materials were first developed by the Transportation Research Board's SHRP2 R15B and R15C projects.

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COURSE OVERVIEW

INTRODUCTION

A critical factor that contributes to inefficiencies in the project development and delivery process is the lack of adequate information about the location and other characteristics of utility facilities that might be affected by a transportation project. Inaccurate and/or incomplete utility data can result in a number of problems, including the following:

- Disruptions when utility installations are encountered unexpectedly during construction, either because there was no previous information about those installations or because their stated location on the construction plans was incorrect.
- Damage to utility installations, which can lead to disruptions in utility service, environmental damage, and increased risk to the health and safety of construction workers and the public.
- Delays that can extend the period of project development and/or delivery and increase total project costs through higher bids, change orders and/or damage or delay claims, redesign, and litigation by utility owners or agencies. These delays also result in frustration by the traveling public and negative public perception about the project.
- Unplanned environmental corrective actions.
- Unnecessary utility relocations and project delivery inefficiencies that occur because adequate information about existing utility facilities was not available to enable stakeholders apply alternative utility conflict resolution strategies.

Potential for utility conflicts exists at most transportation projects, such as in the following situations:

- Interference between utility facilities and transportation design features (existing or proposed).
- Interference between utility facilities and transportation construction activities or phasing.
- Interference between planned utility facilities and existing utility facilities.
- Noncompliance of utility facilities with utility accommodation policies.
- Noncompliance of utility facilities with safety and accessibility regulations.

Detection of utility conflicts as early as possible during the project development and delivery process can help to identify the optimum application of strategies to resolve those conflicts. Strategies normally available include one or more of the following options:

- Remove, abandon, or relocate the utilities in conflict.
- Modify the proposed transportation facility, e.g., by changing the horizontal and/or vertical alignment of the project, structure dimensions, or other characteristics.
- Implement an engineering (protect-in-place) countermeasure that does not involve utility relocation or changes to the transportation project alignment.
- Accept an exception to policy.

Relocating utilities (frequently the default path in project development) is not necessarily or always the optimal solution, which is one of the reasons that tools such as effective communication, cooperation, and coordination with all affected stakeholders are so important to help identify solution alternatives that are feasible, cost-effective, and beneficial to tax payers *and* rate payers.

Utility-related activities in the project development and delivery process involves the production and exchange of enormous amount of data and supporting documents, including schematics, design files, agreements, and certifications. A critical component of this process is how to document and manage utility conflict data effectively. Utility conflict tables, also known as utility conflict matrices (UCMs) or utility conflict lists, enable users to organize and track utility conflict data. In practice, these tables or matrices support a wide range of related processes, including conflict analyses, utility agreement development, construction letting, as well as utility relocation scheduling, billings, and payments.

Practices involving the use of UCMs vary widely throughout the country, not just among states but also within states. There is a need to document these practices and develop optimized UCM concepts and techniques that can contribute to standardization and optimization of the utility coordination process. SHRP 2 Project R15B addressed this need by reviewing the state-of-the-practice around the country, identifying recommendations for best practices, developing and testing standalone and database UCMs, and developing training materials and implementation guidelines. SHRP 2 Project R15C involved a pilot implementation of the SHRP 2 R15B products at the Maryland State Highway Administration.

This document contains the training materials developed as part of SHRP 2 R15B and updated as part of the SHRP 2 R15C pilot implementation.

COMPANION CD

The companion compact disk (CD) includes copies of all the training materials described in this document. The CD is organized as follows:

Folder Name	File Name	Format[1]
Binder	Training Material Binder Participant	pdf
	Training Material Binder Instructor	pdf
Instructional Materials	Lesson 5 Group 1 Exercise Materials	pdf
	Lesson 5 Group 2 Exercise Materials	pdf
	Lesson 5 Group 3 Exercise Materials	pdf
	Lesson 5 Group 4 Exercise Materials	pdf
	Lesson 5 Group Assignment	pdf
	Lesson 5 Test Hole Forms	pdf
	Lesson 5 Utility Conflict Solution Sheet	pdf
Lessons	Lesson 1	pptx
	Lesson 2	pptx
	Lesson 3	pptx
	Lesson 4	pptx
	Lesson 5	pptx
	Lesson 6	pptx
Standalone UCM	Utility Conflict Matrix	xls
Data Model and Database	UCD Data Dictionary	pdf
	UCD Data Model – Access	erwin
	UCD Data Model – Oracle	erwin
	UCD Export Schema Oracle	sql
	UCD Logical Data Model	pdf
	UCD Physical Data Model – Access	pdf
	Utility_Conflict_Database–Application	accdb
	Utility_Conflict_Database–Data	accdb

[1] File formats:

erwin	Computer Associates ERwin Data Modeler
accdb	Microsoft Access® 2010
pdf	Adobe® Portable Document Format
pptx	Microsoft PowerPoint® 2010
sql	Structured Query Language
xls	Microsoft® Excel® 2007

INSTRUCTIONS

The one-day Utility Conflicts and Solutions course is divided into six lessons, as follows:

AM Session:

- Lesson 1: Introductions and Course Overview (30 minutes)
- Lesson 2: Utility Conflict Concepts (75 minutes)
- Lesson 3: Utility Conflict Identification and Management (75 minutes)

PM Session:

- Lesson 4: Use of Database Approach to Manage Utility Conflicts (20 minutes)
- Lesson 5: Hands-On Utility Conflict Management Exercise (120 minutes)
- Lesson 6: Wrap-Up (10 minutes)

The course is designed for a total of seven hours and 15 minutes of instruction, from 8:30 AM to 3:45 PM. It includes 5:30 hours (330 minutes) of direct instructor contact and 1:45 hours (105 minutes) of breaks (including lunch). The course provides ample opportunities for participant interaction and enables the instructor to adjust session and lesson start times and durations depending on the audience and the level of participant engagement in the discussions.

The following pages provide a more detailed description of the lesson plan.

Post-Course Activities

- Instructor consolidates participant feedback forms.
- Instructor completes the instructor review form.

LESSON PLAN

Lesson Number:	**1**
Lesson Title:	**Introductions and Course Overview**
Topics:	• Introductions (both instructor and participants). • Overview of course objectives, outcomes, agenda, and reference materials. • Discussion of ground rules, sign-in-sheet, feedback forms, and other housekeeping items.
Instructional Method:	Activity 1: Instructor welcomes participants, introduces him/herself, and leads participants through introductions. Participants introduce themselves and provide a brief description of their role and experience in utility coordination, design, or other project development and delivery process matters. Activity 2: Instructor provides an overview of the course objectives, outcomes, agenda, and reference materials. Activity 3: Instructor discusses ground rules, sign-in sheet, feedback forms, and other housekeeping items as needed.
Instruction Day:	Day 1: 8:30 AM – 9:00 AM
Time Allocation:	• Activity 1: Introductions 15 minutes • Activity 2: Course overview 10 minutes • Activity 3: Housekeeping 5 minutes • Total Lesson 1 30 minutes Note: Depending on the course setting and the length of time actually spent on Lesson 1 activities, it might be possible to increase the time allocated to Lessons 2 or 3. In any case, for maximum effectiveness, it is not recommended to extend Lesson 3 beyond Noon.
Evaluation Plan:	• Instructor uses the instructor review form to take notes on the background, experience, and role of participants in utility coordination, design, or other project development and delivery process matters.
References:	• Course binder. • Lesson 1 PowerPoint file and handouts. • SHRP 2 R15B research report (http://www.trb.org/Main/Blurbs/166731.aspx). • SHRP 2 R15C research report (http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_R15Cpilotreport.pdf).

Lesson Number:	**2**
Lesson Title:	**Utility Conflict Concepts**
Learning Outcomes:	• Understanding of relevant concepts related to the management of utility conflicts within the project development and delivery process.
Instructional Method:	Activity 1: Instructor uses PowerPoint slides to: • Describe typical utility conflict management concepts and issues. Activity 2: Instructor uses PowerPoint slides and printed UCM materials to: • Describe the purpose and main findings of the SHRP 2 R15B project. • Summarize trends and other information gathered through the online surveys and follow-up interviews. • Summarize process to develop standalone UCM. • Describe UCM data model and Access database application. Activity 3: Questions and answers: • Instructor answers questions from participants. As needed, other participants participate in the discussion. • Depending on the course setting, instructor might choose to encourage questions from participants throughout the presentation instead of allocating 10 minutes at the end of the lesson for questions and answers.
Instruction Day:	Day 1: 9:00 AM – 10:15 AM
Time Allocation:	• Activity 1: Utility conflicts and project development and delivery 25 minutes • Activity 2: SHRP 2 R15B research findings 40 minutes • Activity 3: Questions and answers 10 minutes • Total Lesson 2 75 minutes
Evaluation Plan:	• Instructor uses the instructor review form to summarize the type of questions and comments from participants. Depending on the setting, this activity might need to be completed after the course. • Participants use the participant feedback form to rate the effectiveness of the presentation.
References:	• Lesson 2 PowerPoint file and handouts. • Standalone and sample UCM printouts.

Lesson Number:	**3**
Lesson Title:	**Utility Conflict Identification and Management**
Learning Outcomes:	• Understanding of process to develop and maintain a UCM using data from a sample project. • Understanding of the types of reporting options available when using a database representation of the UCM.
Instructional Method:	Activity 1: Instructor uses PowerPoint slides and sample materials to: • Demonstrate the process to identify utility conflicts using sample project drawings and associated information. • Describe structure and format of the UCM and the process to populate and maintain the UCM using sample project data. Activity 2: Discussion, questions, and answers: • Instructor answers questions from participants. As needed, other participants participate in the discussion. • Instructor encourages participants to share and discuss real-world examples and/or the applicability of UCMs to real-world situations. • Depending on the course setting, instructor might choose to encourage questions and discussion from participants throughout Activity 1 instead of allocating 30 minutes at the end of the lesson for questions and answers.
Instruction Day:	Day 1: 10:30 AM – 11:45 AM
Time Allocation:	• Activity 1: Utility conflict management and use of UCM 65 minutes • Activity 2: Discussion, questions, and answers 10 minutes • Total Lesson 3 75 minutes
Evaluation Plan:	• Instructor uses the instructor review form to summarize the type of questions and comments from participants. Depending on the setting, this activity might need to be completed after the course. • Participants use the participant feedback form to rate the effectiveness of the presentation.
References:	• Lesson 3 PowerPoint file and handouts. • Sample UCM printouts, plan sheets, and test hole reports.

Lesson Number:	**4**
Lesson Title:	**Use of Database Approach to Manage Utility Conflicts**
Learning Outcomes:	• Understanding of utility conflict data model and database capabilities. • Understanding of the process to develop and use customized queries and reports.
Instructional Method:	Activity 1: Instructor uses PowerPoint slides, Access database, and sample materials to: • Describe data model and database structure and capabilities. • Describe data model connections with other DOT information systems. Activity 2: Instructor uses PowerPoint slides, Access database, and sample materials to: • Describe how utility conflict data are stored into the database. • Illustrate the process to use Access queries, forms, and reports. Activity 3: Questions and answers: • Instructor answers questions from participants. As needed, other participants participate in the discussion. • Depending on the course setting, instructor might choose to encourage questions from participants throughout the presentation instead of allocating 10 minutes at the end of the lesson for questions and answers.
Instruction Day:	Day 1: 1:00 PM – 1:20 PM
Time Allocation:	• Activity 1: Data model structure 5 minutes • Activity 2: Use of Access database to manage utility conflicts 10 minutes • Activity 3: Questions and answers 5 minutes • Total Lesson 4 20 minutes
Evaluation Plan:	Participants' learning will be evaluated by their participation and questions.
References:	• Lesson 4 PowerPoint file and handouts. • Printed copies of sample database queries and reports.

Lesson Number:	**5**
Lesson Title:	**Hands-On Utility Conflict Management Exercise**
Learning Outcomes:	• Identification of utility conflicts on sample project design drawings. • Use of UCMs to manage utility conflicts.
Instructional Method:	For all activities: Instructor uses PowerPoint presentation and other sample materials to: • Direct course participants during exercise and answer questions as needed. Activity 1: Participants organized in groups use sample project materials and blank UCM template to: • Identify as many utility conflicts as possible on sample project materials. • Evaluate potential locations for test holes. • Transcribe utility conflict information into the UCM. Activity 2: Instructor hands out test hole data sheets. Participants use test hole data sheets to: • Review and assess potential utility conflicts. Activity 3: Participants use blank conflict resolution alternatives template to: • Choose 1-2 utility conflicts and develop 3-4 utility conflict resolution strategies each, including cost estimates. • Choose the best strategy to resolve the utility conflicts. Activity 4: Participants use PDF plan sheets and projector to: • Give a 3-minute group presentation, highlighting a utility conflict, the strategies considered to resolve the conflict, and any other lessons learned.
Instruction Day:	Day 1: 1:20 PM – 3:35 PM
Time Allocation:	• Activity 1: Identify conflicts 30 minutes • Activity 2: Review test hole data and analyze utility conflicts 30 minutes • Afternoon Break 15 minutes • Activity 3: Develop conflict resolution strategy 30 minutes • Activity 4: Group presentations 30 minutes • Total Lesson 5 135 minutes
Evaluation Plan:	• Instructor uses the instructor review form to summarize the type of questions and comments from participants. Depending on the setting, this activity might need to be completed after the course. • Participants use feedback form to rate the effectiveness of the presentation.
References:	• Lesson 5 PowerPoint file and handouts. • Sample UCM printouts, plan sheets, and test hole reports.

Lesson Number:	**6**
Lesson Title:	**Wrap-Up**
Topics:	• Instructor provides summary of course. • Instructor collects feedback forms.
Instructional Method:	Activity 1: Instructor summarizes the activities of the course, addresses any final questions of course participants, and provides some closing remarks. Participants fill out the feedback form. The instructor then collects the feedback forms provided by the course participants.
Instruction Day:	Day 1: 3:35 PM – 3:45 PM
Time Allocation:	• Activity 1: Final questions and closing remarks 10 minutes • Total Lesson 6 10 minutes
References:	• Participant feedback form.

INSTRUCTOR MATERIALS

The instructor materials are not included in the participant version of the training handbook.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

PARTICIPANT HANDOUT

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Lesson 1

Introductions and Course Overview

1-1

Lesson 1 Overview

1.1 Introductions
1.2 Course overview
1.3 Training objectives
1.4 Participant workbook
1.5 Housekeeping

1-2

Introductions

- Your name
- Where do you work?
- Experience with the utility process?
- Expectations for this course?

1-3

Course Overview

• 8:30 AM	– 9:00 AM	Introductions and Course Overview
• 9:00 AM	– 10:15 AM	Utility Conflict Concepts
• 10:15 AM	– 10:30 AM	Morning Break
• 10:30 AM	– 11:45 AM	Utility Conflict Identification and Management
• 11:45 AM	– 1:00 PM	Lunch Break
• 1:00 PM	– 1:20 PM	Use of Database Approach to Manage Utility Conflicts
• 1:20 PM	– 2:20 PM	Hands-On Utility Conflict Management Exercise Part I
• 2:20 PM	– 2:35 PM	Afternoon break
• 2:35 PM	– 3:35 PM	Hands-On Utility Conflict Management Exercise Part II
• 3:35 PM	– 3:45 PM	Wrap-Up

1-4

Training Objectives

- Review concepts related to the management of utility conflicts within the project development and delivery process
- Describe the process to develop and maintain utility conflict matrices
- Review reporting options when using a database to manage utility conflicts
- Identify utility conflicts on sample design sheets
- Develop utility conflict resolution strategies

1-5

Participant Workbook

- Section A: Course overview
- Section B: Instructor materials
- Section C: Participant handout
- Section D: Utility Conflict Matrix Update Process
- Section E: Utility Conflict Matrices
- Section F: Sample project files
- Section G: Selected database lookup tables
- Section H: Course forms

1-6

Housekeeping

- Make course time as productive as possible
  - Turn off cell phones
  - Return from breaks and lunch on time
  - Stay on task during activities
- Ask questions
- Use sign-in sheet
- Use course feedback form
- Miscellaneous

1-7

Lesson 2

Utility Conflict Concepts

2-1

Course Overview

- 8:30 AM – 9:00 AM Introductions and Course Overview
- 9:00 AM – 10:15 AM Utility Conflict Concepts
- 10:15 AM – 10:30 AM Morning Break
- 10:30 AM – 11:45 AM Utility Conflict Identification and Management
- 11:45 AM – 1:00 PM Lunch Break
- 1:00 PM – 1:20 PM Use of Database Approach to Manage Utility Conflicts
- 1:20 PM – 2:20 PM Hands-On Utility Conflict Management Exercise Part I
- 2:20 PM – 2:35 PM Afternoon break
- 2:35 PM – 3:35 PM Hands-On Utility Conflict Management Exercise Part II
- 3:35 PM – 3:45 PM Wrap-Up

2-2

Lesson 2 Overview

2.1 Utility conflicts and project development and delivery

2.2 SHRP2 R15B research findings

2.3 Questions and answers

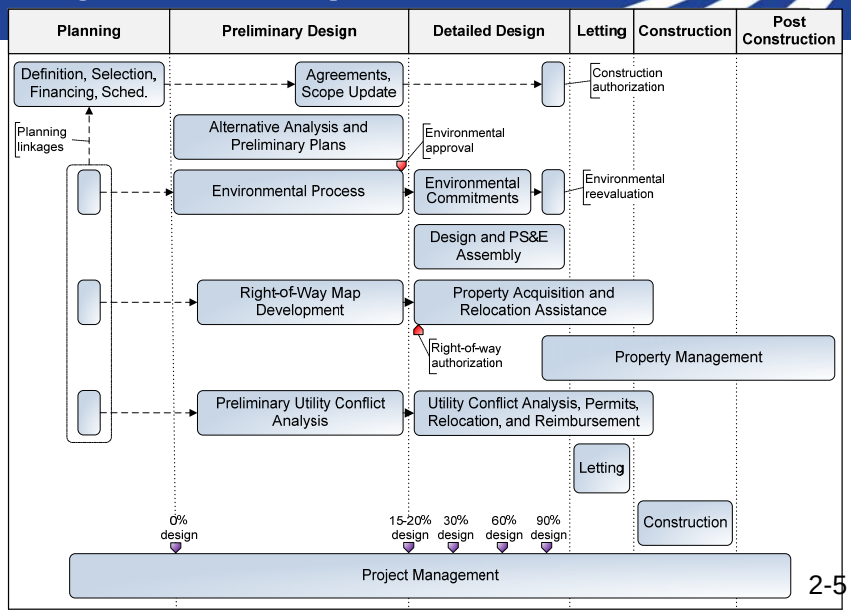
2-3

2.1

Utility Conflicts and Project Development and Delivery

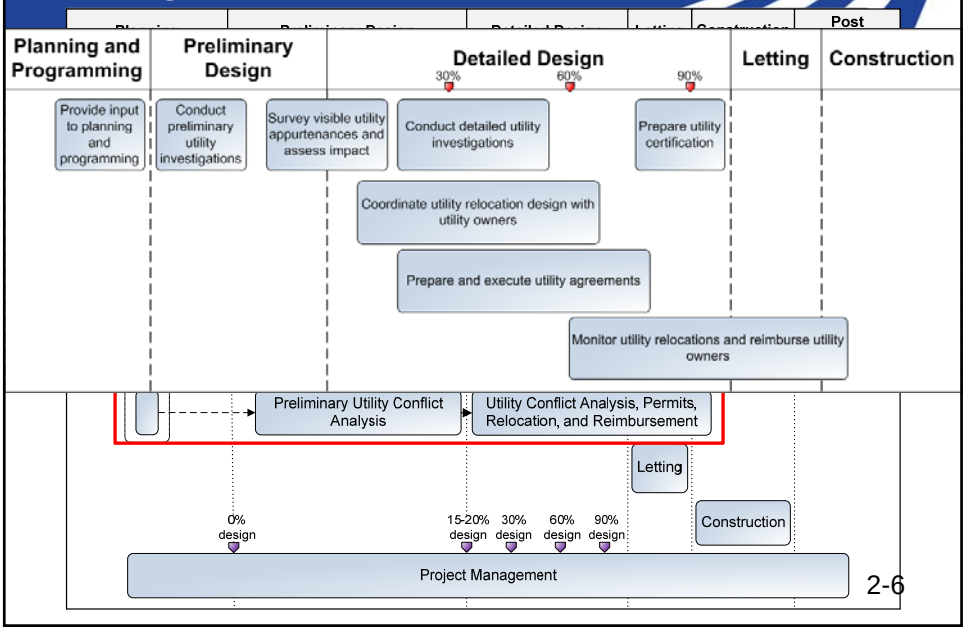
2-4

Project Development Process



2-5

Utility Process



2-6

Reality Check …

- Frequently cited reasons for project delays (DOT perspective):
  - Short timeframe for developing projects
  - Project design changes
  - Environmental process delays
  - Utility-related inefficiencies
    - Inaccurate location and marking of existing utility facilities
    - Identifying utility conflicts late in the design phase
    - Disagreements on recommended utility-related solutions
    - Utility relocation costs not handled properly
    - …

2-7

Reality Check …

- Frequently cited reasons for project delays (utility owner perspective):
  - Limited resources (financial and personnel)
  - Internal demands (maintenance, service upgrades)
  - Utility owner's project development process protocols
  - Coordination with other stakeholders during design
  - Coordination with other stakeholders during construction
  - Changes in DOT design and schedules
  - Unrealistic schedule by DOT for utility relocations

2-8

Inefficient Management of Utility Issues

- Lack of accurate, complete utility data
- Resolution and management of utility conflicts
- Negative impacts:
  - Disruptions during construction
  - Damage to utility installations
  - Delays and project overruns
  - Unplanned environmental corrective actions
  - Unnecessary utility relocations

2-9

Utility Conflict Scenarios

- Utility facility vs. transportation design feature (existing or proposed)
- Utility facility vs. transportation construction activity or phasing
- Planned utility facility vs. existing utility facility
- Noncompliance with:
  - Utility accommodation statutes, regulations, and policies
  - Safety or accessibility regulations

2-10

2-11

2-12

Solution Strategies

- Remove, abandon, or relocate utilities in conflict
  - Relocating utilities NOT NECESSARILY OR ALWAYS the best or most cost-effective solution
- Modify transportation facility
- Protect-in-place utility installation
- Accept an exception to policy

2-13

Transportation Design Changes

- Geometric alignment (horizontal/vertical):
  - Change grade
  - Offset centerline, widen one side of highway
  - Move ramps, driveways
- Structure dimensions, other characteristics:
  - Change embankment slope
  - Add/modify retaining wall to reduce slope encroachment
  - Redesign bridge footings and abutments, move pilings
  - Redesign drainage structures

2-14

Example: Widening Both Sides vs. One Side of Highway

- Issues to consider:
  - Widening both sides of highway impacts everyone (no one is spared!)
  - Widening one side can reduce utility impacts
  - Depends on what kind of utilities are affected

2-15

Example: Gas Line

- Highway widening project on MD 32, Maryland, to accommodate center turn lane
- Identified 114 potential conflicts using UCM
  - Discovered gas line in conflict with drainage design
  - Discovered all conflicts were on one side of the road
- Changed design and construction sequence to avoid most conflicts
- Estimated cost savings: $500,000
- Estimated time savings: 4-6 months
- Improved goodwill with utilities: priceless

2-16

Example: Embankment

- Due to interstate widening, embankment had to be raised 50-60 feet
- Major gas and water facilities in the area
- Large soil settlement expected
- Modified project to protect-in-place utilities:
  - Foam layer
  - Thin concrete cap
- Costly utility relocation was avoided

2-17

Example: Bridge

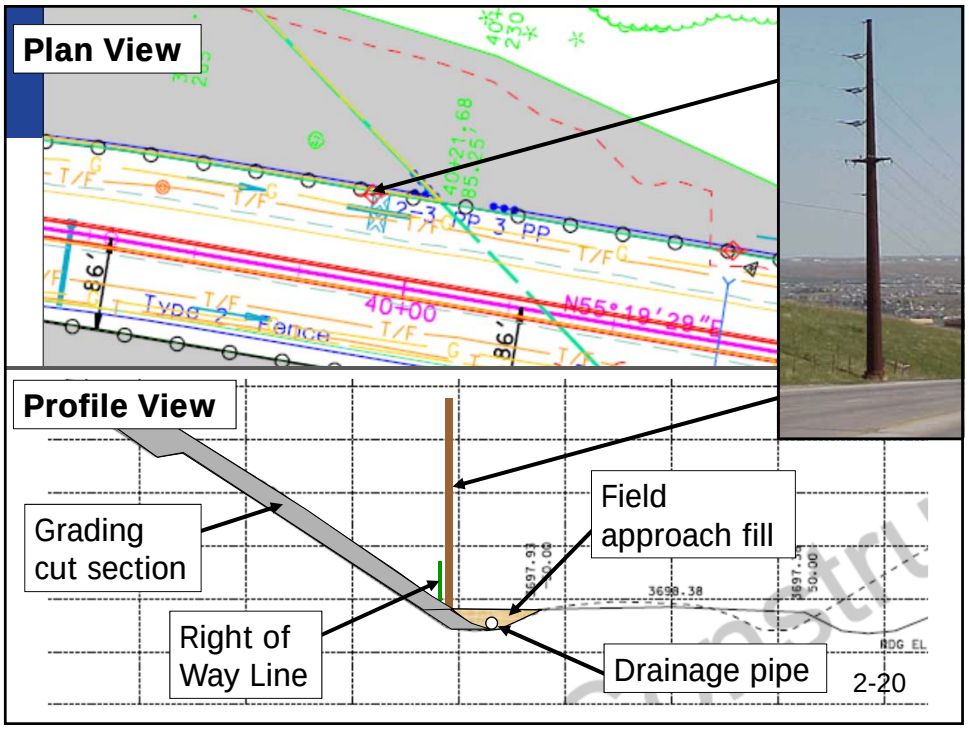
- Bridge project affected multiple utilities (power, water, sewer, etc.)
- Modifying horizontal bridge alignment slightly
  - Would have avoided any utility impact
  - Would not have impacted right-of-way
  - Would not have compromised bridge construction
- Discovered during construction… too late!
- Utility relocation costs = $5,000,000

2-18

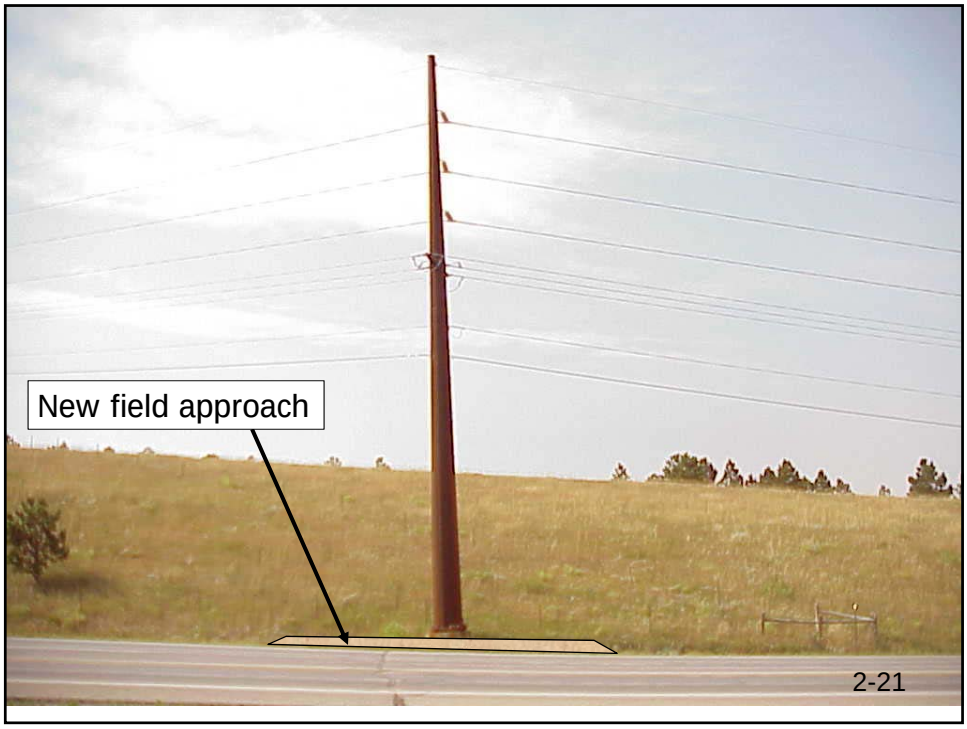
Example: Power Pole

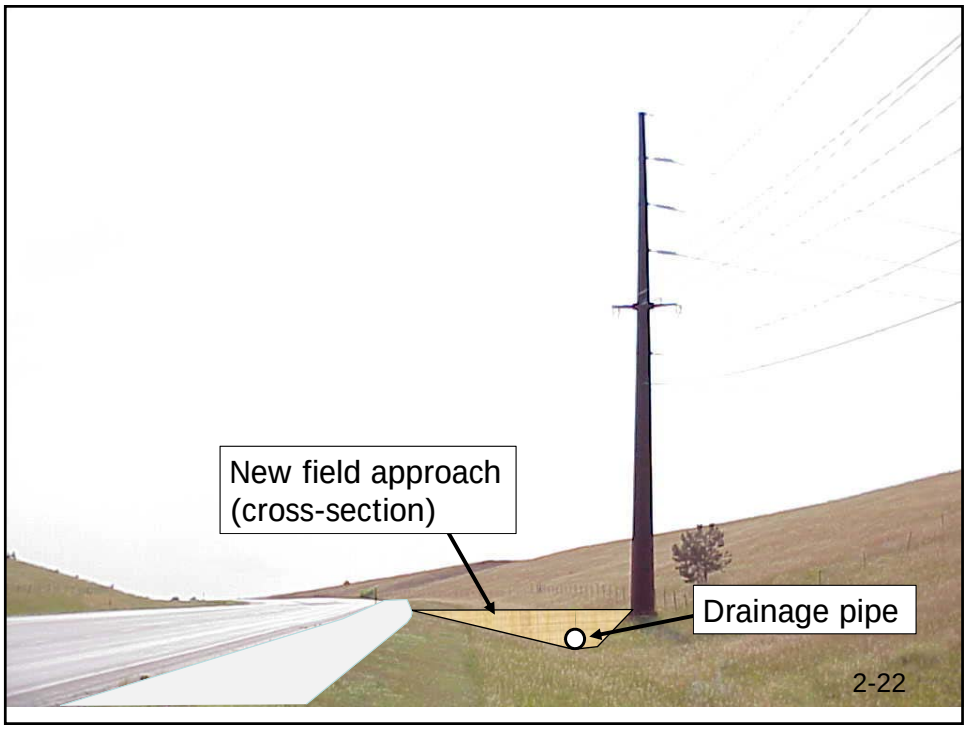
- Rapid City, South Dakota
- Conflict discovered at 30% coordination meeting discussion
- Redesign avoided utility adjustment
- Additional costs were paid by utility

2-19



2-20


New field approach
2-21


New field approach
(cross-section)
Drainage pipe
2-22

Summary of Cost Savings

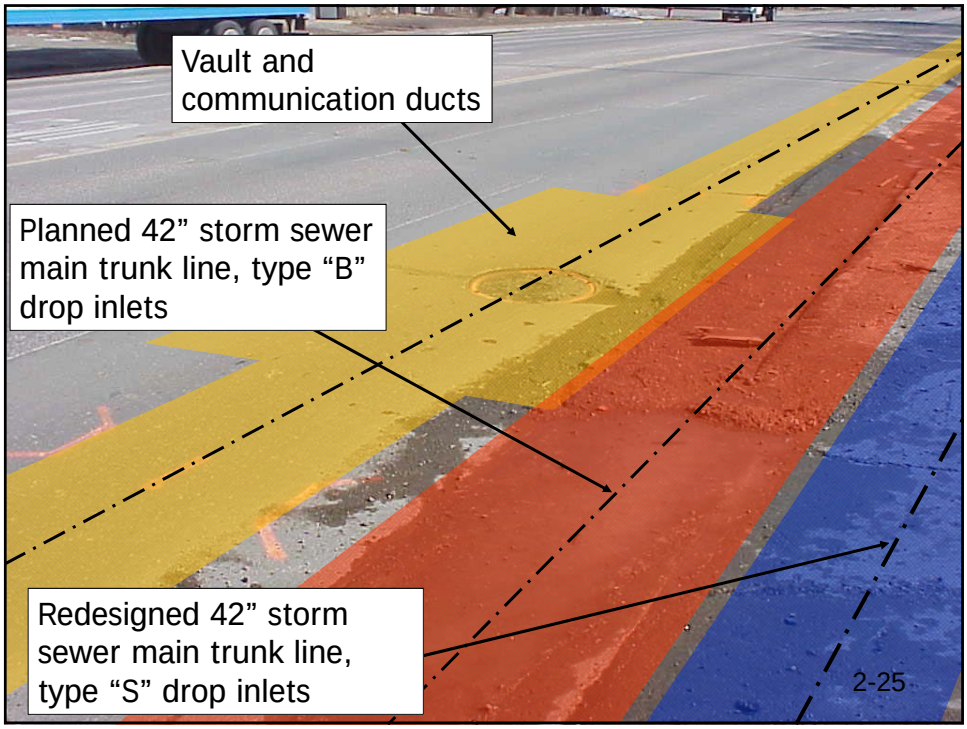
• BHP&L estimate to relocate 69-kV corner structure	$60,000
• Additional cost to add field approach	- $3,000
• Cost savings to BHP&L consumers/ taxpayers	$57,000

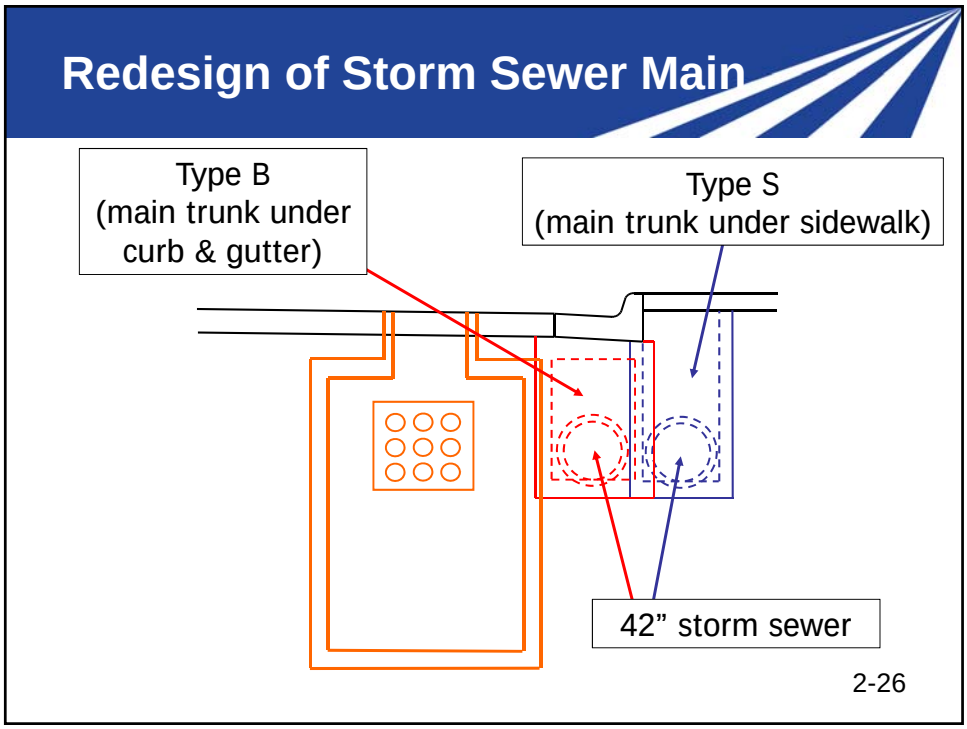
2-23

Example: Storm Sewer and Communication Duct System

- Aberdeen, South Dakota
- Communication ducts along 5 blocks of city streets
- 5 vaults (5 feet x 7 feet x 12 feet) connected with 9 4-inch ducts encased in concrete
- In conflict with planned storm sewer

2-24


Vault and communication ducts
Planned 42” storm sewer main trunk line, type “B” drop inlets
Redesigned 42” storm sewer main trunk line, type “S” drop inlets
2-25


Redesign of Storm Sewer Main
Type B (main trunk under curb & gutter)
Type S (main trunk under sidewalk)
42” storm sewer
2-26

Summary of Cost Savings

• Qwest estimate to relocate 9-way duct system	$750,000
• Additional cost to re-design storm sewer	- $37,270
• Cost savings to consumers/ taxpayers	$712,730

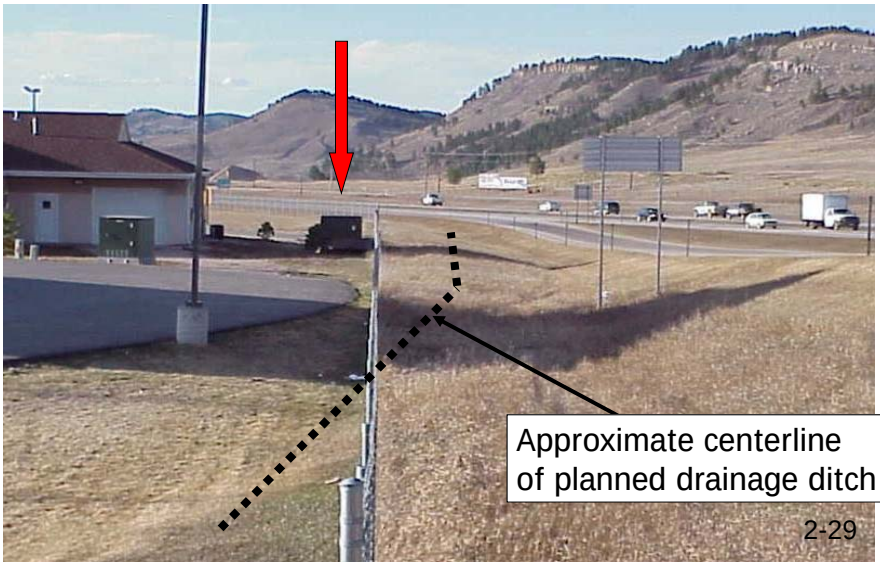
2-27

Example: Drainage Channel

- Rapid City, South Dakota
- Impact discovered during preliminary project scoping phase
- Typical concrete lined drainage ditch would have affected electrical cabinet and cables
- Recommendation: redesign sloped ditch to vertical wall
- Additional benefit: elimination of some real property acquisition

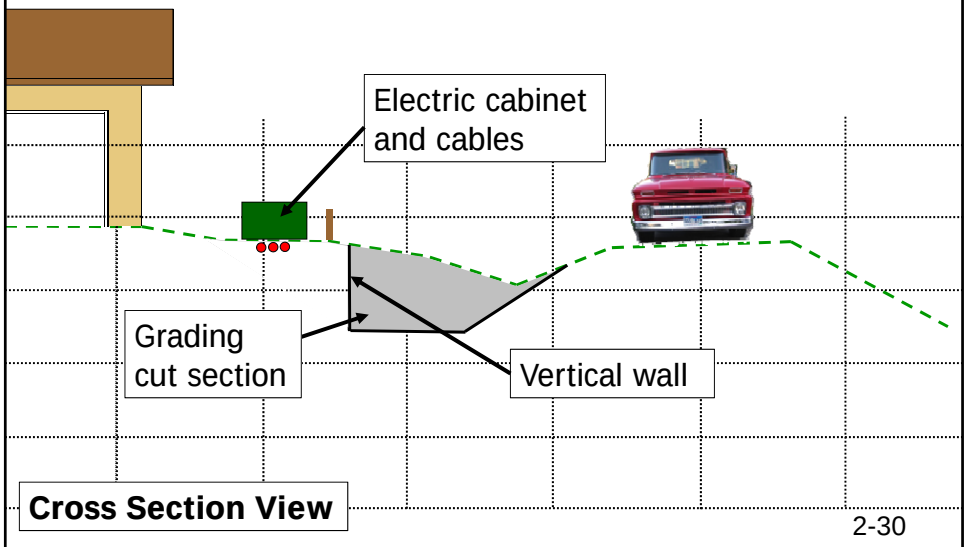
2-28

Example: Drainage Channel



2-29

Recommended Redesign



2-30

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2-32

2-33

Example: Traffic Signal Footing

- Deadwood, South Dakota
- Pole to be placed in close proximity to electric utilities
- Pole location surveyed on ground by DOT
- Utilities in vicinity identified by One Call
- High cost to relocate electric utilities
- QLA utility investigation
- Recommendation: Reduce pole footing diameter from 36” to 30” and increase footing depth

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Vacuum excavation

2-35

Example: Traffic Signal Footing

3 conduits interfere with 36” pole footing diameter

Redesign using 30” sonotube (longer, narrower footing)

2-36

Summary of Cost Savings

• Cost to relocate power facilities	$95,000
• Cost to collect QLA data	- $5,785
• Cost savings to consumers/ taxpayers	$89,215

2-37

Key Concepts

- Utility conflict management:
  - Should start before 60% design
  - Does not end at letting
- Goal: Avoid or minimize utility impacts
- Strategies:
  - Involve utility owner early and often
  - Avoid unnecessary utility relocations
  - Evaluate design alternatives
  - Conduct utility conflict analysis
  - Not all strategies apply to all conflicts
- Not all projects or locations need QLB/QLA data

2-38

General References

- ASCE Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data (CI/ASCE 38-02)
- AASHTO Guide for Accommodating Utilities Within Highway Right-of-Way
- AASHTO Policy on the Accommodation of Utilities Within Freeway Right-of-Way
- AASHTO Right of Way and Utilities Guidelines and Best Practices
- FHWA Program Guide
- SHRP2 R15B and R15C Reports

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2.2

SHRP2 R15B Research Findings

2-40

Background and Objectives

- Utility conflict matrix (UCM) an important tool for managing utility conflicts
- Objectives:
  - Review trends and identify best practices for the use of UCMs
  - Develop a recommended UCM approach and document related processes
  - Develop training materials for implementing UCM product

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SHRP2 R15B Products

- Product 1: Compact, standalone UCM
  - Low number of data items
  - Spreadsheet (MS Excel)
- Product 2: Utility conflict database
  - Formal data model (ERwin)
  - Enterprise database support (e.g., Oracle, SQL Server)
  - Tested in MS Access
  - UCM is one of many queries/reports possible
- Product 3: One-day UCM training course

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UCM State of the Practice

- Many states use tables or spreadsheets to manage utility conflicts (26 sample tables collected)
- Different categories of data tracked
- Wide range of styles and content
  - 144 different data items in total
  - Range of data items per table: 4 – 39
  - Average number of data items per table: 14
  - One size does not fit all
  - Different ideas about “consensus” tables

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Sample (Alaska)

DRAFT Utility Conflict Report
West Dowling Road Phase I

Anchorage, Alaska
DOT&PF No. 50898

Table 2: Chugach Electric Association, Incorporated, Conflicts Summary

Station	Offset	Station	Offset	Size/Type	Length	Conflict	ADJ/REL	Cost	PE/CE Cost	Total Cost
CEA Distribution Relocation Costs										
9+00	150' RT		200' LT	3φ UG	350	FG	REL	52,500	15,750	68,250
16+00	100' LT	42+30	80' LT	3φ UG	2630	FG	REL	394,500	118,350	512,850
16+00	100' LT	15+50	100' RT	3φ UG	250	FG	REL	37,500	11,250	48,750
16+00	100' LT	29+00	75' LT	1φ UG	1650	FG	REL	165,000	49,500	214,500
36+40	80' LT	35+80	350' RT	3φ UG	430	FG	REL	64,500	19,350	83,850
36+60	80' LT	36+70	380' LT	3φ UG	300	FG	REL	45,000	13,500	58,500
	UG Loop to the North			3φ UG	1000	FG	REL	150,000	45,000	195,000
							Subtotal	909,000	272,700	1,181,700
CEA Transmission Relocation Costs										
14+75	55' RT			138 kV OH	1	PWY	REL	30,000	9,000	39,000
32+75	55' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
36+38	45' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
							Subtotal	130,000	39,000	169,000
							Total CEA Relocation Costs	**1,039,000**	**311,700**	**1,350,700**

1φ Underground (UG) loop to extend across Dowling Road and along the south side to reconnect existing services.
UG loop provided to the north of the project to accommodate undergrounding.
Removal of existing swamp braces removed and steel piling added, down guys replaced with overhead span guy and down guys.

2-44

Sample (California)

I-10-EA 122401-Utilities Conflict Status

date of last revision May 30, 2000
this document was prepared by

Conflict No	Utility Sheet No.	Pothole No. (On D-sheet)	Owner	Utility Description	Pothole/Manhole Location	Conflict Location	Utility Conflict/ Work Description	Investigation: Pothole	Investigation: Manhole	Investigation: Overhead	Depth (ft)	Impact? Y	Impact? N	Action: Remove	Action: Relocate	Action: Other	Util. Reloc. A-Abandon RB- RD- P- NC-	Resp. Party U-Utility Co. C-Contractor	Required Completion Date	Comments
1	U-2	1	PACBELL	40 DU Telephone	62 m Rt of I-405 Sta 165+55	40 m Rt and 57 m Rt of I-405 Sta 165+55	conflict with Retaining Walls No. 165 & No. 166	X			4.55 14.40		N				P			
2	U-2	2	PACBELL	40 DU Telephone	48 m Lt of I-405 Sta 165+55	40 m Rt and 57 m Rt of I-405 Sta 165+55	conflict with Retaining Walls No. 165 & No. 166				-		N				P			
3	U-3	3	SCE	25 mm DU	35 m Rt of I-405 Sta 165+01	43 m Rt of I-405 Sta 165+01	conflict with Retaining Wall No. 166				-		N				P			Located in Bristol OC
4	U-3	4	SCE	25 mm DU	45 m Lt of I-405 Sta 165+01	43 m Rt of I-405 Sta 165+01	conflict with Retaining Wall No. 166				-		N				P			Located in Bristol OC
5	U-3	5	MWD	900 mm WSP Water in 380 mL ENC	50 m Rt of I-405 Sta 164+96	44 m Rt of I-405 Sta 164+95	conflict with Retaining Wall No. 166	X			6.70		N				P			
6	U-3	6	MWD	900 mm WSP Water in 380 mL ENC	50 m Lt of I-405 Sta 164+96	44 m Rt of I-405 Sta 164+95	conflict with Retaining Wall No. 166	X			6.50		N				P			
7	U-3	7	Caltrans	600 mm RCP	53 m Rt of I-405 Sta 163+42	53 m Rt of I-405 from Sta 163+29 to Sta 163+42	conflict with Delhi Channel Bridge	X			6.00		N				P			
8	U-3	8	Caltrans	600 mm RCP	53 m Rt of I-405 Sta 163+29	53 m Rt of I-405 from Sta 163+29 to Sta 163+42	conflict with Delhi Channel Bridge	X			9.00		N				P			
9	U-3	9	MCWD	300 mm ACP Water in 119mL, 500mm STL Casing	37 m Rt of I-405 Sta 163+25	35 m Rt of I-405 Sta 163+25	conflict with I-405 Widening & BR1 Line	X			10.30		N				P			
10	U-3	10	MCWD	300 mm ACP Water 119mL, 500mm STL Casing	32 m Lt of I-405 Sta 163+25	33 m Lt of I-405 Sta 163+25	conflict with I-405 Widening & BR1 Line	X			8.75		N				P			
11	U-3	MH 11	CSDOC	Manhole	81 m Rt of I-405 Sta 162+92	35 m Rt of I-405 Sta 162+92	conflict with I-405 Widening & BR1 Line		X		15.40		N				P			
12	U-3	12	CSDOC	380 mm VCP Sewer	36 m Lt of I-405 Sta 162+91	32 m Lt of I-405 Sta 162+90	conflict with I-405 Widening & BR1 Line						N				P			
13	U-4	13	MCWD	600mm CCP Water in 94m L 900mm Dia Stl Casing	67 m Rt of I-405 Sta 161+44	58 m Rt of I-405 Sta 161+44	Conflict with Airport Channel	X			4.55	Y			X	X	RB			600 mm Waterline to be Lowered Extend Encasement
14	U-4	14	MCWD	600mm CCP Water in 94m L 900mm Dia Stl Casing	38 m Lt of I-405 Sta 161+40	32 m Lt of I-405 Sta 161+42	conflict with I-405 Widening				-		N				P			
15	U-4	15	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 160+29	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	Conflict with AOA Line and Retaining Wall No. 268	X			-	Y			X		RD			Enchroachment CT R/W and Private Owne Encased under Roadway
16	U-4	16	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 159+07	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	Conflict with AOA Line and Retaining Wall No. 268	X			-	Y			X		RD			Enchroachment CT R/W and Private Owne Encased under Roadway
17	U-5	17	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 156+87	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	conflict with AOA Line and Retaining Wall No. 268	X			4.35		N				P			
18	U-5	MH 18	CSDOC	Manhole	60 m Rt of I-405 Sta 156+65	28 m Rt of I-405 Sta 156+65	conflict with I-405 Widening		X		16.20		N				P			
19	U-5	19	CSDOC	380 mm VCP Sewer	46 m Lt of I-405 Sta 156+65	25 m Rt of I-405 Sta 156+65	conflict with I-405 Widening	X			18.40		N				P			
20	U-5	20	CSDOC	830 mm VCP Sewer	14 m Rt of B2 Sta 24+96		conflict with construction of B2 Line						N				P			
21	U-5	21	CSDOC	830 mm VCP Sewer	6 m Lt of B2 Sta 25+54		conflict with construction of B2 Line						N				P			
22	U-8	MH 22	CSDOC	Manhole	8m Rt of Main St Sta 102+78				X			Y				X	RB			MH to be Lowered New Top MH Elev= 9.588
23	U-8	MH 23 SCE MH 4503	SCE	Manhole No. 4503	8m Rt of Main St Sta 102+87				X			Y				X	RB			MH to be Lowered New Top MH Elev= 9.583 m
24	U-8	MH 24 SCE MH 4502	SCE	Manhole No. 4502	8m Rt of Main St Sta 104+17				X			Y				X	RB			MH to be Lowered New Top MH Elev= 9.728 m

2-45

Sample (Florida)

FPID:	1	Description:	2	This matrix was created by ______3__________ to assist the UAO's in identifying conflicts between the UAO's facilities and proposed roadway construction.
Phase #:	4	Plans Date:	5	_________________ accepts no liability for conflicts overlooked for this report. Each UAO or designee is responsible to perform a detailed and comprehensive plans review for conflict analysis.
Reviewer:	6			
Date:	7			

Conflict #	Utility Agency/ Owner (UAO)	Station/Offset (From C/L)	Facility Description (Material, Type, Number, Size)	Conflict Description (Possible or Actual)	VVH (Y/N)	VVH #	Recommended Conflict Resolution	Resolved Status
8	9	10	11	12	13	14	15	16

Consider using the form from the beginning of a project as a tool for monitoring areas of concern with UAO facilities. That is the reason for the Phase Number space. The form is set up to: 1. Print legal size and have the header information on each page. 2. The cells where the conflicts are listed are set to word wrap automatically. 3. The footer is set to number the pages 1 of ??.

1 Project number.
2 Project description.
3 Disclaimer that the reviewer and their firm is not responsible for any missed conflicts. The blanks are for the name of the design firm.
4 Phase that the plans represent.
5 The date should be on the plans Key Sheet. The phase and plans date should keep everyone working on the same plans.
6 That would be you, the person that wrote the conflict matrix.
7 The date the matrix was completed.
8 For ease of discussion the conflicts are numbered, plan sheet numbers are not used because they change from Phase to Phase which has caused confusion in the past.
9 Owner of the underground line.
10 The standard reference used on FDOT plans is the Centerline of Construction, it is used for all components of the proposed roadway construction.
11 Describe the facility. What is it? Water main? Force main? Cable? Conduit? Overhead electric? Overhead cable? Manhole? Handhold? What's the size? How many? What's it made of?
12 What is it the facility perceived to be in conflict with? It a possible conflict or actually in conflict with proposed work. Consider the trench and hole size required to place pipe and drainage structures. Don't forget aerial facilities when there are signals and large signs in the project.
13 SUE work can be used to if a conflict is considered a possibility. This entry area is a tool to determine areas where test holes should be taken for confirmation or exclusion of a conflict.
14 Entry area for the test hole number. Test holes should be numbered consecutively to avoid confusion.
15 What can be done to remove the conflict? Don't forget to consult with the Designer for alternatives to the proposed construction.
16 Examples of entries could be "Cleared", "Pending", "No Conflict". It's suggested to keep the entries determined as "No Conflict" in the matrix so other reviewers will know a perceived conflict has been noted and determined to not be an issue.

2-46

Sample (Georgia)

Conflic	Station and Offset	Utility	Identified Conflict	Testhole Needed	Utility Impact with Cost ("As-designed")	Recommended Resolution	*Benefit of Resolution
C1	100+05, 21'L 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO	No	Relocate 1150LF of BFO-DUCT ($91,000)	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save Cost to Relocate BFO-DUCT ($91,000)
C2	100+66, 21'L 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO	No	See C1		
C3	100+38, 24'R 14th St Constr. BL	UNK@Tee	Proposed 18" storm and unknown utility tee	TH 1	Relocate unknown type and function utility	TH to identify utility and conflict	Eliminate possible delay during construction
C4	100+56, 25'R 14th St Constr. BL	8"W	Proposed 18" storm and existing 8"W	TH 2	Relocate 8"W ($7,500)	TH on 8"W, adjust depth of proposed storm drainage	Save Cost to Relocate 8"W ($6,000)
C5	100+61, 25R 14th St Constr. BL	8"W	Proposed 18" storm and existing 8"W	TH 3	Relocate 8"W ($7,500)	TH on 8"W, adjust depth of proposed storm drainage	Save Cost to Relocate 8"W ($6,000)
C6	100+82, 28R 14th St Constr. BL	4"G	Proposed storm structure and existing 4"G	TH 4	Relocate 20 LF of 4"G ($6,000)	TH on 4"G, adjust depth of proposed storm structure	Save Cost to Relocate 4"G ($4,500)
C7	101+22 27'R 14th St Constr. BL	4"G	Proposed 18" storm and existing 4"x2" gas tee	TH 5	Relocate 2"G & 4"G Tee ($12,500)	TH on G lines, adjust depth of proposed storm structure	Save Cost to Relocate G lines ($11,000)
C8	101+01 28'L 14th St Constr. BL	16"G	Proposed 18" storm and existing 16"G	TH 6	Relocate 16"G ($10,000)	TH on 16"G, adjust depth of proposed storm structure	Save Cost to Relocate 16"G ($8,500)
C9	101+25 41'L 14th St Constr. BL	BT-DUCT 2"G	Proposed storm structure and two BT-ducts	TH 7	Relocate BT-DUCT & 2"G ($11,000)	TH on BT-DUCT & 2"G, adjust depth of proposed storm structure	Save Cost to Relocate BT-DUCT & 2"G ($10,500)
C10	101+37, 41'L 14th St Constr. BL	6"W	Proposed 18" storm and existing 6"W	TH 8	Relocate 6"W ($5,000)	TH on 6"W, adjust depth of proposed storm drainage	Save Cost to Relocate 6"W ($3,500)
C11	101+57, 27'L 14th St Constr. BL	16"G	Proposed 18" storm and existing 16"G	TH 9	Relocate 16"G ($10,000)	TH on 16"G, adjust depth of proposed storm structure	Save Cost to Relocate 16"G ($8,500)
C12	101+58, 22'L 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO	No	See C1		
C13	101+90, 22'L 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO	No	See C1		
C14	102+20, 27'R 14th St Constr. BL	4"G	Proposed storm structure and existing 4"G	No	Relocate 4"G ($4,500)	Relocate 4"G	Elimnate conflict with proposed DI
C15	102+36, 24'L 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO	No	See C1		

*Please include all benefits incurred including time, costs, and safety improvements.

Key:

AC - Asbestos Concrete
BE - Buried Electric
BFO - Buried Fiber Optic
BT - Buried Telephone
G - Gas
L - Left
MES - Mitered End Section
OE - Overhead Electric
OT - Overhead Telephone
R - Right
RCP - Reinforce Concrete Pipe
W - Water
WM - Water Main
TH - Test Hole, verify vert. and horiz
UNK - Unknown Type
SAN - Sanitary Sewer

Utility Owner:

AGL Atlanta Gas Light
BE Georgia Power
BT Bell South
L3 Level 3 Communications
MFN Metromedia Fiber Network
SAN Fulton County Public Works
W City of Atlanta
UNK Unknown Owner

Sample (Michigan)

M-6 (South Beltline) from I-196 to West of Eastern Avenue
South of Grand Rapids, Michigan

Utility Log - Electric

CS 70025 - JN 33330

Item #	Utility Owner / Operator	Conflict Location	Segment	Date Relocation Plan must be submitted	Relocation Plan submitted to Design Team	Design Team Review / Comment / Approval	Permit Application Submitted to MDOT	MDOT Permit Number / Approval Date	Relocation Scheduled	Action Items
1	Consumers Energy Transmission	Consumers Power Transmission Overhead – 8th Ave	1			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
2	Consumers Energy Transmission	West of Kenowa Ave.	1			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
3	Consumers Energy Distribution	Aerial Lines at Jackson and Angling Road	1							Design in process.
4	Consumers Energy Distribution	Aerial Lines at Kenowa and 64th St.	2							Design in process.
5	Consumers Energy Transmission	64th at Wilson and East and West of Wilson–Overhead	2			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
6	Consumers Energy Transmission	East and West of Ivanrest	2			7/6/2000	7/27/00 rev.	41064-0125-00-0174	10/15/2000	Final permit approval from MDOT.
7	**Consumers Energy Distribution**	**along Ivanrest**	**2**							**Permit to be submitted the week of August 14, 2000.**
8	Consumers Energy Transmission	East and West of Byron Center - overhead	3			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT. Schedule Relocation

Sample (South Dakota)

Picture No.	PCN	Picture Looking	City or Town	Hwy. No.	Description
6.JPG	02BF	N	Platte	44	Water valve in the SE quadrant of Hwy 44 & Indiana
7.JPG	02BF	W	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
8.JPG	02BF	N	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
9.JPG	02BF	N	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
10.JPG	02BF	E	Platte	44	Power Pole (Transmission w/ riser) in the SE quadrant of Hwy 44 & Ohio
11.JPG	02BF	E	Platte	44	Power Pole (Transmission w/ riser) in the SE quadrant of Hwy 44 & Ohio
12.JPG	02BF	N	Platte	44	Power Pole, Fire hydrant & water valve in the SE quadrant of Hwy 44 & Ohio
13.JPG	02BG	S	Platte	45	Light Pole in the SW quadrant of Hwy 45 & 4th St
14.JPG	02BG	E	Platte	45	Light Pole in the NE quadrant of Hwy 45 & 4th St
15.JPG	02BG	S	Platte	45	Light Pole in the SW quadrant of Hwy 45 & 6th St
16.JPG	02BG	E	Platte	45	Power Pole in the NE quadrant of Hwy 45 & 6th St
17.JPG	02BG	E	Platte	45	Power Pole in the NE quadrant of Hwy 45 & 6th St
18.JPG	02BG	W	Platte	45	Power Pole & Fire hydrant in the NW quadrant of Hwy 45 & 6th St
19.JPG	02BG	W	Platte	45	Power Pole w/ riser in the NW quadrant of Hwy 45 & 6th St

Sample (Texas)

PARIS DISTRICT
UTILITY ADJUSTMENT REPORT

As Of: August 19, 2009
Changes since last update in RED

County Highway ROW CSJ	Name of Utility	Reimbursable?	Location of Agreement Package	Packet Status?	Current Action	Adjustment Status	Responsible TxDOT Employee	Amount Approved	Amount Billed	90% Payment	Audit Exceptions	10% Retainage	Outstanding Balance
HOPKINS SH 11 ROW CSJ 0083-03-046 SH 19 0108-09-039	Verizon	No	ROW	Approved	U11114: Relocation is complete. NR	Complete	Keith Hollje						
	TXU Electric	Yes	ROW	Approved	U11655: Relocation & Reimbursement is complete	Complete	Keith Hollje	$ 74,397.96	$ 62,850.69	$ 56,565.62	$ -	$ 6,285.07	$ -
	Atmos Energy (Trans)	Yes	ROW	Approved	U12208: Relocation & Reimbursement is complete	Complete	Mike Powers	$ 235,912.59	$ 184,436.76	$ 165,993.08	$ -	$ 18,443.68	$ -
	Atmos Energy (Distribution)	No	ROW	Approved	U12446: Relocation is complete. NR	Complete	Mike Powers						
	SS Water & Sewer	No	ROW	Approved	U12450: Relocation is complete. NR	Complete	Mike Powers						
	TXU Distribution	No	ROW	Approved	U12614: Relocation is complete. NR	Complete	Mike Powers						
	Sudden Link Communication	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
	People's Telephone	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
	Shady Grove WSC	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
								$ 310,310.55	$ 247,287.45	$ 222,558.70	$ -	$ 24,728.75	$ -
HUNT US 380 ROW CSJ: 0135-06-022	Caddo Basin	Yes	ROW	Approved	U11423: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 853,746.47	$ 783,618.01	$ 705,256.21	$ -	$ 78,361.80	$ -
	Verizon	No	ROW	Approved	U11450: Relocation is complete. NR	Complete	Mike Powers						
	One OK Pipeline	Yes	ROW	Approved	U11523: Relocation is complete. Reimbursement has not been submitted.	Complete	Keith Hollje	$ 229,170.00	$ -	$ -	$ -	$ -	$ 229,170.00
	Cap Rock Energy	Yes	ROW	Approved	U11524: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 741,668.69	$ 741,668.69	$ 667,388.42	$(27,771.80)	$ 46,508.47	$ -
	AT&T	No	ROW	Approved	U11526: Relocation is complete. NR	Complete	Mike Powers						
	Explorer	Yes	ROW	Approved	U11534: Relocation & Reimbursement is complete.	Complete	Keith Hollje	$ 191,805.22	$ 201,206.44	$ 181,085.80	$ -	$ 20,120.64	$ -
	Energy Transfer (Gas)	Yes	ROW	Approved	U11695: Relocation is complete. Reimbursement returned to Utility 4/29/09. No Coorespondence!	Complete	Mike Powers	$ 370,006.39	$ 420,136.25	$ -	$ -	$ -	$ 370,006.39
	GEUS	No	ROW	Approved	U11850: Relocation is complete. NR	Complete	Mike Powers						
	AT&T	No	ROW	Approved	U12358: Relocation is complete. NR	Complete	Mike Powers						
	TMPA	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
	Comcast	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
	Kinder-Morgan	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
								$ 2,386,396.77	$2,146,629.39	$ 1,553,730.43	$(27,771.80)	$144,990.91	$ 599,176.39
HUNT US 380 ROW CSJ: 0135-07-037	AT&T	No	ROW	Approved	U11525: Relocation is complete. NR	Complete	Mike Powers						
	Atmos Energy (Pipeline)	Yes	ROW	Approved	U12012: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 193,912.59	$ 73,187.29	$ 65,868.56	$ -	$ 7,318.73	$ -
	Atmos Energy (Distribution)	No	ROW	Approved	U12013: Relocation is complete. NR	Complete	Mike Powers						
	Caddo Basin	Yes	ROW	Approved	U12026: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 651,005.00	$ 383,518.60	$ 345,166.74	$ -	$ 38,351.86	$ -
	TMPA	Yes	ROW	Approved	U12076: Relocation is complete. Supplemental Agreement approved 8/06/09.	Complete	Mike Powers	$ 514,097.06	$ 516,702.66	$ 462,196.85	$ -	$ 51,355.21	$ 51,355.21
	GEUS	No	ROW	Approved	U12077: Relocation is complete. NR	Complete	Mike Powers						
	TXU Electric(Transmission)	No	ROW	Approved	U12079: Relocation is complete. NR	Complete	Mike Powers						
	GEUS	Yes	ROW	No	U12445: Utility Package approved 5/19/09. Utility working on relocation.	35%	Mike Powers	$ 88,073.29	$ -	$ -			$ 88,073.29
	City of Greenville (Water)	No	AO	n/a	City has already moved utility on private easement. (no agreement required)	n/a	Mike Powers						
	City of Greenville (Sewer)	No	AO	n/a	City has already moved utility on private easement. (no agreement required)	n/a	Mike Powers						
	Cap Rock Energy	No	AO	n/a	No effect (no adjustment required)	n/a	Mike Powers						
								$ 1,447,087.94	$ 973,408.55	$ 873,232.15	$ -	$ 97,025.80	$ 139,428.50

State DOT Recommendations for Utility Conflict Matrix

- Track utility conflicts at facility level
- Maintain and update UCM regularly
- Develop UCM reports for utility companies
- Keep UCMs simple
- Use 11x17-inch page size for UCM
- Start UCM during preliminary design phase
- Include data from UCM in PS&E assembly

2-51

State DOT Recommendations for Utility Conflict Management

- Use document management systems to support utility conflict management process
- Conduct “plan-in-hand” field trips with utilities
- Use One Call to identify utilities early in the PDP
- Use RFID tags for damage prevention during construction
- Provide 3-D design details to utility owners early in the design phase

2-52

Other State DOT Recommendations

- Involve stakeholders in review of utility conflicts and solutions
- Develop effective communications with utility owners regardless of reimbursement eligibility
- Provide training to utility coordination stakeholders

2-53

Product 1: Utility Conflict Matrix

- UCM header: 8 data items
- UCM body: 15 data items
- MS Excel format
- Includes drop-down lists

Project Owner: _____ Utility Conflict Matrix Developed/Revised By: _____
Project No. : _____ Date: _____
Project Description: _____ Reviewed By: _____
Highway or Route: _____ Note: refer to subsheet for utility conflict cost analysis. Date: _____

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status

2-54

Product 1: Cost Estimate Analysis (Optional for Minor Utility Conflicts)

- Cost Estimate Analysis header: 13 data items
- Cost Estimate Analysis body: 12 data items
- MS Excel format, includes drop-down lists

Project Owner: _____ Cost Estimate Analysis Developed/Revised By _____
Project No. : _____ Date _____
Project Description: _____ Reviewed By _____
Highway or Route: _____ Date _____

Utility Conflict: _____
Utility Owner: _____
Utility Type: _____
Size and/or Material: _____
Project Phase: _____

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision

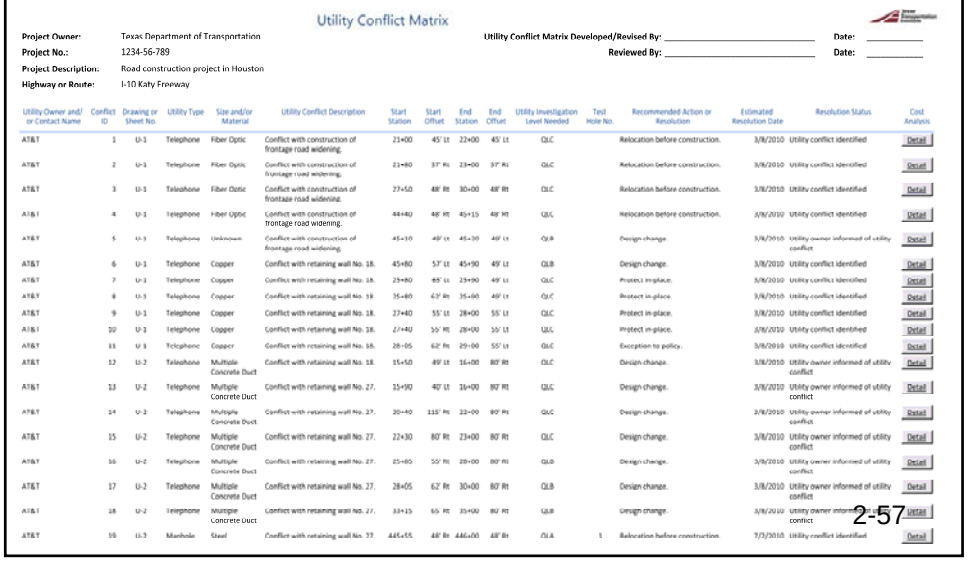
2-55

Product 2: Development

- Formal data model (ERwin)
- Enterprise database support (Oracle, SQL Server)
- Tested in MS Access
- UCM is one of many queries/reports possible

2-56

Product 2: UCM Report



Utility Conflict Matrix

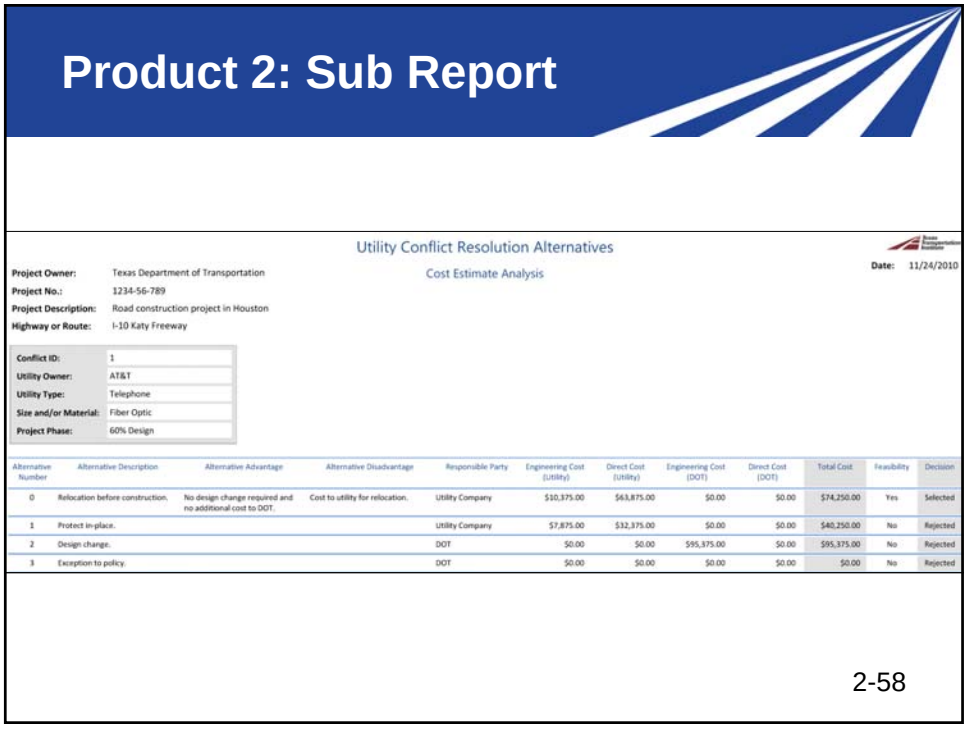
Project Owner: Texas Department of Transportation
Project No.: 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Utility Conflict Matrix Developed/Revised By: _____ Date: _____
Reviewed By: _____ Date: _____

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole No.	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status	Cost Analysis
AT&T	1	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	21+00	45' Lt	22+00	45' Lt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	2	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	23+80	37' Rt	23+00	37' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	3	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	27+50	48' Rt	30+00	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	4	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	44+40	48' Rt	45+15	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	5	U-1	Telephone	Unknown	Conflict with construction of frontage road widening.	45+10	49' Lt	46+30	49' Lt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	6	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	45+80	57' Lt	45+90	49' Lt	QLB		Design change.	3/8/2010	Utility conflict identified	Detail
AT&T	7	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	23+80	65' Lt	23+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	8	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	35+80	63' Rt	35+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	9	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	55' Lt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	10	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	55' Rt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	11	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	28+05	62' Rt	29+00	55' Lt	QLC		Exception to policy.	3/8/2010	Utility conflict identified	Detail
AT&T	12	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 18.	15+50	49' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	13	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	15+90	40' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	14	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	20+40	115' Rt	22+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	15	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	22+30	80' Rt	23+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	16	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	25+85	55' Rt	26+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	17	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	28+05	62' Rt	30+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	18	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	33+15	65' Rt	35+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	19	U-3	Manhole	Steel	Conflict with retaining wall No. 39	446+55	48' Rt	446+00	48' Rt	QLA	1	Relocation before construction.	7/3/2010	Utility conflict identified	Detail

2-57

Product 2: Sub Report



Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Date: 11/24/2010

Project Owner: Texas Department of Transportation
Project No.: 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Conflict ID:	1
Utility Owner:	AT&T
Utility Type:	Telephone
Size and/or Material:	Fiber Optic
Project Phase:	60% Design

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
0	Relocation before construction.	No design change required and no additional cost to DOT.	Cost to utility for relocation.	Utility Company	$10,375.00	$63,875.00	$0.00	$0.00	$74,250.00	Yes	Selected
1	Protect in-place.			Utility Company	$7,875.00	$32,375.00	$0.00	$0.00	$40,250.00	No	Rejected
2	Design change.			DOT	$0.00	$0.00	$95,375.00	$0.00	$95,375.00	No	Rejected
3	Exception to policy.			DOT	$0.00	$0.00	$0.00	$0.00	$0.00	No	Rejected

2-58

In Summary …

- UCM practices vary widely across the country
- SHRP2 R15B products:
  - Product 1: Compact, standalone UCM
  - Product 2: Utility conflict data model and database
  - Product 3: One-day UCM training course

2-59

2.3

Questions and Answers

2-60

Lesson 3

Utility Conflict Identification and Management

3-1

Course Overview

- 8:30 AM – 9:00 AM Introductions and Course Overview
- 9:00 AM – 10:15 AM Utility Conflict Concepts
- 10:15 AM – 10:30 AM Morning Break
- 10:30 AM – 11:45 AM Use of Utility Conflict Identification and Management
- 11:45 AM – 1:00 PM Lunch Break
- 1:00 PM – 1:20 PM Database Approach to Manage Utility Conflicts
- 1:20 PM – 2:20 PM Hands-On Utility Conflict Management Exercise Part I
- 2:20 PM – 2:35 PM Afternoon break
- 2:35 PM – 3:35 PM Hands-On Utility Conflict Management Exercise Part II
- 3:35 PM – 3:45 PM Wrap-Up

3-2

Lesson 3 Overview

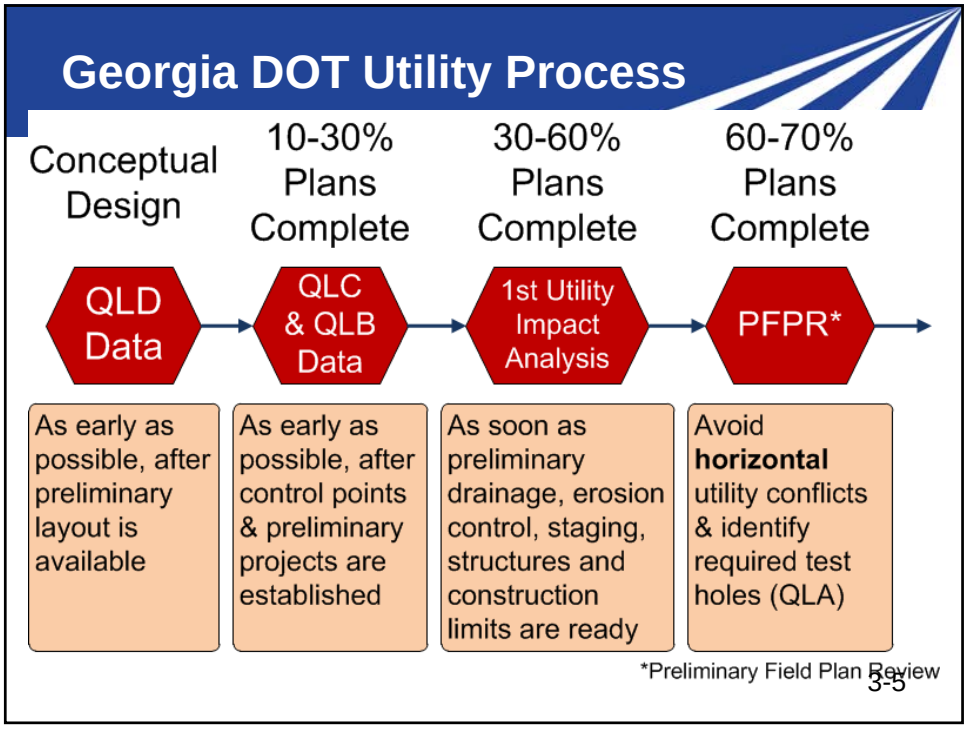
3.1 Utility conflict management and use of UCM
3.2 Utility conflict management for 3D project delivery workflows
3.3 Discussion, questions, and answers

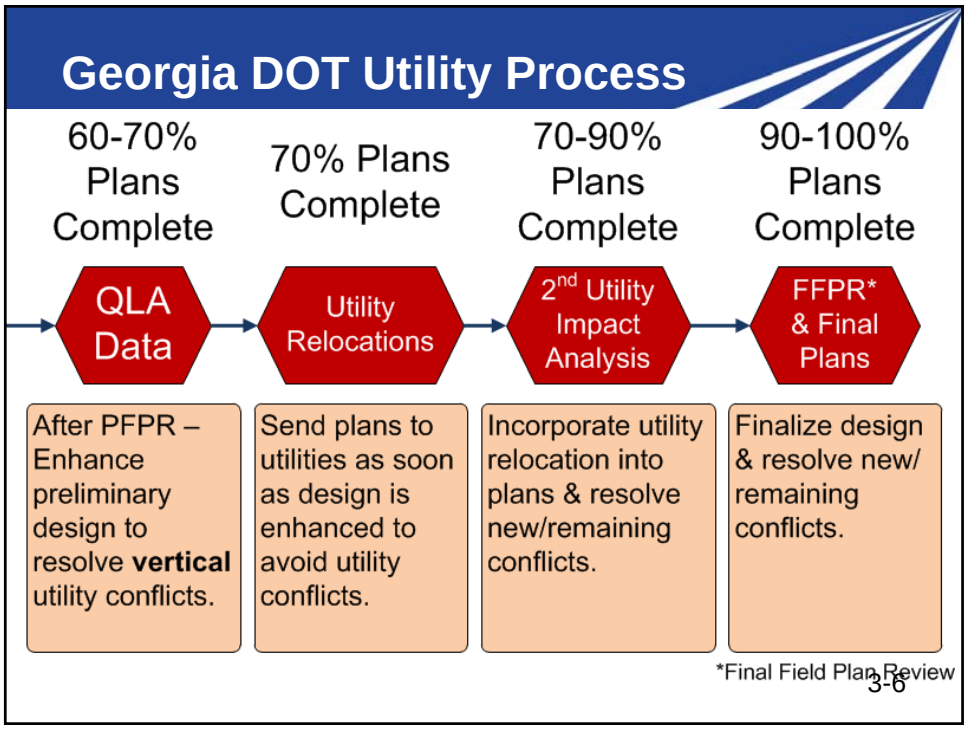
3-3

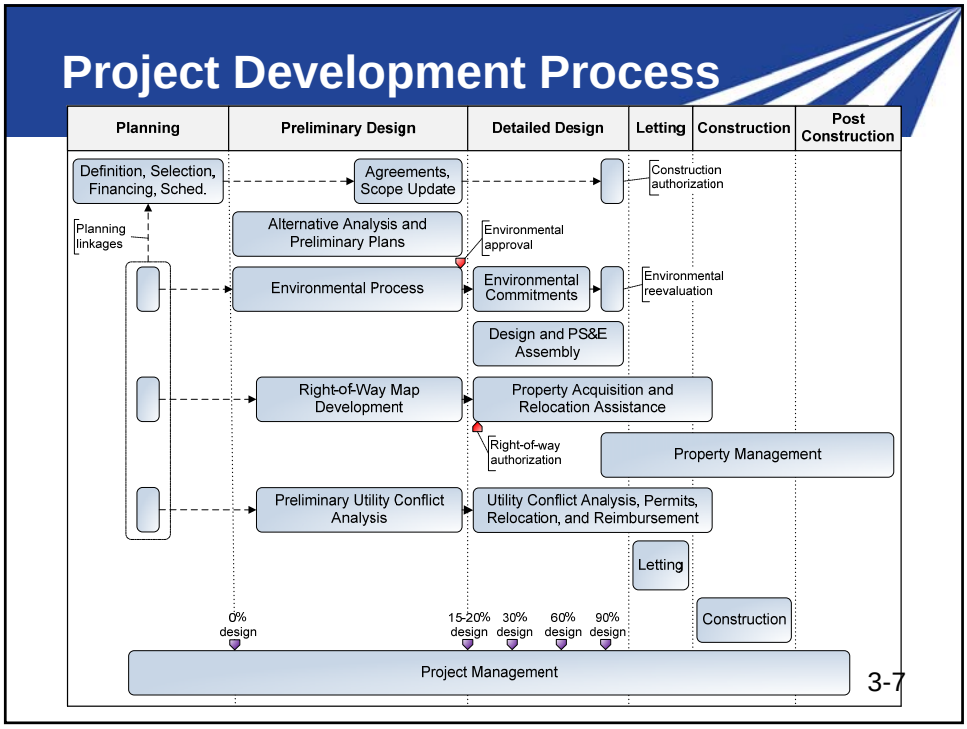
3.1

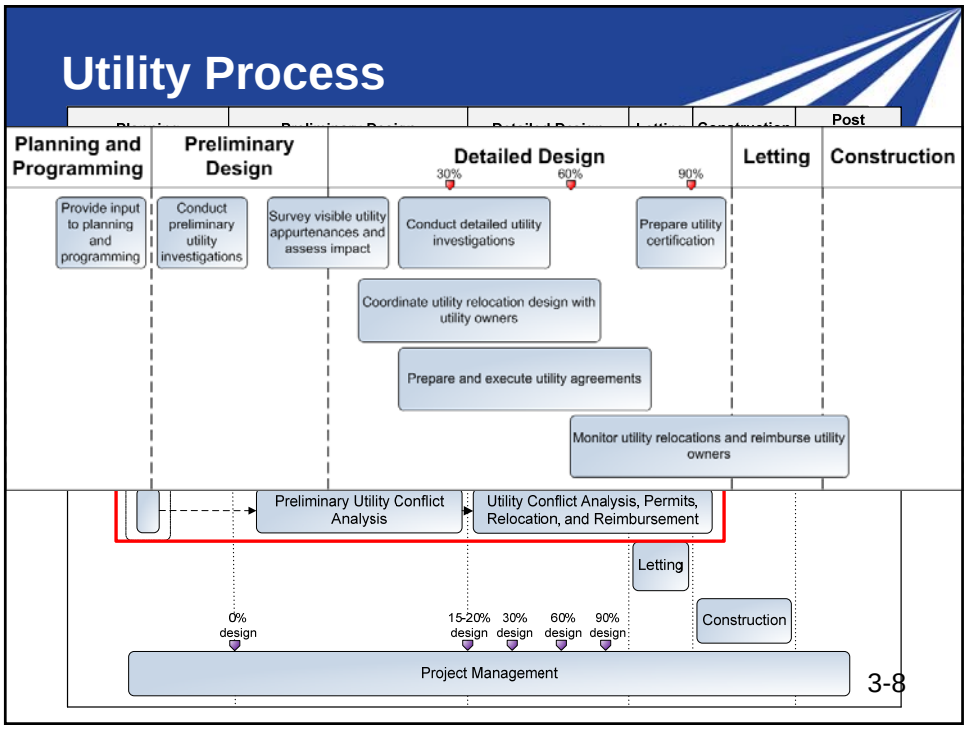
Utility Conflict Management and Use of UCM

3-4


Georgia DOT Utility Process
Conceptual Design
10-30% Plans Complete
30-60% Plans Complete
60-70% Plans Complete
QLD Data
QLC & QLB Data
1st Utility Impact Analysis
PFPR*
As early as possible, after preliminary layout is available
As early as possible, after control points & preliminary projects are established
As soon as preliminary drainage, erosion control, staging, structures and construction limits are ready
Avoid horizontal utility conflicts & identify required test holes (QLA)
*Preliminary Field Plan Review
3-5


Georgia DOT Utility Process
60-70% Plans Complete
70% Plans Complete
70-90% Plans Complete
90-100% Plans Complete
QLA Data
Utility Relocations
2nd Utility Impact Analysis
FFPR* & Final Plans
After PFPR – Enhance preliminary design to resolve vertical utility conflicts.
Send plans to utilities as soon as design is enhanced to avoid utility conflicts.
Incorporate utility relocation into plans & resolve new/remaining conflicts.
Finalize design & resolve new/ remaining conflicts.
*Final Field Plan Review
3-6


Project Development Process
Planning
Preliminary Design
Detailed Design
Letting
Construction
Post Construction
Definition, Selection, Financing, Sched.
Agreements, Scope Update
Construction authorization
Planning linkages
Alternative Analysis and Preliminary Plans
Environmental approval
Environmental Process
Environmental Commitments
Environmental reevaluation
Design and PS&E Assembly
Right-of-Way Map Development
Property Acquisition and Relocation Assistance
Right-of-way authorization
Property Management
Preliminary Utility Conflict Analysis
Utility Conflict Analysis, Permits, Relocation, and Reimbursement
Letting
Construction
0% design
15-20% design
30% design
60% design
90% design
Project Management
3-7


Utility Process
Planning and Programming
Preliminary Design
Detailed Design
30%
60%
90%
Letting
Construction
Post
Provide input to planning and programming
Conduct preliminary utility investigations
Survey visible utility appurtenances and assess impact
Conduct detailed utility investigations
Prepare utility certification
Coordinate utility relocation design with utility owners
Prepare and execute utility agreements
Monitor utility relocations and reimburse utility owners
Preliminary Utility Conflict Analysis
Utility Conflict Analysis, Permits, Relocation, and Reimbursement
Letting
Construction
0% design
15-20% design
30% design
60% design
90% design
Project Management
3-8

Utility Process Activities

- **Utility investigations**
- Utility conflict analysis and resolution
- Utility coordination
- Utility construction management

3-9

Utility Investigations

- Characterization of subsurface and above ground utility installations
- Quality levels of utility information
  - QLD
  - QLC
  - QLB
  - QLA
- ASCE Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data (ASCE/CI 38-02)

3-10

Quality Level D (QLD)

- Data collection from existing records or oral recollections
  - Utility owner records (marked up drawings, cable records, service records, as-builts), GIS databases, oral histories, One Call markings, field notes
  - Information sources (utility owners, county clerk's office, visual site inspections, One Call notification centers, public service commissions, land owners, and database searches)
  - Deliverables: Composite drawing (QLD)

3-11

Quality Level C (QLC)

- Surveying and plotting visible utility appurtenances and making inferences about underground linear utility facilities that connect those appurtenances
  - Survey using project datum and specifications (e.g., valve covers, junction boxes, and manhole covers)
  - Correlate utility records to surveyed features
  - Resolve discrepancies
  - Deliverables: Composite drawings (QLC and QLD)

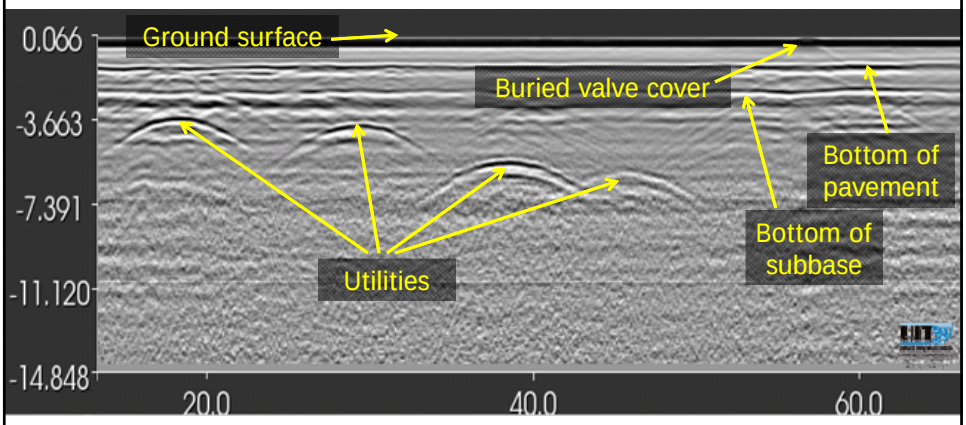
3-12

Quality Level B (QLB)

- Surface geophysical methods to determine the approximate horizontal position of subsurface utilities
  - Mark indications of utilities on the ground surface
  - Accuracy depends on geophysical method, soil conditions
  - Survey markings using project datum and specifications
  - No vertical positions reported
  - Correlate utility records to surveyed features
  - Resolve discrepancies
  - Deliverables: Composite drawings (QLB, QLC, QLD)

3-13

QLB Example: Ground Penetrating Radar



3-14

Quality Level A (QLA)

- Accurate *horizontal* and *vertical* utility locations through exposure of underground utility facilities at certain locations
  - Test hole excavation (minimally intrusive)
  - Data gathered during construction (in some cases)
  - Survey exposed facilities using project datum (*horizontal* and *vertical*) and specifications
  - Resolve discrepancies
  - Deliverables: Composite drawings (QLA, QLB, QLC, QLD), test hole reports

3-16

3-17

COLOR/LINE CODES

CW — CITY WATER
FP — FIRE PROTECTION
RW — RESERVOIR WATER
DI — DEIONIZED WATER
CHW — CHILLED WATER

------W------- WATER (QL-D)
-----W(C)------ WATER (QL-C)
-----W(B)------ WATER (QL-B)

O — OXYGEN
CD — CARBON DIOXIDE
T — TELEPHONE
E — ELECTRIC
CS — CHEMICAL SEWER
UNK — UNKNOWN FUNCTION
ST — STORM
---------- LINE CODE FOR QLC OR QLD INFORMATION

SYMBOLS

MANHOLE
DROP INLET
UTILITY POLE
LIGHT POLE
PEDESTAL, TRANSFORMER
BOLLARD
SIGN
HOUSE TRAP
"QUALITY LEVEL A" DATA POINT

3-18

ABBREVIATIONS

F.O.	FIBER OPTIC
EOI	END OF SURFACE GEOPHYSICAL INFORMATION
EORI	END OF RECORD INFORMATION
AATUR	UTILITY ABANDONED ACCORDING TO UTILITY RECORDS
AATFI	UTILITY ABANDONED ACCORDING TO FIELD INSPECTION
EATUR	EMPTY ACCORDING TO UTILITY RECORDS
NAP	NO ASSOCIATED PIPING FOUND FROM STRUCTURE
NAC	NO ASSOCIATED CABLES FOUND FROM STRUCTURE

NOTES

NOTE 1: "QUALITY LEVEL A" DATA POINTS INDICATED BY SYMBOL ⊕. SEE QLA SUPPLEMENTAL DATA FORM FOR ADDITIONAL UTILITY INFORMATION.

NOTE 2: ALL "QUALITY LEVEL A" ELEVATIONS ARE FOR THE TOP OF THE UTILITY UNLESS OTHERWISE NOTED.

NOTE 3: ALL UTILITIES DEPICTED AT "QUALITY LEVEL B" UNLESS INDICATED BY DOTTED LINE CODE (.....) AND LABELED "QLC" OR "QLD".

3-19

All Utilities depicted at QL B unless otherwise noted.

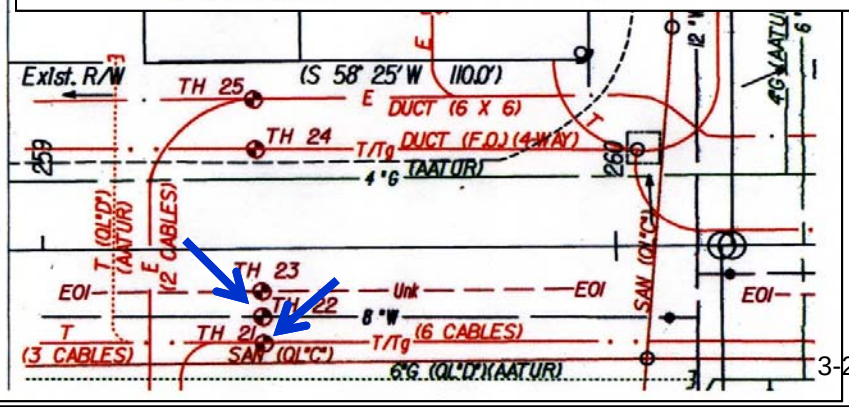
QL A Data Summary (see QL A Supplemental Data Sheets for additional information):

TH 21: 6 non-encased telephone cables

elevation top of cable configuration: 186.15'
elevation bottom of configuration: 183.43'
Coords: N 441987.8011
E 3640280.1310

TH 22: 8 3/4" C.I. water

elevation top of water line: 184.67'
Coords: N 441992.7925
E 3640280.0092



3-20

Test Hole Form

Utility Type		Utility Material	Offset Measured From	Identified By
E	Electrical	1 Steel	30 Edge of Pavement	20 Sleeve
G	Gas Line	2 PVC (Polyvinyl Chloride)	31 Baseline	21 Hub/Lathe
BT	Buried Telephone	3 DIP (Ductile Iron Pipe)	32 Right-of-Way	22 Nail/Disk
FOC	Fiber Optic Cable	4 VCP (Vitrified Clay Pipe)	33 Centerline	23 "X" in Concrete
W	Water	5 PE (Polyethylene Pipe)	34 Back of Curb	24 Set Iron Rod and Cap 5/8"
SAN	Sanitary Sewer	6 AC (Transite)	35 Survey Hub	25
STM	Storm Sewer	7 CI (Cast Iron)	36 "X" in Concrete	26
CATV	Cable TV	8 DBC (Direct Buried Cable)	37 Swing Ties	
FM	Force Main	9 Concrete Pipe	38 Ref. Point in Driveway	
RW	Reclaimed Water	10 Corrugated Metal Pipe	39	
SL	Street Light	11 Duct	**Surface Type**	
TS	Traffic Signal	12 Fiberglass	A Asphalt	
FL	Fuel Line	13 Unknown	C Concrete	
EXP	Exploratory	14 Corrugated Plastic	NG Natural Ground	
UNK	Unknown	15 Concrete Duct		
IRR	Irrigation			

Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.) in. ☑ mm. ☐	Approx. Station	Approx. Offset Distance ft. ☑ m. ☐ L	R	Offset From	Manual Depth (Top) ft. ☑ m. ☐	Cross Sectional View	Utility Direction	ID'd By	Surface Type	Pvmnt. Thick-ness in. ☑ mm. ☐
C40	19	BE	2	6"	37+00	62.0		31	3.16'			22	NG	
C42	20	BE	2	6"	37+00	57.0		31	3.33'			22	NG	
C43	21	W	6	12"	37+00	53.0		31	4.21'			22	NG	
C44	22	G	1	6"	37+00	48.0		31	3.56'			22	NG	
C18	23	BE	2	6"	37+40	60.0		31	3.19'			22	NG	
C19	24	BT	8	1"	37+90	43.0		31	4.52'			22	NG	
C23	25	W	2	6"	39+00	110		31	3.83'			22	NG	
C24	26	CATV	8	1"	35+30	105		31	4.12'			22	NG	

Notes:

Sheet 1 of 1 Prepared By: VL Date: 10/13/06 Checked By: RMP Date: 10/14/06

3-21

Main Utility Process Activities

- Utility investigations
- **Utility conflict analysis and resolution**
- Utility coordination
- Utility construction management

3-22

Utility Conflict Analysis and Resolution

- Processes:
  - Utility conflict analysis at critical milestones
  - Evaluation of alternatives (utility and project)
  - Meetings, discussions with stakeholders
- Tools:
  - Project plan sheets, profiles, cross sections, drainage
  - Utility layouts/plans, test hole data sheets, other
  - Utility conflict matrix and cost analysis sheet
  - Project schedules
  - Project and utility construction specifications

3-23

Utility Conflict Analysis and Resolution

- Outcomes:
  - Alternatives for utility conflict resolution
  - Utility construction phasing
  - Constructability recommendations
  - Traffic control plan
  - Project management reports during design
  - Project management reports during construction
  - Plans, schedules, and estimates
  - Certifications/special provisions in PS&E assembly

3-24

Main Utility Process Activities

- Utility investigations
- Utility conflict analysis and resolution
- **Utility coordination**
- Utility construction management

3-25

Utility Coordination

- Communication and coordination with utility owners, consultants, designers, other stakeholders
- Activities include:
  - Utility data collection planning and coordination
  - Coordination of utility conflict resolution process
  - Notifications, meeting scheduling
  - Utility work plan coordination
  - Permits and rights of entry
  - Utility agreement assemblies
  - Funding and escrow agreements

3-26

Main Utility Process Activities

- Utility investigations
- Utility conflict analysis and resolution
- Utility coordination
- **Utility construction management**

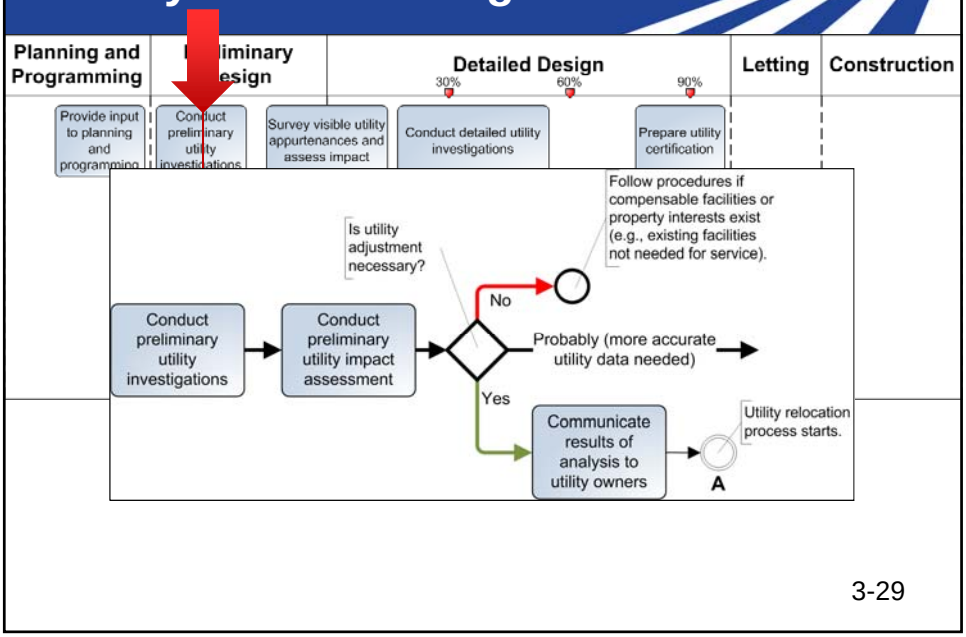
3-27

Utility Construction Management

- Coordination of utility construction
  - Pre and post letting
- Inspection and verification
- Compliance with policies (e.g., utility accommodation rules, traffic control, SW3P, OSHA, etc.)
- Payment request reviews
- Gathering or preparing as-built plans

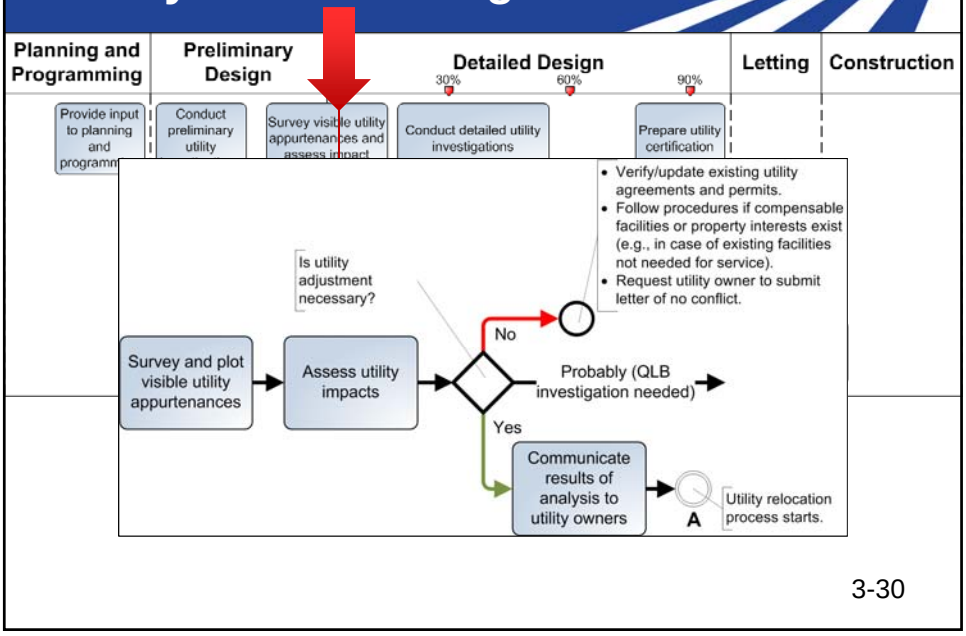
3-28

Utility Process: Stage 1



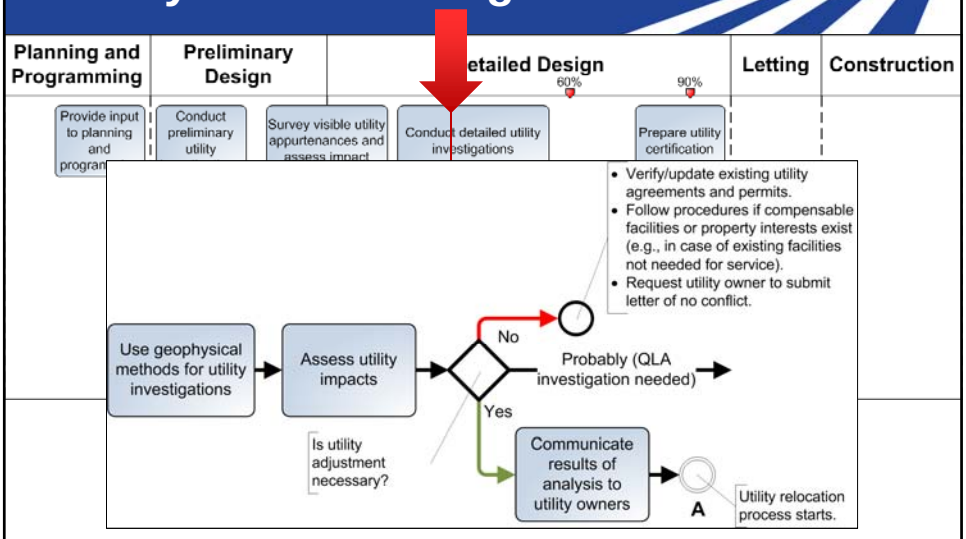
3-29

Utility Process: Stage 2



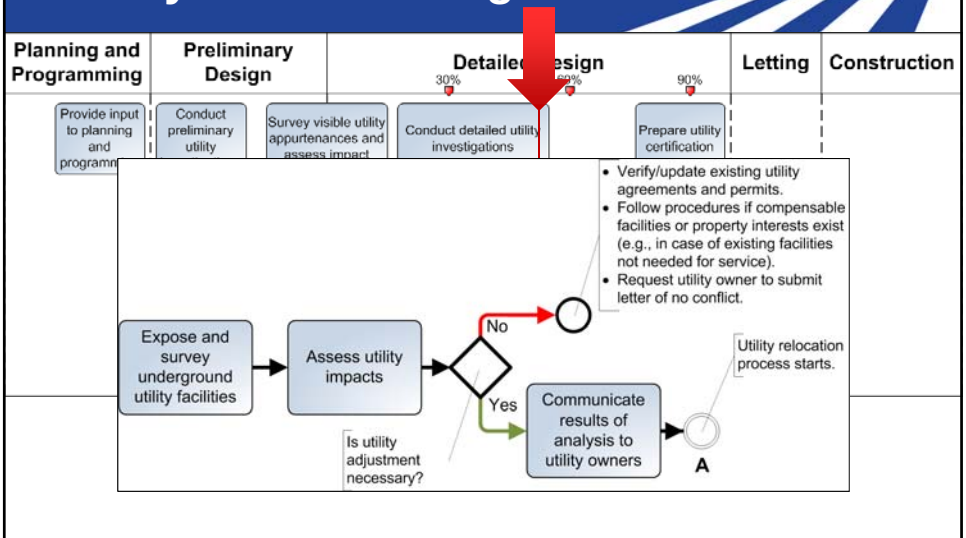
3-30

Utility Process: Stage 3



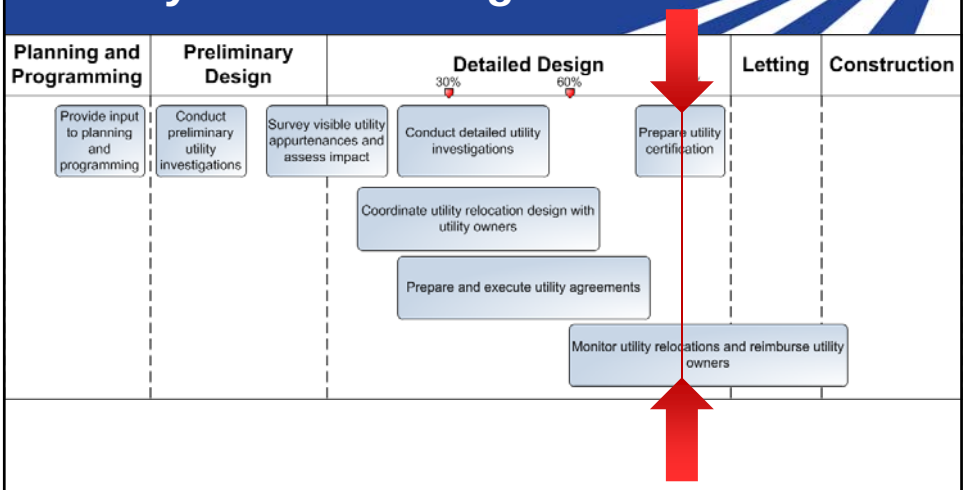
3-31

Utility Process: Stage 4



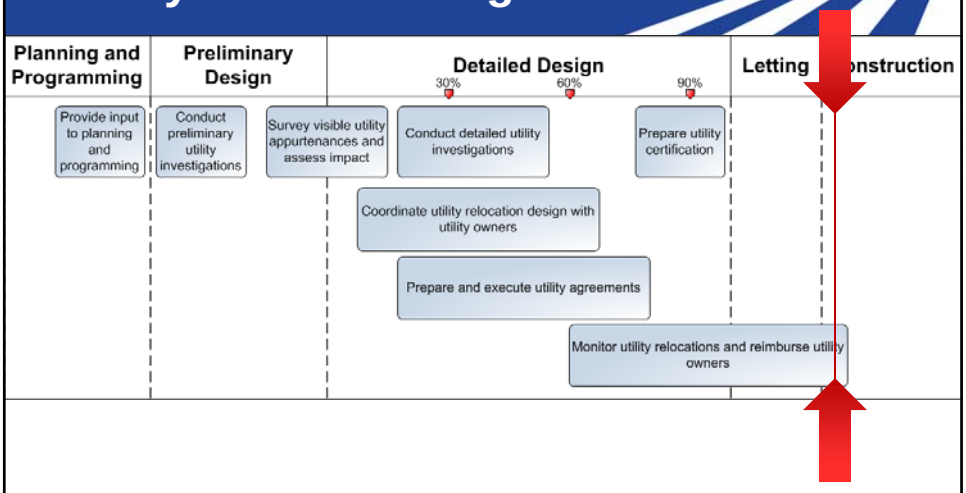
3-32

Utility Process: Stage 5



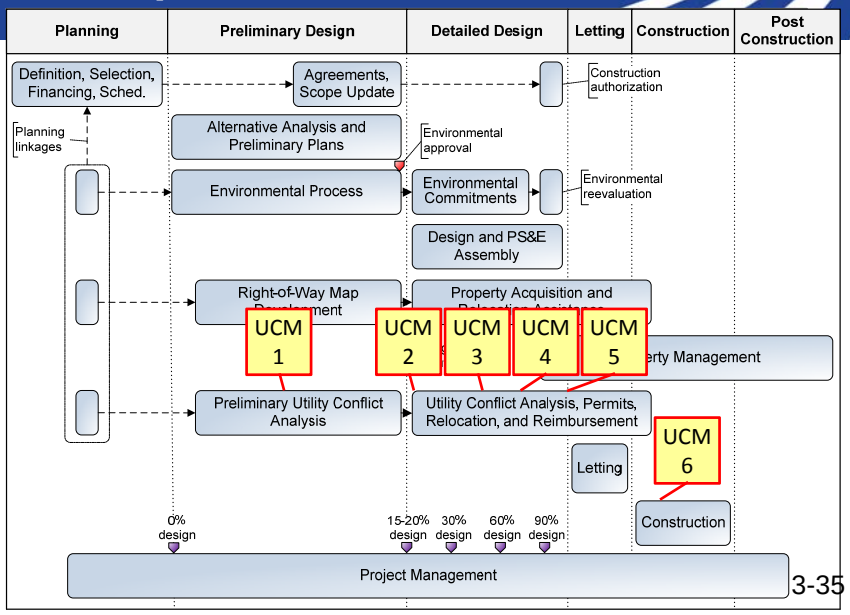
3-33

Utility Process: Stage 6



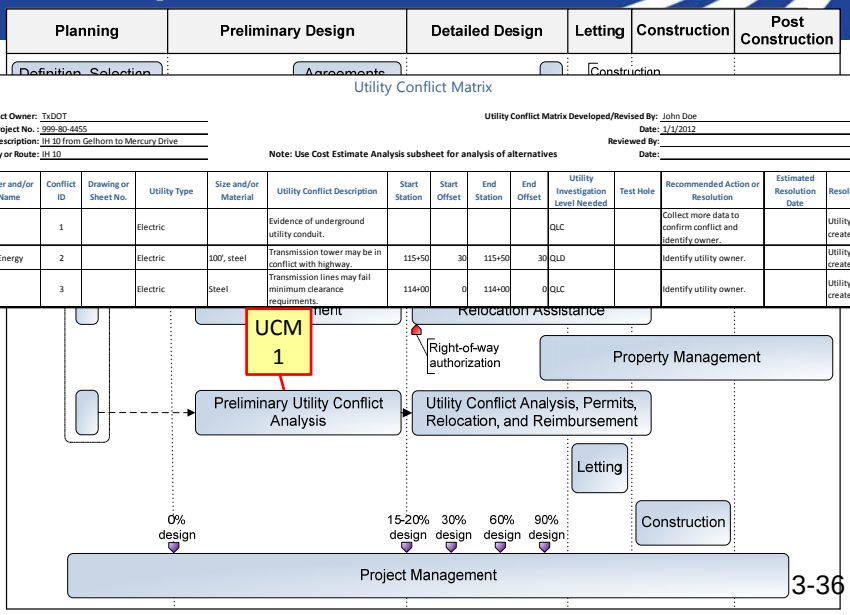
3-34

UCM Update



3-35

UCM Update: UCM 1



3-36

UCM Update: UCM 2

Utility Conflict Matrix

Utility Conflict Resolution Alternatives

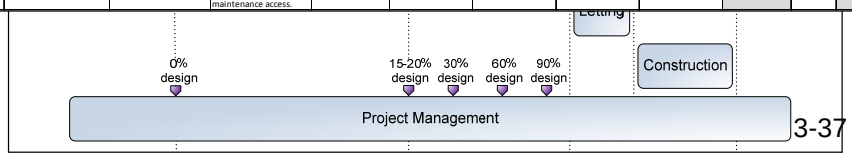
Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By
Date

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility						Unknown	Under Review
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT						Unknown	Under Review
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility						Unknown	Under Review
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A						Unknown	Under Review



3-37

UCM Update: UCM 3

Utility Conflict Matrix

Utility Conflict Resolution Alternatives

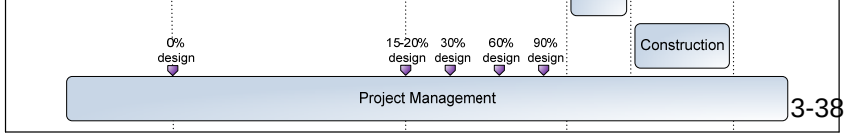
Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By John Doe
Date 3/1/2013

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility	$ 25,000.00	$ 200,000.00	$ -	$ -	$ 225,000.00	Unknown	Under Review
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT	$ -	$ -	$ 10,000.00	$ 30,000.00	$ 40,000.00	Unknown	Under Review
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility	$ 5,000.00	$ 20,000.00		$ -	$ 25,000.00	Unknown	Under Review
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A	$ -	$ -	$ -	$ -	$ -	No	Rejected



3-38

UCM Update: UCM 4

Utility Conflict Matrix

Utility Conflict Resolution Alternatives

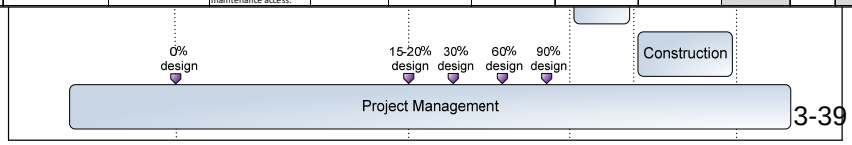
Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By John Doe
Date 4/1/2013

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility	$ 25,000.00	$ 200,000.00	$ -	$ -	$ 225,000.00	Yes	Rejected
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT	$ 10,000.00	$ 30,000.00	$ -	$ -	$ 40,000.00	Yes	Selected
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility	$ -	$ -	$ 25,000.00	$ -	$ 25,000.00	No	Rejected
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A	$ -	$ -	$ -	$ -	$ -	No	Rejected



3-39

UCM Update: UCM 5

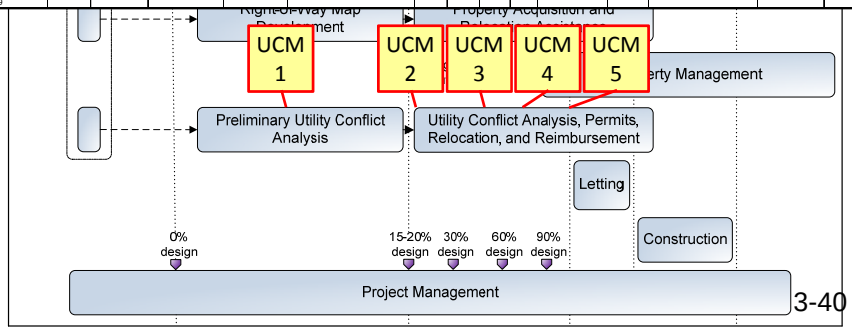
Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By: John Doe
Date: 7/1/2013

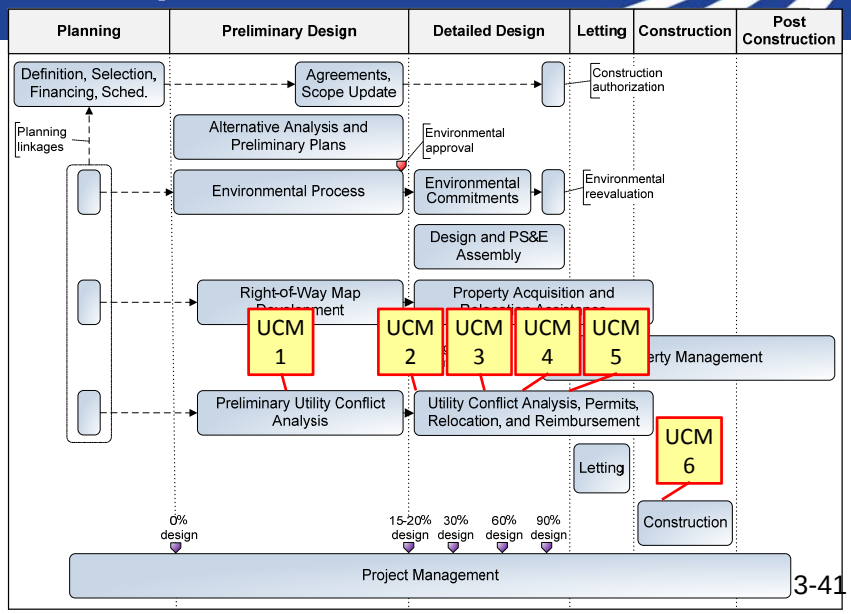
Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
City Electric Services Tina Miller tmiller@ces.com 555-999-8888	1	PS-4	Electric	18"	Underground utility conduit in conflict with highway	110+00	40	140+00	40	QLA	10	None	6/1/2013	Utility conflict resolved
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	2	PS-8	Electric	100', steel	Transmission tower in conflict with highway	115+50	30	115+50	30	QLC		None	-	Utility conflict resolved
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	3	PS-7	Electric	Steel	Transmission lines fail minimum clearance requirements	114+00	0	114+00	0	QLC		None	6/1/2013	Utility conflict resolved



3-40

UCM Update: UCM 6



3-41

Cost Estimate Analysis

- Detailed analysis of utility conflict resolution alternatives
  - Cost (both utility and DOT)
  - Feasibility
- Analysis varies from simple to detailed
  - Several alternatives for each utility conflict
  - Up to four cost estimates for each alternative
- Useful for documentation purposes

3-42

Cost Estimate Analysis

Conflict ID:	1
Utility Owner:	AT&T
Utility Type:	Telephone
Size and/or Material:	Fiber Optic
Project Phase:	60% Design

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Respons. Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocation before construction.	No design change required, no additional cost to DOT.	Cost to utility for relocation.	Utility	$25,000	$200,000	$0	$0	$225,000	Yes	Rejected
2	Protect in-place.	Utility can remain in place.	Access to utility for maintenance problematic.	Utility	$10,000	$30,000	$0	$0	$40,000	No	Rejected
3	Change highway design.	Utility can remain in place.	High cost and project delay.	DOT	$0	$0	$25,000	$0	$25,000	Yes	Selected
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and maintenance problems.	N/A	$0	$0	$0	$0	$0	No	Rejected

3-43

UCM Responsibilities

	Data Collection	Impact Assessment	Populate UCM	Coordinate with Utilities	Utility Conflict Management Responsibility
UCM 1	PM, UC, Cons	PM, Cons	PM	UC	PM
UCM 2	UC, Sur, Cons	PM, Cons	PM, UC, Cons	UC	PM
UCM 3	Sur, Cons	PM, Cons	PM, Cons	UC	PM
UCM 4	Sur, Cons	PM, Cons	PM, Cons	UC	PM
UCM 5	n/a	PM, Cons	PM, UC	UC	PM
UCM 6	PM, Contr	PM, Cons, Contr	PM, UC, Contr	UC, Contr	PM, Contr

PM = Project Manager/Designer
UC = Utility Coordinator
Sur = Surveyor
Cons = Consultant
Contr = Contractor

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Utility Conflict Matrix Uses

- Management report during project development
- Utility information for highway project bidders included in letting documents
  - Certification of known utility facilities within project limits
  - Special provision for utility relocations
- Management report during construction
- Cost savings report after construction

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UCM Sample Applications

- Georgia DOT
- California DOT

3-46

Sample Application No. 1

- Roswell Road Project, Georgia
  - NW of Atlanta, Cobb County
  - Widening of SR 120/Roswell Road from SR 120 ALT to Bridgegate Drive
  - Project length: 1.8 miles
  - 13 utility owners
  - 135,000 linear feet of underground utilities

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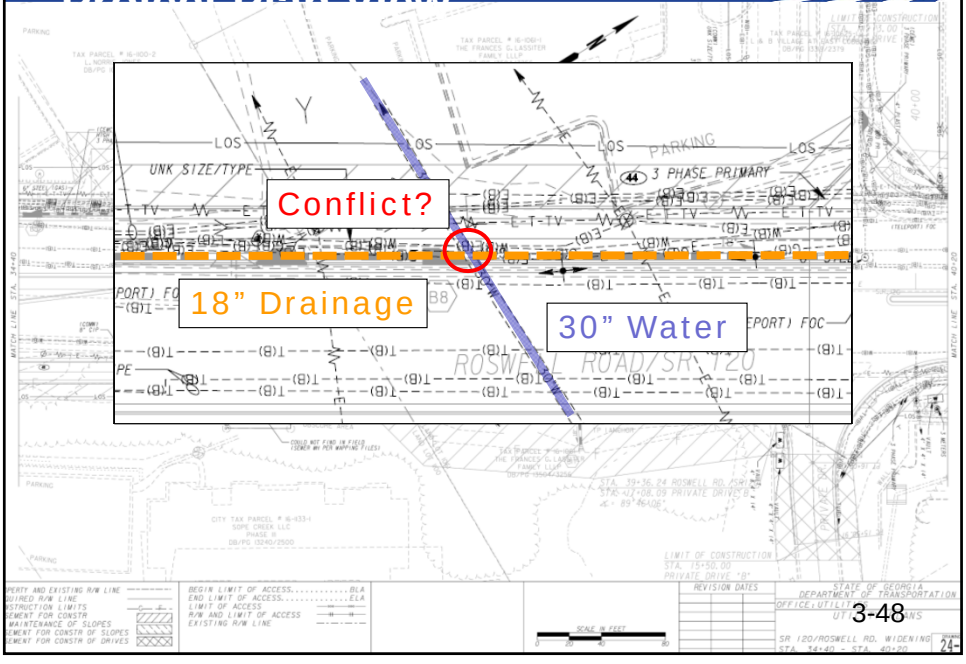
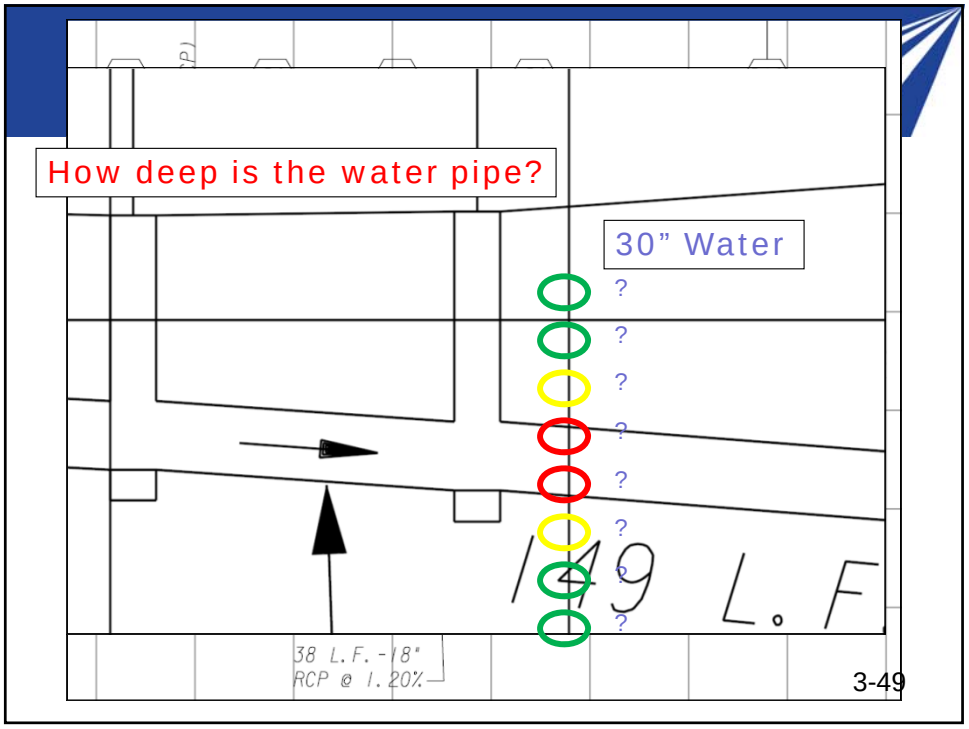
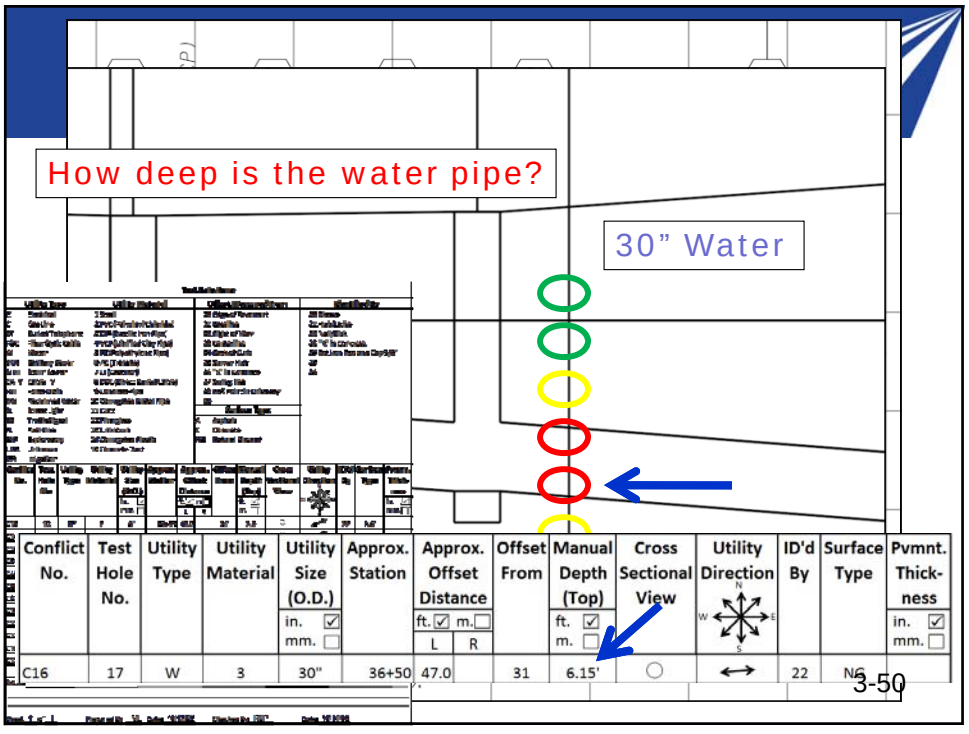
Project Plan View

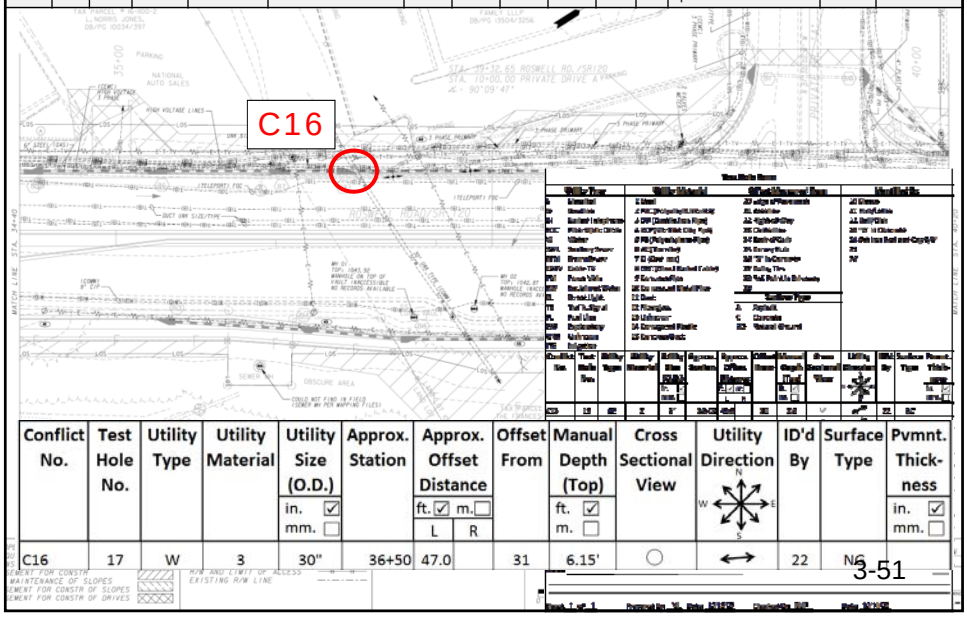


3-48


How deep is the water pipe?
30" Water
?
?
?
?
?
?
?
149 L.F.
38 L.F. - 18" RCP @ 1.20%
3-49

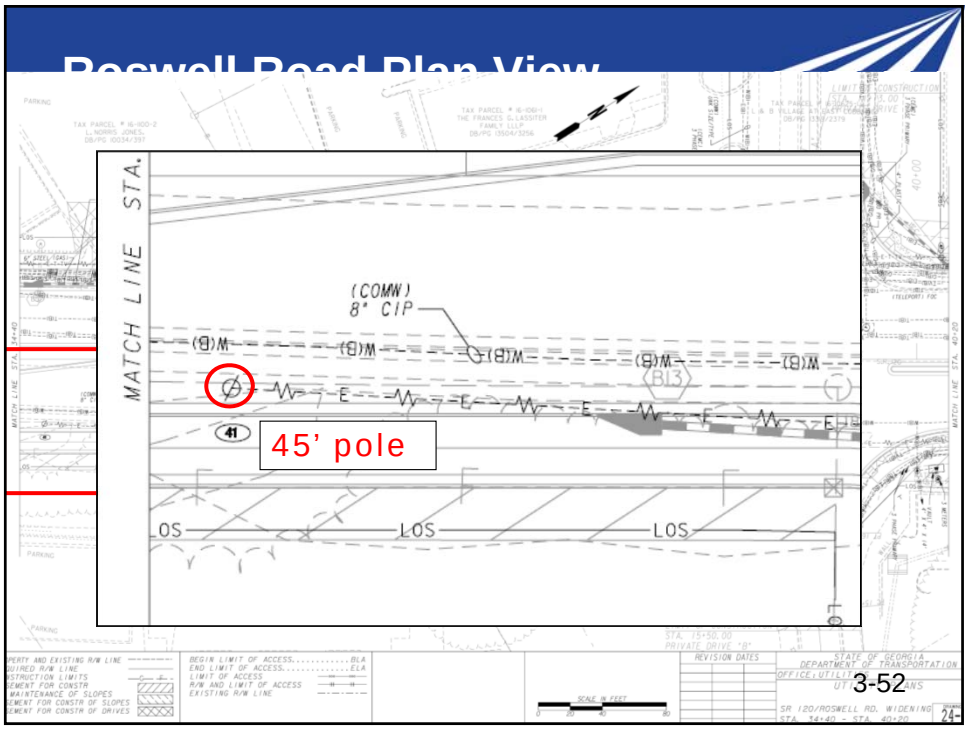

How deep is the water pipe?
30" Water
Conflict No.
Test Hole No.
Utility Type
Utility Material
Utility Size (O.D.)
Approx. Station
Approx. Offset Distance
Offset From
Manual Depth (Top)
Cross Sectional View
Utility Direction
ID'd By
Surface Type
Pvmnt. Thick-ness
in.
mm.
ft.
m.
L
R
C16
17
W
3
30"
36+50
47.0
31
6.15'
22
NS
3-50

Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
AWS	C16	1	Water	30" ductile iron pipe	Proposed 18" drainage pipe would cross water main	36+50	47' LT	36+50		QLA	17	Review possibility of adjusting drainage pipe up to avoid conflict	n/a	Utility conflict created

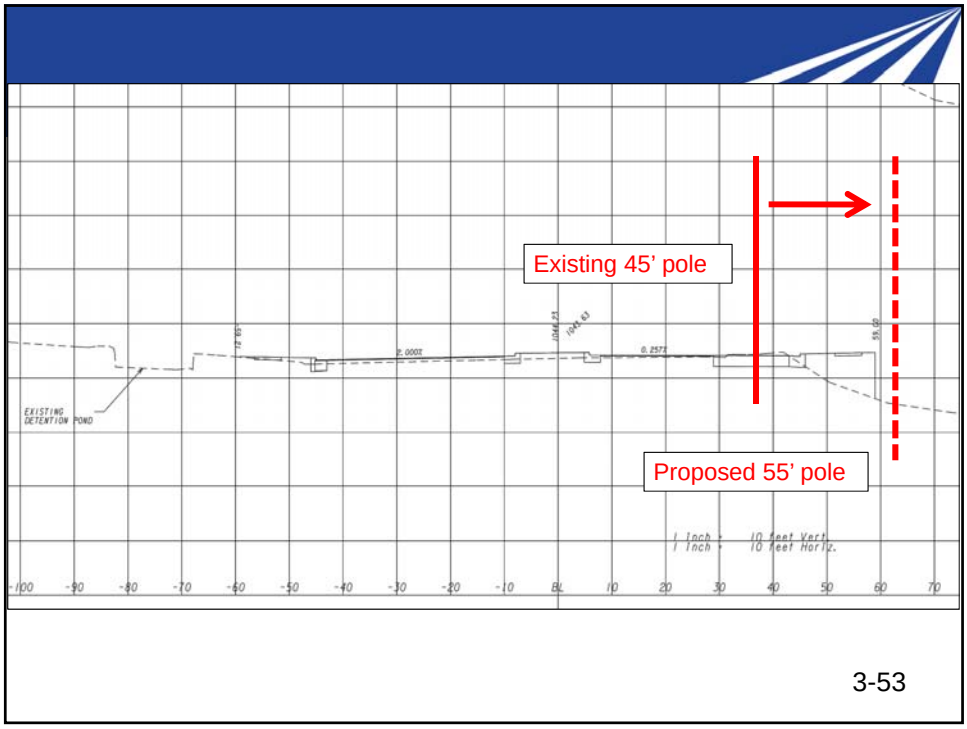


Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.)	Approx. Station	Approx. Offset Distance		Offset From	Manual Depth (Top)	Cross Sectional View	Utility Direction	ID'd By	Surface Type	Pvmnt. Thick-ness
				in. ☑ mm. ☐		ft. ☑ m. ☐ L	R		ft. ☑ m. ☐					in. ☑ mm. ☐
C16	17	W	3	30"	36+50	47.0		31	6.15'	○	↔	22	NC	

3-51

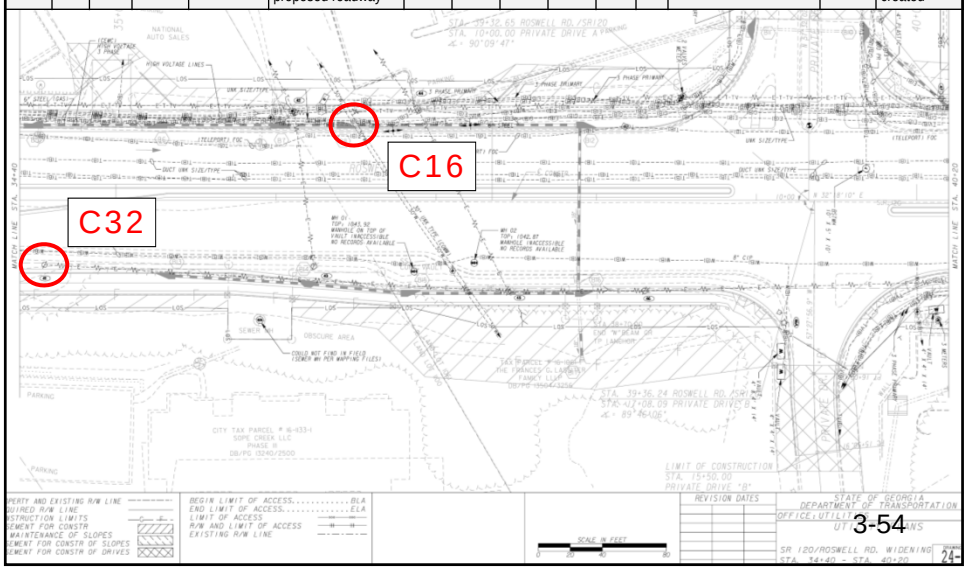


3-52



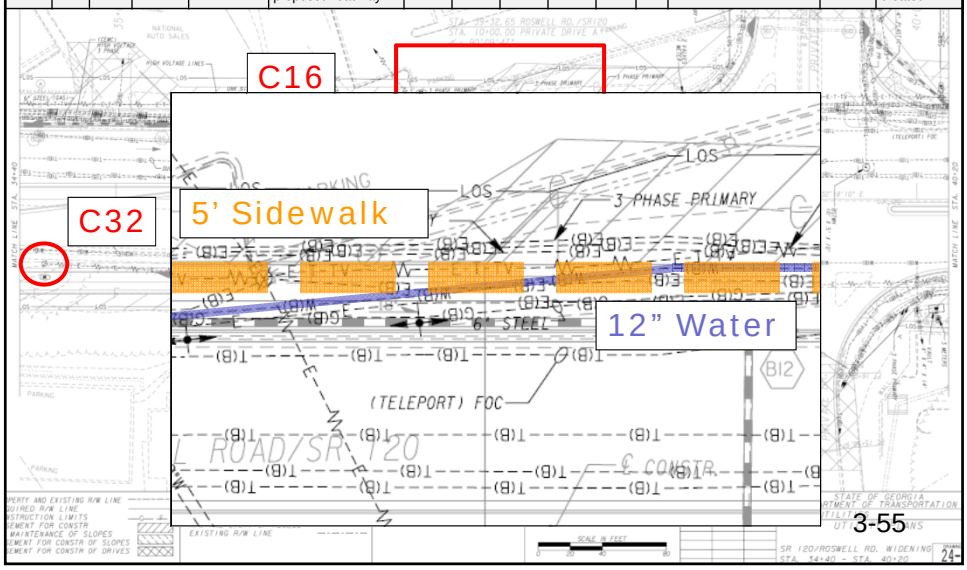
3-53

Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
AWS	C16	1	Water	30" ductile iron pipe	Proposed 18" drainage pipe would cross water main	36+50	47' LT	36+50		QLA	17	Review possibility of adjusting drainage pipe up to avoid conflict	n/a	Utility conflict created
CPS	C32	1	Electric	45" pole	Existing pole in proposed roadway	34+55	40' RT			QLC		Pole to be relocated	n/a	Utility conflict created

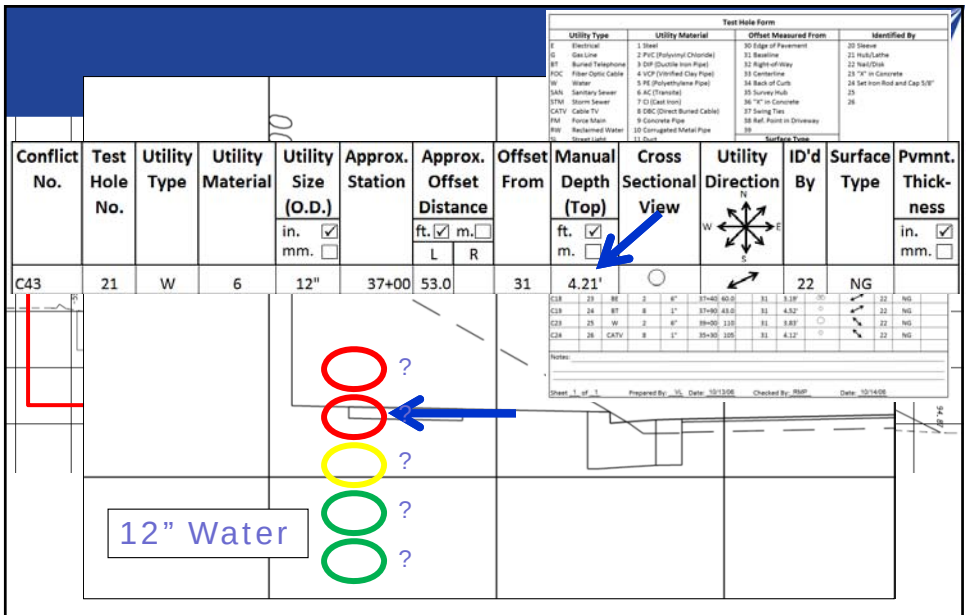


3-54

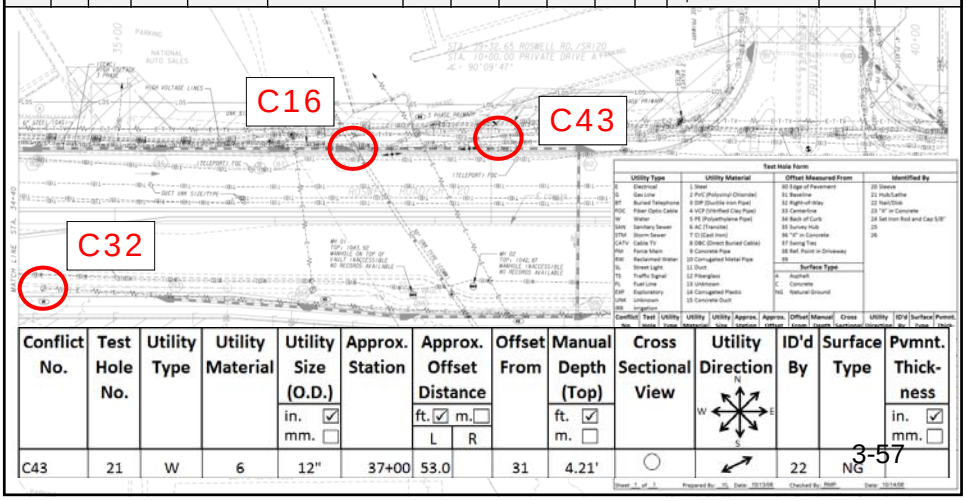
Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
AWS	C16	1	Water	30" ductile iron pipe	Proposed 18" drainage pipe would cross water main	36+50	47' LT	36+50		QLA	17	Review possibility of adjusting drainage pipe up to avoid conflict	n/a	Utility conflict created
CPS	C32	1	Electric	45" pole	Existing pole in proposed roadway	34+55	40' RT			QLC		Pole to be relocated	n/a	Utility conflict created



Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.) in. ☑ mm. ☐	Approx. Station	Approx. Offset Distance ft. ☑ m. ☐ L	R	Offset From	Manual Depth (Top) ft. ☑ m. ☐	Cross Sectional View	Utility Direction	ID'd By	Surface Type	Pvmnt. Thick-ness in. ☑ mm. ☐
C43	21	W	6	12"	37+00	53.0		31	4.21'			22	NG	



Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
AWS	C16	1	Water	30" ductile iron pipe	Proposed 18" drainage pipe would cross water main	36+50	47' LT	36+50		QLA	17	Review possibility of adjusting drainage pipe up to avoid conflict	n/a	Utility conflict created
CPS	C32	1	Electric	45" pole	Existing pole in proposed roadway	34+55	40' RT			QLC		Pole to be relocated	n/a	Utility conflict created
AWS	C43	1	Water	12" water pipe	Proposed sidewalk in conflict with 12" water main	37+00	53' LT			QLA	21	Highway/sidewalk re-design to avoid utility impact	n/a	Utility conflict created



Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.) in. ☑ mm. ☐	Approx. Station	Approx. Offset Distance ft. ☑ m. ☐ L	R	Offset From	Manual Depth (Top) ft. ☑ m. ☐	Cross Sectional View	Utility Direction	ID'd By	Surface Type	Pvmnt. Thick-ness in. ☑ mm. ☐
C43	21	W	6	12"	37+00	53.0		31	4.21'	○	N W E S	22	NG	

Utility Conflict Matrix

Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
AWS	C16	1	Water	30" ductile iron pipe	Proposed 18" drainage pipe would cross water main	36+50	47' LT	36+50		QLA	17	Review possibility of adjusting drainage pipe up to avoid conflict	n/a	Utility conflict created
CPS	C32	1	Electric	45" pole	Existing pole in proposed roadway	34+55	40' RT			QLC		Pole to be relocated	n/a	Utility conflict created
AWS	C43	1	Water	12" water pipe	Proposed sidewalk in conflict with 12" water main	37+00	53' LT			QLA	21	Highway/sidewalk re-design to avoid utility impact	n/a	Utility conflict created
CPS	C54	1	Electric	45' pole	Existing pole in proposed curb line	38+30	57' RT			QLC		Pole to be relocated	n/a	Utility conflict created
CPS	C55	1	Electric	45' pole	Existing pole in area of grade cut	38+50	63' RT			QLC		Pole may need to be supported or replaced with taller pole	n/a	Utility conflict created
CPS	C61	1	Electric	45' pole	Existing pole in proposed curb line	40+00	52' RT			QLC		Pole to be relocated	n/a	Utility conflict created
ATT	C28	1	Commu nication	45' pole	Existing pole in conflict with proposed drainage	40+15	65' LT			QLC		Pole to be relocated	n/a	Utility conflict created

Sample Application No. 2

- California DOT project
  - US 91
  - Riverside, east of Los Angeles, Riverside County

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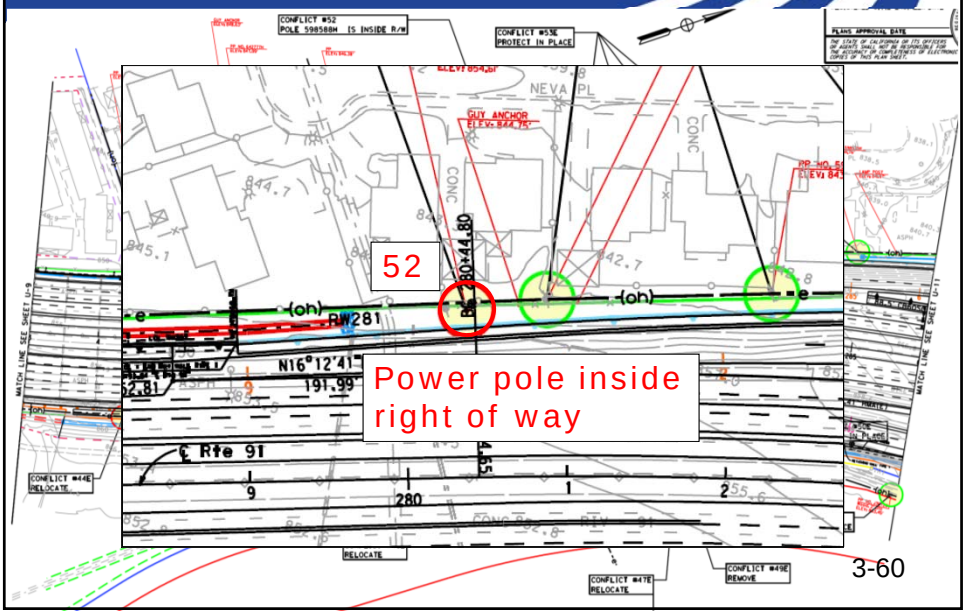
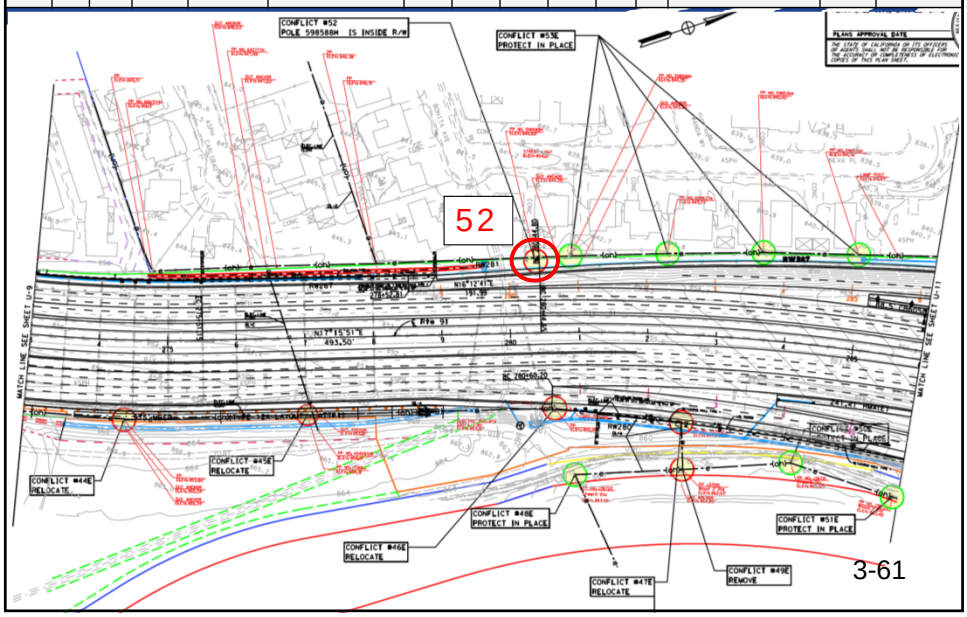
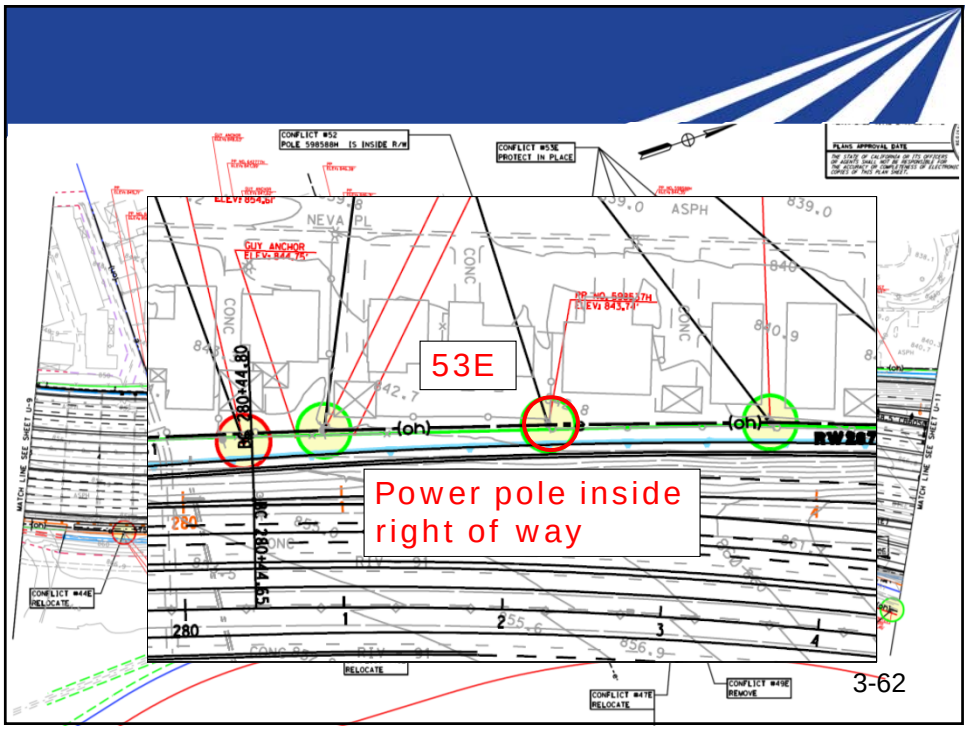
Project Plan View



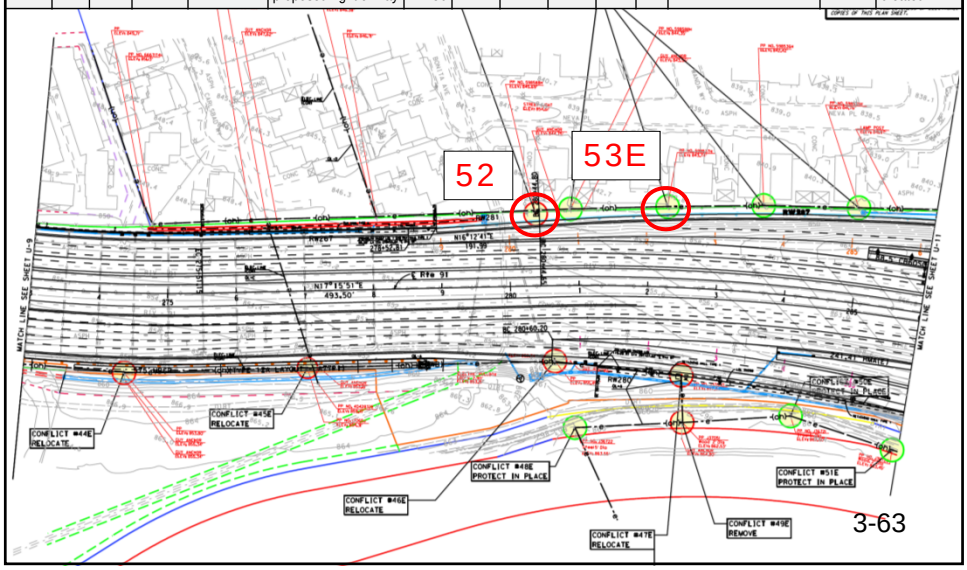
3-60

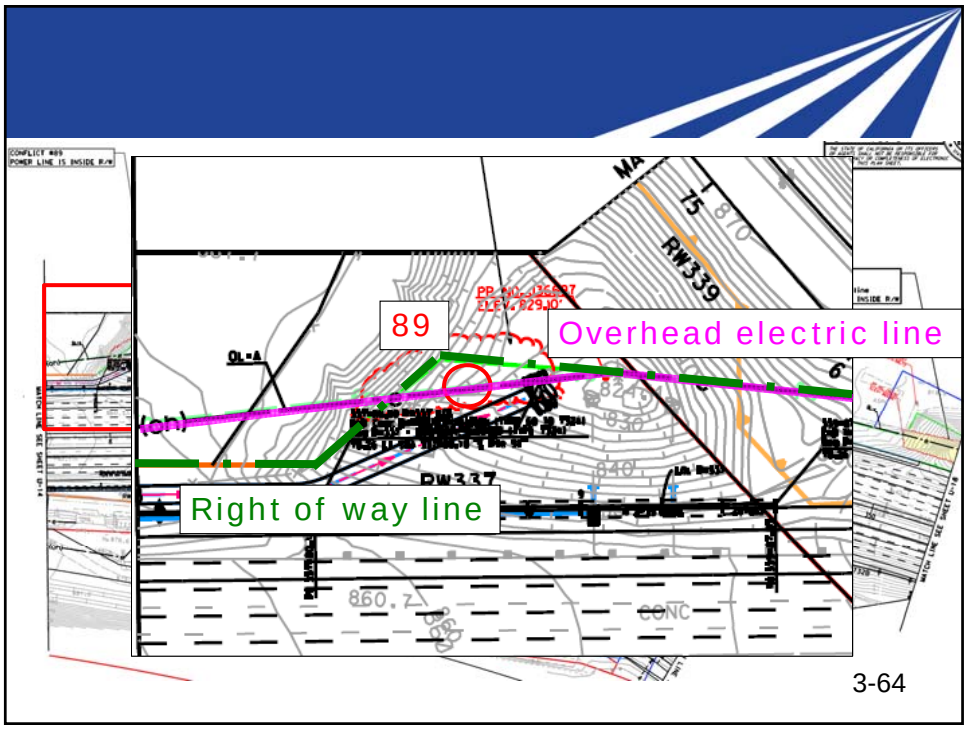
Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
CP	52	U-10	Electric	Pole	Pole is in conflict with retaining wall.	280 +50	80' LT			QLC		Review possibility of modifying retaining wall 281 to avoid conflict	n/a	Utility conflict created



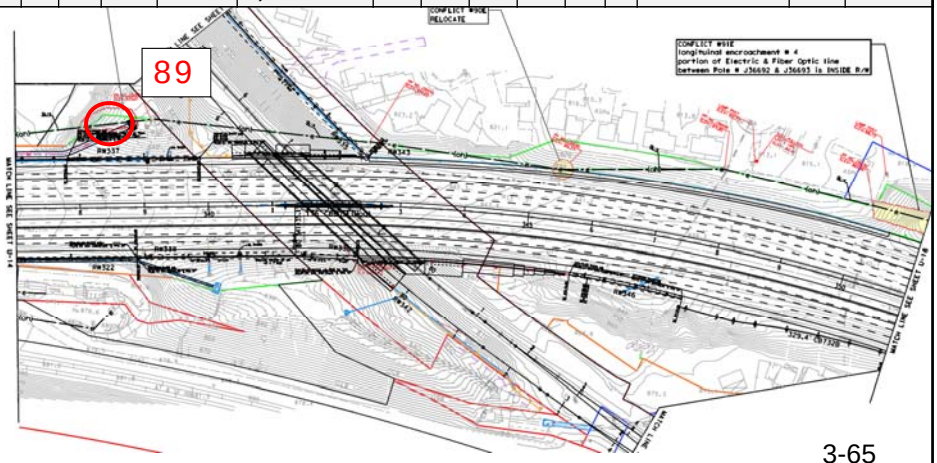


Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
CP	52	U-10	Electric	Pole	Pole is in conflict with retaining wall.	280 +50	80' LT			QLC		Review possibility of modifying retaining wall 281 to avoid conflict	n/a	Utility conflict created
CP	53E	U-10	Electric	Pole	Pole is within the proposed right of way	282 +50	80' LT			QLC		Protect in place	n/a	Utility conflict created

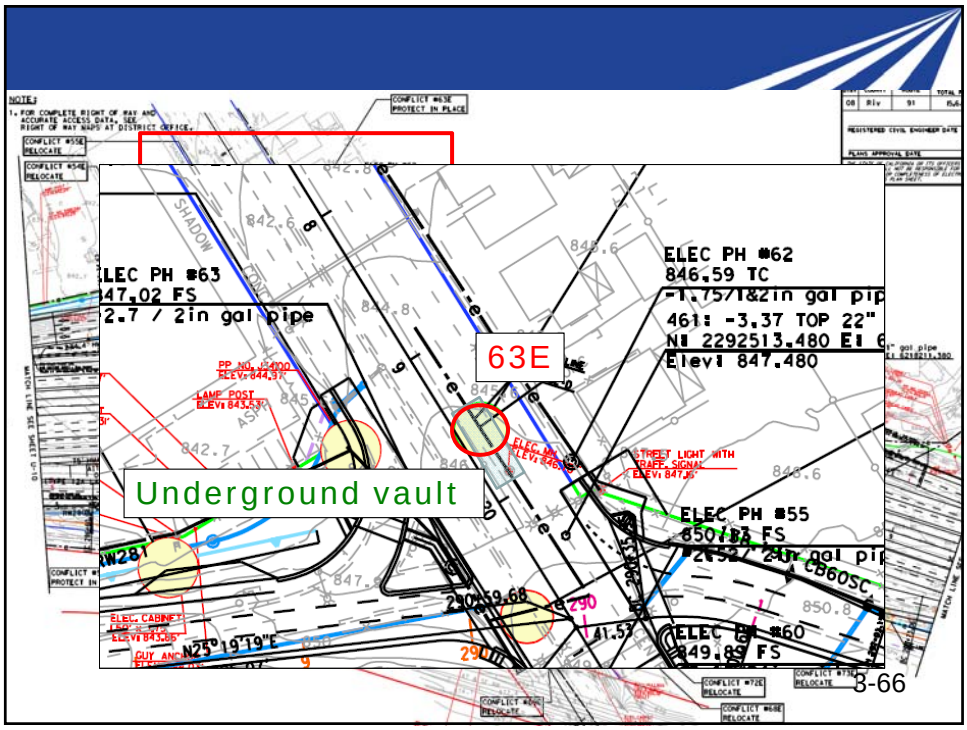




Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
CP	52	U-10	Electric	Pole	Pole is in conflict with retaining wall.	280 +50	80' LT			QLC		Review possibility of modifying retaining wall 281 to avoid conflict	n/a	Utility conflict created
CP	53E	U-10	Electric	Pole	Pole is within the proposed right of way	282 +50	80' LT			QLC		Protect in place	n/a	Utility conflict created
CP	89	U-15	Electric	Pole	Power line is within the proposed right of way	348 +00	75' LT	349 +00	85' LT	QLC		Relocate utility line	n/a	Utility conflict created

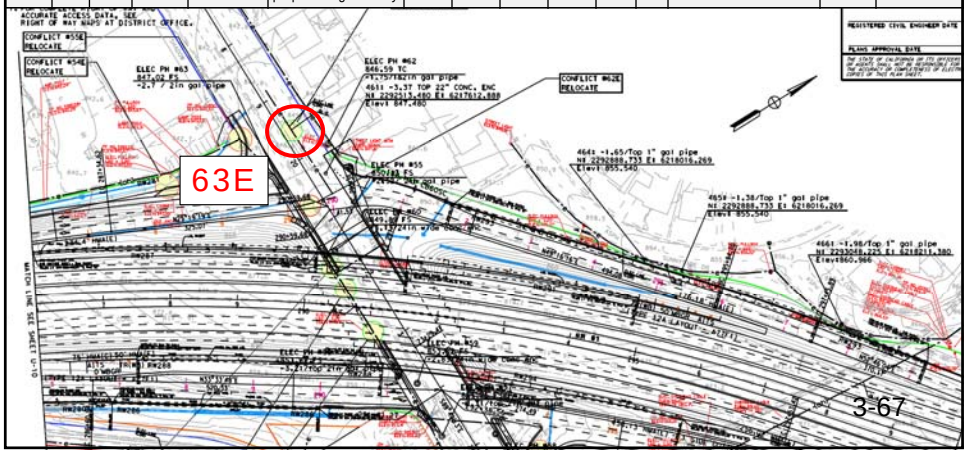


3-65



3-66

Utility Owner	ID	Sheet No.	Utility Type	Size/ Material	Utility Conflict Description	Start Sta.	Start Offset	End Sta.	End Offset	Inv. Need	Test Hole	Recommended Action or Resolution	Est. Res. Date	Resolution Status
CP	52	U-10	Electric	Pole	Pole is in conflict with retaining wall.	280 +50	80' LT			QLC		Review possibility of modifying retaining wall 281 to avoid conflict	n/a	Utility conflict created
CP	53E	U-10	Electric	Pole	Pole is within the proposed right of way	282 +50	80' LT			QLC		Protect in place	n/a	Utility conflict created
CP	89	U-15	Electric	Pole	Power line is within the proposed right of way	348 +00	75' LT	349 +00	85' LT	QLC		Relocate utility line	n/a	Utility conflict created
EPP	63E	U-11	Unknown	Vault	Vault is within the proposed right of way	19+50	0			QLA	14	Protect in place	n/a	Utility conflict created



3-67

3.2

Utility conflict management for 3D project delivery workflows

3-68

FHWA Project – Strategies

- Review all previous utility information, including QLB data
- Collect additional QLB and QLA data
  - New utility installations on the ground after bidding
- Strengthen utility permitting process
  - PE signature and seal required
  - Field inspection and surveying required
- Build 3D utility model and integrate into main 3D model

3-69

FHWA Project – Strategies

- Process to develop 3D utility model:
  - Calculate spot utility elevations from data gathered at points such as vaults, valves, basements, and records
  - Use SMEs to estimate depths between spot locations
  - Develop 3D utility model
  - Collect QLA data at critical locations
  - Update 3D utility model as needed

3-70

FHWA Project – Strategies

- Conduct ‘hard’ and ‘soft’ clash detections
- Maintain the utility data current during PDP:
  - Review all city construction permits
    - Check for utility conditions that do not need a permit
  - Review all One Call tickets
  - Contact utility owners and request information on any changes
  - Walk the project and scan for evidence of new construction
  - Conduct QLB investigation at locations with changes

3-71

In Summary …

- Gather available info
- Identify potential utility conflicts
- Prepare utility conflict matrix
- Evaluate alternatives (both utility and project)
- Conduct utility conflict analysis
- Coordinate with stakeholders
- Iterative process (pending design progression)
- Goal: minimize unnecessary utility relocations

3-72

3.3

Discussion, questions, and answers

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Lesson 4

Use of Database Approach to Manage Utility Conflicts

4-1

Course Overview

- 8:30 AM – 9:00 AM Introductions and Course Overview
- 9:00 AM – 10:15 AM Utility Conflict Concepts
- 10:15 AM – 10:30 AM Morning Break
- 10:30 AM – 11:45 AM Utility Conflict Identification and Management
- 11:45 AM – 1:00 PM Lunch Break
- 1:00 PM – 1:20 PM Use of Database Approach to Manage Utility Conflicts
- 1:20 PM – 2:20 PM Hands-On Utility Conflict Management Exercise Part I
- 2:20 PM – 2:35 PM Afternoon break
- 2:35 PM – 3:35 PM Hands-On Utility Conflict Management Exercise Part II
- 3:35 PM – 3:45 PM Wrap-Up

4-2

Lesson 4 Overview

4.1 Data Model and Database Structure

4.2 Use of Access Database to Manage Utility Conflicts

4.3 Questions and Answers

4-3

4.1

Data Model and Database Structure

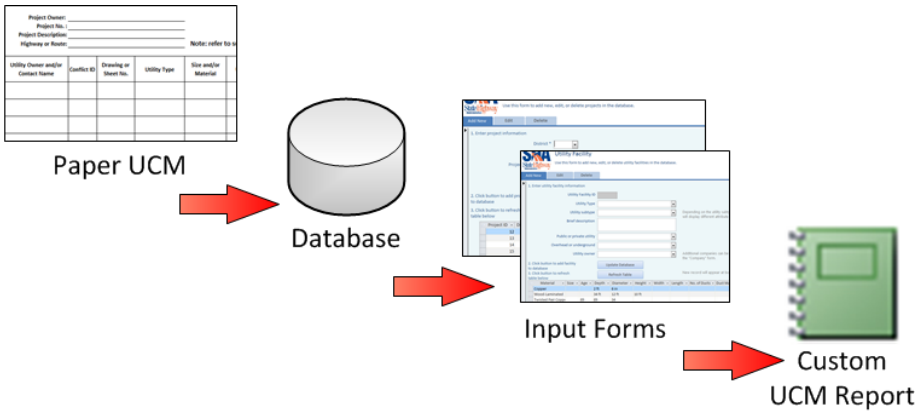
4-4

Need for Database Approach

- Problem: "The UCM in Excel is great, but…"
  - I need a column for relocation priority
  - I need to track prior rights
  - I need to track when preliminary plans/semi-final plans/final plans were sent to the utility owner
  - I need to track as-builts, both request date and respond date
  - I have hundreds of utility conflicts to manage.
  - …
- Solution: use database to manage utility conflicts

4-5

Custom UCMs



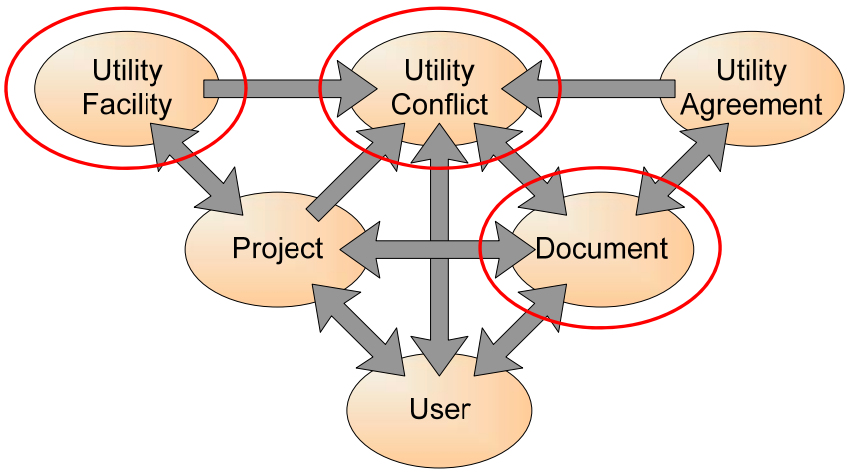
4-6

Data Model Development

- Based on 26 UCMs in use nationwide
- Formal data model (ERwin format)
- Tested in MS Access environment
- Enterprise database support (Oracle, SQL Server)
- UCM is **one of many** queries/reports possible

4-7

Conceptual Model



4-8

Advantages of a Database Approach

- Flexible structure
  - Based on large number of diverse state DOT UCMs
  - Based on large number of data items
- Adapts to DOT needs and business process
  - Choose which portions to implement
- Scalable
  - Add records in lookup tables as needed
- Can link to existing DOT data systems

4-9

4.2

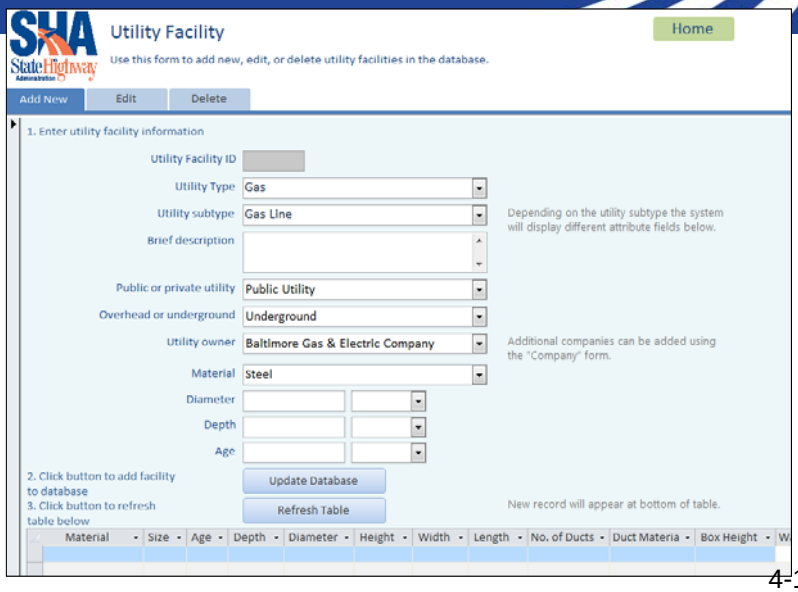
Use of Access Database to Manage Utility Conflicts

4-10

Sample Data Entry Form

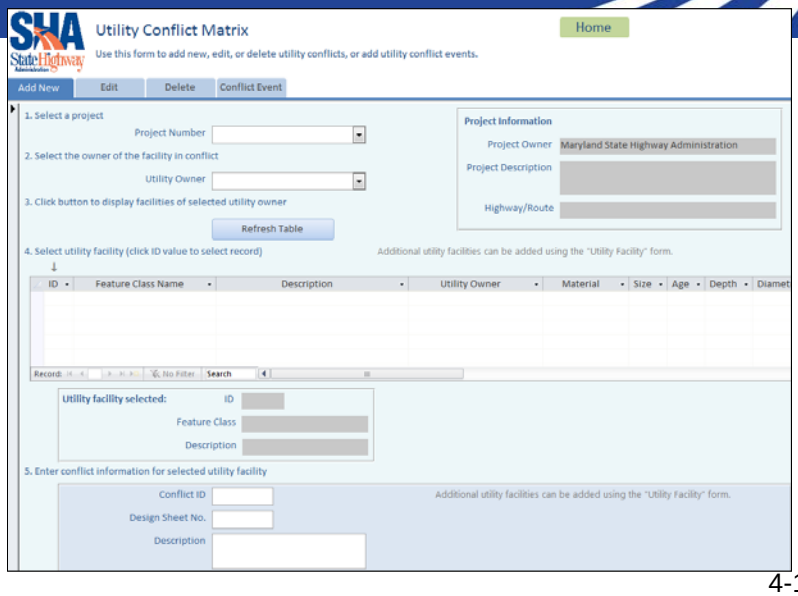
4-11

Sample Data Entry Form



4-12

Sample Data Entry Form



4-13

Sample UCM Reports

- Standard UCM
- Alaska DOT
- California DOT

4-14

Excel Spreadsheet UCM

Utility Conflict Matrix

Project Owner: Texas Department of Transportation
Project No. : 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Note: refer to subsheet for utility conflict cost analysis.

Utility Conflict Matrix Developed/Revised By: _____
Date: _____
Reviewed By: _____
Date: _____

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
AT&T	1	U-1	Communications	Fiber Optic	Conflict with construction of frontage road widening.	21+00	45' Lt	22+00	45' Lt	QLC		Relocation befor construction.	3/8/2010	Utility conflict created
AT&T	2	U-1	Communications	Fiber Optic	Conflict with construction of frontage road widening.	21+80	37' Rt	23+00	37' Rt	QLC		Relocation befor construction.	3/8/2010	Utility conflict created
AT&T	3	U-1	Communications	Fiber Optic	Conflict with construction of frontage road widening.	27+50	48' Rt	30+00	48' Rt	QLC		Relocation befor construction.	3/8/2010	Utility conflict created
AT&T	4	U-1	Communications	Fiber Optic	Conflict with construction of frontage road widening.	44+40	48' Rt	45+15	48' Rt	QLC		Relocation befor construction.	3/8/2010	Utility conflict created
AT&T	5	U-1	Communications	Unknown	Conflict with construction of frontage road widening.	45+10	49' Lt	45+20	49' Lt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	6	U-1	Communications	Copper	Conflict with retaining wall No. 18.	45+80	57' Lt	45+90	49' Lt	QLB		Design change.	3/8/2010	Utility conflict created
AT&T	7	U-1	Communications	Copper	Conflict with retaining wall No. 18.	25+80	65' Lt	25+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict created
AT&T	8	U-1	Communications	Copper	Conflict with retaining wall No. 18.	25+80	62' Rt	25+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict created
AT&T	9	U-1	Communications	Copper	Conflict with retaining wall No. 18.	27+40	55' Lt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict created
AT&T	10	U-1	Communications	Copper	Conflict with retaining wall No. 18.	27+40	55' Rt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict created
AT&T	11	U-1	Communications	Copper	Conflict with retaining wall No. 18.	28+05	62' Rt	29+00	55' Lt	QLC		Exception to policy.	3/8/2010	Utility conflict created
AT&T	12	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 18.	15+50	49' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	13	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 27.	15+90	40' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	14	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 27.	20+40	115' Rt	22+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	15	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 27.	22+30	80' Rt	23+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	16	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 27.	25+85	55' Rt	28+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict
AT&T	17	U-2	Communications	Multiple Concrete Duct	Conflict with retaining wall No. 27.	28+05	62' Rt	30+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict

4-15

UCM Database Report

Utility Conflict Matrix

Project Owner: Texas Department of Transportation
Project No.: 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Utility Conflict Matrix Developed/Revised By: _____ **Date:** _____
Reviewed By: _____ **Date:** _____

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole No.	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status	Cost Analysis
AT&T	1	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	21+00	45' Lt	22+00	45' Lt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	2	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	21+80	37' Rt	23+00	37' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	3	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	27+50	48' Rt	30+00	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	4	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	44+40	48' Rt	45+15	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	5	U-1	Telephone	Unknown	Conflict with construction of frontage road widening.	45+10	49' Lt	45+20	49' Lt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	6	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	45+80	57' Lt	45+90	49' Lt	QLB		Design change.	3/8/2010	Utility conflict identified	Detail
AT&T	7	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	25+80	65' Lt	25+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	8	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	25+80	62' Rt	25+90	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	9	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	55' Lt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	10	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	55' Rt	28+00	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	11	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	28+05	62' Rt	29+00	55' Lt	QLC		Exception to policy.	3/8/2010	Utility conflict identified	Detail
AT&T	12	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 18.	15+50	49' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	13	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	15+90	40' Lt	16+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	14	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	20+40	115' Rt	22+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	15	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	22+30	80' Rt	23+00	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	16	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	25+85	55' Rt	28+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	17	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	28+05	62' Rt	30+00	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail

4-16

Excel Spreadsheet Sub Sheet

Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Project Owner: Texas Department of Transportation
Project No. : 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Cost Estimate Analysis Developed/Revised By
Date 11/24/2010
Reviewed By
Date

Utility Conflict: 1
Utility Owner: AT&T
Utility Type: Communications
Size and/or Material: Fiber Optic
Project Phase: 60% Design

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
0	Relocation before construction.	No design change required and no additional cost to DOT.	Cost to utility for relocation.	Utility	$ 10,375.00	$63,875.00	$ -	$ -	$74,250.00	Yes	Selected
1	Protect in-place.			Utility	$ 7,875.00	$32,375.00	$ -	$ -	$40,250.00	No	Rejected
2	Design change.			DOT	$ -	$ -	$95,375.00	$ -	$95,375.00	No	Rejected
3	Exception to policy.			DOT	$ -	$ -	$ -	$ -	$ -	No	Rejected

4-17

Sub Sheet Database Report

Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Date: 11/24/2010

Project Owner: Texas Department of Transportation
Project No.: 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Conflict ID: 1
Utility Owner: AT&T
Utility Type: Telephone
Size and/or Material: Fiber Optic
Project Phase: 60% Design

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
0	Relocation before construction.	No design change required and no additional cost to DOT.	Cost to utility for relocation.	Utility Company	$10,375.00	$63,875.00	$0.00	$0.00	$74,250.00	Yes	Selected
1	Protect in-place.			Utility Company	$7,875.00	$32,375.00	$0.00	$0.00	$40,250.00	No	Rejected
2	Design change.			DOT	$0.00	$0.00	$95,375.00	$0.00	$95,375.00	No	Rejected
3	Exception to policy.			DOT	$0.00	$0.00	$0.00	$0.00	$0.00	No	Rejected

4-18

Alaska DOT: Sample Report

DRAFT Utility Conflict Report
West Dowling Road Phase I

Anchorage, Alaska
DOT&PF No. 50898

Table 2: Chugach Electric Association, Incorporated, Conflicts Summary

Station	Offset	Station	Offset	Size/Type	Length	Conflict	ADJ/REL	Cost	PE/CE Cost	Total Cost
CEA Distribution Relocation Costs										
9+00	150' RT		200' LT	3φ UG	350	FG	REL	52,500	15,750	68,250
16+00	100' LT	42+30	80' LT	3φ UG	2630	FG	REL	394,500	118,350	512,850
16+00	100' LT	15+50	100' RT	3φ UG	250	FG	REL	37,500	11,250	48,750
16+00	100' LT	29+00	75' LT	1φ UG	1650	FG	REL	165,000	49,500	214,500
36+40	80' LT	35+80	350' RT	3φ UG	430	FG	REL	64,500	19,350	83,850
36+60	80' LT	36+70	380' LT	3φ UG	300	FG	REL	45,000	13,500	58,500
	UG Loop to the North			3φ UG	1000	FG	REL	150,000	45,000	195,000
							Subtotal	909,000	272,700	1,181,700
CEA Transmission Relocation Costs										
14+75	55' RT			138 kV OH	1	PWY	REL	30,000	9,000	39,000
32+75	55' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
36+38	45' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
							Subtotal	130,000	39,000	169,000
							Total CEA Relocation Costs	**1,039,000**	**311,700**	**1,350,700**

1φ Underground (UG) loop to extend across Dowling Road and along the south side to reconnect existing services.
UG loop provided to the north of the project to accommodate undergrounding.
Removal of existing swamp braces removed and steel piling added, down guys replaced with overhead span guy and down guys.

4-19

Alaska DOT: Database Report

Alaska UCM

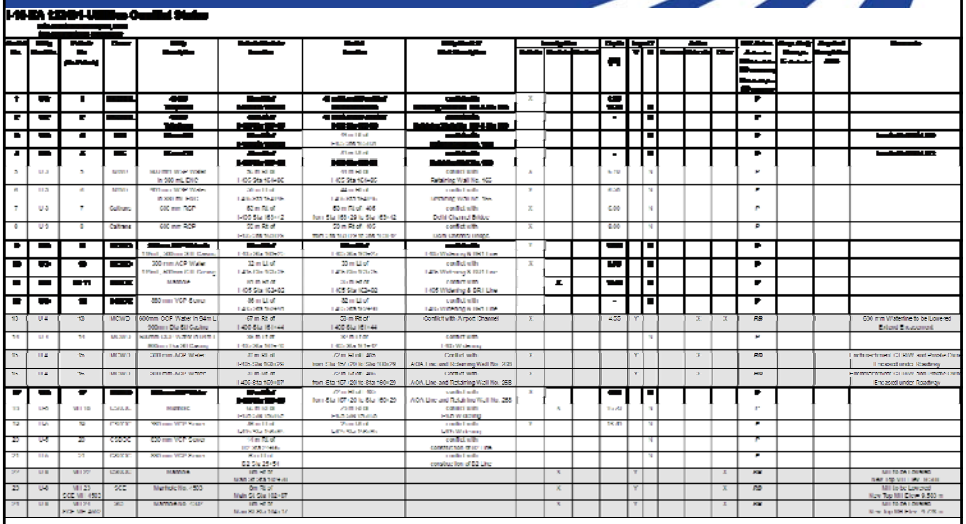
DRAFT Utility Conflict Report
West Dowling Road Phase 1

Anchorage, Alaska
DOT&PF No. 50898

Start Station	Start Offset	End Station	End Offset	Size	Type	Length	Conflict	ADJ/REL	Cost	PE/CE Cost	Total Cost
CEA Distribution Relocation Costs											
9+00	150' RT		200' LT	3 phi	UG	350	FG	Relocation before construction	$52,500	$15,750	$68,250
16+00	100' LT	42+30	80' LT	3 phi	UG	2,630	FG	Relocation before construction	$394,500	$118,350	$512,850
16+00	100' LT	15+50	100' RT	3 phi	UG	250	FG	Relocation before construction	$37,500	$11,250	$48,750
16+00	100' LT	29+00	75' LT	1 phi	UG	1,650	FG	Relocation before construction	$165,000	$49,500	$214,500
36+40	80' LT	35+80	350' RT	3 phi	UG	430	FG	Relocation before construction	$64,500	$19,350	$83,850
36+60	80' LT	36+70	380' LT	3 phi	UG	300	FG	Relocation before construction	$45,000	$13,500	$58,500
	UG Loop to the North			3 phi	UG	1,000	FG	Relocation before construction	$150,000	$45,000	$195,000
								Subtotal:	$909,000	$272,700	$1,181,700
CEA Transmission Relocation Costs											
14+75	55' RT			138 kV	OH	1	PWY	Relocation before construction	$30,000	$9,000	$39,000
32+75	55' RT			138 kV	OH	1	EX	Relocation before construction	$50,000	$15,000	$65,000
36+38	45' RT			138 kV	OH	1	EX	Relocation before construction	$50,000	$15,000	$65,000
								Subtotal:	$130,000	$39,000	$169,000
								Total Relocation Costs:	**$1,039,000**	**$311,700**	**$1,350,700**

4-20

California DOT: Sample Report



4-21

California DOT: Database Report

California UCM

I-10-EA 122401 - Utilities Conflict Status

Date of last revision: 12/4/2009

This document was prepared by: _____

Conflict No.	Utility Sheet No.	Test Hole No.	Owner	Utility Description			Test Hole/ Manhole Location	Start Station	End Station	Offset	Utility Conflict/ Work Description	Utility Conflict Investigation	Depth (ft)	Impact?	Utility Relocation	Resp. Party	Required Completion Date	Comments
1	U-2	1	PACBELL	40 mm DU	Telephone		62 m Rt of I-405 Sta 165+55	165+55		40 m Rt and 57 m Rt of I-405	Conflict with retaining walls No. 166 and No. 168	QLA	4.55	N	P	U	1/10/2010	
2	U-2	2	PACBELL	40 mm DU	Telephone		48 m Lt of I-405 Sta 165+55	165+55		40 m Rt and 57 m Rt of I-405	Conflict with retaining walls No. 166 and No. 168		14.40	N	P	U	1/10/2010	
3	U-3	3	SCE	25 mm DU	Telephone		35 m Rt of I-405 Sta 165+01	165+01		43 m Rt of I-405	Conflict with retaining wall No. 166			N	P	U	1/10/2010	Located in Bristol OC
4	U-3	4	SCE	25 mm DU	Telephone		46 m Lt of I-405 Sta 165+55	165+01		43 m Rt of I-405	Conflict with retaining wall No. 166			N	P	U		Located in Bristol OC
5	U-3	5	MWD	900 mm	Water	in 380 mL ENC	50 m Rt of I-405 Sta 165+96	164+95		44 m Rt of I-405	Conflict with retaining wall No. 166	QLA	6.70	N	P	U		
6	U-3	6	MWD	900 mm	Water	in 380 mL ENC	50 m Lt of I-405 Sta 165+96	164+95		44 m Rt of I-405	Conflict with retaining wall No. 166	QLA	6.50	N	P	U		
7	U-3	7	Caltrans	600 mm			53 m Rt of I-405 Sta 163+42	163+29	163+24	53 m Rt of I-405	Conflict with Delhi Channel Bridge	QLA	6.00	N	P	U		
8	U-3	8	Caltrans	600 mm			53 m Rt of I-405 Sta 163+29	163+29	163+42	53 m Rt of I-405	Conflict with Delhi Channel Bridge	QLA	9.00	N	P	U		
9	U-3	9	MCWD	300 mm	Water	in 119 mL, 500 mm STL Casing	32 m Rt of I-405 Sta 163+25	163+25		35 m Rt of I-405	Conflict with I-405 widening and BR1 Line	QLA	10.30	N	P	U		
10	U-3	10	MCWD	300 mm	Water	in 119 mL, 500 mm STL Casing	32 m Lt of I-405 Sta 163+25	163+25		33 m Lt of I-405	Conflict with I-405 widening and BR1 Line	QLA	8.75	N	P	U		
11	U-3	MH 11	CSDOC		Manhole		81 m Rt of I-405 Sta 162+92	162+92		35 m Rt of I-405	Conflict with I-405 widening and BR1 Line	QLB	18.40	N	P	U		
12	U-3	12	CSDOC	380 mm	Sewer		36 m Lt of I-405 Sta 162+91	162+92		32 m Lt of I-405	Conflict with I-405 widening and BR1 Line			N	P	U		
13	U-4	13	MCWD	600 mm	Water	in 94 mL, 900 mm STL Casing	67 m Rt of I-405 Sta 161+44	161+44		58 m Rt of I-405	Conflict with airport channel	QLA	4.55	Y	RB	U		600 mm waterline to be lowered, extend encasement
14	U-4	14	MCWD	600 mm	Water	in 94 mL, 900 mm STL Casing	38 m Lt of I-405 Sta 161+40	161+42		32 m Lt of I-405	Conflict with I-405 widening			N	P	U		
15	U-4	15	MCWD	300 mm	Water		70 m Rt of I-405 Sta 160+29	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA		Y	RD	U		Encroachment CR R/W and private owner, encased under roadway
16	U-4	16	MCWD	300 mm	Water		70 m Rt of I-405 Sta 159+07	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA		Y	RD	U		Encroachment CR R/W and private owner, encased under roadway
17	U-5	17	MCWD	300 mm	Water		70 m Rt of I-405 Sta 156+87	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA	4.35	N	P	U		
18	U-5	MH 18	CSDOC		Manhole		60 m Rt of I-405 Sta 156+65	156+65		28 m Rt of I-405	Conflict with I-405 widening	QLB	16.20	N	P	U		

4-22

Other Potential Reports

- All utility conflicts associated with company X (project, corridor, or timeframe)
- All water utilities in conflict (project or corridor)
- Average conflict resolution time for electric utilities
- Average conflict resolution time for water utilities on project Z
- All utility conflicts with resolution time >100 days
- Customized UCMs for individual utility companies
- Utility certification for inclusion in PS&E package
- …

4-23

4.3

Questions and Answers

4-24

Lesson 5

Hands-on Utility Conflict Management Exercise

5-1

Course Overview

- 8:30 AM – 9:00 AM Introductions and Course Overview
- 9:00 AM – 10:15 AM Utility Conflict Concepts
- 10:15 AM – 10:30 AM Morning Break
- 10:30 AM – 11:45 AM Utility Conflict Identification and Management
- 11:45 AM – 1:00 PM Lunch Break
- 1:00 PM – 1:20 PM Use of Database Approach to Manage Utility Conflicts
- 1:20 PM – 2:20 PM Hands-On Utility Conflict Management Exercise Part I
- 2:20 PM – 2:35 PM Afternoon break
- 2:35 PM – 3:35 PM Hands-On Utility Conflict Management Exercise Part II
- 3:35 PM – 3:45 PM Wrap-Up

5-2

Lesson 5 Overview

5.1 Identify potential conflicts using QLB data (30 min)
5.2 Evaluate conflicts using QLA test hole data (30 min)
Break
5.3 Prepare alternative and cost analysis (30 min)
5.4 Present findings in 3-minute presentation (30 min)

5-3

5.1

Identify Potential Conflicts Using QLB Data

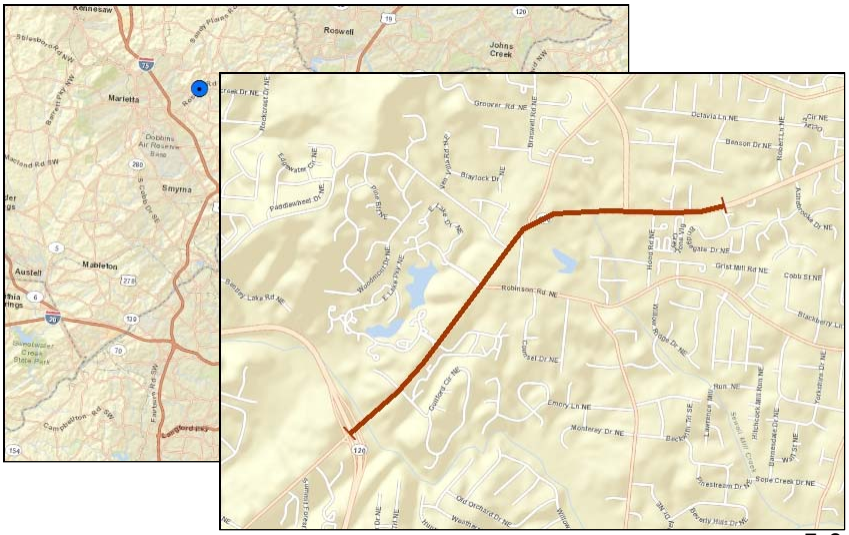
5-4

Project Overview

- Widening of SR 120/Roswell Road from SR 120 ALT to Bridgegate Drive
- Located in Marietta, north-west of Atlanta, Georgia
- Suburban, 4-lane and 6-lane divided sections
- Project length: 1.8 miles
- 13 utility owners
- 135,000 linear feet of underground utilities
- $415K estimated utility impact cost (as designed)

5-5

Project Location and Limits



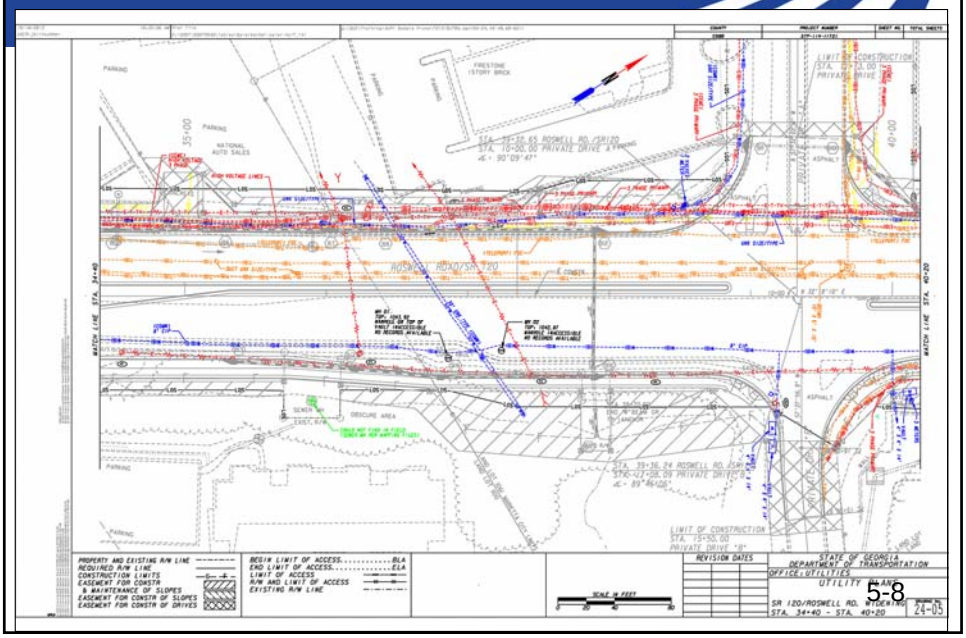
5-6

Exercise Materials

- 13 plan sheets
  - Legend
  - Pole data
  - Typical sections
  - 1 plan, 3 stages, 5 cross sections, 1 drainage profile
- Test hole data sheets
- Blank utility conflict matrix
- Cost estimate analysis sheet

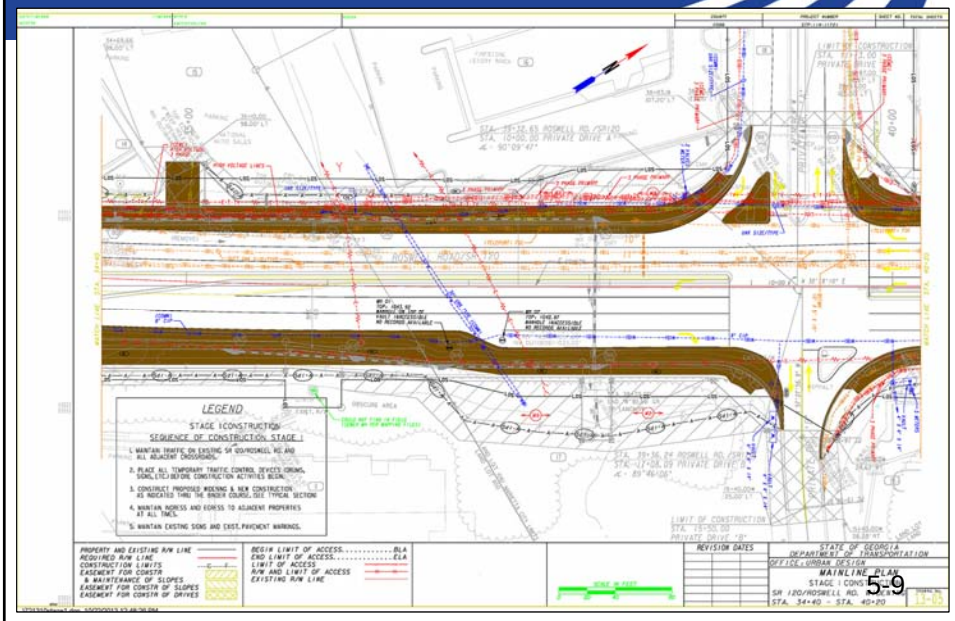
5-7

Plan Sheets

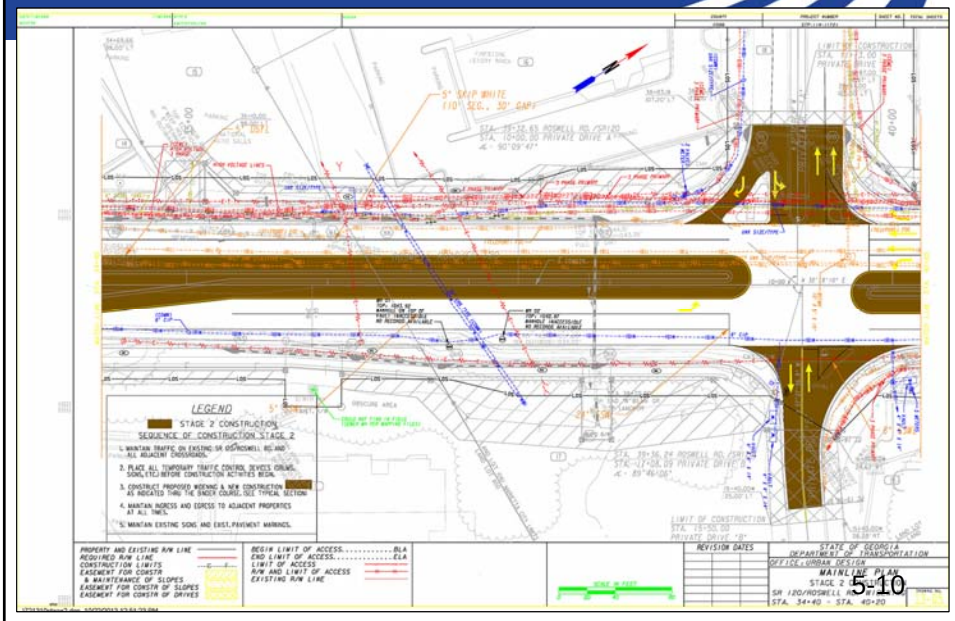


5-8

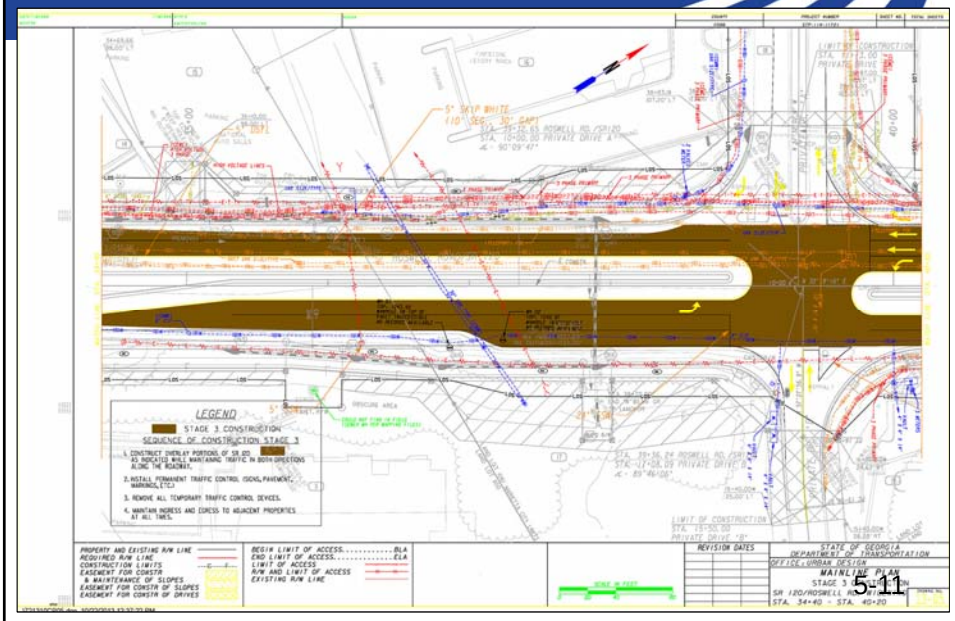
Stage 1 Construction



Stage 2 Construction



Stage 3 Construction



5-11

Test

Test Hole Form

Utility Type		Utility Material	Offset Measured From	Identified By
E	Electrical	1 Steel	30 Edge of Pavement	20 Sleeve
G	Gas Line	2 PVC (Polyvinyl Chloride)	31 Baseline	21 Hub/Lathe
BT	Buried Telephone	3 DIP (Ductile Iron Pipe)	32 Right-of-Way	22 Nail/Disk
FOC	Fiber Optic Cable	4 VCP (Vitrified Clay Pipe)	33 Centerline	23 "X" in Concrete
W	Water	5 PE (Polyethylene Pipe)	34 Back of Curb	24 Set Iron Rod and Cap 5/8"
SAN	Sanitary Sewer	6 AC (Transite)	35 Survey Hub	25
STM	Storm Sewer	7 CI (Cast Iron)	36 "X" in Concrete	26
CATV	Cable TV	8 DBC (Direct Buried Cable)	37 Swing Ties	
FM	Force Main	9 Concrete Pipe	38 Ref. Point in Driveway	
RW	Reclaimed Water	10 Corrugated Metal Pipe	39	
SL	Street Light	11 Duct	**Surface Type**	
TS	Traffic Signal	12 Fiberglass	A Asphalt	
FL	Fuel Line	13 Unknown	C Concrete	
EXP	Exploratory	14 Corrugated Plastic	NG Natural Ground	
UNK	Unknown	15 Concrete Duct		
IRR	Irrigation			

Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.) in. ☑ mm. ☐	Approx. Station	Approx. Offset Distance ft. ☑ m. ☐ L	R	Offset From	Manual Depth (Top) ft. ☑ m. ☐	Cross Sectional View	Utility Direction	ID'd By	Surface Type	Pvmnt. Thick-ness in. ☑ mm. ☐
C38	1	W	7	8"	36+00		36.0	31	3.1'	○		22	NG	
C45	2	W	7	8"	37+00		40.0	31	3.2'	○		22	NG	
C3	3	W	3	30"	37+20		60.0	31	6.2'	◯		22	NG	
C6	4	W	7	8"	37+90		40.0	31	3.4'	○		22	A	6.00
C8	5	E	2	6"	34+50	50.0		31	3.5'	⁂		22	NG	
C9	6	W	6	12"	34+50	55.0		31	3.75'	○		22	NG	
C20	7	BT	2	4"	37+90	25.0		31	3.25'	○		22	A	6.00
C21	8	BT	15	unk	37+90	16.0		31	3.4'	□		22	A	6.00
C22	9	BT	15	unk	37+90	13.0			6.0'	□		22	A	6.00

Notes:

Sheet 1 of 1 Prepared By: VL Date: 10/13/06 Checked By: RMP Date: 10/14/06

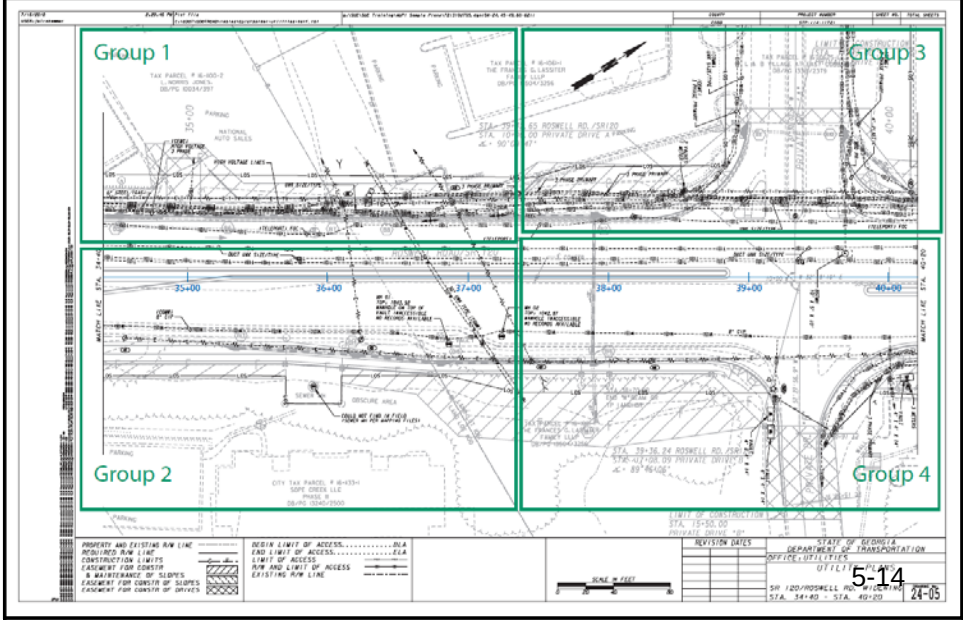
5-12

Hands-on Exercise

- Break into groups of 4 to 5
- Each group should focus on one area of the plan sheets

5-13

Group Assignments



5-14

Hands-on Exercise

- 5.1 Identify potential conflicts using QLB data (30 min)
  - Focus on area indicated on plan sheets
  - Populate UCM with as much information as possible
  - Examine potential resolution strategies
  - Examine utility investigation levels needed
  - Determine need for QLA data
- 5.2 Evaluate conflicts using QLA test hole data (30 min)
- Break
- 5.3 Prepare alternative and cost analysis (30 min)
- 5.4 Present findings in 3-minute presentation (30 min)

5-15

5.2

Evaluate Conflicts Using QLA Test Hole Data Sheets

5-16

Hands-on Exercise

- 5.1 Identify potential conflicts using QLB data (30 min)
- 5.2 Evaluate conflicts using QLA test hole data (30 min)
  - Review data provided on test hole sheets
  - Assess utility conflicts
- Break
- 5.3 Prepare alternative and cost analysis (30 min)
- 5.4 Present findings in 3-minute presentation (30 min)

5-17

5.3

Prepare Alternative and Cost Analysis for Conflicts

5-18

Hands-on Exercise

- 5.1 Identify potential conflicts using QLB data (30 min)
- 5.2 Evaluate conflicts using QLA test hole data (30 min)
- Break
- 5.3 Prepare alternative and cost analysis (30 min)
  - Pick one or more conflicts
  - Develop and compare 3-4 resolution alternatives
  - Outline potential costs
  - Select most appropriate resolution alternative
- 5.4 Present findings in 3-minute presentation (30 min)

5-19

5.4

Present Findings in 3-Minute Presentation

5-20

Hands-on Exercise

- 5.1 Identify potential conflicts using QLB data (30 min)
- 5.2 Evaluate conflicts using QLA test hole data (30 min)
- Break
- 5.3 Prepare alternative and cost analysis (30 min)
- 5.4 Present findings in 3-minute presentation (30 min)
  - 3-minute group presentation
  - Description of a conflict that each group identified and the group's approach to analyze and resolve the conflict
  - Lessons learned each group would like to share
  - Consider using PDF versions of plan sheets during presentation

5-21

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Lesson 6

Wrap-Up

6-1

Course Overview

- 8:30 AM – 9:00 AM Introductions and Course Overview
- 9:00 AM – 10:15 AM Utility Conflict Concepts
- 10:15 AM – 10:30 AM Morning Break
- 10:30 AM – 11:45 AM Utility Conflict Identification and Management
- 11:45 AM – 1:00 PM Lunch Break
- 1:00 PM – 1:20 PM Use of Database Approach to Manage Utility Conflicts
- 1:20 PM – 2:20 PM Hands-On Utility Conflict Management Exercise Part I
- 2:20 PM – 2:35 PM Afternoon break
- 2:35 PM – 3:35 PM Hands-On Utility Conflict Management Exercise Part II
- 3:35 PM – 3:45 PM Wrap-Up

6-2

Lesson 6 Overview

1. Final questions and closing remarks
2. Fill out review form

6-3

UTILITY CONFLICT MATRIX UPDATE PROCESS

The following figures provide an example of how a utility conflict matrix could be updated at four stages of a typical project development process. These figures are provided to make it easier for participants to follow the presentation during Lesson 3.

The utility conflict matrix update process is only a portion of the utility conflict management process, which in turn is only a portion of the utility process.

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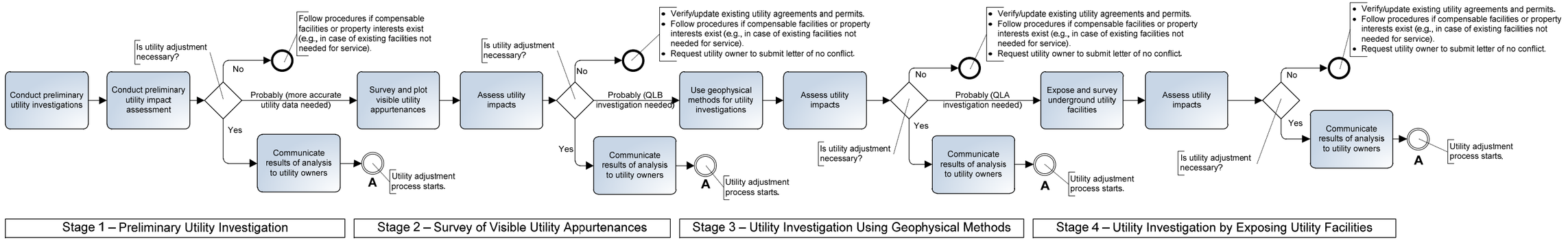

Figure D1. Utility Data Collection and Impact Assessment Activities.

Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By:
Date:

Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
Unknown	1		Electric		Evidence of underground utility conduit					QLC		Collect more data to confirm conflict and identify owner		Utility conflict created
Centerpoint Energy	2		Electric	100', steel	Transmission tower might be in conflict with highway	115+50	30	115+50	30	QLD		Identify utility owner		Utility conflict created
Unknown	3		Electric	Steel	Transmission lines may fail minimum clearance requirements	114+00	0	114+00	0	QLC		Identify utility owner		Utility conflict created

Figure D2. UCM 1 – at the Beginning of the Preliminary Utility Investigation Phase.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By: John Doe
Date: 1/14/2013

Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
City Electric Services Tina Miller tmiller@ces.com 555-999-8888	1	PS-4	Electric	18"	Underground utility conduit in potential conflict with highway	110+00	40	140+00	40	QLB		Collect more data to confirm conflict		Utility owner informed of utility conflict
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	2	PS-8	Electric	100', steel	Transmission tower might be in conflict with highway	115+50	30	115+50	30	QLC		Send UCM and cost estimate analysis to utility owner. Meet with utility owner to discuss potential resolution strategy.		Utility owner informed of utility conflict
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	3	PS-7	Electric	Steel	Transmission lines fail minimum clearance requirements	114+00	0	114+00	0	QLC		Send UCM and cost estimate analysis to utility owner. Meet with utility owner to discuss potential resolution strategy.		Utility owner informed of utility conflict

Figure D3. UCM 2 – after Surveying and Plotting Visible Utility Appurtenances.

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Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By
Date

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility						Unknown	Under Review
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT						Unknown	Under Review
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility						Unknown	Under Review
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A						Unknown	Under Review

Figure D4. UCM 2 – Cost Estimate Analysis for the Transmission Tower Conflict.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Note: refer to subsheet for utility conflict cost analysis.

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By: John Doe
Date: 3/1/2013

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
City Electric Services Tina Miller tmiller@ces.com 555-999-8888	1	PS-4	Electric	18"	Underground utility conduit in potential conflict with highway	110+00	40	140+00	40	QLA		Collect more data to confirm conflict		Utility owner informed of utility conflict
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	2	PS-8	Electric	100', steel	Transmission tower might be in conflict with highway	115+50	30	115+50	30	QLC		Review conflict resolution strategies		Utility owner informed of utility conflict
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	3	PS-7	Electric	Steel	Transmission lines fail minimum clearance requirements	114+00	0	114+00	0	QLC		Adjust facility as discussed during coordination meeting		Utility conflict resolution strategy selected

Figure D5. UCM 3 – after Using Geophysical Methods to Collect Data about Underground Conduit.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By John Doe
Date 3/1/2013

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility	$ 25,000.00	$ 200,000.00	$ -	$ -	$ 225,000.00	Unknown	Under Review
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT	$ -	$ -	$ 10,000.00	$ 30,000.00	$ 40,000.00	Unknown	Under Review
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility	$ 5,000.00	$ 20,000.00		$ -	$ 25,000.00	Unknown	Under Review
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A	$ -	$ -	$ -	$ -	$ -	No	Rejected

Figure D6. UCM 3 – Updated Cost Estimate Analysis for the Transmission Tower Conflict.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By: John Doe
Date: 4/1/2013

Note: refer to subsheet for utility conflict cost analysis.

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
City Electric Services Tina Miller tmiller@ces.com 555-999-8888	1	PS-4	Electric	18"	Underground utility conduit in conflict with highway	110+00	40	140+00	40	QLA	10	Adjust facility as discussed during coordination meeting	6/1/2013	Utility conflict resolution strategy selected
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	2	PS-8	Electric	100', steel	Transmission tower might be in conflict with highway	115+50	30	115+50	30	QLC		Change design to accommodate utility	-	Utility conflict resolution strategy selected
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	3	PS-7	Electric	Steel	Transmission lines fail minimum clearance requirements	114+00	0	114+00	0	QLC		Adjust facility as discussed during coordination meeting	6/1/2013	Utility conflict resolution strategy selected

Figure D7. UCM 4 – after Exposing Underground Conduit (QLA Data Collection).

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Utility Conflict: 2
Utility Owner: Centerpoint Energy
Utility Type: Electric
Size and/or Material: 100', steel
Project Phase: 30% Design

Cost Estimate Analysis Developed/Revised By John Doe
Date 1/14/2013
Reviewed By John Doe
Date 4/1/2013

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
1	Relocate transmission tower.	No design change required, no additional cost to DOT.	High cost to utility for relocation and project delay.	Utility	$ 25,000.00	$ 200,000.00	$ -	$ -	$ 225,000.00	Yes	Rejected
2	Change highway design to accommodate tower.	Utility can remain in place.	Cost to redesign, potential impact on right-of-way acquistion and environmental document	DOT	$ -	$ -	$ 10,000.00	$ 30,000.00	$ 40,000.00	Yes	Selected
3	Protect tower in-place.	Utility can remain in place.	Potential safety hazard, problematic access for maintenance.	Utility	$ 5,000.00	$ 20,000.00		$ -	$ 25,000.00	No	Rejected
4	Exception to policy.	No cost to utility or DOT.	High risk of damage to utility and problematic maintenance access.	N/A	$ -	$ -	$ -	$ -	$ -	No	Rejected

Figure D8. UCM 4 – Selected Conflict Resolution Alternative for the Transmission Tower Conflict.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Matrix

Project Owner: Sample DOT
Project No. : 445-56-4789
Project Description: Widening of IH-10 from Loop 410 to Loop 1604
Highway or Route: IH-10

Note: refer to subsheet for utility conflict cost analysis.

Utility Conflict Matrix Developed/Revised By: John Doe
Date: 1/1/2013
Reviewed By: John Doe
Date: 7/1/2013

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status
City Electric Services Tina Miller tmiller@ces.com 555-999-8888	1	PS-4	Electric	18"	Underground utility conduit in conflict with highway	110+00	40	140+00	40	QLA	10	None	6/1/2013	Utility conflict resolved
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	2	PS-8	Electric	100', steel	Transmission tower in conflict with highway	115+50	30	115+50	30	QLC		None	-	Utility conflict resolved
Centerpoint Energy James Smith jsmith@cpe.com 555-999-9999	3	PS-7	Electric	Steel	Transmission lines fail minimum clearance requirements	114+00	0	114+00	0	QLC		None	6/1/2013	Utility conflict resolved

Figure 9. UCM 5 – All Utility Conflicts Have Been Resolved.

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UTILITY CONFLICT MATRICES

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SAMPLE UTILITY CONFLICT MATRICES

The following are UCMs provided by several state DOTs (Alaska, Michigan, South Dakota, California, Florida, Georgia, and Texas) that illustrate the diverse structure of UCMs used by state DOTs.

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DRAFT Utility Conflict Report
West Dowling Road Phase I

Anchorage, Alaska
DOT&PF No. 50898

Table 2: Chugach Electric Association, Incorporated, Conflicts Summary

Station	Offset	Station	Offset	Size/Type	Length	Conflict	ADJ/REL	Cost	PE/CE Cost	Total Cost
CEA Distribution Relocation Costs										
9+00	150' RT		200' LT	3φ UG	350	FG	REL	52,500	15,750	68,250
16+00	100' LT	42+30	80' LT	3φ UG	2630	FG	REL	394,500	118,350	512,850
16+00	100' LT	15+50	100' RT	3φ UG	250	FG	REL	37,500	11,250	48,750
16+00	100' LT	29+00	75' LT	1φ UG	1650	FG	REL	165,000	49,500	214,500
36+40	80' LT	35+80	350' RT	3φ UG	430	FG	REL	64,500	19,350	83,850
36+60	80' LT	36+70	380' LT	3φ UG	300	FG	REL	45,000	13,500	58,500
	UG Loop to the North			3φ UG	1000	FG	REL	150,000	45,000	195,000
							Subtotal	909,000	272,700	1,181,700
CEA Transmission Relocation Costs										
14+75	55' RT			138 kV OH	1	PWY	REL	30,000	9,000	39,000
32+75	55' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
36+38	45' RT			138 kV OH	1	EX	REL	50,000	15,000	65,000
							Subtotal	130,000	39,000	169,000
							Total CEA Relocation Costs	**1,039,000**	**311,700**	**1,350,700**

1φ Underground (UG) loop to extend across Dowling Road and along the south side to reconnect existing services.

UG loop provided to the north of the project to accommodate undergrounding.

Removal of existing swamp braces removed and steel piling added, down guys replaced with overhead span guy and down guys.

Figure E1. Alaska DOT&PF Sample Utility Conflict Report.

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M-6 (South Beltline) from I-196 to West of Eastern Avenue
South of Grand Rapids, Michigan

Utility Log - Electric

CS 70025 - JN 33330

Item #	Utility Owner / Operator	Conflict Location	Segment	Date Relocation Plan must be submitted	Relocation Plan submitted to Design Team	Design Team Review / Comment / Approval	Permit Application Submitted to MDOT	MDOT Permit Number / Approval Date	Relocation Scheduled	Action Items
1	Consumers Energy Transmission	Consumers Power Transmission Overhead – 8th Ave	1			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
2	Consumers Energy Transmission	West of Kenowa Ave.	1			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
3	Consumers Energy Distribution	Aerial Lines at Jackson and Angling Road	1							Design in process.
4	Consumers Energy Distribution	Aerial Lines at Kenowa and 64th St.	2							Design in process.
5	Consumers Energy Transmission	64th at Wilson and East and West of Wilson– Overhead	2			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT.
6	Consumers Energy Transmission	East and West of Ivanrest	2			7/6/2000	7/27/00 rev.	41064-0125-00-0174	10/15/2000	Final permit approval from MDOT.
7	**Consumers Energy Distribution**	**along Ivanrest**	**2**							**Permit to be submitted the week of August 14, 2000.**
8	Consumers Energy Transmission	East and West of Byron Center - overhead	3			7/6/2000	7/27/00 rev.	41064-0125-00-0174	4/1/2001	Final permit approval from MDOT. Schedule Relocation
9	**Consumers Energy Transmission**	**At Burlingame - overhead**	**3**			**6/5/2000**		**41064-0124-00-173**	**10/15/2000**	**Final permit approval from MDOT.**
10	**Consumers Energy Distribution**	**along Burlingame**	**3**						**11/14/2000**	**Permit for relocation has been submitted. Need design team approval.**
11	Consumers Energy Transmission	East and West of Clyde Park - overhead	3			7/6/2000	7/27/00 rev.	41064-0125-00-0174	12/1/2000	Final permit approval from MDOT.
12	**Consumers Energy Transmission**	**East and West of US131 - overhead**	**4**			7/6/2000	7/27/00 rev.	**41064-0125-00-0174**	**12/1/2000**	**Final permit approval from MDOT.**
13	**Consumers Energy Transmission**	**East and West of Norfolk Southern - overhead**	**4**			7/6/2000	7/27/00 rev.	**41064-0125-00-0174**	**12/1/2000**	**Final permit approval from MDOT.**
14	Consumers Energy Transmission	Clyde Park and M-6 - temporary	4						Coordination Clause	Design team approval.
15	Consumers Energy Transmission	US 131/Norfolk Southern and M-6 - temporary	4						Coordination Clause	Design team approval.
16	Consumers Energy Transmission	Buck Creek @ M-6 - temporary	4						Coordination Clause	Design team approval.
17	**Consumers Energy Distribution**	**Clyde Park and 64th – Overhead**	**4**			**7/6/2000**	**6/1/2000**	**41604-0085-00-0117**		**Permit approval required.**

Figure E2. Michigan DOT Sample Utility Log.

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Picture No.	PCN	Picture Looking	City or Town	Hwy. No.	Description
6.JPG	02BF	N	Platte	44	Water valve in the SE quadrant of Hwy 44 & Indiana
7.JPG	02BF	W	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
8.JPG	02BF	N	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
9.JPG	02BF	N	Platte	44	Power Pole in the SW quadrant of Hwy 44 & Indiana
10.JPG	02BF	E	Platte	44	Power Pole (Transmission w/ riser) in the SE quadrant of Hwy 44 & Ohio
11.JPG	02BF	E	Platte	44	Power Pole (Transmission w/ riser) in the SE quadrant of Hwy 44 & Ohio
12.JPG	02BF	N	Platte	44	Power Pole, Fire hydrant & water valve in the SE quadrant of Hwy 44 & Ohio
13.JPG	02BG	S	Platte	45	Light Pole in the SW quadrant of Hwy 45 & 4th St
14.JPG	02BG	E	Platte	45	Light Pole in the NE quadrant of Hwy 45 & 4th St
15.JPG	02BG	S	Platte	45	Light Pole in the SW quadrant of Hwy 45 & 6th St
16.JPG	02BG	E	Platte	45	Power Pole in the NE quadrant of Hwy 45 & 6th St
17.JPG	02BG	E	Platte	45	Power Pole in the NE quadrant of Hwy 45 & 6th St
18.JPG	02BG	W	Platte	45	Power Pole & Fire hydrant in the NW quadrant of Hwy 45 & 6th St
19.JPG	02BG	W	Platte	45	Power Pole w/ riser in the NW quadrant of Hwy 45 & 6th St

Figure E3. South Dakota DOT Sample Utility Conflict Matrix.

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I-10-EA 122401-Utilities Conflict Status

date of last revision May 30, 2000
this document was prepared by

Conflict No.	Utility Sheet No.	Pothole No. *(On U-sheets)*	Owner	Utility Description	Pothole/Manhole Location	Conflict Location	Utility Conflict/ Work Description	Investigation			Depth	Impact?		Action			***Util. Reloc.*** ***A*** - Abandon ***RB***- Reloc.Before ***RD***- Reloc.During ***P***- Protect in place ***NC***- No conflict	***Resp. Party*** ***U***- Utility Co ***C***- Contractor	***Required Completion Date***	Comments
								Pothole	Manhole	Overhead	**(ft)**	Y	N	Remove	Relocate	Other				
1	U-2	1	PACBELL	40 DU Telephone	62 m Rt of I-405 Sta 165+55	40 m Rt and 57 m Rt of I-405 Sta 165+55	conflict with Retaining Walls No. 166 & No. 168	X			4.55 14.40		N				***P***			
2	U-2	2	PACBELL	40 DU Telephone	48 m Lt of I-405 Sta 165+55	40 m Rt and 57 m Rt of I-405 Sta 165+55	conflict with Retaining Walls No. 166 & No. 168				-		N				***P***			
3	U-3	3	SCE	25 mm DU	35 m Rt of I-405 Sta 165+01	43 m Rt of I-405 Sta 165+01	conflict with Retaining Wall No. 166				-		N				***P***			Located in Bristol OC
4	U-3	4	SCE	25 mm DU	46 m Lt of I-405 Sta 165+01	43 m Rt of I-405 Sta 165+01	conflict with Retaining Wall No. 166				-		N				***P***			Located in Bristol OC
5	U-3	5	MWD	900 mm WSP Water in 380 mL ENC	50 m Rt of I-405 Sta 164+96	44 m Rt of I-405 Sta 164+95	conflict with Retaining Wall No. 166	X			6.70		N				***P***			
6	U-3	6	MWD	900 mm WSP Water in 380 mL ENC	50 m Lt of I-405 Sta 164+96	44 m Rt of I-405 Sta 164+95	conflict with Retaining Wall No. 166	X			6.50		N				***P***			
7	U-3	7	Caltrans	600 mm RCP	53 m Rt of I-405 Sta 163+42	53 m Rt of I-405 from Sta 163+29 to Sta 163+42	conflict with Delhi Channel Bridge	X			6.00		N				***P***			
8	U-3	8	Caltrans	600 mm RCP	53 m Rt of I-405 Sta 163+29	53 m Rt of I-405 from Sta 163+29 to Sta 163+42	conflict with Delhi Channel Bridge	X			9.00		N				***P***			
9	U-3	9	MCWD	300 mm ACP Water in 119mL, 500mm STL Casing	32 m Rt of I-405 Sta 163+25	35 m Rt of I-405 Sta 163+25	conflict with I-405 Widening & BR1 Line	X			10.30		N				***P***			
10	U-3	10	MCWD	300 mm ACP Water 119mL, 500mm STL Casing	32 m Lt of I-405 Sta 163+25	33 m Lt of I-405 Sta 163+25	conflict with I-405 Widening & BR1 Line	X			8.75		N				***P***			
11	U-3	MH 11	CSDOC	Manhole	81 m Rt of I-405 Sta 162+92	35 m Rt of I-405 Sta 162+92	conflict with I-405 Widening & BR1 Line		X		18.40		N				***P***			
12	U-3	12	CSDOC	380 mm VCP Sewer	36 m Lt of I-405 Sta 162+91	32 m Lt of I-405 Sta 162+90	conflict with I-405 Widening & BR1 Line				-		N				***P***			
13	U-4	13	MCWD	600mm CCP Water in 94m L 900mm Dia Stl Casing	67 m Rt of I-405 Sta 161+44	58 m Rt of I-405 Sta 161+44	Conflict with Airport Channel	X			4.55	Y			X	X	***RB***			600 mm Waterline to be Lowered Extend Encasement
14	U-4	14	MCWD	600mm CCP Water in 94m L 900mm Dia Stl Casing	38 m Lt of I-405 Sta 161+40	32 m Lt of I-405 Sta 161+42	conflict with I-405 Widening				-		N				***P***			
15	U-4	15	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 160+29	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	Conflict with AOA Line and Retaining Wall No. 268	X			-	Y			X		***RD***			Enchroachment CT R/W and Private Owne Encased under Roadway
16	U-4	16	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 159+07	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	Conflict with AOA Line and Retaining Wall No. 268	X			-	Y			X		***RD***			Enchroachment CT R/W and Private Owne Encased under Roadway
17	U-5	17	MCWD	300 mm ACP Water	70 m Rt of I-405 Sta 156+87	72 m Rt of I-405 from Sta 157+20 to Sta 160+29	conflict with AOA Line and Retaining Wall No. 268	X			4.35		N				***P***			
18	U-5	MH 18	CSDOC	Manhole	60 m Rt of I-405 Sta 156+65	28 m Rt of I-405 Sta 156+65	conflict with I-405 Widening		X		16.20		N				***P***			
19	U-5	19	CSDOC	380 mm VCP Sewer	46 m Lt of I-405 Sta 156+65	25 m Rt of I-405 Sta 156+65	conflict with I-405 Widening	X			18.40		N				***P***			
20	U-5	20	CSDOC	830 mm VCP Sewer	14 m Rt of B2 Sta 24+96		conflict with construction of B2 Line						N				***P***			
21	U-5	21	CSDOC	830 mm VCP Sewer	6 m Lt of B2 Sta 25+54		conflict with construction of B2 Line						N				***P***			
22	U-8	MH 22	CSDOC	Manhole	8m Rt of Main St Sta 102+78				X			Y				X	***RB***			MH to be Lowered New Top MH Elev= 9.588
23	U-8	MH 23 SCE MH 4503	SCE	Manhole No. 4503	8m Rt of Main St Sta 102+87				X			Y				X	***RB***			MH to be Lowered New Top MH Elev= 9.583 m
24	U-8	MH 24 SCE MH 4502	SCE	Manhole No. 4502	8m Rt of Main St Sta 104+17				X			Y				X	***RB***			MH to be Lowered New Top MH Elev= 9.728 m

Figure E4. Caltrans Sample Utility Conflict Matrix.

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FPID:	1	Description:	2		This matrix was created by _____3_____ to assist the UAO's in identifying conflicts between the UAO's facilities and proposed roadway construction. _____ accepts no liability for conflicts overlooked for this report. Each UAO or designee is responsible to perform a detailed and comprehensive plans review for conflict analysis.			
Phase #:	4	Plans Date:	5					
Reviewer:	6							
Date:	7							
Conflict #	Utility Agency/ Owner (UAO)	Station/Offset (From C/L)	Facility Description (Material, Type, Number, Size)	Conflict Description (Possible or Actual)	VVH (Y/N)	VVH #	Recommended Conflict Resolution	Resolved Status
8	9	10	11	12	13	14	15	16

Consider using the form from the beginning of a project as a tool for monitoring areas of concern with UAO facilities. That is the reason for the Phase Number space. The form is set up to: 1. Print legal size and have the header information on each page. 2. The cells where the conflicts are listed are set to word wrap automatically. 3. The footer is set to number the pages 1 of ??.

1	Project number.
2	Project description.
3	Disclaimer that the reviewer and their firm is not responsible for any missed conflicts. The blanks are for the name of the design firm.
4	Phase that the plans represent.
5	The date should be on the plans Key Sheet. The phase and plans date should keep everyone working on the same plans.
6	That would be you, the person that wrote the conflict matrix.
7	The date the matrix was completed.
8	For ease of discussion the conflicts are numbered, plan sheet numbers are not used because they change from Phase to Phase which has caused confusion in the past.
9	Owner of the underground line.
10	The standard reference used on FDOT plans is the Centerline of Construction, it is used for all components of the proposed roadway construction.
11	Describe the facility. What is it? Water main? Force main? Cable? Conduit? Overhead electric? Overhead cable? Manhole? Handhold? What's the size? How many? What's it made of?
12	What is it the facility perceived to be in conflict with? It a possible conflict or actually in conflict with proposed work. Consider the trench and hole size required to place pipe and drainage structures. Don't forget aerial facilities when there are signals and large signs in the project.
13	SUE work can be used to if a conflict is considered a possibility. This entry area is a tool to determine areas where test holes should be taken for confirmation or exclusion of a conflict.
14	Entry area for the test hole number. Test holes should be numbered consecutively to avoid confusion.
15	What can be done to remove the conflict? Don't forget to consult with the Designer for alternatives to the proposed construction.
16	Examples of entries could be "Cleared", "Pending", "No Conflict". It's suggested to keep the entries determined as "No Conflict" in the matrix so other reviewers will know a perceived conflict has been noted and determined to not be an issue.

Figure E5. Florida DOT Sample Utility Conflict Matrix.

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Conflict #	Station and Offset	Dwg. No.	*Utility	Identified Conflict	TH	Utility Impact with Cost ("As-designed")	Recommended Resolution	**Benefit of Resolution

* Please fill the cell with the color code for the utility as shown below. The color code can be found on the Georgia Utilities Protection Center website at www.gaupc.com in the tab "LAWS/POLICIES" in the section "APWA COLOR CODE REQUIREMENTS."

**Please include all benefits incurred including time, costs, and safety improvements.

UTILITY KEY

Underground	Overhead
E - Electric	OE - Overhead Electric
G - Gas	OGW - Overhead Guy Wire
NW - Non-Potable Water	OT - Overhead Telecommunications
P - Petroleum	OTC - Overhead Traffic Control
SFM - Sanitary Sewer	OTV - Overhead Cable TV
SS - Sanitary Sewer	
STM -Steam	
T - Telecommunications	
TC - Traffic Control	
TV - Cable TV	
UNK - Unknown Type	
W - Water	

ABBREVIATIONS

Material

AC - Asbestos Concrete
FO - Fiber Optic
MES - Mitered End Section
RCP - Reinforce Concrete Pipe

Other

BL - Baseline
L - Left
R - Right
TH - Test Hole

UTILITY OWNERS

AGL - Atlanta Gas Light
GP - Georgia Power
ATT - AT&T (formerly BellSouth)
L3 - Level 3 Communications
MFN - Metromedia Fiber Network
FCPW - Fulton County Public Works
CoA - City of Atlanta
UNK - Unknown Owner

INSTRUCTIONS:

1. **Please fill in the header information for the GREEN items, then change the color back to BLACK.**
2. **For conflicts involving combination overhead lines, please provide a separate entry for each utility.**
3. **For places where there are multiple utilities at one point of conflict, please provide a separate entry for each utility .**
4. **The Abbreviations listed are examples only. Please provide abbreviations as appropriate for this project.**
5. **The Utility Owners listed are examples only. Please provide abbreviations for each Utility Owner as appropriate for this project.**
6. **Please add tabs as needed. See tab 2, "Sample Sheet 2".**

Figure E6. Georgia DOT Sample Utility Conflict Matrix.

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PARIS DISTRICT
UTILITY ADJUSTMENT REPORT

As Of: **August 19, 2009**
Changes since last update in RED

County Highway ROW CSJ	Name of Utility	Reimbursable?	Location of Agreement Package	Packet Status?	Current Action	Adjustment Status	Responsible TxDOT Employee	Amount Approved	Amount Billed	90% Payment	Audit Exceptions	10% Retainage	Outstanding Balance
HOPKINS SH 11 ROW CSJ: **0083-03-046** SH 19 **0108-09-039**	Verizon	No	ROW	Approved	U11114: Relocation is complete. NR	Complete	Keith Hollje						
	TXU Electric	Yes	ROW	Approved	U11655: Relocation & Reimbursement is complete	Complete	Keith Hollje	$ 74,397.96	$ 62,850.69	$ 56,565.62	$ -	$ 6,285.07	$ -
	Atmos Energy (Trans)	Yes	ROW	Approved	U12208: Relocation & Reimbursement is complete	Complete	Mike Powers	$ 235,912.59	$ 184,436.76	$ 165,993.08	$ -	$ 18,443.68	$ -
	Atmos Energy (Distribution)	No	ROW	Approved	U12446: Relocation is complete. NR	Complete	Mike Powers						
	SS Water & Sewer	No	ROW	Approved	U12450: Relocation is complete. NR	Complete	Mike Powers						
	TXU Distribution	No	ROW	Approved	U12614: Relocation is complete. NR	Complete	Mike Powers						
	Sudden Link Communication	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
	People's Telephone	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
	Shady Grove WSC	No	AO	Approved	Relocation is complete by Permit. NR	Complete	Tim Taylor						
								$ 310,310.55	$ 247,287.45	$ 222,558.70	$ -	$ 24,728.75	$ -
HUNT US 380 ROW CSJ: **0135-06-022**	Caddo Basin	Yes	ROW	Approved	U11423: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 853,746.47	$ 783,618.01	$ 705,256.21	$ -	$ 78,361.80	$ -
	Verizon	No	ROW	Approved	U11450: Relocation is complete. NR	Complete	Mike Powers						
	One OK Pipeline	Yes	ROW	Approved	U11523: Relocation is complete. Reimbursement has not been submitted.	Complete	Keith Hollje	$ 229,170.00	$ -	$ -	$ -	$ -	$ 229,170.00
	Cap Rock Energy	Yes	ROW	Approved	U11524: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 741,668.69	$ 741,668.69	$ 667,388.42	$ (27,771.80)	$ 46,508.47	$ -
	AT&T	No	ROW	Approved	U11526: Relocation is complete. NR	Complete	Mike Powers						
	Explorer	Yes	ROW	Approved	U11534: Relocation & Reimbursement is complete.	Complete	Keith Hollje	$ 191,805.22	$ 201,206.44	$ 181,085.80	$ -	$ 20,120.64	$ -
	Energy Transfer (Gas)	Yes	ROW	Approved	U11695: Relocation is complete. Reimbursement returned to Utility 4/29/09. No Coorespondence!	Complete	Mike Powers	$ 370,006.39	$ 420,136.25	$ -	$ -	$ -	$ 370,006.39
	GEUS	No	ROW	Approved	U11850: Relocation is complete. NR	Complete	Mike Powers						
	AT&T	No	ROW	Approved	U12358: Relocation is complete. NR	Complete	Mike Powers						
	TMPA	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
	Comcast	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
	Kinder-Morgan	No	n/a	n/a	No effect (no adjustment required)	n/a	Mike Powers						
								$ 2,386,396.77	$ 2,146,629.39	$ 1,553,730.43	$ (27,771.80)	$ 144,990.91	$ 599,176.39
HUNT US 380 ROW CSJ: **0135-07-037**	AT&T	No	ROW	Approved	U11525: Relocation is complete. NR	Complete	Mike Powers						
	Atmos Energy (Pipeline)	Yes	ROW	Approved	U12012: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 193,912.59	$ 73,187.29	$ 65,868.56	$ -	$ 7,318.73	$ -
	Atmos Energy (Distribution)	No	ROW	Approved	U12013: Relocation is complete. NR	Complete	Mike Powers						
	Caddo Basin	Yes	ROW	Approved	U12026: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 651,005.00	$ 383,518.60	$ 345,166.74	$ -	$ 38,351.86	$ -
	TMPA	Yes	ROW	Approved	U12076: Relocation is complete. Supplemental Agreement approved 8/06/09.	Complete	Mike Powers	$ 514,097.06	$ 516,702.66	$ 462,196.85	$ -	$ 51,355.21	$ 51,355.21
	GEUS	No	ROW	Approved	U12077: Relocation is complete. NR	Complete	Mike Powers						
	TXU Electric(Transmission)	No	ROW	Approved	U12079: Relocation is complete. NR	Complete	Mike Powers						
	GEUS	Yes	ROW	No	U12445: Utility Package approved 5/19/09. Utility working on relocation.	35%	Mike Powers	$ 88,073.29	$ -	$ -			$ 88,073.29
	City of Greenville (Water)	No	AO	n/a	City has already moved utility on private easement. (no agreement required)	n/a	Mike Powers						
	City of Greenville (Sewer)	No	AO	n/a	City has already moved utility on private easement. (no agreement required)	n/a	Mike Powers						
	Cap Rock Energy	No	AO	n/a	No effect (no adjustment required)	n/a	Mike Powers						
								$ 1,447,087.94	$ 973,408.55	$ 873,232.15	$ -	$ 97,025.80	$ 139,428.50
DELTA SH 24 **0136-04-032**	Delta MUD	Yes	ROW	Approved	U11736: Relocation & Reimbursement is complete.	Complete	Keith Hollje	$ 196,689.02	$ 196,689.02	$ 177,020.12	$ -	$ 19,668.90	$ -
	Embarq Communication	No	ROW	Approved	U11853: Relocation is complete. NR	Complete	Mike Powers						
	Lamar Electric Coop	Yes	ROW	Approved	U12095: Relocation & Reimbursement is complete.	Complete	Keith Hollje	$ 124,447.65	$ 124,447.65	$ 112,002.89	$ -	$ 12,444.76	$ -
	Atmos Energy (Trans)	Yes	ROW	Approved	U12215: Relocation & Reimbursement is complete.	Complete	Mike Powers	$ 193,721.26	$ 98,779.90	$ 88,901.91	$ -	$ 9,877.99	$ -
								$ 514,857.93	$ 419,916.57	$ 377,924.92	$ -	$ 41,991.65	$ -

Figure E7. Texas DOT Sample Utility Conflict Matrix.

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UTILITY CONFLICT MATRIX SAMPLE DATABASE REPORTS

The following provides reports from the Access database that recreated sample UCMs of four states (Alaska, California, Georgia, and Texas) in an effort to demonstrate that the database structure is flexible enough to accommodate a great variety of state UCMs.

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Alaska UCM

Texas Transportation Institute

DRAFT Utility Conflict Report — Anchorage, Alaska

West Dowling Road Phase 1 — DOT&PF No. 50898

Start Station	Start Offset	End Station	End Offset	Size	Type	Length	Conflict	ADJ/REL	Cost	PE/CE Cost	Total Cost
CEA Distribution Relocation Costs											
9+00	150' RT		200' LT	3 phi	UG	350	FG	Relocation before construction	$52,500	$15,750	$68,250
16+00	100' LT	42+30	80' LT	3 phi	UG	2,630	FG	Relocation before construction	$394,500	$118,350	$512,850
16+00	100' LT	15+50	100' RT	3 phi	UG	250	FG	Relocation before construction	$37,500	$11,250	$48,750
16+00	100' LT	29+00	75' LT	1 phi	UG	1,650	FG	Relocation before construction	$165,000	$49,500	$214,500
36+40	80' LT	35+80	350' RT	3 phi	UG	430	FG	Relocation before construction	$64,500	$19,350	$83,850
36+60	80' LT	36+70	380' LT	3 phi	UG	300	FG	Relocation before construction	$45,000	$13,500	$58,500
	UG Loop to the North			3 phi	UG	1,000	FG	Relocation before construction	$150,000	$45,000	$195,000
								Subtotal:	$909,000	$272,700	$1,181,700
CEA Transmission Relocation Costs											
14+75	55' RT			138 kV	OH	1	PWY	Relocation before construction	$30,000	$9,000	$39,000
32+75	55' RT			138 kV	OH	1	EX	Relocation before construction	$50,000	$15,000	$65,000
36+38	45' RT			138 kV	OH	1	EX	Relocation before construction	$50,000	$15,000	$65,000
								Subtotal:	$130,000	$39,000	$169,000
								Total Relocation Costs:	**$1,039,000**	**$311,700**	**$1,350,700**

Figure E8. Access Database Report Based on Alaska DOT&PF Sample Utility Conflict Report.

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California UCM

I-10-EA 122401 - Utilities Conflict Status

Date of last revision: 12/4/2009

This document was prepared by: _____

Conflict No.	Utility Sheet No.	Test Hole No.	Owner	Utility Description				Test Hole/ Manhole Location	Start Station	End Station	Offset	Utility Conflict/ Work Description	Utility Conflict Investigation	Depth (ft)	Impact?	Utility Relocation	Resp. Party	Required Completion Date	Comments
1	U-2	1	PACBELL	40 mm	DU	Telephone		62 m Rt of I-405 Sta 165+55	165+55		40 m Rt and 57 m Rt of I-405	Conflict with retaining walls No. 166 and No. 168	QLA	4.55	N	P	U	1/10/2010	
2	U-2	2	PACBELL	40 mm	DU	Telephone		48 m Lt of I-405 Sta 165+55	165+55		40 m Rt and 57 m Rt of I-405	Conflict with retaining walls No. 166 and No. 168		14.40	N	P	U	1/10/2010	
3	U-3	3	SCE	25 mm	DU	Telephone		35 m Rt of I-405 Sta 165+01	165+01		43 m Rt of I-405	Conflict with retaining wall No. 166			N	P	U	1/10/2010	Located in Bristol OC
4	U-3	4	SCE	25 mm	DU	Telephone		46 m Lt of I-405 Sta 165+55	165+01		43 m Rt of I-405	Conflict with retaining wall No. 166			N	P	U		Located in Bristol OC
5	U-3	5	MWD	900 mm		Water	in 380 mL ENC	50 m Rt of I-405 Sta 165+96	164+95		44 m Rt of I-405	Conflict with retaining wall No. 166	QLA	6.70	N	P	U		
6	U-3	6	MWD	900 mm		Water	in 380 mL ENC	50 m Lt of I-405 Sta 165+96	164+95		44 m Rt of I-405	Conflict with retaining wall No. 166	QLA	6.50	N	P	U		
7	U-3	7	Caltrans	600 mm				53 m Rt of I-405 Sta 163+42	163+29	163+24	53 m Rt of I-405	Conflict with Delhi Channel Bridge	QLA	6.00	N	P	U		
8	U-3	8	Caltrans	600 mm				53 m Rt of I-405 Sta 163+29	163+29	163+42	53 m Rt of I-405	Conflict with Delhi Channel Bridge	QLA	9.00	N	P	U		
9	U-3	9	MCWD	300 mm		Water	in 119 mL, 500 mm STL Casing	32 m Rt of I-405 Sta 163+25	163+25		35 m Rt of I-405	Conflict with I-405 widening and BR1 Line	QLA	10.30	N	P	U		
10	U-3	10	MCWD	300 mm		Water	in 119 mL, 500 mm STL Casing	32 m Lt of I-405 Sta 163+25	163+25		33 m Lt of I-405	Conflict with I-405 widening and BR1 Line	QLA	8.75	N	P	U		
11	U-3	MH 11	CSDOC			Manhole		81 m Rt of I-405 Sta 162+92	162+92		35 m Rt of I-405	Conflict with I-405 widening and BR1 Line	QLB	18.40	N	P	U		
12	U-3	12	CSDOC	380 mm		Sewer		36 m Lt of I-405 Sta 162+91	162+92		32 m Lt of I-405	Conflict with I-405 widening and BR1 Line			N	P	U		
13	U-4	13	MCWD	600 mm		Water	in 94 mL, 900 mm STL Casing	67 m Rt of I-405 Sta 161+44	161+44		58 m Rt of I-405	Conflict with airport channel	QLA	4.55	Y	RB	U		600 mm waterline to be lowered, extend encasement
14	U-4	14	MCWD	600 mm		Water	in 94 mL, 900 mm STL Casing	38 m Lt of I-405 Sta 161+40	161+42		32 m Lt of I-405	Conflict with I-405 widening			N	P	U		
15	U-4	15	MCWD	300 mm		Water		70 m Rt of I-405 Sta 160+29	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA		Y	RD	U		Encroachment CR R/W and private owner, encased under roadway
16	U-4	16	MCWD	300 mm		Water		70 m Rt of I-405 Sta 159+07	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA		Y	RD	U		Encroachment CR R/W and private owner, encased under roadway
17	U-5	17	MCWD	300 mm		Water		70 m Rt of I-405 Sta 156+87	157+20	160+29	72 m Rt of I-405	Conflict with AOA line and retaining wall No. 268	QLA	4.35	N	P	U		
18	U-5	MH 18	CSDOC			Manhole		60 m Rt of I-405 Sta 156+65	156+65		28 m Rt of I-405	Conflict with I-405 widening	QLB	16.20	N	P	U		

Figure E9. Access Database Report Based on Caltrans Sample Utility Conflict Matrix.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Georgia DOT Utility Conflict Matrix

Wednesday, November 24, 2010
1:46:08 PM

Texas Transportation Institute

GDOT Project Number: 987654321

Conflict	Station and Offset	Utility	Identified Conflict	Testhole Needed	Utility Impact with Cost ("As-designed")	Recommended Resolution	Benefit of Resolution*
C1	100+05, 21' L, 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO.		Relocate 1150 LF of BFO-DUCT ($91,000).	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save cost to relocate BFO-DUCT ($91,000).
C2	100+66, 21' L, 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO.		Relocate 1150 LF of BFO-DUCT ($91,000).	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save cost to relocate BFO-DUCT ($91,000).
C3	100+38, 24' R, 14th St Constr. BL	UNK-UNK	Proposed 18" storm and unknown utility tee.	TH 1	Relocate unknown type and function utility.	TH to identify utility and conflict.	Eliminate possible delay during construction.
C4	100+56, 25' R, 14th St Constr. BL	8"W	Proposed 18" storm and existing 8" W.	TH 2	Relocate 8" W ($7,500).	TH on 8" W, adjust depth of proposed storm drainage.	Save cost to relocate 8" W ($6,000).
C5	100+61, 25' R, 14th St Constr. BL	8"W	Proposed 18" storm and existing 8" W.	TH 3	Relocate 8" W ($7,500).	TH on 8" W, adjust depth of proposed storm drainage.	Save cost to relocate 8" W ($6,000).
C6	100+82, 28' R, 14th St Constr. BL	4"G	Proposed storm structure and existing 4" G.	TH 4	Relocate 20 LF of 4" G ($6,000).	TH on 4" G, adjust depth of proposed storm structure.	Save cost to relocate 4" G ($4,5000).
C7	101+22, 27' R, 14th St Constr. BL	4"G	Proposed 18' and existing 4" by 2" gas tee.	TH 5	Relocate 2" G and 4" G Tee ($12,500).	TH on G lines, adjust depth of proposed storm structure.	Save cost to relocate G lines ($11,000).
C8	101+01, 28' L, 14th St Constr. BL	16"G	Proposed storm structure and existing 16" G.	TH 6	Relocate 16" G ($10,000).	TH on 16" G, adjust depth of proposed storm structure.	Save cost to relocate 16" G ($8,5000).
C9	101+25, 41' L, 14th St Constr. BL	UNK-BT-DUCT	Proposed storm structure and two BT ducts.	TH 7	Relocate BT-DUCT and 2" G ($11,000).	TH on BT-DUCT and 2" G, adjust depth of proposed storm structure.	Save cost to relocate BT duct and 2" G ($10,500).
C10	101+37, 41' L, 14th St Constr. BL	6"W	Proposed 18" storm and existing 6" W.	TH 8	Relocate 6" W ($5,000).	TH on 6" W, adjust depth of proposed storm drainage.	Save cost to relocate 6" W ($3,500).
C11	101+57, 27' L, 14th St Constr. BL	16"G	Proposed 18" storm and existing 16" G.	TH 9	Relocate 16" G ($10,000).	TH on 16" G, adjust depth of proposed storm structure.	Save cost to relocate 16" G ($8,5000).
C12	101+58, 22' L, 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO.		Relocate 1150 LF of BFO-DUCT ($91,000).	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save cost to relocate BFO-DUCT ($91,000).
C13	101+90, 22' L, 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO.		Relocate 1150 LF of BFO-DUCT ($91,000).	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save cost to relocate BFO-DUCT ($91,000).
C14	102+20, 27' R, 14th St Constr. BL	4"G	Proposed storm structure and existing 4" G.		Relocate 4" G ($4,500).	Relocate 4" G.	Eliminate conflict with proposed DI.
C15	102+36, 24" L, 14th St Constr. BL	AGL-BFO	Proposed storm structure and existing BFO.		Relocate 1150 LF of BFO-DUCT ($91,000).	Relocate proposed storm drainage into street. Use DI's that drain toward roadway.	Save cost to relocate BFO-DUCT ($91,000).

*** Please include all benefits incurred including time, costs, and safety improvements**

Key:

AC - Asbestos Concrete
BE - Buried Electric
BFO - Buried Fiber Optic
BT - Buried Telephone
G - Gas
L - Left
MES - Mitered End Section
OT - Overhead Telephone
R - Right
RCP - Reinforced Concrete Pipe
W - Water
WM - Water Main
TH - Test Hole
UNK - Unknown

Utility Owner:

AGL Atlanta Gas Light
BE Georgia Power
BT Bell South
L3 Level 3 Communications
MFN Metromedia Fiber Network
SAN Fulton County Public Works
W City of Atlanta

Figure E10. Access Database Report Based on Georgia DOT Sample Utility Conflict Matrix.

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TxDOT District: Houston

Texas UCM

Wednesday, November 24, 2010

1:46:25 PM

CSJ: 050-80-1166 IH 10: from Gelhorn to Mercury Dr.

CSJ: 002-80-2081 US 90: from IH 10 to 0.29 miles west of Mercury Dr.

Item Number	Owner	Utility	Utility Size Material	Location	Crossing	Conflict	Sheet Number	Conflict Status	Estimated Conflict Resolution Date	Agreement Assembly	Agreement Status	Agreement Submittal Date	Comments
1	Centerpoint Energy	Electrical Conduit	18" Conduit Duct	115+36, US 90	Underground	Proposed pavement, ditch.	Utility Sketch - Centerpoint Electric Sheet 1 of 1	Document received	3/1/2006	JUA A	Agreement Submittal	5/17/2010	CPEE completed design.
2	Centerpoint Energy	Transmission Tower	N/A	115+57, US 90	Underground	Proposed pavement.	Utility Sketch - Centerpoint Transmission Sheet 1 of 1	Document received		JUA B			CPEE completed design.
3	Centerpoint Energy	Transmission Lines	N/A	114+56	Overhead	Minimum clearance requirement.	Utility Sketch - Centerpoint Transmission Sheet 1 of 1	Document received		JUA A	Agreement Approval or Execution	5/17/2010	CPEE completed design.
4	Centerpoint Energy	Distribution Line	N/A	IH 10 at Oates Rd	Overhead	Minimum clearance requirement.		Utility conflict resolved	1/12/2006	JUA B			CPEE completed design.
5	Centerpoint Energy	Distribution Line	N/A	102+00, US 90 WBFR	Overhead	Minimum clearance requirement.		Utility conflict identified		JUA B			CPEE completed design.
6	Centerpoint Energy	Distribution Line	N/A	129+00, US 90	Overhead	Minimum clearance requirement, proposed bridge at Oates Rd.	Utility Sketch - Centerpoint Distribution Sheet 1 of 1	Document received		JUA B			CPEE completed design.

Figure E11. Access Database Report Based on Texas DOT Sample Utility Conflict Matrix.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Matrix

Texas Transportation Institute

Project Owner: Texas Department of Transportation

Project No.: 1234-56-789

Project Description: Road construction project in Houston

Highway or Route: I-10 Katy Freeway

Utility Conflict Matrix Developed/Revised By: _____ **Date:** _____

Reviewed By: _____ **Date:** _____

Utility Owner and/ or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	End Station	Start Offset	End Offset	Utility Investigation Level Needed	Test Hole No.	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status	Cost Analysis
AT&T	1	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	21+00	22+00	45' Lt	45' Lt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	2	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	21+80	23+00	37' Rt	37' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	3	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	27+50	30+00	48' Rt	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	4	U-1	Telephone	Fiber Optic	Conflict with construction of frontage road widening.	44+40	45+15	48' Rt	48' Rt	QLC		Relocation before construction.	3/8/2010	Utility conflict identified	Detail
AT&T	5	U-1	Telephone	Unknown	Conflict with construction of frontage road widening.	45+10	45+20	49' Lt	49' Lt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	6	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	45+80	45+90	57' Lt	49' Lt	QLB		Design change.	3/8/2010	Utility conflict identified	Detail
AT&T	7	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	25+80	25+90	65' Lt	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	8	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	25+80	25+90	62' Rt	49' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	9	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	28+00	55' Lt	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	10	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	27+40	28+00	55' Rt	55' Lt	QLC		Protect in-place.	3/8/2010	Utility conflict identified	Detail
AT&T	11	U-1	Telephone	Copper	Conflict with retaining wall No. 18.	28+05	29+00	62' Rt	55' Lt	QLC		Exception to policy.	3/8/2010	Utility conflict identified	Detail
AT&T	12	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 18.	15+50	16+00	49' Lt	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	13	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	15+90	16+00	40' Lt	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	14	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	20+40	22+00	115' Rt	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	15	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	22+30	23+00	80' Rt	80' Rt	QLC		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	16	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	25+85	28+00	55' Rt	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	17	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	28+05	30+00	62' Rt	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	18	U-2	Telephone	Multiple Concrete Duct	Conflict with retaining wall No. 27.	33+15	35+00	65' Rt	80' Rt	QLB		Design change.	3/8/2010	Utility owner informed of utility conflict	Detail
AT&T	19	U-2	Manhole	Steel	Conflict with retaining wall No. 27.	445+55	446+00	48' Rt	48' Rt	QLA	1	Relocation before construction.	7/2/2010	Utility conflict identified	Detail
Centerpoint Energy	20	U-3	Electricity Distribution	Steel	Conflict with retaining wall No. 27.	445+55	446+00	48' Rt	48' Rt	QLA	2	Relocation before construction.	7/2/2010	Utility conflict identified	Detail

Figure E12. Access Database Report Based on Standalone Utility Conflict Matrix.

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Texas Transportation Institute

Date: 11/24/2010

Project Owner: Texas Department of Transportation
Project No.: 1234-56-789
Project Description: Road construction project in Houston
Highway or Route: I-10 Katy Freeway

Conflict ID:	1
Utility Owner:	AT&T
Utility Type:	Telephone
Size and/or Material:	Fiber Optic
Project Phase:	60% Design

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision
0	Relocation before construction.	No design change required and no additional cost to DOT.	Cost to utility for relocation.	Utility Company	$10,375.00	$63,875.00	$0.00	$0.00	$74,250.00	Yes	Selected
1	Protect in-place.			Utility Company	$7,875.00	$32,375.00	$0.00	$0.00	$40,250.00	No	Rejected
2	Design change.			DOT	$0.00	$0.00	$95,375.00	$0.00	$95,375.00	No	Rejected
3	Exception to policy.			DOT	$0.00	$0.00	$0.00	$0.00	$0.00	No	Rejected

Figure E13. Access Database Report Based on Standalone Utility Conflict Matrix, Cost Estimate Analysis Sub Sheet.

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SAMPLE PROJECT FILES

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

Test Hole Form

Utility Type		Utility Material	Offset Measured From	Identified By
E	Electrical	1 Steel	30 Edge of Pavement	20 Sleeve
G	Gas Line	2 PVC (Polyvinyl Chloride)	31 Baseline	21 Hub/Lathe
BT	Buried Telephone	3 DIP (Ductile Iron Pipe)	32 Right-of-Way	22 Nail/Disk
FOC	Fiber Optic Cable	4 VCP (Vitrified Clay Pipe)	33 Centerline	23 "X" in Concrete
W	Water	5 PE (Polyethylene Pipe)	34 Back of Curb	24 Set Iron Rod and Cap 5/8"
SAN	Sanitary Sewer	6 AC (Transite)	35 Survey Hub	25
STM	Storm Sewer	7 CI (Cast Iron)	36 "X" in Concrete	26
CATV	Cable TV	8 DBC (Direct Buried Cable)	37 Swing Ties	
FM	Force Main	9 Concrete Pipe	38 Ref. Point in Driveway	
RW	Reclaimed Water	10 Corrugated Metal Pipe	39	
SL	Street Light	11 Duct	**Surface Type**	
TS	Traffic Signal	12 Fiberglass	A Asphalt	
FL	Fuel Line	13 Unknown	C Concrete	
EXP	Exploratory	14 Corrugated Plastic	NG Natural Ground	
UNK	Unknown	15 Concrete Duct		
IRR	Irrigation			

Conflict No.	Test Hole No.	Utility Type	Utility Material	Utility Size (O.D.) in. ☑ mm. ☐	Approx. Station	Approx. Offset Distance ft. ☑ m. ☐ L	Approx. Offset Distance R	Offset From	Manual Depth (Top) ft. ☑ m. ☐	Cross Sectional View	Utility Direction (N/W/E/S)	ID'd By	Surface Type	Pvmnt. Thick-ness in. ☑ mm. ☐
C40	19	BE	2	6"	37+00	62.0		31	3.16'			22	NG	
C42	20	BE	2	6"	37+00	57.0		31	3.33'			22	NG	
C43	21	W	6	12"	37+00	53.0		31	4.21'			22	NG	
C44	22	G	1	6"	37+00	48.0		31	3.56'			22	NG	
C18	23	BE	2	6"	37+40	60.0		31	3.19'			22	NG	
C19	24	BT	8	1"	37+90	43.0		31	4.52'			22	NG	
C23	25	W	2	6"	39+00	110		31	3.83'			22	NG	
C24	26	CATV	8	1"	35+30	105		31	4.12'			22	NG	

Notes: _____

Sheet 1 of 1 Prepared By: VL Date: 10/13/06 Checked By: RMP Date: 10/14/06

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STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA			

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

UTILITY LINECODES

OVERHEAD

EXISTING	TO BE REMOVED	PROPOSED	TYPE OF UTILITY
E	E	E	ELECTRIC
E-T	E-T	E-T	ELECTRIC/TELECOMMUNICATIONS
E-TV	E-TV	E-TV	ELECTRIC/CABLE TV
E-TC	E-TC	E-TC	ELECTRIC/TRAFFIC CONTROL
E-T-TV	E-T-TV	E-T-TV	ELECTRIC/TELECOMMUNICATIONS/CABLE TV
E-T-TV-TC	E-T-TV-TC	E-T-TV-TC	ELECTRIC/TELECOMMUNICATIONS/CABLE TV/TRAFFIC CONTROL
E-TV-TC	E-TV-TC	E-TV-TC	ELECTRIC/CABLE TV/TRAFFIC CONTROL
E-T-TC	E-T-TC	E-T-TC	ELECTRIC/TELECOMMUNICATIONS/TRAFFIC CONTROL
GW	GW	GW	GUY WIRE
T	T	T	TELECOMMUNICATIONS
T-TC	T-TC	T-TC	TELECOMMUNICATIONS/TRAFFIC CONTROL
T-TV-TC	T-TV-TC	T-TV-TC	TELECOMUNICATIONS/CABLE TV/TRAFFIC CONTROL
T-TV	T-TV	T-TV	TELECOMUNICATIONS/CABLE TV
TV	TV	TV	CABLE TV
TV-TC	TV-TC	TV-TC	CABLE TV/TRAFFIC CONTROL
TC	TC	TC	TRAFFIC CONTROL

UNDERGROUND

EXISTING	TO BE REMOVED	PROPOSED	TYPE OF UTILITY
E	E	E	ELECTRIC (QL-D)
E(C)	E(C)		ELECTRIC (QL-C)
E(B)	E(B)		ELECTRIC (QL-B)
T	T	T	TELECOMMUNICATIONS (QL-D)
T(C)	T(C)		TELECOMMUNICATIONS (QL-C)
T(B)	T(B)		TELECOMMUNICATIONS (QL-B)
TV	TV	TV	CABLE TV (QL-D)
TV(C)	TV(C)		CABLE TV (QL-C)
TV(B)	TV(B)		CABLE TV (QL-B)
W	W	W	WATER (QL-D)
W(C)	W(C)		WATER (QL-C)
W(B)	W(B)		WATER (QL-B)
**"W	**"W	**"W	WATER FOR LABELED PIPE SIZES (QL-D)
**"W(C)	**"W(C)		WATER FOR LABELED PIPE SIZES (QL-C)
**"W(B)	**"W(B)		WATER FOR LABELED PIPE SIZES (QL-B)
NW	NW	NW	NON-POTABLE WATER (QL-D)
NW(C)	NW(C)		NON-POTABLE WATER (QL-C)
NW(B)	NW(B)		NON-POTABLE WATER (QL-B)
**"NW	**"NW	**"NW	NON-POTABLE WATER FOR LABELED PIPE SIZES (QL-D)
**"NW(C)	**"NW(C)		NON-POTABLE WATER FOR LABELED PIPE SIZES (QL-C)
**"NW(B)	**"NW(B)		NON-POTABLE WATER FOR LABELED PIPE SIZES (QL-B)
STM	STM	STM	STEAM (QL-D)
STM(C)	STM(C)		STEAM (QL-C)
STM(B)	STM(B)		STEAM (QL-B)
**"STM	**"STM	**"STM	STEAM FOR LABELED PIPE SIZES (QL-D)
**"STM(C)	**"STM(C)		STEAM FOR LABELED PIPE SIZES (QL-C)
**"STM(B)	**"STM(B)		STEAM FOR LABELED PIPE SIZES (QL-B)
SS	SS	SS	SANITARY SEWER WITH FLOW DIRECTION (QL-D)
SS(C)	SS(C)		SANITARY SEWER WITH FLOW DIRECTION (QL-C)
SS(B)	SS(B)		SANITARY SEWER WITH FLOW DIRECTION (QL-B)
Σ**"SS	Σ**"SS	Σ**"SS	SANITARY SEWER WITH FLOW DIRECTION FOR LABELED PIPE SIZES (QL-D)
Σ**"SS(C)	Σ**"SS(C)		SANITARY SEWER WITH FLOW DIRECTION FOR LABELED PIPE SIZES (QL-C)
Σ**"SS(B)	Σ**"SS(B)		SANITARY SEWER WITH FLOW DIRECTION FOR LABELED PIPE SIZES (QL-B)
SFM	SFM	SFM	SANITARY SEWER FORCE MAIN WITH FLOW DIRECTION (QL-D)
SFM(C)	SFM(C)		SANITARY SEWER FORCE MAIN WITH FLOW DIRECTION (QL-C)
SFM(B)	SFM(B)		SANITARY SEWER FORCE MAIN WITH FLOW DIRECTION (QL-B)
G	G	G	GAS (QL-D)
G(C)	G(C)		GAS (QL-C)
G(B)	G(B)		GAS (QL-B)
**"G	**"G	**"G	GAS FOR LABELED PIPE SIZES (QL-D)
**"G(C)	**"G(C)		GAS FOR LABELED PIPE SIZES (QL-C)
**"G(B)	**"G(B)		GAS FOR LABELED PIPE SIZES (QL-B)
P	P	P	PETROLEUM (QL-D)
P(C)	P(C)		PETROLEUM (QL-C)
P(B)	P(B)		PETROLEUM (QL-B)
**"P	**"P	**"P	PETROLEUM FOR LABELED PIPE SIZES (QL-D)
**"P(C)	**"P(C)		PETROLEUM FOR LABELED PIPE SIZES (QL-C)
**"P(B)	**"P(B)		PETROLEUM FOR LABELED PIPE SIZES (QL-B)
TC	FOR PROPOSED/TEMPORARY TRAFFIC CONTROL INFORMATION REFER TO TRAFFIC SIGNAL PLANS		TRAFFIC CONTROL (QL-D)
TC(C)			TRAFFIC CONTROL (QL-C)
TC(B)			TRAFFIC CONTROL (QL-B)
UNK(B)	UNK(B)		UNKNOWN UTILITY FOUND IN SUE INVESTIGATION (QL-B)

UTILITY SYMBOLS

EXISTING	PROPOSED	TEMPORARY	
			UTILITY POLE/GUY POLE
			LIGHT POLE
			GUY ANCHOR
M	M	M	MARKER
X	X	X	SPLICE BOX
			CABINET
			VENT
E	E	E	ELECTRIC MANHOLE
H	H	H	HAND HOLE
E	E	E	TRANSFORMER
E	E	E	ELECTRIC METER
E	E	E	ELECTRIC BOX
T	T	T	TELECOMMUNICATIONS MANHOLE
T	T	T	TELECOMMUNICATIONS PEDESTAL
SLC	SLC	SLC	SUBCRIBER LOOP CARRIER (aka "SLICK")
			PHONE BOOTH
			CABLE TV PEDESTAL
TV	TV	TV	CABLE TV MANHOLE
W	W	W	WATER VALVE
W	W	W	WATER METER
W	W	W	WATER MANHOLE
			FIRE HYDRANT ASSEMBLY (INCLUDES ASSOCIATED VALVE)
BFP	BFP	BFP	BACKFLOW PREVENTER
PIV	PIV	PIV	PRESSURE INDICATOR VALVE
ARV	ARV	ARV	AIR RELEASE VALVE
W	W	W	WELL
W	W	W	WATER VAULT
W	W	W	WATER VALVE MARKER
			STAND PIPE

EXISTING	PROPOSED	TEMPORARY	
			CLEANOUT
SS	SS	SS	SANITARY SEWER MANHOLE
ARV	ARV	ARV	AIR RELEASE VALVE
GT	GT	GT	GREASE TRAP
S	S	S	SANITARY SEWER FORCE MAIN VALVE
G	G	G	GAS VALVE
G	G	G	GAS METER
G	G	G	GAS MANHOLE
GPR	GPR	GPR	GAS PRESSURE REGULATOR
G	G	G	GAS VAULT
GTS	GTS	GTS	GAS TEST STATION
P	P	P	PETROLEUM VALVE
TC	FOR PROPOSED/TEMPORARY TRAFFIC CONTROL INFORMATION REFER TO TRAFFIC SIGNAL PLANS		TRAFFIC CONTROL MANHOLE/ ELECTRIC COMMUNICATIONS BOX
			TRAFFIC CONTROL PEDESTRIAN SIGNAL/BUTTON POST

MISCELLANEOUS

LOS	LIMITS OF OVERHEAD AND SUBSURFACE UTILITY INVESTIGATION
TH	TEST HOLE (QL-A ONLY)
EOI	END OF INFORMATION
	QUALITY LEVEL (QL) DELINEATION
123	POLE ID
A01	SANITARY SEWER MANHOLE (SSMH) ID
C123	CONFLICT LOCATION (UTILITY IMPACT ANALYSIS (UIA) ONLY)

QUALITY LEVELS AND DEFINITIONS

QL-D DEPICTED ACCORDING TO UTILITY RECORD INFORMATION AND IN-FIELD VISUAL INSPECTION. NO ELECTRONIC DESIGNATING INFORMATION WAS OBTAINED.

QL-C EXISTING UTILITY STRUCTURES HAVE BEEN FIELD LOCATED AND SURVEYED TO ASSIST IN DEPICTING THE UTILITIES SHOWN ON RECORDS. NO ELECTRONIC DESIGNATING INFORMATION WAS OBTAINED.

QL-B INFORMATION WAS OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROPRIATE HORIZONTAL POSITION OF THE SUBSURFACE UTILITIES. QL-B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

QL-A OBTAIN PRECISE HORIZONTAL AND VERTICAL POSITION OF THE UTILITY LINE BY EXCAVATING A TEST HOLE. THE TEST HOLE SHALL BE DONE USING VACUUM EXCAVATION OR COMPARABLE NONDESTRUCTIVE EQUIPMENT IN A MANNER AS TO CAUSE NO DAMAGE TO THE UTILITY LINE. AFTER EXCAVATING A TEST HOLE, A FIELD SURVEY SHALL BE PERFORMED TO DETERMINE THE EXACT LOCATION AND POSITION OF THE UTILITY LINE.

TELEPHONE PAIR SIZE TABLE

TELEPHONE PAIR SIZE	TELEPHONE CABLE DIAMETER
5 - 100	0.50 TO 2.00 IN
101 - 2400	UP TO 3.50 IN

NOT TO SCALE

REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: UTILITIES

UTILITY PLANS
LEGEND

SR 120/ROSWELL RD. WIDENING

F5

DRAWING No. 24-0B

3/1/2007 GPLN

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UTILITY POLE DATA SHEET

Description: SR120 (ROSWELL RD.)
TBE Job #: GA095-005-05

Pole #	Pole ID	Pole Owner	Electric	Telecom	Cable TV	Traffic	Other	Northing	Easting	Height	Dia.	Material	Misc.
1		COMT	0	0	0	1	0	1440619.299	2196108.477	28.34	8"	METAL	TRAFFIC SIGN
1A		COMT	0	0	0	1	0	1440541.586	2196196.505	52.38	8"	METAL	TRAFFIC SIGN
2		COMT	0	0	0	0	0	1440630.171	2196115.085	43.43	12"	METAL	LIGHT
3		CEMC	1	1	0	1	0	1440549.258	2196251.533	43.43	12"	WOOD	
4		GP	1	0	1	0	0	1440761.236	2196145.671	43.65	12"	WOOD	
4A		GP	1	0	1	0	0	1440772.462	2196123.745	49.95	12"	WOOD	
4B		PRIVATE	0	0	0	0	0	1440768.565	2196124.796	12.10	6"	WOOD	ABANDONED
5		COMT	1	0	0	1	0	1440569.437	2196255.795	43.57	12"	WOOD	
6		GP	1	0	1	0	0	1440914.264	2196272.924	54.80	12"	WOOD	
6A		COMT	1	0	0	1	0	1440695.733	2196390.965	57.13	12"	WOOD	LIGHT
7		COMT	0	0	0	1	0	1440726.978	2196379.319	24.45	12"	WOOD	
7A		COMT	0	0	0	1	0	1440974.807	2196439.520	30.63	12"	WOOD	
7B		COMT	1	0	0	1	0	1440824.977	2196299.807	33.20	12"	WOOD	
7C		COMT	0	0	0	1	0	1440802.429	2196223.907	30.06	12"	WOOD	
7D		COMT	0	0	0	1	0	1440626.918	2196311.771	29.30	12"	WOOD	
7E		PRIVATE	0	0	0	0	0	1440620.292	2196326.497	36.17	12"	WOOD	ABANDONED
8		COMT	1	0	0	1	0	1440824.535	2196531.179	66.11	12"	WOOD	
8A		COMT	0	0	0	1	0	1440779.995	2196637.567	30.63	12"	WOOD	NOT SHOWN
8B		COMT	0	0	0	1	0	1440747.224	2196573.803	25.92	12"	WOOD	NOT SHOWN
9		COMT	0	0	0	1	0	1440938.793	2196577.454	33.44	12"	WOOD	
9A		GP	1	0	1	0	1	1441047.394	2196381.276	58.58	12"	WOOD	
10		GP	1	1	1	1	1	1441190.074	2196629.446	55.46	12"	WOOD	
10A		COMT	0	0	0	1	0	1441079.141	2196506.343	40.26	12"	WOOD	
11		COMT	0	0	0	0	1	1441065.962	2196722.612	41.57	12"	WOOD	GUY POLE
12		CEMC	1	0	0	0	0	1441099.254	2196793.720	37.42	12"	WOOD	
13		COMT	1	0	0	1	0	1441186.051	2196809.117	29.91	12"	METAL	SIGN W/LIGHT
14		COMT	0	0	0	1	0	1441275.032	2196719.128	27.6	12"	METAL	TRAFFIC SIGN
15		PRIVATE	1	0	0	0	0	1441319.432	2196723.267	37.85	12"	WOOD	LIGHT
16		COMP	1	1	0	0	0	1441214.808	2196909.161	47.4	12"	WOOD	
16A		PRIVATE	0	0	0	0	0	1441218.015	2196906.789	23.01	12"	WOOD	ABANDONED
17		GP	1	1	1	1	0	1441365.019	2196808.094	37.10	12"	WOOD	
18		COMP	1	1	0	0	0	1441291.635	2196988.610	37.79	12"	WOOD	
18A		CEMC	1	1	0	0	0	1441438.183	2197086.669	39.51	12"	WOOD	
18B		PRIVATE	1	0	0	0	0	1441443.446	2197105.165	28.96	12"	WOOD	
19		PRIVATE	1	0	0	0	0	1441418.973	2196833.443	38.37	12"	WOOD	LIGHT
20		PRIVATE	1	0	0	0	0	1441532.602	2196928.269	50.56	12"	WOOD	LIGHT
21		GP	1	1	1	1	0	1441511.711	2196957.307	41.26	12"	WOOD	
22		CEMC	1	1	0	0	0	1441478.622	2197117.185	43.23	12"	WOOD	
23		CEMC	1	1	0	0	1	1441591.907	2197203.634	41.92	12"	WOOD	
24		COMT	0	0	0	0	1	1441694.117	2197139.018	30.16	12"	WOOD	TRAFFIC SIGN
25		COMT	0	0	0	0	1	1441630.827	2197210.701	30.61	12"	WOOD	TRAFFIC SIGN
26			POLE	#	NOT	USED							
27		GP	1	1	1	1	0	1441707.808	2197134.047	42.92	12"	WOOD	
28		CEMC	1	0	0	0	0	1441710.939	2197295.056	38.48	12"	WOOD	
28A		COMT	0	0	0	1	0	1441748.646	2197331.619	27.71	12"	WOOD	TRAFFIC POLE
29		GP	1	1	1	0	0	1441901.972	2197311.859	29.58	12"	WOOD	
29A		COMT	0	0	0	1	0	1441876.030	2197296.963	27.82	12"	METAL	TRAFFIC POLE
29B		GP	1	1	0	0	0	1441887.864	2197275.864	51.75	12"	WOOD	
29C		GP	1	1	0	0	0	1442020.246	2197123.784	43.36	12"	WOOD	
29D		COMT	0	0	0	1	0	1441820.581	2197249.795	27.99	12"	METAL	TRAFFIC POLE
30		GP	1	1	1	0	1	1441904.002	2197314.000	56.87	12"	WOOD	
31		BST	0	1	0	0	0	1441801.851	2197376.529	31.25	12"	WOOD	LIGHT
31A		CEMC	1	0	1	0	0	1441814.520	2197378.793	42.98	12"	WOOD	
31B		CCDOT	0	0	0	1	0	1441806.670	2197377.795	27.73	12"	METAL	TRAFFIC POLE
32		CEMC	1	0	0	0	0	1441961.313	2197501.664	36.63	12"	WOOD	
33	60532	GP	1	0	1	1	0	1442042.538	2197438.823	58.26	12"	WOOD	
34		GP	1	0	1	0	0	1442133.789	2197520.321	48.18	12"	WOOD	
35		GP	1	0	0	0	0	1442152.106	2197520.473	38.97	12"	WOOD	
36		GP	1	0	0	0	0	1442154.025	2197500.233	34.11	12"	WOOD	
37		CEMC	1	0	0	0	0	1442115.721	2197621.902	37.79	12"	WOOD	
38		GP	1	0	1	0	0	1442200.900	2197581.107	41.87	12"	METAL	
39		GP	1	0	0	0	0	1442271.354	2197611.565		12"	METAL	TRANS. TOWER
40		GP	1	1	1	0	0	1442330.548	2197665.980	42.07	12"	WOOD	
41	C0512	GP	1	0	0	0	0	1442379.578	2197810.932	47.08	12"	WOOD	

UTILITY POLE DATA SHEET

Description: SR120 (ROSWELL RD.)
TBE Job #: GA095-005-05

Pole #	Pole ID	Pole Owner	Electric	Telecom	Cable TV	Traffic	Other	Northing	Easting	Height	Dia.	Material	Misc.
42		GP	1	1	1	0	0	1442562.352	2197814.124	46.79	12"	WOOD	
43	C0522	GP	1	0	0	0	0	1442521.107	2197901.599	33.18	12"	WOOD	
44		GP	1	1	1	0	0	1442628.379	2197854.364	81.97	12"	WOOD	
45		GP	1	0	0	0	0	1442615.404	2197979.819	48.95	12"	WOOD	
46		GP	1	0	0	0	0	1442687.421	2198024.769	42.39	12"	WOOD	
46A		PRIVATE	0	0	0	0	0	1442750.512	2198088.317	19.22	12"	WOOD	LIGHT
47		GP	1	1	1	0	0	1442908.084	2198022.602	84.11	12"	WOOD	
47A		PRIVATE	0	0	0	0	0	1443011.485	2198069.300	26.88	12"	METAL	LIGHT
47B		PRIVATE	0	0	0	0	0	1442951.615	2198030.496	25.29	12"	METAL	LIGHT
48		GP	1	0	1	0	0	1442885.000	2198149.510	41.98	12"	WOOD	
49	37	GP	1	1	1	0	0	1443131.659	2198172.706	82.00	12"	WOOD	
50		GP	1	0	1	0	0	1443092.582	2198280.691	43.28	12"	WOOD	
51		PRIVATE	0	0	0	0	0	1443150.434	2198186.636	28.95	12"	METAL	ABANDONED
52	SC335	GP	1	1	1	0	0	1443386.921	2198333.009	79.66	12"	WOOD	
53		GP	1	0	1	0	0	1443317.706	2198425.100	43.87	12"	WOOD	
53A		PRIVATE	0	0	0	0	0	1443273.330	2198399.956	24.06	12"	METAL	LIGHT
53B		PRIVATE	0	0	0	0	0	1443164.033	2198330.551	22.95	12"	METAL	LIGHT
54		GP	1	0	0	0	0	1443473.516	2198522.980	40.96	12"	WOOD	
55	27751	GP	1	1	1	0	0	1443581.514	2198455.023	81.40	12"	WOOD	
56		PRIVATE	1	0	0	0	0	1443765.607	2198578.163	28.80	12"	WOOD	LIGHT
56A		PRIVATE	0	0	0	0	0	1443732.528	2198539.853	30.52	12"	METAL	LIGHT
57		GP	1	0	0	1	0	1443657.655	2198638.373	39.17	12"	WOOD	
57A		PRIVATE	0	0	0	0	0	1443718.062	2198679.523	20.37	12"	METAL	LIGHT
57B		PRIVATE	0	0	0	0	0	1443634.291	2198627.041	20.43	12"	METAL	LIGHT
58	27751	GP	1	0	0	0	0	1443845.436	2198618.717	87.30	12"	METAL	TRANS. POLE
59		GP	1	1	1	0	1	1443851.966	2198624.331	49.19	12"	WOOD	
59A		PRIVATE	0	0	0	0	0	1443860.694	2198622.232	29.21	12"	METAL	LIGHT
60		GP	1	0	0	0	0	1443906.976	2198668.181	37.23	12"	WOOD	
61		GP	1	0	0	1	0	1443859.780	2198765.038	42.83	12"	WOOD	
61A		PRIVATE	0	0	0	0	0	1443854.842	2198785.642	22.92	12"	METAL	LIGHT
62		PRIVATE	0	0	0	0	0	1443977.296	2198704.467	26.65	12"	METAL	LIGHT
62A		PRIVATE	0	0	0	0	0	1444066.054	2198735.926	24.19	12"	METAL	LIGHT
62B		PRIVATE	0	0	0	0	0	1443939.619	2198667.624	25.58	12"	METAL	LIGHT
63		GP	0	1	0	0	0	1444019.164	2198740.530	32.07	12"	WOOD	
64		GP	1	0	1	0	0	1444036.704	2198755.594	89.63	12"	METAL	TRANSMISSION
65		CCDOT	0	0	0	1	0	1444057.304	2198756.927	32.13	12"	METAL	TRAFFIC
66		CCDOT	0	0	0	0	0	1444063.047	2198760.641	11.99	12"	METAL	PEDESTRIAN
67		CCDOT	0	0	0	0	0	1444066.672	2198756.676	49.93	12"	METAL	SURVEILLANCE
68		GP	0	0	0	0	0	1444070.649	2198756.709	26.61	12"	WOOD	ABANDONED
69		GP	1	1	0	0	0	1444070.505	2198755.110	29.84	12"	WOOD	
70		PRIVATE	0	0	0	0	0	1444156.926	2198721.834	40.24	12"	METAL	LIGHT
71		GP	1	1	1	1	0	1444016.282	2198862.357	38.83	12"	WOOD	
72		PRIVATE	0	0	0	0	0	1444194.732	2198754.571	21.60	12"	METAL	LIGHT
73		PRIVATE	0	0	0	0	0	1444186.098	2198836.224	21.79	12"	METAL	LIGHT
74		GP	1	1	1	0	0	1444162.059	2198817.940	33.57	12"	WOOD	
75		CCDOT	0	0	0	0	0	1444163.412	2198820.644	11.88	12"	METAL	PEDESTRIAN
76		CCDOT	0	0	0	1	0	1444172.601	2198828.626	32.18	12"	METAL	TRAFFIC
77		CCDOT	0	0	0	0	0	1444090.365	2198911.601	11.90	12"	METAL	PEDESTRIAN
78		CCDOT	0	0	0	1	0	1444103.858	2198928.678	32.28	12"	METAL	TRAFFIC
78A		GP	1	1	1	0	0	1444027.819	2199052.638	78.55	12"	WOOD	
79		PRIVATE	0	0	0	0	0	1444198.764	2198852.413	32.52	12"	WOOD	ABANDONED
79A		PRIVATE	0	0	0	0	0	1444291.110	2198895.631	21.80	12"	METAL	LIGHT
80		GP	1	0	1	0	0	1444226.421	2198991.994	41.74	12"	WOOD	
81		CCDOT	0	0	0	0	1	1444292.153	2198912.663	28.23	12"	METAL	TRAFFIC
82		GP	1	0	1	1	0	1444322.764	2198925.319	93.62	12"	WOOD	
83		GP	1	0	1	1	0	1444527.640	2199053.912	93.73	12"	METAL	TRANSMISSION
84		GP	1	1	1	0	0	1444513.678	2199168.985	41.47	12"	WOOD	
84A		GP	1	0	1	0	0	1444389.954	2199092.983	42.81	12"	WOOD	
85		GP	0	1	0	0	0	1444532.054	2199066.397	29.66	12"	WOOD	
86		GP	1	1	1	0	0	1444678.011	2199278.133	44.35	12"	WOOD	
87		GP	1	0	1	1	0	1444709.557	2199166.888	42.17	12"	WOOD	
88		PRIVATE	0	0	0	0	0	1444778.781	2199211.039	27.74	12"	METAL	LIGHT
89		PRIVATE	0	0	0	0	0	1444829.703	2199230.022	32.21			LIGHT
90		GP	1	1	1	1	0	1444801.234	2199343.490	41.80	12"	WOOD	TRANSMISSION
91		GP	1	0	0	0	0	1444797.365	2199356.516	97.47	36"	METAL	
92		GP	1	1	1	1	1	1444849.922	2199253.332	51.30	12"	WOOD	
92A		CCDOT	0	0	0	0	0	1444883.842	2199280.173	9.85	4"	METAL	PEDESTRIAN

NOT TO SCALE

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: UTILITIES
UTILITY PLANS
UTILITY POLE DATA
SR 120/ROSWELL RD. WIDENING
F7
DRAWING No. 24-0C

3/1/2007 GPLN

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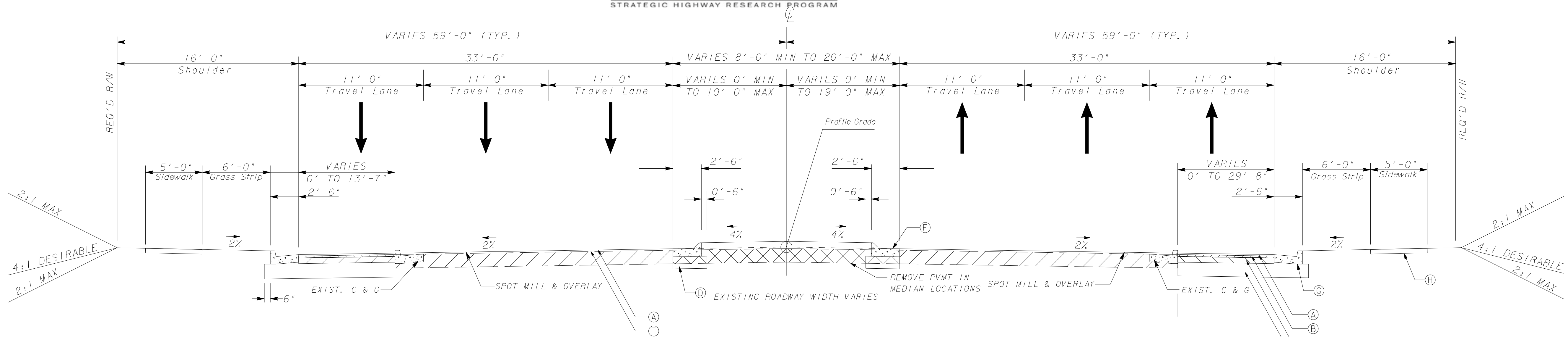
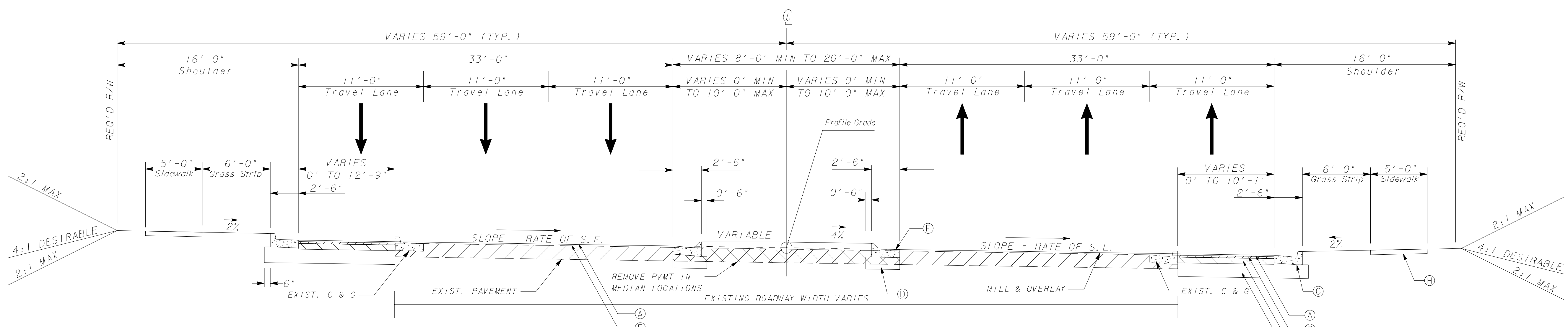


TANGENT SECTION
SR 120 / ROSWELL ROAD

STA. 14+95.93 TO 24+67.00
STA. 35+89.00 TO 62+90.00
STA. 86+88.96 TO 90+50.00

SLOPE CONTROLS		
SLOPE	CUT	FILL
4:1	0-10'	0-10'
3:1	--	--
2:1	OVER 10'	OVER 10'

PAVEMENT MATERIAL SCHEDULE
(A) RECYCLED ASPH. CONC. 12.5 mm SMA, GP 2 ONLY, 165 LBS./SY, DESIGN MIX LEVEL D
(B) RECYCLED ASPH. CONC. 19 mm SUPERPAVE, GP 1OR GP2, 330 LBS./SY, DESIGN MIX LEVEL D
(C) RECYCLED ASPH. CONC. 25 mm SUPERPAVE, GP1OR GP2, 880 LBS./SY, DESIGN MIX LEVEL C
(D) GRADED AGGREGATE BASE COURSE, 12"
(E) ASPHALTIC CONCRETE LEVELING, AS REQUIRED
(F) CONCRETE CURB & GUTTER, 8" X 30", TYPE 7, GA STD. 9032 B
(G) CONCRETE CURB & GUTTER, 8" X 30", TYPE 2, GA STD. 9032 B
(H) 5' CONCRETE SIDEWALK, 4 INCH THICK



SUPER ELEVATED SECTION
SR 120 / ROSWELL ROAD

STA. 24+67.00 TO 35+89.00
STA. 62+90.00 TO 66+29.91

NOTE: SEE DRAWING NO. 5-07 FOR STD. DETAILS

SCALE IN FEET: 0 5 10 20

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN
TYPICAL SECTIONS
SR 120/ROSWELL RD. WIDENING

F9

DRAWING No. 5-01

GPLN

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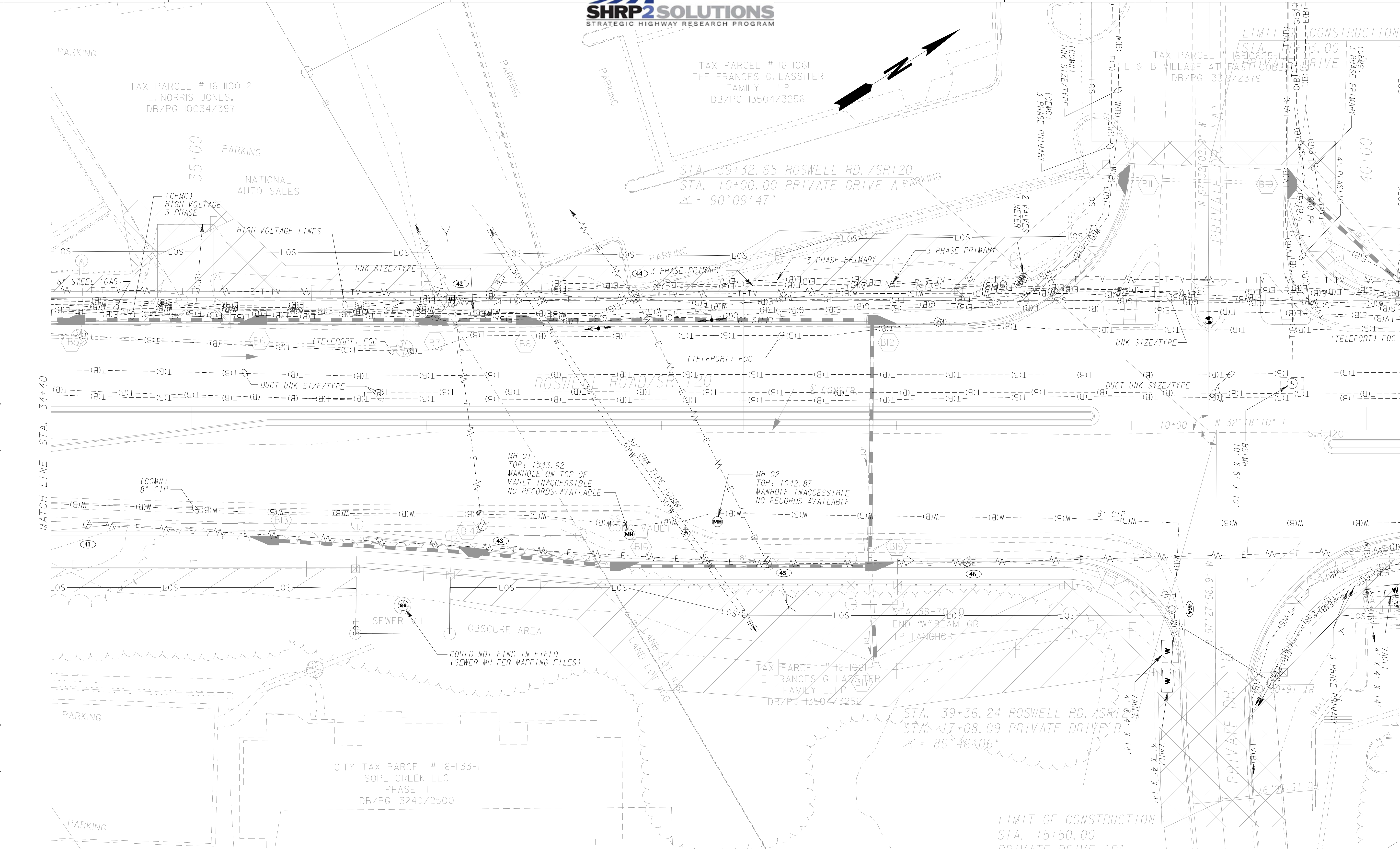
SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM
N
TAX PARCEL # 16-1100-2
L. NORRIS JONES.
DB/PG 10034/397
TAX PARCEL # 16-1061-1
THE FRANCES G. LASSITER
FAMILY LLLP
DB/PG 13504/3256
TAX PARCEL # 16-10625-1
L & B VILLAGE AT EAST COBB, LLC
DB/PG 13319/2379
LIMIT OF CONSTRUCTION
STA. 39+32.65 ROSWELL RD./SR120
STA. 10+00.00 PRIVATE DRIVE A
NATIONAL AUTO SALES
PARKING
(CEMC)
HIGH VOLTAGE
3 PHASE
HIGH VOLTAGE LINES
UNK SIZE/TYPE
6" STEEL (GAS)
3 PHASE PRIMARY
(TELEPORT) FOC
DUCT UNK SIZE/TYPE
ROSWELL ROAD/SR 120
MATCH LINE STA. 34+40
MATCH LINE STA. 40+20
(COMM)
8" CIP
MH 01
TOP: 1043.92
MANHOLE ON TOP OF
VAULT INACCESSIBLE
NO RECORDS AVAILABLE
30" UNK TYPE (COMM)
MH 02
TOP: 1042.87
MANHOLE INACCESSIBLE
NO RECORDS AVAILABLE
SEWER MH
OBSCURE AREA
COULD NOT FIND IN FIELD
(SEWER MH PER MAPPING FILES)
STA. 38+70.00
END "W" BEAM GR
TP 1 ANCHOR
LAND LOT 1006
LAND LOT 1000
TAX PARCEL # 16-1061-1
THE FRANCES G. LASSITER
FAMILY LLLP
DB/PG 13504/3256
STA. 39+36.24 ROSWELL RD./SR120
STA. 17+08.09 PRIVATE DRIVE B
CITY TAX PARCEL # 16-1133-1
SOPE CREEK LLC
PHASE III
DB/PG 13240/2500
LIMIT OF CONSTRUCTION
STA. 15+50.00
PRIVATE DRIVE "B"
VAULT 4' X 4' X 14'
3 METERS
2 VALVES 1 METER
4" PLASTIC
BSTWH 10' X 5' X 10'

PROPERTY AND EXISTING R/W LINE	
REQUIRED R/W LINE	
CONSTRUCTION LIMITS	—C— —F—
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	
EASEMENT FOR CONSTR OF SLOPES	
EASEMENT FOR CONSTR OF DRIVES	

BEGIN LIMIT OF ACCESS	BLA
END LIMIT OF ACCESS	ELA
LIMIT OF ACCESS	
R/W AND LIMIT OF ACCESS	
EXISTING R/W LINE	

SCALE IN FEET
0 20 40 80

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: UTILITIES
UTILITY PLANS
SR 120/ROSWELL RD. WIDENING
STA. 34+40 - STA. 40+20

F11

DRAWING No.
24-05

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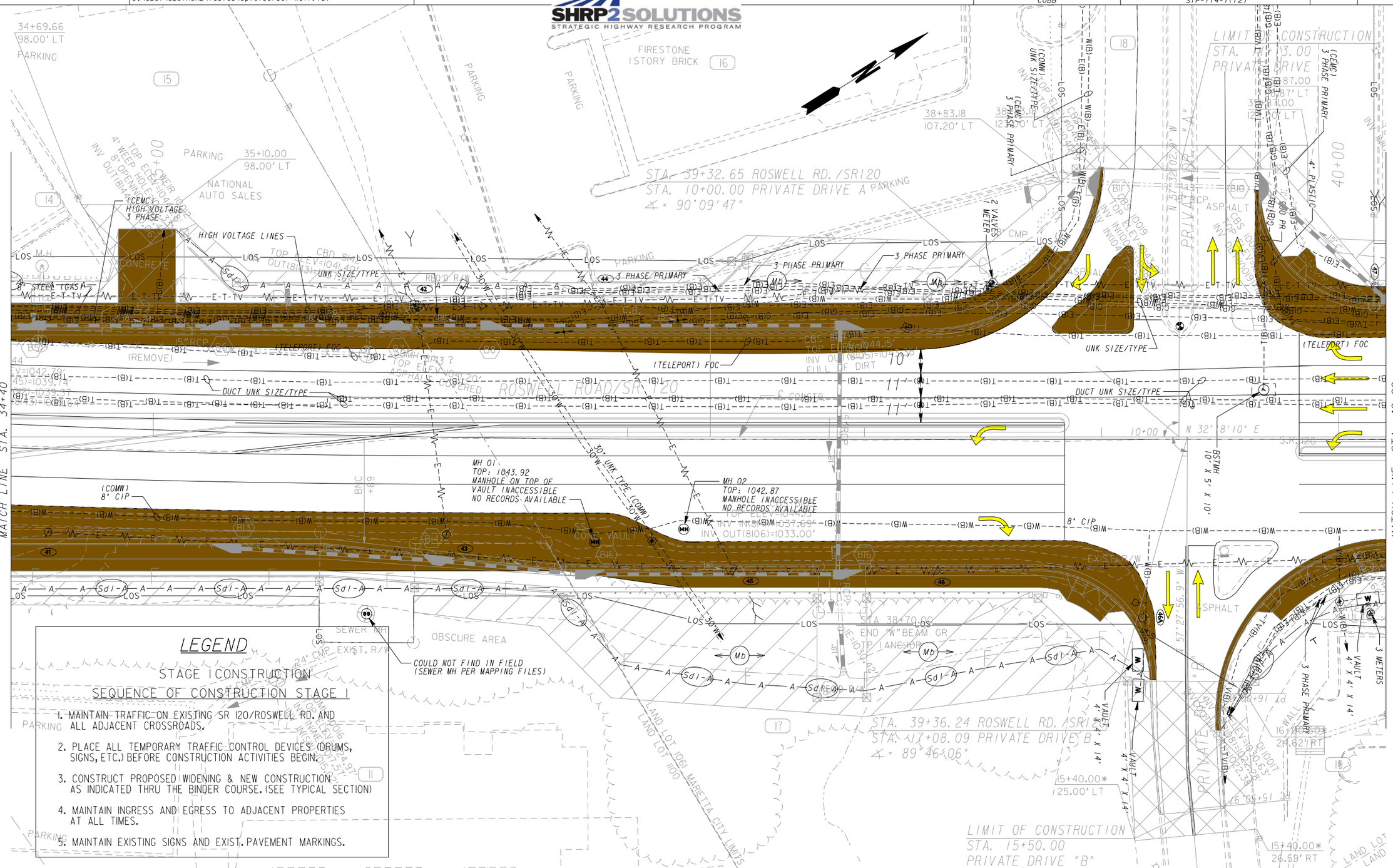
7/19/2010 9:00:12 AM USER:jblrnkammer	Plot file C:\GDOT\GDOTROAD\tables\Gplotborder-half.tbl	G:\SUE\SUE Training\AUPI Sampl…	COUNTY COBB	PROJECT NUMBER STP-114-1(72)	SHEET NO.	TOTAL SHEETS

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM



LEGEND

STAGE I CONSTRUCTION

SEQUENCE OF CONSTRUCTION STAGE I

1. MAINTAIN TRAFFIC ON EXISTING SR 120/ROSWELL RD. AND ALL ADJACENT CROSSROADS.
2. PLACE ALL TEMPORARY TRAFFIC CONTROL DEVICES (DRUMS, SIGNS, ETC.) BEFORE CONSTRUCTION ACTIVITIES BEGIN.
3. CONSTRUCT PROPOSED WIDENING & NEW CONSTRUCTION AS INDICATED THRU THE BINDER COURSE. (SEE TYPICAL SECTION)
4. MAINTAIN INGRESS AND EGRESS TO ADJACENT PROPERTIES AT ALL TIMES.
5. MAINTAIN EXISTING SIGNS AND EXIST. PAVEMENT MARKINGS.

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS.....BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS.....ELA
CONSTRUCTION LIMITS —C— F—	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	R/W AND LIMIT OF ACCESS
EASEMENT FOR CONSTR OF SLOPES	EXISTING R/W LINE
EASEMENT FOR CONSTR OF DRIVES	

SCALE IN FEET
0 20 40 80

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN

MAINLINE PLAN
STAGE I CONSTRUCTION
SR 120/ROSWELL RD. WIDENING
STA. 34+40 - STA. 40+20

F13

DRAWING No. 13-05

GPLN

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

LEGEND

STAGE 2 CONSTRUCTION

SEQUENCE OF CONSTRUCTION STAGE 2

1. MAINTAIN TRAFFIC ON EXISTING SR 120/ROSWELL RD. AND ALL ADJACENT CROSSROADS.
2. PLACE ALL TEMPORARY TRAFFIC CONTROL DEVICES (DRUMS, SIGNS, ETC.) BEFORE CONSTRUCTION ACTIVITIES BEGIN.
3. CONSTRUCT PROPOSED WIDENING & NEW CONSTRUCTION AS INDICATED THRU THE BINDER COURSE. (SEE TYPICAL SECTION)
4. MAINTAIN INGRESS AND EGRESS TO ADJACENT PROPERTIES AT ALL TIMES.
5. MAINTAIN EXISTING SIGNS AND EXIST. PAVEMENT MARKINGS.

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS.....BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS.....ELA
CONSTRUCTION LIMITS —C— F—	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	R/W AND LIMIT OF ACCESS
EASEMENT FOR CONSTR OF SLOPES	EXISTING R/W LINE
EASEMENT FOR CONSTR OF DRIVES	

SCALE IN FEET
0 20 40 80

REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN

MAINLINE PLAN
STAGE 2 CONSTRUCTION
SR 120/ROSWELL RD. WIDENING
STA. 34+40 - STA. 40+20

DRAWING No. F15 13-05

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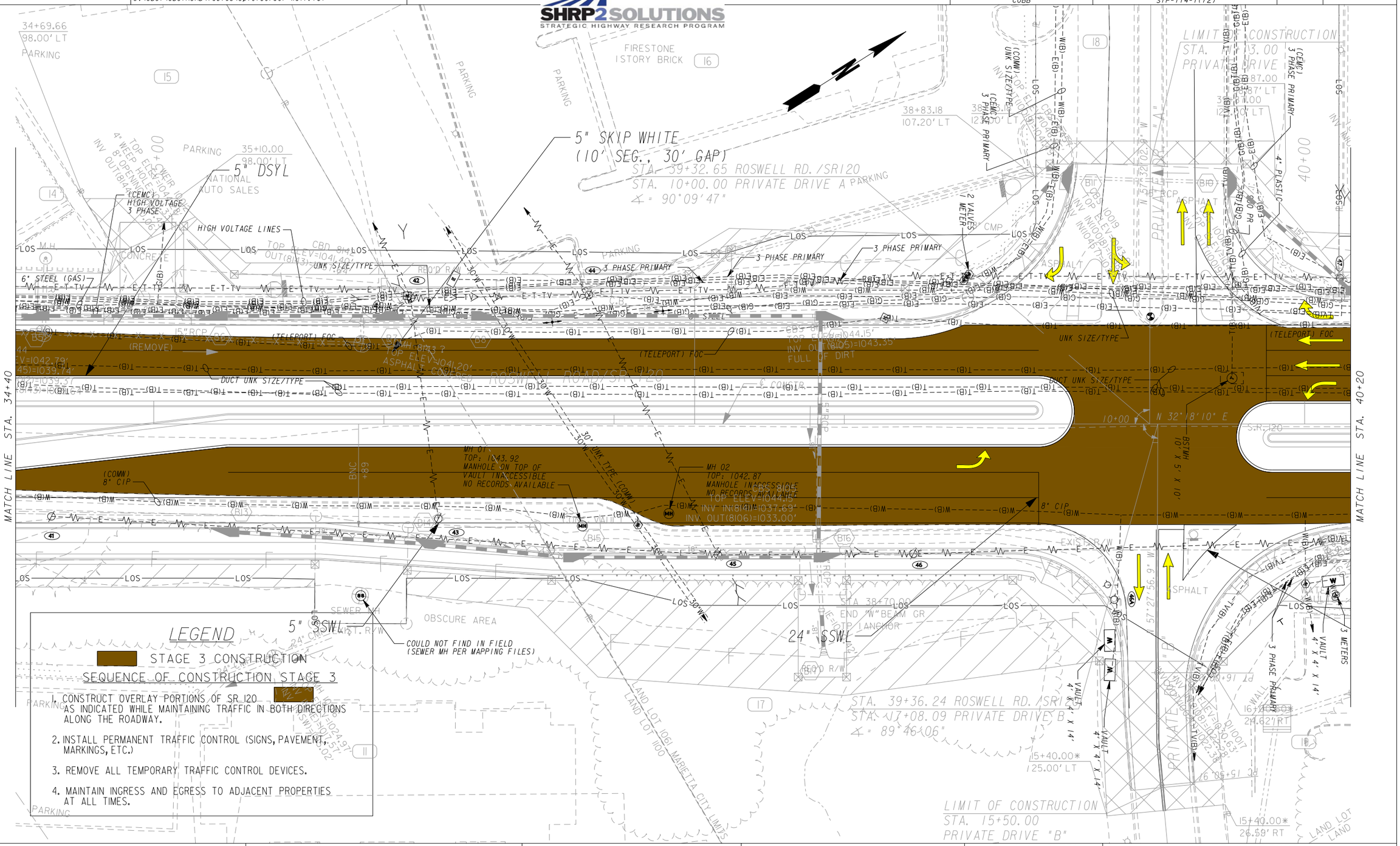
7/19/2010 9:07:15 AM USER:jblrnkammer	Plot file C:\GDOT\GDOTROAD\tables\Gplotborder-half.tbl	G:\SUE\SUE Training\AUPI Sampl...	COUNTY COBB	PROJECT NUMBER STP-114-1(72)	SHEET NO.	TOTAL SHEETS

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM



LEGEND

STAGE 3 CONSTRUCTION

SEQUENCE OF CONSTRUCTION STAGE 3

1. CONSTRUCT OVERLAY PORTIONS OF SR 120 AS INDICATED WHILE MAINTAINING TRAFFIC IN BOTH DIRECTIONS ALONG THE ROADWAY.
2. INSTALL PERMANENT TRAFFIC CONTROL (SIGNS, PAVEMENT, MARKINGS, ETC.)
3. REMOVE ALL TEMPORARY TRAFFIC CONTROL DEVICES.
4. MAINTAIN INGRESS AND EGRESS TO ADJACENT PROPERTIES AT ALL TIMES.

PROPERTY AND EXISTING R/W LINE	BEGIN LIMIT OF ACCESS.....BLA
REQUIRED R/W LINE	END LIMIT OF ACCESS.....ELA
CONSTRUCTION LIMITS —C— F —	LIMIT OF ACCESS
EASEMENT FOR CONSTR & MAINTENANCE OF SLOPES	R/W AND LIMIT OF ACCESS
EASEMENT FOR CONSTR OF SLOPES	EXISTING R/W LINE
EASEMENT FOR CONSTR OF DRIVES	

REVISION DATES		

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN

MAINLINE PLAN
STAGE 3 CONSTRUCTION

SR 120/ROSWELL RD. WIDENING
STA. 34+40 - STA. 40+20

F17

DRAWING No. 13-05

GPLN

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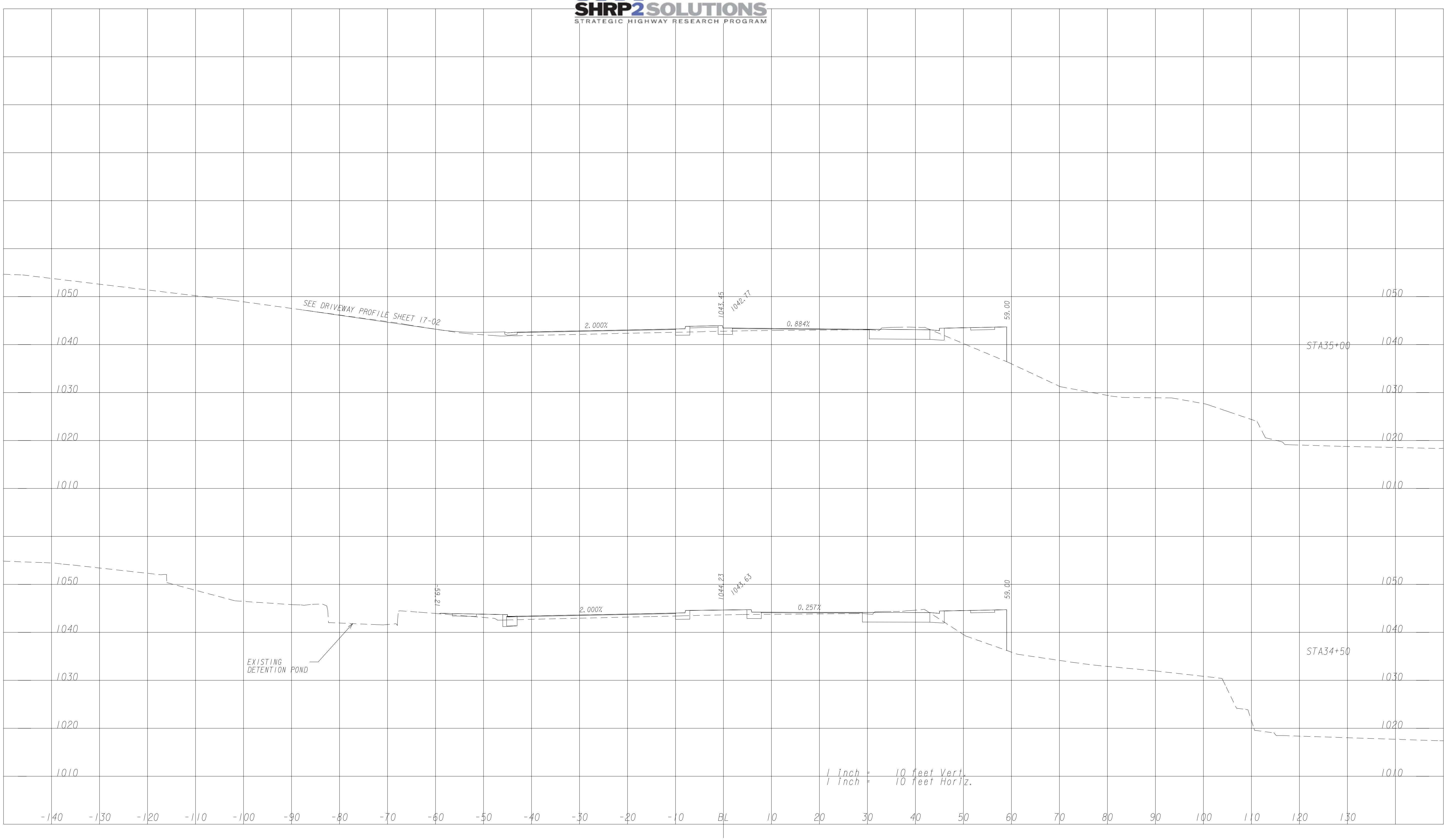

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V. 0 10 20 30
(SCALE IN FEET)

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN

EARTHWORK CROSS SECTIONS

SR 120/ROSWELL RD. WIDENING

F19

DRAWING No.
23-12

GPLN

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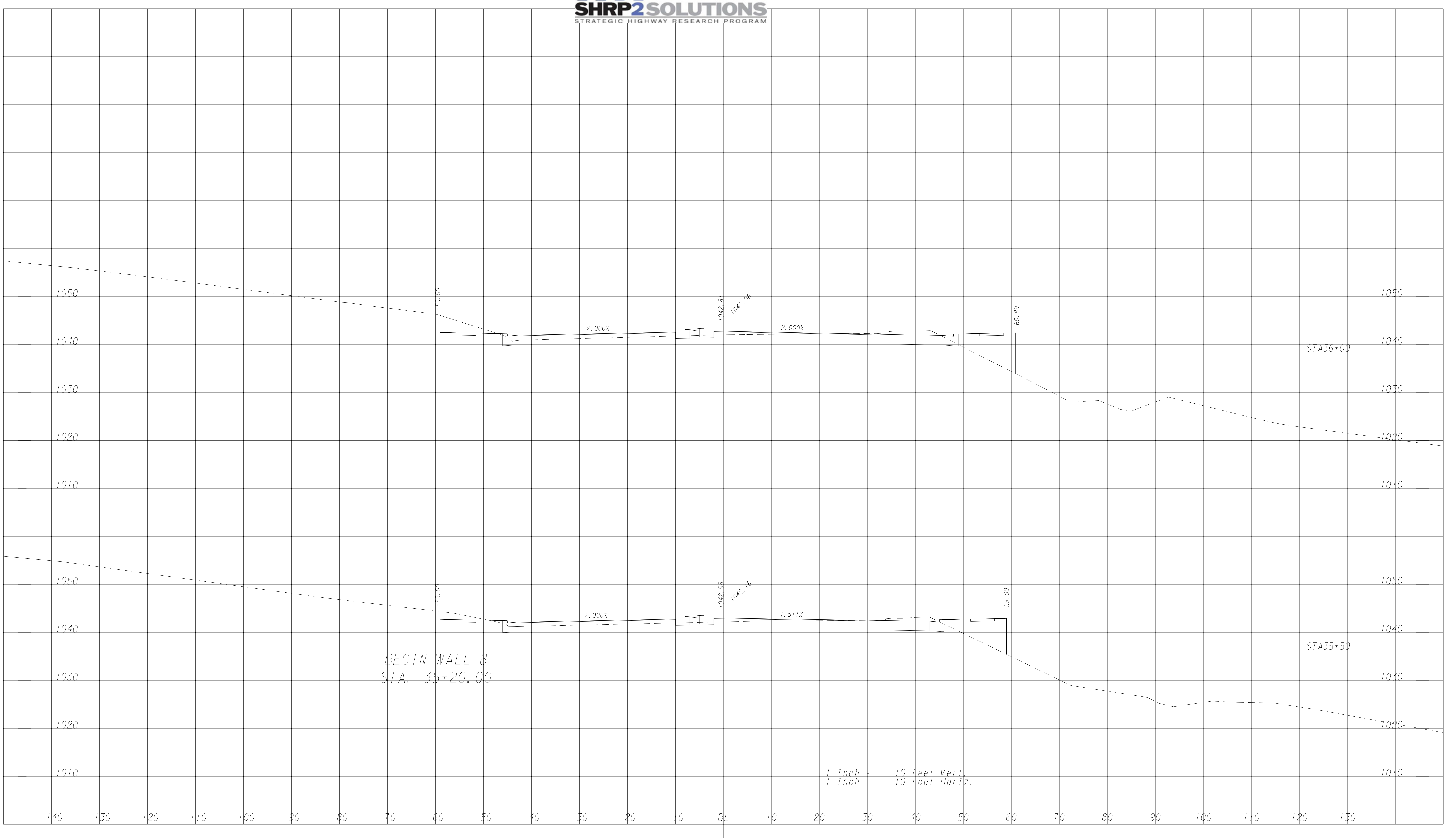
COBB	STP-114-1(72)		



H. 0 10 20 30
V. 0 10 20 30
(SCALE IN FEET)

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN
EARTHWORK CROSS SECTIONS
SR 120/ROSWELL RD. WIDENING

F21

DRAWING No. 23-13

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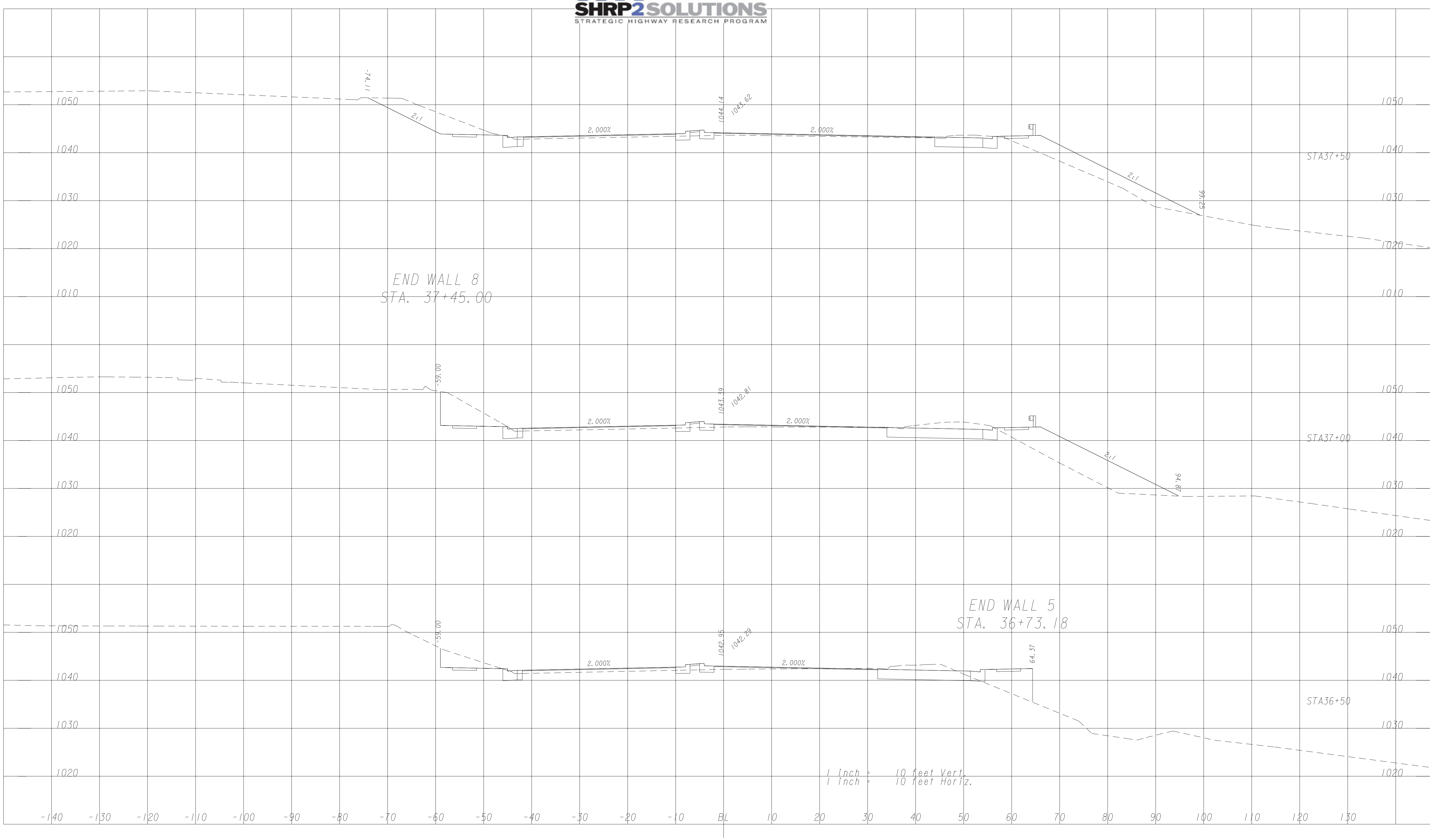
COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
COBB	STP-114-1(72)		



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V. 0 10 20 30
(SCALE IN FEET)

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

OFFICE: URBAN DESIGN

EARTHWORK CROSS SECTIONS

SR 120/ROSWELL RD. WIDENING

F23

DRAWING No.
23-14

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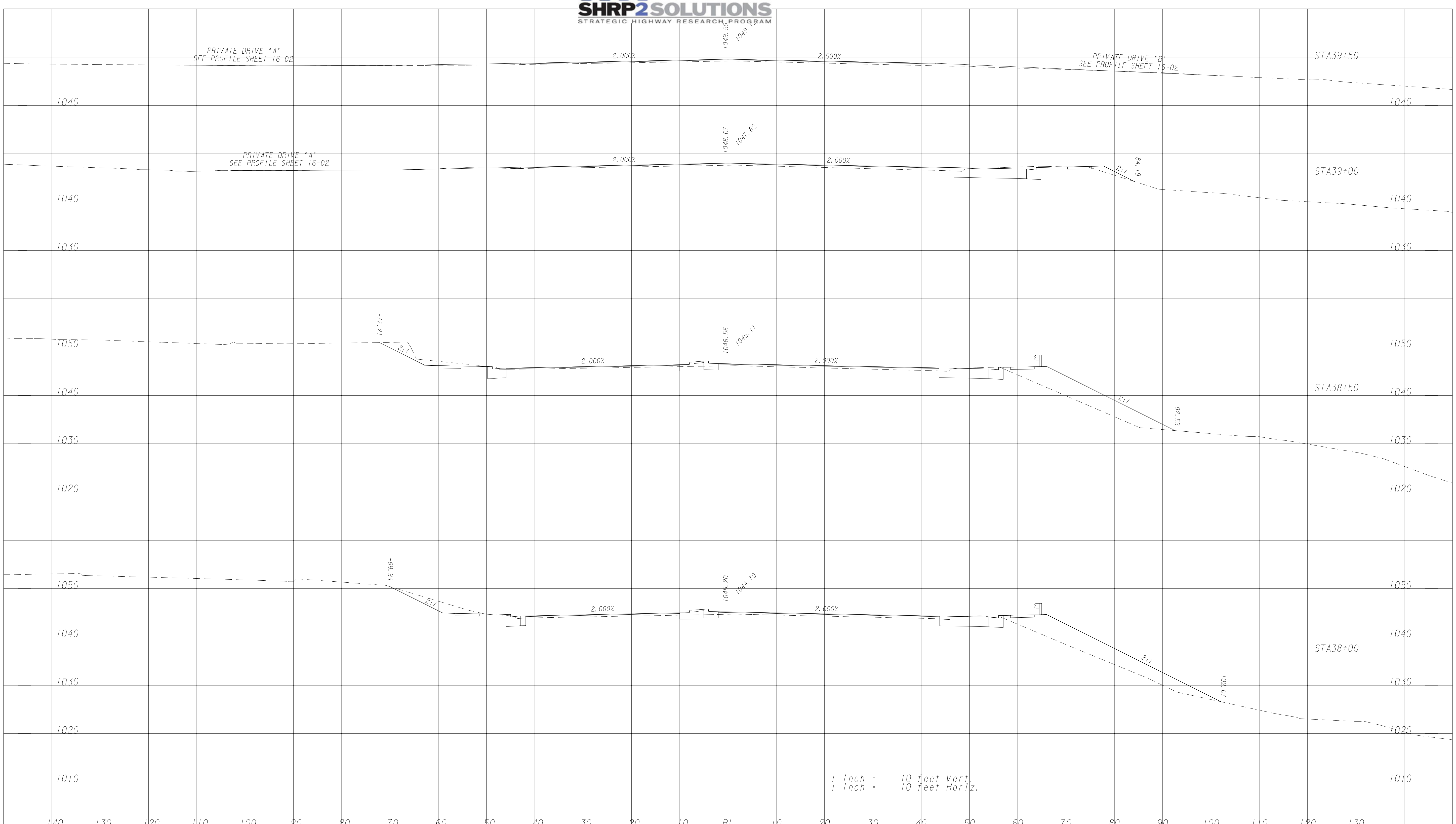

H. 0 10 20 30
V. 0 10 20 30
(SCALE IN FEET)

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN
EARTHWORK CROSS SECTIONS
SR 120/ROSWELL RD. WIDENING

F25

DRAWING No. 23-15

GPLN

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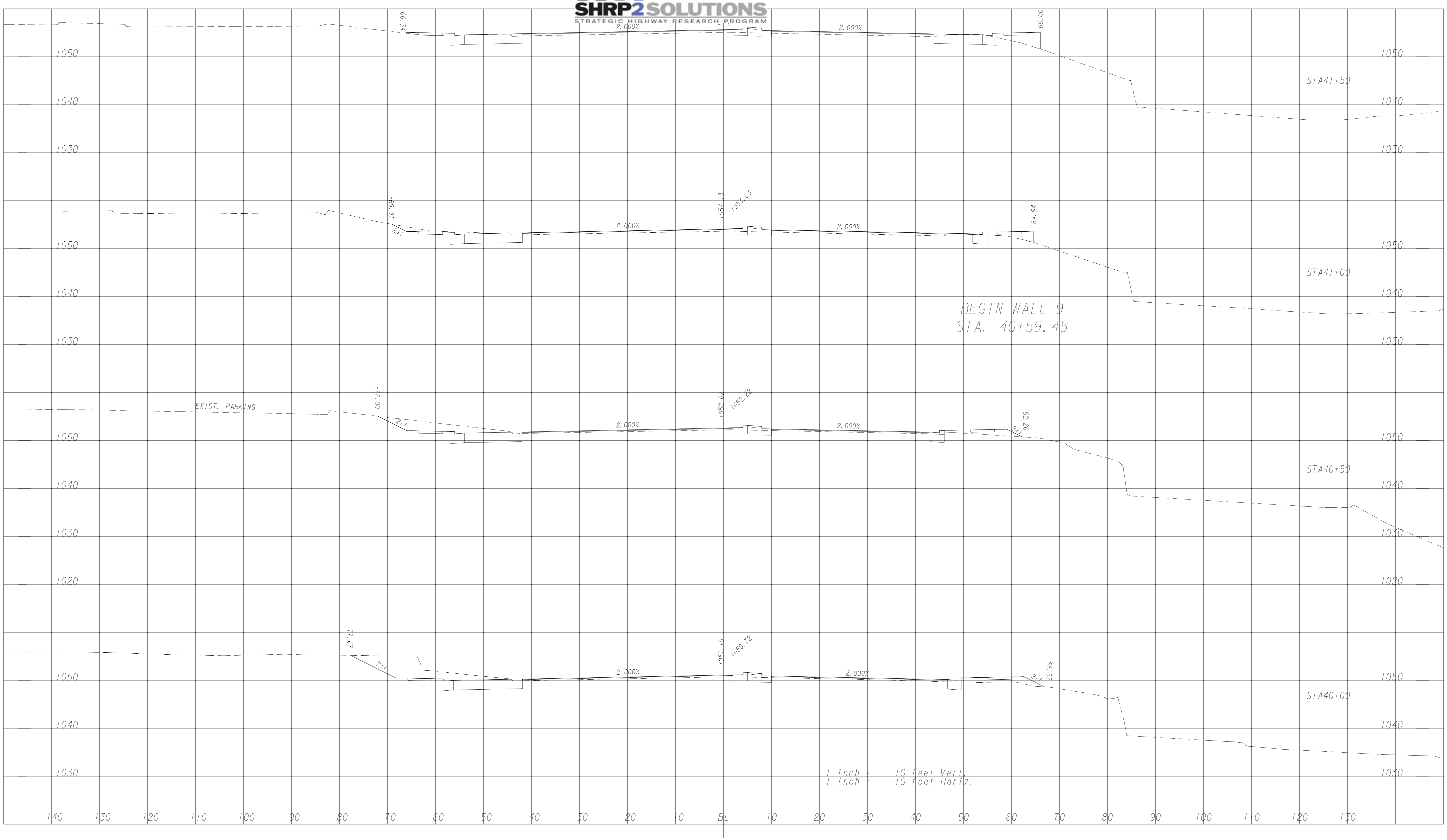
COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
COBB	STP-114-1(72)		

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM



H. 0 10 20 30
V. 0 10 20 30
(SCALE IN FEET)

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

OFFICE: URBAN DESIGN

EARTHWORK CROSS SECTIONS

SR 120/ROSWELL RD. WIDENING

F27

DRAWING No. 23-16

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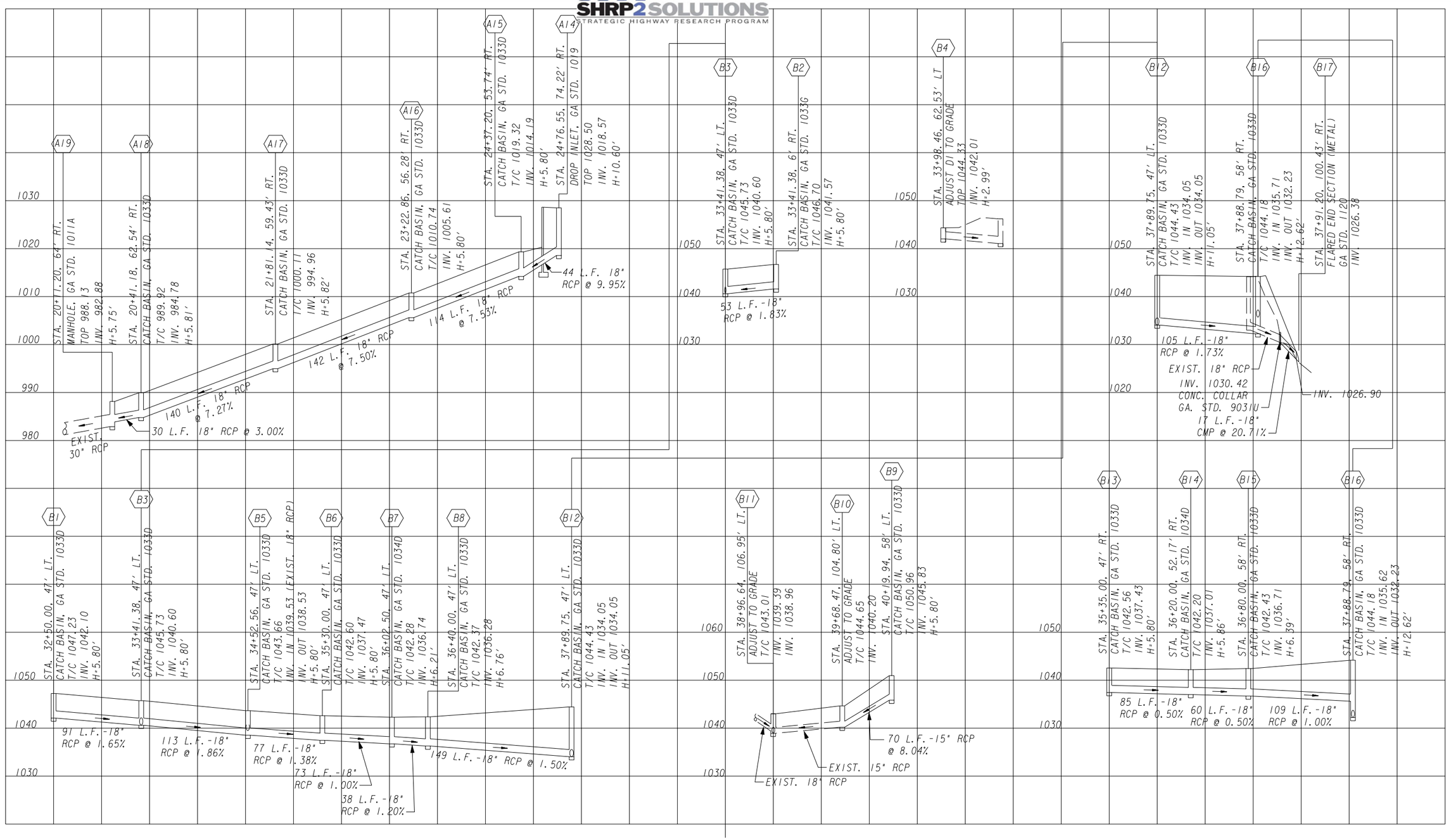
SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM



REVISION DATES		

H. 0 50 100 150
V. 0 10 20 30
(SCALE IN FEET)

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
OFFICE: URBAN DESIGN

DRAINAGE PROFILES

SR 120/ROSWELL ROAD WIDENING F29

DRAWING No. 22-02

GPLN

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Utility Conflict Matrix

Project Owner: _____
Project No. : _____
Project Description: _____
Highway or Route: _____

Note: refer to subsheet for utility conflict cost analysis.

Utility Conflict Matrix Developed/Revised By: _____
Date: _____
Reviewed By: _____
Date: _____

Utility Owner and/or Contact Name	Conflict ID	Drawing or Sheet No.	Utility Type	Size and/or Material	Utility Conflict Description	Start Station	Start Offset	End Station	End Offset	Utility Investigation Level Needed	Test Hole	Recommended Action or Resolution	Estimated Resolution Date	Resolution Status

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Utility Conflict Resolution Alternatives

Cost Estimate Analysis

Project Owner: _____

Project No. : _____

Project Description: _____

Highway or Route: _____

Utility Conflict: _____

Utility Owner: _____

Utility Type: _____

Size and/or Material: _____

Project Phase: _____

Cost Estimate Analysis Developed/Revised By _____

Date _____

Reviewed By _____

Date _____

Alternative Number	Alternative Description	Alternative Advantage	Alternative Disadvantage	Responsible Party	Engineering Cost (Utility)	Direct Cost (Utility)	Engineering Cost (DOT)	Direct Cost (DOT)	Total Cost	Feasibility	Decision

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SELECTED DATABASE LOOKUP TABLES

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LOOKUP TABLES USED IN LESSON 4

Table 1. Company.

CMPNY		
COMPANY ID:	**COMPANY NAME:**	**COMPANY ACRONYM TEXT:**
0	Chugach Electric Association, Inc.	CEA
1	Pacific Bell	PACBELL
2	Southern California Edison	SCE
3	Metropolitan Water District of Southern California	MWD
4	California Department of Transportation	Caltrans
5	Marina Coast Water District	MCWD
6	County Sanitation Districts of Orange County	CSDOC
7	AT&T	ATT
8	Centerpoint Energy	CPE
9	Southwestern Bell	SBC
10	Atlanta Gas Light	AGL
11	Unknown	UNK

Table 2. Estimate Type.

ESTMT_TYPE		
ESTIMATE TYPE ID:	**ESTIMATE TYPE NAME:**	**ESTIMATE TYPE DESCRIPTION:**
0	Alternate Procedure Estimate	An Alternate Procedure Estimate is the approximate amount a utility adjustment will cost that a utility company provides to a DOT and which is then subsequently submitted to FHWA for review. The Alternate Procedure Estimate is typically a rough approximation of the actual cost that is submitted during the preliminary design phase of a highway project.
1	Direct Cost to Utility Estimate	A Direct Cost to Utility Estimate is the approximate amount that a utility adjustment will cost that a utility company provides to a DOT, not including the cost for engineering and design. Typical cost items of a Direct Cost to Utility Estimate are construction labor, materials, and transportation costs.
2	Engineering Cost to Utility Estimate	An Engineering Cost to Utility Estimate is the approximate amount that the engineering and design portion of a utility adjustment will cost that a utility company provides to a DOT, not including direct adjustment costs such as construction labor and materials.
3	Total Cost Estimate	A Total Cost Estimate is the approximate amount that a utility adjustment will cost that a utility company provides to a DOT, including engineering costs and direct construction costs.
4	Direct Cost to DOT Estimate	A Direct Cost to DOT Estimate is the approximate amount that a modification to the highway design will cost the DOT, except cost for redesign and reengineering.
5	Engineering Cost to DOT Estimate	An Engineering Cost to DOT Estimate is the approximate amount that a modification to the highway will cost the DOT to reengineer or redesign the project.

Table 3. Horizontal Spatial Reference.

HRZNTL_SPATIAL_REF		
HORIZONTAL SPATIAL REFERENCE ID:	**HORIZONTAL SPATIAL REFERENCE NAME:**	**HORIZONTAL SPATIAL REFERENCE DESCRIPTION:**
0	NAD_1983_UTM_Zone_12N	North American Datum 1983 Universal Transverse Mercator Zone 12 N (meters).
1	NAVD_1988	North American Vertical Datum 1988 (meters).
2	GCS_WGS_1984	Geographic Coordinate System World Geodetic System 1984 (degrees).
3	GCS_North_American_1983	Geographic Coordinate System North American Datum 1983 (degrees).
4	Geodetic (lat/long)	Geographic Coordinate System of latitude and longitude.

Table 4. Highway Functional Class.

HWY_FUNCL_CLASS		
HIGHWAY FUNCTIONAL CLASS ID:	**HIGHWAY FUNCTIONAL CLASS CODE:**	**HIGHWAY FUNCTIONAL CLASS NAME:**
0	I	Interstate
1	UF	Other Urban Freeway or Expressway
2	RA	Rural Principal Aterial
3	FM	Farm to Market Road
4	US	United States Highway

Table 5. State.

STATE			
STATE ID:	**STATE NAME:**	**STATE DOT NAME:**	**STATE DOT ACRONYM TEXT:**
1	Alabama	Alabama Department of Transportation	ALDOT
2	Alaska	Alaska Department of Transportation and Public Facilities	Alaska DOT&PF
3	American Samoa		
4	Arizona	Arizona Department of Transportation	ADOT
5	Arkansas	Arkansas State Highway and Transportation Department	AHTD
6	California	California Department of Transportation	Caltrans
7	Colorado	Colorado Department of Transportation	CDOT
8	Connecticut	Connecticut Department of Transportation	CONNDOT
9	Delaware	Delaware Department of Transportation	DELDOT
10	District of Columbia	District Department of Transportation	DDOT
11	Federated States of Micronesia		
12	Florida	Florida Department of Transportation	FDOT
13	Georgia	Georgia Department of Transportation	GDOT
14	Guam		
15	Hawaii	Hawaii Department of Transportation	HDOT
16	Idaho	Idaho Transportation Department	ITD
17	Illinois	Illinois Department of Transportation	IDOT
18	Indiana	Indiana Department of Transportation	INDOT
19	Iowa	Iowa Department of Transportation	Iowa DOT
20	Kansas	Kansas Department of Transportation	KDOT
21	Kentucky	Kentucky Transportation Cabinet	KTC
22	Louisiana	Louisiana Department of Transportation and Development	DOTD
23	Maine	Maine Department of Transportation	MaineDOT
24	Marshall Islands		
25	Maryland	Maryland Department of Transportation	MDOT
26	Massachusetts	Massachusetts Department of Transportation	MassDOT
27	Michigan	Michigan Department of Transportation	MDOT
28	Minnesota	Minnesota Department of Transportation	Mn/DOT
29	Mississippi	Mississippi Department of Transportation	MDOT
30	Missouri	Missouri Department of Transportation	MoDOT
31	Montana	Montana Department of Transportation	MDT
32	Nebraska	Nebraska Department of Roads	NDOR

Table 5. State (Continued).

STATE			
STATE ID:	**STATE NAME:**	**STATE DOT NAME:**	**STATE DOT ACRONYM TEXT:**
33	Nevada	Nevada Department of Transportation	NDOT
34	New Hampshire	New Hampshire Department of Transportation	NHDOT
35	New Jersey	New Jersey Department of Transportation	NJDOT
36	New Mexico	New Mexico Department of Transportation	NMDOT
37	New York	New York State Department of Transportation	NYSDOT
38	North Carolina	North Carolina Department of Transportation	NCDOT
39	North Dakota	North Dakota Department of Transportation	NDDOT
40	Northern Mariana Islands		
41	Ohio	Ohio Department of Transportation	ODOT
42	Oklahoma	Oklahoma Department of Transportation	ODOT
43	Oregon	Oregon Department of Transportation	ODOT
44	Palau		
45	Pennsylvania	Pennsylvania Department of Transportation	PennDOT
46	Puerto Rico		
47	Rhode Island	Rhode Island Department of Transportation	RIDOT
48	South Carolina	South Carolina Department of Transportation	SCDOT
49	South Dakota	South Dakota Department of Transportation	SDDOT
50	Tennessee	Tennessee Department of Transportation	TDOT
51	Texas	Texas Department of Transportation	TxDOT
52	Utah	Utah Department of Transportation	UDOT
53	Vermont	Vermont Agency of Transportation	VTrans
54	Virgin Islands		
55	Virginia	Virginia Department of Transportation	VDOT
56	Washington	Washington State Department of Transportation	WSDOT
57	West Virginia	West Virginia Department of Transportation	WVDOT
58	Wisconsin	Wisconsin Department of Transportation	WisDOT
59	Wyoming	Wyoming Department of Transportation	WYDOT

Table 6. Utility Conflict Event Type.

UTIL_CNFLT_EVNT_TYPE	
UTILITY CONFLICT EVENT TYPE ID:	**UTILITY CONFLICT EVENT TYPE NAME:**
0	Utility conflict identified
1	Comment created
2	Utility owner informed of utility conflict
3	Utility conflict resolved
4	Utility owner acknowledges receipt of document
5	Document requested
6	Document sent
7	Document received
8	Document reviewed
9	Document certified
10	Document approved
11	Document uploaded
12	Document review, comment, and approval
13	Utility coordination meeting
14	ROW cleared for adjustment
15	Required adjustment completion
16	Estimated adjustment completion
17	Scheduled adjustment completion
18	Notice to proceed to utility owner
19	Adjustment construction start
20	Adjustment construction end
21	Permit application
22	Permit approved
23	Exception requested
24	Exception approved
25	Plans sufficient sent to utility owner
26	30-day notice submitted
27	90-day notice submitted
28	Utility conflict resolution strategy selected
29	Utility relocation under construction
30	Utility conflict archived

Table 7. Utility Conflict Investigation Need Type.

UTIL_CNFLT_INVESTIGATION_NEED_TYPE		
UC INVESTIGATION NEED TYPE ID:	**UC INVESTIGATION NEED TYPE NAME:**	**UC INVESTIGATION NEED TYPE DESCRIPTION:**
0	QLD	Utility Investigation QLD
1	QLC	Utility Investigation QLC
2	QLB	Utility Investigation QLB
3	QLA	Utility Investigation QLA
4	Unknown	Unknown

Table 8. Utility Conflict Type.

UTIL_CNFLT_TYPE		
UTILITY CONFLICT TYPE ID:	**UTILITY CONFLICT TYPE NAME:**	**UTILITY CONFLICT TYPE DESCRIPTION:**
0	Conflict with roadway project features.	A conflict of a utility facility with a feature of the roadway project. For example, this can be roadway drainage feature that is planned to be installed in the location of an underground sewer line.
1	Conflict with another utility feature.	A conflict of a utility facility with another utility facility feature. For example, this can be a conflict between two existing facilities that are found to be in violation of a safety standard. This can also be a proposed facility that is designed to be installed in a location that is either occupied by an existing utility facility or that would violate a safety distance requirement of an existing utility facility.
2	Conflict with utility regulations or standards.	A conflict of a utility facility with a utility standard, utility installation regulation, or utility accommodation rule. For example, buried utility facilities must be installed with a minimum depth of cover above the facility. If a utility is buried at a shallower depth, it is a conflict with the depth of cover regulation.
3	Conflict with safety regulations.	A conflict of a utility facility with an established safety regulation. For example, a utility pole may be located within the clear zone of a roadway. If the pole is unprotected, it may violate clear zone safety regulations.
4	Conflict with transportation construction or phasing.	A conflict of a utility facility with temporary activities during construction or construction phasing. For example, a utility facility may interfere with the space requirements to construct a roadway. This type of conflict may only exist temporarily for the duration of a construction phase, and may not exist as a conflict of the utility facility with the constructed roadway.

Table 9. Utility Conflict Subtype.

UTIL_CNFLT_SUBTYPE		
UTILITY CONFLICT SUBTYPE ID:	**UTILITY CONFLICT SUBTYPE NAME:**	**UTILITY CONFLICT SUBTYPE DESCRIPTION:**
0	FG	Finish grade
1	PWY	Pathway
2	EX	Excavation

Table 10. Utility Conflict Resolution Alternative Decision.

UTIL_CNFLT_RESOLN_ALTERNAT_DCSN	
UTILITY CONFLICT RESOLUTION ALTERNATIVE DECISION ID:	**UTILITY CONFLICT RESOLUTION ALTERNATIVE DECISION NAME:**
0	Under review
1	Selected
2	Rejected

Table 11. Utility Conflict Resolution Alternative Responsibility.

UTIL_CNFLT_RESOLN_ALTERNAT_RSPNBL		
UCR ALTERNATIVE RESPONSIBILITY ID:	**UCR ALTERNATIVE RESPONSIBILITY CODE:**	**UCR ALTERNATIVE RESPONSIBILITY NAME:**
0	U	Utility Company
1	D	DOT
2	U/D	Utility Company and DOT
3	N/A	Not Available
4	C	Contractor

Table 12. Utility Facility Material.

UTIL_FCLTY_MTRL		
UTILITY FACILITY MATERIAL ID:	**UTILITY FACILITY MATERIAL NAME:**	**UTILITY FACILITY MATERIAL ACRONYM TEXT:**
0	Welded Steel Pipe	WSP
1	Reinforced Concrete Pipe	RCP
2	Asbestos Cement Pipe	ACP
3	Concrete Cylinder Pipe	CCP
4	Vitrified Clay Pipe	VCP
5	Unknown	U
6	Multiple Concrete Duct	MCD
7	Fiber Optic	FO
8	Copper	CO
9	Steel	ST

Table 13. Utility Facility Operation Type.

UTIL_FCLTY_OPERATION_TYPE	
UTILITY FACILITY OPERATION TYPE ID:	**UTILITY FACILITY OPERATION TYPE NAME:**
0	Public Utility
1	Private Utility

Table 14. Utility Facility Type.

UTIL_FCLTY_TYPE			
UTILITY FACILITY TYPE ID:	**UTILITY FACILITY TYPE NAME:**	**UTILITY FACILITY SUBTYPE ID:**	**UTILITY FACILITY TYPE ACRONYM TEXT:**
0	Electricity Distribution	0	
1	Electricity Distribution	1	
2	Electricity Transmission	2	
3	Telephone	3	
4	Water	4	W
5	Sewer	4	
6	Manhole	4	
7	Unknown	4	UNK
8	Electricity Distribution		
9	Communication	4	
10	Gas	4	G
11	Buried Fiber Optic	4	BFO
12	Buried Telephone Duct Bank		BT-DUCT
13	Electrical Conduit	4	
14	Transmission Tower	4	
15	Transmission Lines	4	
16	Distribution Line	4	

Table 15. Utility Facility Subtype.

UTIL_FCLTY_SUBTYPE		
UTILITY FACILITY SUBTYPE ID:	**UTILITY FACILITY SUBTYPE NAME:**	**UTILITY FACILITY SUBTYPE DESCRIPTION:**
0	3 phi	
1	1 phi	
2	138 kV	
3	DU	
4		No subtype

Table 16. Vertical Spatial Reference.

VERT_SPATIAL_REF		
VERTICAL SPATIAL REFERENCE ID:	**VERTICAL SPATIAL REFERENCE NAME:**	**VERTICAL SPATIAL REFERENCE DESCRIPTION:**
0	NAD_1983_UTM_Zone_12N	North American Datum 1983 Universal Transverse Mercator Zone 12 N (meters).
1	NAVD_1988	North American Vertical Datum 1988 (meters).
2	GCS_WGS_1984	Geographic Coordinate System World Geodetic System 1984 (degrees).
3	GCS_North_American_1983	Geographic Coordinate System North American Datum 1983 (degrees).
4	Geodetic (lat/long)	Geographic Coordinate System of latitude and longitude.

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COURSE FORMS

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SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

REVIEW FORM

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Instructor: _____

Location: _____ **Date**: _____

Lesson 1: Introductions and Course Overview				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Lesson 2: Utility Conflict Concepts				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Lesson 3: Utility Conflict Identification and Management				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Lesson 4: Use of Database Approach to Manage Utility Conflicts				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Lesson 5: Hands-On Utility Conflict Management Exercise				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Lesson 6: Wrap-Up				
	Excellent	**Good**	**Acceptable**	**Needs Improvement**
Presentation Materials	○	○	○	○
Handout Materials	○	○	○	○
Time Allocation	○	○	○	○
Comment				

Additional Comments

SHRP2 SOLUTIONS
STRATEGIC HIGHWAY RESEARCH PROGRAM

SIGN-IN SHEET

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Instructor: _____

Location: _____ **Date**: _____

Name	Affiliation	Phone	Email Address

Name	Affiliation	Phone	Email Address