

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
SYNTHESIS OF HIGHWAY PRACTICE

115

REDUCING CONSTRUCTION CONFLICTS
BETWEEN HIGHWAYS AND UTILITIES

TRANSPORTATION RESEARCH BOARD EXECUTIVE COMMITTEE 1984

Officers

Chairman

JOSEPH M. CLAPP, *Senior Vice President, Roadway Express, Akron, Ohio*

Vice Chairman

JOHN A. CLEMENTS, *Commissioner, New Hampshire Department of Public Works and Highways, Concord, New Hampshire*

Secretary

THOMAS B. DEEN, *Executive Director, Transportation Research Board*

Members

RAY A. BARNHART, *Administrator, Federal Highway Administration (ex officio)*
LAWRENCE D. DAHMS, *Executive Director, Metropolitan Transportation Commission, San Francisco Bay Area (ex officio, Past Chairman 1983)*
MICHAEL J. FENELLO, *Acting Administrator, Federal Aviation Administration, U.S. Department of Transportation (ex officio)*
FRANCIS B. FRANCOIS, *Executive Director, American Association of State Highway and Transportation Officials (ex officio)*
WILLIAM J. HARRIS, JR., *Vice President for Research and Test Department, Association of American Railroads (ex officio)*
DARRELL V. MANNING, *Director, Idaho Transportation Department (ex officio, Past Chairman 1982)*
RALPH STANLEY, *Administrator, Urban Mass Transportation Administration, U.S. Department of Transportation (ex officio)*
DIANE STEED, *Administrator, National Highway Traffic Safety Administration, U.S. Department of Transportation (ex officio)*
DUANE BERENTSON, *Secretary, Washington State Department of Transportation*
JOHN R. BORCHERT, *Regents Professor of Geography, Department of Geography, University of Minnesota*
LOWELL K. BRIDWELL, *Secretary, Maryland Department of Transportation*
ERNEST E. DEAN, *Executive Director, Dallas/Fort Worth Airport*
MORTIMER L. DOWNEY, *Deputy Executive Director for Capital Programs, Metropolitan Transportation Authority, New York, New York*
ALAN G. DUSTIN, *President and Chief Executive Officer, Boston and Maine Corporation*
MARK G. GOODE, *Engineer-Director, Texas State Department of Highways and Public Transportation*
LESTER A. HOEL, *Hamilton Professor and Chairman, Department of Civil Engineering, University of Virginia*
LOWELL B. JACKSON, *Secretary, Wisconsin Department of Transportation*
ALAN F. KIEPPER, *General Manager, Metropolitan Transit Authority, Houston*
HAROLD C. KING, *Commissioner, Virginia Department of Highways and Transportation*
FUJIO MATSUDA, *President, University of Hawaii*
JAMES K. MITCHELL, *Professor and Chairman, Department of Civil Engineering, University of California, Berkeley*
DANIEL T. MURPHY, *County Executive, Oakland County Courthouse, Michigan*
ROLAND A. OUELLETTE, *Director of Transportation Affairs, General Motors Corporation*
MILTON PIKARSKY, *Director of Transportation Research, Illinois Institute of Technology*
WALTER W. SIMPSON, *Vice President-Engineering, Norfolk Southern Corporation*
JOHN E. STEINER, *Vice President for Corporate Product Development, The Boeing Company (Retired)*
LEO J. TROMBATORE, *Director, California Department of Transportation*
RICHARD A. WARD, *Director-Chief Engineer, Oklahoma Department of Transportation*

TRANSPORTATION RESEARCH BOARD COMMITTEE FOR NRC OVERSIGHT (CNO)

MILTON PIKARSKY, *Illinois Institute of Technology (Chairman)*
JOSEPH M. CLAPP, *Roadway Express, Inc.*

JOHN R. BORCHERT, *University of Minnesota*
MARK G. GOODE, *Texas State Dept. of Hwys. and Public Transp.*

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Transportation Research Board Executive Committee Subcommittee for NCHRP

JOSEPH M. CLAPP, *Roadway Express, Inc. (Chairman)*
JOHN A. CLEMENTS, *New Hampshire Dept. of Public Works & Hwys.*
FRANCIS B. FRANCOIS, *Amer. Assn. of State Hwy. & Transp. Officials*

RAY A. BARNHART, *U.S. Dept. of Transp.*
LAWRENCE D. DAHMS, *Metropolitan Transp. Comm., Berkeley, California*
THOMAS B. DEEN, *Transportation Research Board*

Field of Special Projects

Project Committee SP 20-5

RAY R. BIEGE, JR., *Consultant (Chairman)*
VERDI ADAM, *Louisiana Dept. of Transp. and Development*
ROBERT N. BOTHMAN, *Oregon Dept. of Transportation*
JACK FRIEDENRICH, *New Jersey Dept. of Transportation*
DAVID GEDNEY, *De Leuw, Cather and Company*
SANFORD P. LAHUE, *American Concrete Pavement Association*
BRYANT MATHER, *USAE Waterways Experiment Station*
THOMAS H. MAY, *Pennsylvania Dept. of Transportation*
THEODORE F. MORF, *Consultant*
EDWARD A. MUELLER, *Morales and Shumer Engineers, Inc.*
DAVID K. PHILLIPS, *Federal Highway Administration*
ROBERT J. BETSOLD, *Federal Highway Administration (Liaison)*
K. B. JOHNS, *Transportation Research Board (Liaison)*

Program Staff

KRIEGER W. HENDERSON, JR., *Director, Cooperative Research Programs*
LOUIS M. MACGREGOR, *Administrative Engineer*
CRAWFORD F. JENCKS, *Projects Engineer*
R. IAN KINGHAM, *Projects Engineer*
ROBERT J. REILLY, *Projects Engineer*
HARRY A. SMITH, *Projects Engineer*
ROBERT E. SPICHER, *Projects Engineer*
HELEN MACK, *Editor*

TRB Staff for NCHRP Project 20-5

DAMIAN J. KULASH, *Assistant Director for Special Projects*
THOMAS L. COPAS, *Special Projects Engineer*
HERBERT A. PENNOCK, *Special Projects Engineer*
ANNE SHIPMAN BRENNAN, *Editor*

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM **115**
SYNTHESIS OF HIGHWAY PRACTICE

REDUCING CONSTRUCTION CONFLICTS BETWEEN HIGHWAYS AND UTILITIES

ORRIN RILEY
New York, New York

Topic Panel

ALBERT R. HEIDECHE, *Commonwealth Edison Company*

DAVID L. HOUCHIN, *Chessie Systems*

ALBERT F. LAUBE, *Virginia Department of Highways and Transportation*

LAWRENCE F. SPAINE, *Transportation Research Board*

RONALD L. WILLIAMS, *West Virginia Department of Highways*

JAMES A. CARNEY, *Federal Highway Administration (Liaison)*

THOMAS D. MYERS, *Federal Highway Administration (Liaison)*

RESEARCH SPONSORED BY THE AMERICAN
ASSOCIATION OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS IN COOPERATION
WITH THE FEDERAL HIGHWAY ADMINISTRATION

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C.

DECEMBER 1984

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an assurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and its Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

NOTE: The Transportation Research Board, the National Research Council, the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the individual states participating in the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

NCHRP SYNTHESIS 115

Project 20-5 FY 1982 (Topic 14-03)
ISSN 0547-5570
ISBN 0-309-03871-5
Library of Congress Catalog Card No. 84-52856

Price: \$8.80

Subject Areas
Facilities Design
Construction

Mode
Highway Transportation

NOTICE

The project that is the subject of this report was a part of the National Cooperative Highway Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council. Such approval reflects the Governing Board's judgment that the program concerned is of national importance and appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the Federal Highway Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

The National Research Council was established by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and of advising the Federal Government. The Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in the conduct of their services to the government, the public, and the scientific and engineering communities. It is administered jointly by both Academies and the Institute of Medicine. The National Academy of Engineering and the Institute of Medicine were established in 1964 and 1970, respectively, under the charter of the National Academy of Sciences.

The Transportation Research Board evolved in 1974 from the Highway Research Board, which was established in 1920. The TRB incorporates all former HRB activities and also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society.

Published reports of the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

are available from:

Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire highway community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

*By Staff
Transportation
Research Board*

This synthesis will be of interest to utility engineers, highway construction engineers, utility company officials, and others concerned with coordination of highway construction with utilities. Information is presented on types of highway-utility conflicts that might be encountered and on procedures used to prevent or minimize problems.

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated, and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project, carried out by the Transportation Research Board as the research agency, has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.

Almost all highway construction or reconstruction has the potential for conflict with utilities. This report of the Transportation Research Board contains information on current practices by highway agencies and utility companies to coordinate their work to prevent or minimize conflicts.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the Board analyzed available information assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the researcher in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

CONTENTS

1	SUMMARY
3	CHAPTER ONE INTRODUCTION
4	CHAPTER TWO TYPES OF DELAYS AND DAMAGES Types of Delays, 4 Types of Costs and Damages, 4
6	CHAPTER THREE UTILITY DAMAGE PREVENTION
7	CHAPTER FOUR EFFECTIVE LIAISON PROCEDURES From the Highway Point of View, 7 From the Utility Point of View, 9
10	CHAPTER FIVE SOME RECOMMENDATIONS Some Problems to Be Solved, 12 Research Needs, 12
12	REFERENCES
13	APPENDIX A TEXAS UTILITY ACCOMODATION POLICY
72	APPENDIX B A CASE HISTORY

ACKNOWLEDGMENTS

This synthesis was completed by the Transportation Research Board under the supervision of Damian J. Kulash, Assistant Director for Special Projects. The principal Investigators responsible for conduct of the synthesis were Thomas L. Copas and Herbert A. Pennock, Special Projects Engineers. This synthesis was edited by Anne S. Brennan.

Special appreciation is expressed to Orrin Riley, New York, New York, who was responsible for the collection of the data and the preparation of the report.

Valuable assistance in the preparation of this synthesis was provided by the Topic Panel, consisting of Albert R. Heidecke, Assistant Director of Real Estate, Commonwealth Edison Company; David L. Houchin, Engineer, Public Improvements and Contracts, Chessie Systems; Albert F. Laube, Utilities Engineer, Virginia Department of Highways and Transportation; Ronald L. Williams, Utilities Engineer, Right of Way Division, West Virginia Department of Highways; and Liaison Members James A. Carney, Chief, Railroads, Utilities, and Programs Branch, and Thomas D. Myers, Highway Engineer, Office of Highway Operations, Federal Highway Administration.

Lawrence F. Spaine, Engineer of Design, Transportation Research Board, assisted the NCHRP Project 20-5 Staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance were most helpful.

REDUCING CONSTRUCTION CONFLICTS BETWEEN HIGHWAYS AND UTILITIES

SUMMARY

As highways are constructed, widened, and rebuilt to meet the needs of the public and as utilities are installed, maintained, and improved to meet customer demand, it is inevitable that there will be conflicts between the highway agency and the utility companies. Most of these conflicts are resolved before construction begins but it is estimated that as much as \$120 million per year of highway contract claims results from utility conflicts.

Construction problems caused by utility conflicts result when utility locations are unknown or when utility removal is late. Both interfere with contractors' schedules and cause delays, and thus may result in a claim.

In general, utility companies report good relations with highway agencies although the relationship varies from state to state. Both highway agencies and utilities believe that the better the relationship, the fewer conflicts and claims. Agencies with effective coordination usually have a manual that sets out in detail the responsibilities and procedures for coordination. Many agencies also participate in liaison committees that foster coordination between these two groups.

Another method of coordination is involvement of utilities in pre-bid meetings with contractors. This allows all parties to understand what has to be done, when it needs to be done, and who is to do it.

There is a need for effective delineation of the locations of buried facilities. This would prevent accidental damage during construction.

The best method of avoiding conflicts is good communication between highway agencies and utility companies. Communication is helped where each organization has only one office that is responsible for coordination regardless of whether the highway agency or the utility company initiates an action.

CHAPTER ONE

INTRODUCTION

Because highways and utilities occupy the same rights-of-way, it is inevitable that some conflict between the two will occur when construction of some kind or another needs to be done. In the foreword to its policy manual, one state puts the problem directly:

New Jersey, the most densely populated and depicted as the "Corridor State," is severely tried in its efforts to provide a safe and modern highway system for its citizens, millions of visitors and transients; while at the same time insuring the degree of safe and adequate utility services that its citizens and industries demand. Freeways, Parkways and Expressways are being designed and constructed at an ever increasing rate to satisfy the needs of the motoring public and conventional highways are being widened, dualized and grade separated to meet the needs of the local driver and hauler. Utilities must continually modify their facilities to conform to these highway construction projects, in addition to carrying out their own plant improvement and expansion customer demands. Rarely, if ever, can either the Department of Transportation or Utility Companies construct or improve their respective facilities without somehow affecting the other (1).

As an example of just how extensive such an effect can become, another state reports that in an urban area \$10,192,000 worth of utility relocations needed to be performed to make way for a single highway contract of \$16,440,000 (see Appendix B).

However real the problem may be, measuring the magnitude of its dimensions nationwide remains elusive. Highway construction in the United States is currently about \$20 billion per year (2). In the more problem-prone environments, ten percent of all contracts result in claims. Where claims are filed, they generally run about thirty percent of contract value. Twenty percent of contract claims involve utilities. Thus, on the high end of the scale, it is conceivable that \$120 million worth of contract claims are generated each year by highway utility conflicts. The only published estimate of the value of utility relocations sets the figure at \$300 million per year (3). So it may be that \$300 million worth of utility relocations generate a volume of disputes equal to forty percent of the value of the work. Indeed, one department of transportation alone has experienced utility-related delay claims of nearly \$14 million in a single year.

At the other end of the scale, another large state paid out only \$65,000 in one year for all contract claims (4). If twenty percent of those payments were for utilities, then something on the order of \$13,000 was spent as a result of utility conflicts. During that year in that state \$321,000,000 worth of construction was accomplished. Seen in that light, utility conflicts are insignificant compared to overall highway costs.

Thus, it is clear that there is a wide disparity in the estimated cost of highway utility conflicts.

CHAPTER TWO

TYPES OF DELAYS AND DAMAGES

TYPES OF DELAYS

The two most common and recurring delays are (a) where utilities are not known to exist (or are known to exist but are mislocated in the field) and (b) where utilities are known to exist but are simply removed too late, to the detriment of the contractor's schedule.

It is widely believed that utility delays are often used as an excuse for late performance. The discovery of unknown utilities has been a recurring problem. Unknown utilities that are accidentally discovered are particularly troublesome because of the time required to inform the utility owner and to arrange for proper design of either protective measures or relocations, and the lead time to order materials if relocations become necessary. Only then can the utility work proceed, and, when completed, allow the contractor to resume work. Such delays frequently run into several months.

Utilities that are known to exist but are removed too late to accommodate the contractor's schedule have proved particularly troublesome and costly for both New York and New Jersey. This is especially nettlesome because both states have straightforward and responsible procedures for informing both utilities and contractors of potential conflicts. In New Jersey, for example, utility agreements are drawn up for all utilities within a project area even if it is not anticipated that any work will be required of the utilities (5). This is to fulfill the permit requirements in the event that it *should* become necessary to relocate the utilities. All such utility agreements show precisely what work will be done by the state, and what work is anticipated to be done by the utility. A forthright determination is made as to who is expected to bear the costs for each portion of the work. Drawings are attached to each utility agreement showing precisely the location of the existing utilities and the relocated position. Agreements are signed by both the Transportation Commissioner and a representative of the utility owner, and distribution of the utility agreements is made well in advance of construction. Nevertheless, delay problems persist.

TYPES OF COSTS AND DAMAGES

Where delays are caused by unknown utilities, mislocated utilities, or totally relocated facilities, the results are the same: increased contract time for undelivered facilities; uncollectable liquidated damages; and escalated contractor costs, which may result in sizeable claims. The state of New York, for example, has experienced utility-related delay claims as shown in Table 1. However, the cost of claims attributable to utilities is somewhat skewed. This is because when the utility claim constitutes

only a part of a "cause of action," then the total damage for that particular cause of action is listed. Thus, if the third item in the contractor's claim was, say, for "delays caused by late utility relocations *and* right-of-way acquisitions," then the entire amount of that third item was tabulated under "Utilities." With that explanation in mind, the value of claims asserted because of utilities was \$30.6 million, or nearly one percent of the value of construction contracts awarded.

It should be pointed out that the value of the claim as filed is not necessarily the amount of money that will flow from the state to the contractor for final resolution. Indeed, in New York the average settlement of utility-type claims is on the order of 10 percent of the amount filed. Nevertheless, the total of over \$30 million during a seven-year period as shown in Table 1 is a perceived cost to someone of utility-related delay. Whether the cost is absorbed by the state, the utility owner, or the contractor, it is a cost of the system.

The state of New Jersey does not keep a separate tabulation of utility delays, but does point to Table 2 as a typical example of utility-related delay experience in recent years.

Illinois is among those states that did not recognize utility claims as reimbursable. Beginning in 1983, however, they do recognize contractor claims arising from utilities that were not known to exist at the time the contract was awarded. Because of the change in policy they have estimated utility-related delay claims as follows:

Utilities	Cost/Year
Not moved in time	\$1,128,816
Not shown in correct location	331,344
Not known to exist	224,640
	<u>\$1,684,800</u>

The California Department of Transportation (Caltrans) does not regularly tabulate its contract claims. A study was made, however, for the one-year period from July 1, 1976 to June 30, 1977. During that period, 368 contracts were awarded with a total value of \$321,426,000. Among those contracts 528 "protests" were filed. (A "protest" is a dispute filed at the Caltrans district level.) Caltrans did not tabulate utility-related delays separately but included them under the category of "right-of-way delay." Twenty-five of the 528 protests were for right-of-way delays. Thus, less than five percent of all protests involved utilities (4).

Of the 528 protests, 81 became "formal claims." (A "formal claim" is defined by Caltrans as a dispute submitted to the Chief Engineer.) Of the 25 right-of-way protests, 3 became formal claims. The total value affixed to all protests is not known, but

TABLE 1
NEW YORK DOT UTILITY-RELATED CLAIMS, 1976-1982

Year	Contracts		Asserted Claims		Utility-Related Claims	
	No.	Value ^a	No.	Value	No.	Value
1982	374	\$ 516.3	21	\$ 17.6	6	\$ 4.8
1981	394	770.0	23	16.1	4	0.9
1980	320	591.0	24	25.9	6	13.7
1979	272	444.6	22	10.9	2	4.2
1978	308	271.1	9	10.1	3	3.5
1977	269	251.0	18	11.9	2	3.0
1976	257	289.8	20	21.3	3	0.5
Totals	2194	\$3,133.8	137	\$113.8	26	\$ 30.6

^a Millions.

the total value of the 81 claims was put at \$1,712,900. The value of the three right-of-way protests that became formal claims is not known. The total amount paid out by Caltrans for all 81 claims was \$65,000. Thus the total amount paid for utility-related claims, if anything, was inconsequential to the \$321,000,000 worth of construction. Once again, however, it should be noted that the value of claims must be considered as a cost to someone irrespective as to its handling by the highway owner.

Florida describes its experience with utilities as a "disaster" until the early 1960s. Since then the state has held semiannual meetings with a Utility Liaison Committee and, with this new policy, has experienced almost no claims for 12 years. In the last four years, however, some problems have begun to surface (see Chapter 4).

States' policies on utility-related delay claims are highly varied. At Caltrans, if high-risk utility facilities are not located on the plans and the contractor is delayed, then the state will compensate the contractor. If the utility facilities are shown on the plans, then the date for their relocation becomes a part of the contract. If utilities are not removed within the specified time, the state will also compensate the contractor (6). Caltrans calculates the value of the claim in accordance with a force-account formula.

Illinois does not recognize utility-related delay claims as long as the utilities are shown on the plans (whether or not the utilities are relocated in a timely manner). But where a contractor is

delayed because of utilities that were not known to exist, payment will be made under the terms of a preliminary policy adopted in 1983. For major delays (more than three weeks) the Illinois formula is: labor cost; the full cost of equipment for the first day of delay and half the cost of equipment for subsequent days' delay up to three weeks, after which the moving-out costs will be included; cost of traffic control devices; and escalation costs as long as the escalation does not occur during the winter months. To all of the above is added fifteen percent for overhead (7).

Virginia does not recognize any claims for additional compensation caused by utility delays other than consideration for an extension of time.

New York has had a law in effect since September 1979 that is unique in at least three ways: it provides a mechanism whereby the state may recover any damages caused by utility delays directly from the utilities; it provides that if the utility has been reimbursed by the state then the contractor may sue the utility in the event of any delay; and it provides that if a contractor should so bring an action and the contractor is unsuccessful, then the cost of that action is to be borne by the contractor. The key to this New York law is deadlines established during design after coordination with utilities. Heavy stress is placed on timely notice to the utilities (8). A four-step procedure is necessary by the New York State Department of Transportation:

1. Once the utilities are identified, discussions must be held with the utility company, and the utility company scheduled for performance relocations must be included in the contract documents.
2. After determining the contract award date, a formal notice is sent to the utility to remove the facility.
3. After the award of contract, a formal order to remove is sent to the utility company.
4. If the utility fails to meet the established utility relocation schedule, then the state moves to request a court order.

Emphasis is also placed on the fact that the deadlines established for the utility to complete its relocation must be reasonable (9).

In an analysis of legal aspects published by the Highway Research Board (10), it was noted that a "problem arises when the utility fails to move its facilities promptly, resulting in delay of commencement of highway construction work." The report then states that "cooperation in this respect seems to be generally satisfactory." The report also observes that "regardless of whether the state or the utility is ultimately responsible for the

TABLE 2
NEW JERSEY EXAMPLES OF EXTENSIVE UTILITY DELAYS

Contract	Time	Delays	Cause	Released Liquidated Damages	Claim
A. (1982)	1356 days	317 days	-	-	\$50,000 - 100,000
B.	329 days	223 days	Unknown	\$33,450	None
C. (1979)	631 days	239 days	Unknown	47,800	None
D. (1982)	385 days	4 - 5 months	Telephone	-	Anticipated

cost of the relocation, the responsibility for seeing that the move is made rests with the state."

New Jersey still makes the same point in its utility policy manual, which states that in New Jersey utilities have the right, by franchise, to occupy highway rights-of-way. The Commissioner of Transportation has the right, by law, to control the occupancy. The manual goes on to note that the state's power to regulate derives from common law (1).

In Texas this point is made in somewhat more benign lan-

guage. The preamble to its policy states that "regulations be established and uniformly administered in a manner which will be in the best interest of the highway system and public use thereof, with due consideration given to the public service afforded by adequate and economical utility installations"(11).

The HRB study (10) also notes that responsibility for delay in contract completion is very apt to rest with the state. Most states have the authority to perform relocations if the utility fails to do so. They also can compel the utility to do the work.

CHAPTER THREE

UTILITY DAMAGE PREVENTION

As with all conflicts, damage is suffered on both sides. In 1975, Kuykendall (12) noted that "the National Transportation Safety Board (NTSB) . . . reports that more than forty percent of all gas pipeline and twenty percent of liquid pipeline accidents are directly related to excavation damage. The Bell System, according to NTSB, reports that its cables were damaged by external contact 87,000 times in 1 year. Eighty-six percent of the damage to underground electrical facilities stems from digging activities."

In a report published by the Federal Highway Administration (13), it was pointed out that accidental digouts are a serious nationwide problem. The report places much of the blame on the lack of reliable information on underground utility location. The report further states that the identification of best practice is not clear-cut and that only subjective judgments are available to assess the relative costs and benefits. This report makes the point that utilities often feel like an unwanted orphan by stating that "in practice, utility considerations are practically ignored in the planning process and utility rights in public rights-of-way

are definitely subordinated to other interests. The result is not in the best public interest" (13, p. 3).

On the other hand, the spokesman for a major pipeline company believes that highway departments give plenty of notice and the utilities know where they stand with highway people. This company believes that developers are far worse than highway departments because they often have very little experience in dealing with major utilities.

The generally cooperative posture of highway departments is also reflected in an informal survey of the American Gas Association—System Protection Committee. When asked to comment on relationships, conflicts, and notice they responded as shown in Table 3. The survey suggests that, although relationships overall are good, the record on timely notice is uneven.

A spokesman for the Pacific Telephone Company noted that in the last three or four years various federal agencies have increased the number of permit applications required. In addition, local governments have sharply escalated the cost of fees for permits (\$25 to \$400). During this time, the engineering cost

TABLE 3
RESULTS OF AMERICAN GAS ASSOCIATION SYSTEM PROTECTION COMMITTEE SURVEY

Respondent	Good or Poor Relations with Highway Departments?	Specific Conflicts between Highways and Utilities	Do You Receive Timely Notice to Make Relocations?
Northern Illinois Gas	Overall good. Strains caused by volume of work.	Unsuitable soil - may need removal.	No. Highway departments stockpile plans. Designs sent in final stage. Consultant jobs sent 2 weeks before award.
Northwest Natural Gas	Excellent.	Freeway widening. Upgrading urban secondary roads.	Well coordinated.
P. S. E. & G. (New Jersey)	Excellent.	None.	Yes.
Iowa-Illinois Gas and Electric Co.	Good, except one area.	Yes. It is we who must change.	Generally yes, but on one state project, the construction engineer couldn't answer questions; answers had to come from the design engineer, which caused delay.

of construction has increased to about twenty percent of construction cost. The spokesman emphasized that they have a good working relationship with Caltrans and find that the Caltrans' decentralized procedure is a good one and helps to develop "credits of cooperation" at the district level.

The idea of developing "credits of cooperation" has been frequently expressed by both utility and highway interests. Utilities must frequently call on highway agencies in order to install new lines, make repairs and improvements, and maintain their systems. Highway agencies must frequently contact utilities in order to perform relocations and the like. Yet in almost all jurisdictions, different people are involved when utilities contact highway agencies than when highway agencies contact utilities. That is, the permit section for a highway agency may be under the maintenance or traffic department, whereas the relocation

interests may be located in a right-of-way division or a design department. Thus, there is no opportunity to develop a dialogue leading toward a community of interests.

A spokesman for AT&T had praise for Texas because of its good long-range planning. He also believes that Connecticut does a particularly good job with its utility coordination. However, he noted that many states change their priorities and suffer from poor forecasting.

This same point was voiced by a highway spokesman in West Virginia who believes that highway agencies often lose their credibility by requiring utilities to relocate their facilities—only to discover that the state lacks funds to continue with the highway construction, for which the utilities were relocated to accommodate.

CHAPTER FOUR

EFFECTIVE LIAISON PROCEDURES

FROM THE HIGHWAY POINT OF VIEW

The utility-accommodation policy in Texas has won praise from utility companies for its cooperation and administrative promptness. The Texas policy manual as written, does not read remarkably differently from the policies in other states, but is more extensive in scope and definitive as to intent than most. (A copy is included as Appendix A.)

Noteworthy in the Texas policy is the inclusion in the manual of actual copies of all of the forms required for the various agreements. Also included are charts summarizing the policies for accommodating kinds of utilities; and informative sketches of such things as desirable and undesirable techniques for tree pruning, and minimum cover requirements for underground lines. Taken as a whole the manual conveys a posture of open communication, which is a requisite step for engineering cooperation.

Connecticut also enjoys a good reputation for cooperation with utilities. This apparently stems in large measure from their policy of paying utilities for relocating facilities on state highways when such relocation is at the behest of the state—a policy not widely endorsed by other states. As evidence of the efficacy of its payment policy, the Department of Transportation notes that they have been performing a considerable amount of construction on municipality-maintained roads. On these projects, the municipality is responsible for arranging for the relocation of utilities. The cost of relocating non-municipality-owned utilities is not reimbursable and they are experiencing a dispro-

portionate number of claims and delays because of utilities on those projects.

Another progressive and effective procedure exists in Florida. The first paragraph of its policy manual establishes a cooperative tone.

All agencies serving the public have a common obligation to provide their services at the lowest possible cost. Highway, Railroad and Utility people should be anxious to coordinate their respective advance planning, with the objective of eliminating costly construction delays which are bound to result from unresolved right of way problems. Conflicts, problems and past disagreements stem from lack of lead time. The adoption of agreeable procedures will permit sufficient lead time to largely eliminate these difficulties. There is no conflict of interest in this area between the Department of Transportation and other affected agencies because they are all public service agents. The public they serve are both taxpayers and rate payers, who should not be obligated to pay, as taxpayers or as ratepayers, any unnecessary costs (14).

The Policy and Procedure Manual goes on to list the responsibilities of the Department of Transportation as follows:

- Furnish annually a five-year plan, including probable construction dates.
- During corridor studies, the Department is to contact all utilities along the corridor.
- The Department is responsible for notifying the utilities of all hearings along the corridor.

- After the corridor selection, the Department is to send preliminary plans to the utilities.
- The Department is to consider changes recommended by the utilities to reduce utility costs whether or not such costs are reimbursable.
- The Department is to establish liaison committees in all districts and arrange for regular meetings among them.
- Utilities are to be included in a preconstruction conference.

The manual then lists the responsibilities of the utilities:

- The utilities are to review with the Department plans for new utility construction and major changes.
- The utilities are to furnish area maps of the utilities' systems.
- The utilities are to supply data on utility structures and on prospective routes.
- The utilities are expected to cooperate with the liaison committee.
- The utilities are expected to promptly review preliminary plans issued by the Department.

To implement this policy, Florida has found it useful to create a wide-ranging and multi-tiered system of committees. Its purpose is to establish a uniform procedure for liaison between the Department of Transportation and utilities and railroads operating in the state to reduce conflicts and minimize costs. The system involves:

1. *Metropolitan Utility Coordinating Groups*—Local coordinating committees have been established throughout the state to coordinate local work and solve conflicts arising among the utilities and governmental agencies operating in and around metropolitan areas. Studies, recommendations, and advance utility relocation plans are made concerning local requirements. Lines of communication have been established with the District Liaison Committees to coordinate with Department projects and, when required, recommendations and suggestions are given to the Florida Utilities Coordinating Committee.

2. *Florida Utilities Coordinating Committee*—Department personnel may be instructed to attend meetings of the Utilities Coordinating Committee, a voluntary association of representatives of road groups. Problems of mutual concern are studied and discussed in the quarterly meetings. The Committee has produced and distributed maps defining the zones of operation of the power and telephone companies and other material of assistance in negotiations for utility adjustments. The Committee participates in negotiations for utility adjustments. The Committee fosters better public relations and a clearer understanding of the plans and problems of the represented utilities and agencies, with the primary objective of coordinating the activities of all utilities in the state to provide minimum interference with other organizations. To accomplish this, subcommittees are assigned to investigate and advise the Committee on such items as governmental procedures and operational methods, utility accommodation policies, utility easement dedication, permit handling, etc.

3. *District Liaison Committees*—Semiannual meetings are held in each of the Department's districts for the purpose of accomplishing utility adjustments that will:

- a. provide maximum safety to the traveling public and to the maintenance workers of the highway and utility industry;
- b. provide adequate protection to the highway and utility plants;
- c. be performed in such expeditious manner that an accelerated highway program will not be delayed; and
- d. be performed at absolute minimum cost, inconvenience, and delay to the highway and utility industry.

Also in Florida, the AASHTO/IRWA Liaison Committee encourages mutual advance planning procedures. The Committee avoids discussions on such things as geometric design and the reimbursement of costs and focuses on points of mutual cooperation.

After twelve years of successful experience with the policy, Florida's Utility Engineer reports that in the last four years some problems have developed simply because the policies are not being carried out. This is attributed to the inevitable change in personnel through attrition over the years, and the fact that new people do not have the same perspective and experience as those who have dealt with the situation for several years. Another factor contributing to the diminishing results is that both the Department of Transportation and the utility companies have suffered cutbacks in funds because of economic conditions and the Utility Liaison Committees are often the first feature to be eliminated from budgets.

The successful Caltrans experience is largely attributed to the decentralization of utility responsibility within the state. On the matter of utilities not known to exist, Caltrans' policy requires all high-risk facilities to be positively located by "pot-holing" (excavation), by probing, or other positive methods, at 100-ft (30-m) intervals. The owners of the utilities are required to do the locating and a utilities' agreement is entered into when there is state financial liability for the work (15). Each district is responsible for recording both alignment and elevation to the nearest 0.1 ft (0.03 m), and the information must be included on the contract plans.

On the matter of utilities' committees, California Assembly Bill Number 3019, not yet signed by the governor, would require all utilities to become members of a regional notification center and share in the costs of such a center.

The California experience may be contrasted with Illinois. In Illinois the Department of Transportation will request field location of utility facilities only after receipt of a notice from a contractor (16). If the utilities then fail to field locate, the Department will reimburse the contractor for the cost of locating facilities. Like California, Illinois places responsibility for utility adjustments with the District Engineer. Unlike California, on other than Interstate work, Illinois will pay for utility relocations only if the utilities are located on a private right-of-way. California may reimburse utility relocations on state highways.

In 1980 the Federal Highway Administration published a two-part history on federal policy for utility relocation (3). This history demonstrates the trend of highway interests to pay for the cost of utilities' relocations.

The report states that between 1954 and 1955 about half of the states required utilities to move their facilities at their own expense when highway improvements were necessary. Also, to facilitate improvement of the highway, utilities could be required to move their facilities "by a reasonable exercise of police power." The report notes that for small utilities, the cost of

relocation could be beyond their fiscal ability to pay. Any such payment, of course, must be passed on to customers of the utility. Thus, customers in affected areas would pay more than customers in unaffected areas.

The 1956 Federal-Aid Highway Act addressed this problem forthrightly. Under the terms of the act it was acceptable for federal aid to be used to pay for utilities as long as such payments were consistent with the laws of the state. As the report noted, "like any other construction cost item, utilities were eligible for federal participation only to the extent that the states were required to pay for such relocation." Sixteen states enacted laws making payments valid. "The only requirement was that the state has legal authority to do so." By 1980, 39 states had the authority to pay for utility relocations. However, about half of those states limit reimbursements to utility adjustments on Interstate highway projects.

Another significant contribution of the Federal Highway Administration occurred when, "it was administratively determined that it was in the public interest to perform by force account the adjustment of utilities." This effectively exempted the utilities from the traditional requirement for competitive bidding.

An NCHRP study published the same year as the FHWA history summarized its findings in part this way (17):

If utilities that are located in or along State highways or rights-of-ways must be relocated, the interest, if any, held by the utility must be analyzed in order to determine whether the State or the utility must bear the cost. Occasionally, utility facilities are located on property that the utility has acquired, such as an easement or right-of-way. In that instance, the rule universally is that the State must pay relocation cost if, during highway construction or improvement, it requires that the utility relocate its facilities. The reason is that the agency's action constitutes a taking or damaging of private property for public use. In this situation, the courts have rejected any argument that the State may compel removal or relocation without paying damages on the basis that a relocation is mere regulation pursuant to an exercise of the police power.

Rather than having an easement or fee interest, the utility is more likely to locate its facilities in accordance with the terms of a franchise, permit, license, or other agreement. In these instances, unless there is statutory authority for paying relocation cost, the general rule is that the utility must bear its own cost when required to relocate or remove its facilities in order to accommodate highway improvements. Although utilities have made several arguments in an attempt to overcome this common law rule, it appears that only an act of the legislature can shift the burden of paying relocation cost from the utility to the transportation or highway agency.

FROM THE UTILITY POINT OF VIEW

Utility companies can be an important source of ideas on how to reduce time and costs. For example, Commonwealth Edison points to these case histories (A.R. Heidecke, personal communication):

Case 1. Eleven poles and 138 underground and 12 KV cables were in conflict with the project. Because of early receipt of

plans, three pre-utility meetings were held wherein IDOT was able to adjust their sewer to eliminate our conflict, which in turn made our overhead adjustments less complex. End result—Edison work 75% completed by preconstruction time. Also substantial savings to C.E. Co.

Case 2. Edison conflict consisted of distribution poles and 1 transmission tower. Again because of early issue of plans by IDOT, Edison coordinated all utility adjustments in the area and requested pre-letting meetings with eligible contractors so they would be aware of the utility involvement and the time involved to relocate utility facilities. Because of the pre-letting meeting, contractors staged their work to begin where no facilities were involved. Consequently, Edison's adjustments were completed by the time the contractor began work in that area.

Case 3. Adjustment was required to six Edison transmission towers. Because of advanced knowledge of improvement by Edison from IDOT's fiscal-year improvement program, Edison was able to alert IDOT at an early stage. This advanced planning allowed sufficient time to order poles and again, pre-utility meetings were held; consequently, all of Edison's facilities were relocated before construction started.

Case 4. The widening of a 4-mile stretch of highway involved a conflict with 200 Edison poles and 50 overhead crossings. IDOT requested removal of facilities or placement underground. Because of a \$4,000,000 cost for underground plus cost to 110 customers for converting to underground service, Edison began research to determine ways to eliminate some of the cost. It was learned that a lighting system was to be installed at a \$2,000,000 cost to the villages. Many early meetings were held between Edison, the state, and the villages with the following results: Edison designed a square tapered pole that carried the conductors on the street light mast arm and that would accommodate the villages' lighting requirements. Edison reduced the number of poles from 200 to 90 and reduced the crossings from 50 to 10, which more than satisfied the IDOT and cost Edison \$790,000 rather than the \$4,000,000 underground request.

Case 5. East River Road Bridge over Kennedy Expressway. Because of very detailed presentations to Illinois Department of Transportation and Federal Highway Administration, Edison was allowed to attach a 10-duct system to the proposed bridge. This approval was obtained after two rejections. The state indicated their final approval was based on the fact that the research presented indicated no other alternative routes and the fact that Edison would use the state's contractor to do the work. The bridge attachment saved Edison \$550,000.

Case 6. Raising 23 bridges, 18 with Edison facilities attached. Again because of early receipt of plans, Edison was able to plan and engineer each location and submit detailed plans between January 17th (first meeting) and April 28th (third meeting). Edison was commended for their early planning and were requested to coordinate pre-bid meetings with contractors so they may bid with knowledge of utility operations.

Heidecke, who supplied those cases, clearly believes in the efficacy of planning, research, and coordination, which reduced his company's costs by nearly \$4,000,000 in those six cases alone. He is among those who reiterate that the same people within highway and utility organizations should deal with each other on all matters. That is, whether a highway department approaches a utility company to move a facility, or the utility company approaches a highway department for a permit for a new line, the same people should be communicating with each other in both cases.

CHAPTER FIVE

SOME RECOMMENDATIONS

The efficacy of liaison committees seems to have won great favor with both highway interests and utility interests. Kuykendall (12) states that,

interaction of utilities and regulating agencies working collectively through an organized mechanism produces superior results to those achieved by an individual organization.

He goes on to cite a recommended framework for a coordinating group:

- Set of by-laws
- Name of the group
- Goals and objectives
- Priority of projects and programs
- Subcommittee responsibilities and constraints

In the FHWA report (13), it is noted that 54 percent of the communities in the United States and Canada have utilities coordinating committees, most of which are informal. Formal committees have by-laws and make recommendations. (In a very small number of cases, such committees make binding decisions.) The more successful groups tend to be those organized on a more formal basis.

The sense of a "call-before-you-dig" program can hardly be opposed. Kuykendall reports that one of the more popular call-before-you-dig techniques is the single telephone number concept. "One-call-notification supporters . . . report that reducing the dig-in damage rate by 30 to 50 percent is not uncommon" (12).

Heidecke also asks that utilities be invited to pre-bid meetings and urges that utilities be authorized to do their work as soon as the highway design is complete and *not* wait until the highway contract is awarded. If changes are made in the design after the utility is relocated but before the highway contract is awarded, then the utility would need to be reimbursed for the second move. But he estimates that nine times out of ten this would not happen, with the implications that the savings earned in the nine successful early moves would more than offset the costs of the unsuccessful tenth.

Williams (18) corroborated many of these thoughts when he stated that "liaison can be defined as a form of appreciation; that is, appreciation of the views and problems of others and taking the necessary steps toward making an overall plan that resolves or compromises differences."

As a result of surveying all 50 states, Williams clearly favors a strong, centralized, utility coordinator and makes these conclusions, among others:

- A reduction of the number of interdepartmental review contacts would reduce processing time, which would reduce delay and costs and increase lead time for utility relocations.

- One well-organized utility group can achieve better working conditions, such as flow of communications, coordination, effort, and working relationship, than can a fragmented group working independently.

- A well-organized utility group can review and process relocations on a more consistent basis, which provides better public relations.

- More efficient processing review of utility proposals can reduce internal cost by minimizing duplication of effort.

- More efficient processing of utility proposals will enable faster highway construction work, which will cause fewer traffic conflicts, delays, accidents, and detours.

Three of those conclusions speak to reducing costs—contracting costs, departmental costs, utility costs, and public costs.

How much will they be reduced? In another context Williams reported that his department, through the use of master agreements and standardized manuals, methods, and procedures, now accomplishes with five people what previously needed fourteen.

Williams also supports the notion of pre-bid conferences, with prospective contractors and the utilities companies in attendance, so that the contractors can ask questions directly to the utility representatives before they put their bids together.

Laube (19) posits that "to simply say that all utilities are required to be adjusted before the highway project is advertised is being naive and provides a false impression."

Laube cites three deficiencies in the highway-utility system that require correction. The first deficiency is in the utility organization, which accomplishes too little work between authorization to proceed and the award of the highway contract. The second deficiency is in the highway organization, which relies too much on sequential assignment of responsibilities. The third deficiency is the lack of communication between the contractor and the utility.

Laube's thesis envisions three nodes and three connectors. Two nodes and one connector are faulty (see Figure 1). Laube's solution is in concert with both Williams and Heidecke. He proposes providing a Utility Coordinator from the highway organization to correct all three deficiencies. Like Heidecke, he sees the sense of one person, or office, handling both inflow and outflow with utilities. Like Williams, he supports a strong central source. Because, he says, "this is a function that spans both sides of the advertisement" (meaning the advertising for bids).

The Williams research, which is parallel to the Laube thesis,

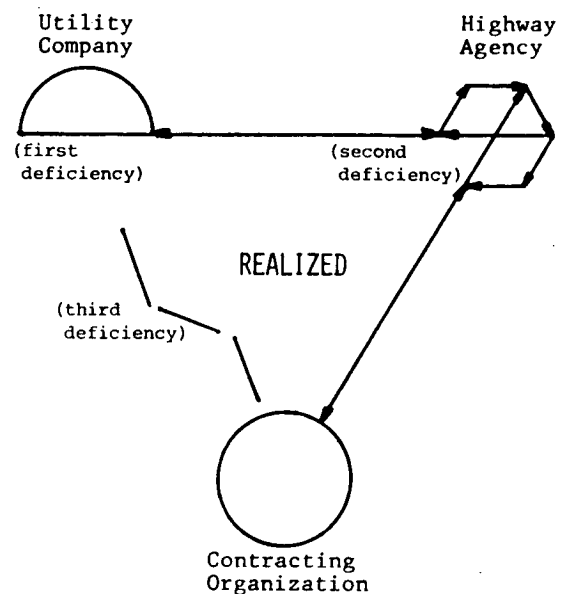
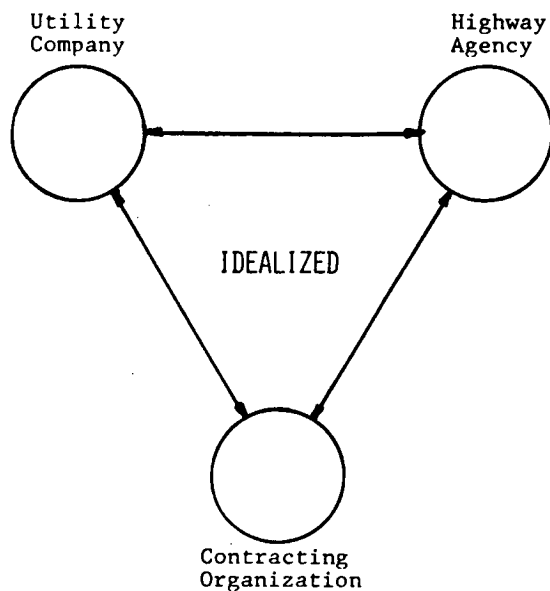


FIGURE 1 The highway/utility system [after Laube (19)].

also uncovered some evidence of differing opinions (18). Williams found that 19 agencies accept the notion that the utility function should be at the division level for such reasons as:

1. Placing it at division level would ensure that the utility-relocation function is included in all planning stages.
2. The utility-relocation function involves all stages of highway projects, and the procedures and inspections used are specialized and do not relate to other divisions.

On the other hand, 25 agencies reject these notions, largely because they find the present lower level satisfactory.

The FHWA study (13) notes the trend toward placing new systems underground and converting aerial facilities to underground systems. The report states that 87 percent of utilities have a call-before-you-dig program. However, in only 35 percent of the communities is there a central telephone to reach utilities. Between 95 and 98 percent of the utilities provide the field location service to locate buried facilities. However, about 40 percent of these programs depend entirely on records to mark the location of buried facilities, and record systems are not always reliable. Instruments are used about 50 to 60 percent of the time.

The foregoing clearly points to the need for effective delineation of underground utilities. Indeed, some utility engineers have pointed out that the failure of the utility companies to accurately locate their facilities is the primary cause of delays during construction. One would suppose, therefore, that requiring, or at least encouraging, all utility companies to supply

state highway departments with maps of utility locations would be the ideal step to take toward reducing this problem. This is now what is being done in Florida. However, there has been considerable resistance to this notion by utility companies, largely because of the costs involved. One telephone company has estimated the national cost of providing such maps to be on the order of \$100,000,000. Thus, the benefit of such extensive mapping would not seem to be justified by the cost. But, as a compromise idea, a midwestern utility proposes location maps for all new facilities (those built from now on) but supports other utility representatives who say that the overall cost of catching up and locating all existing utilities would be prohibitive.

On the matter of the states enacting legislation to pay for the relocation of all utilities on state highway work, some utility engineers believe that there is a trend toward more participation by the states. For example, Virginia is now paying for more municipally owned utilities than was the case in the past. Nevertheless, there is the perception among many utility engineers that even if the states paid for all utility relocations problems would still persist.

Yet, there remains the compelling notion that states would find a more accommodating posture among utilities if the states were to pay the utilities for relocating their facilities when it is in the sole interest of the state for the utility to do so. There is a fundamental deterrent to enforcing prompt action when such action is at the expense of the acting party. Furthermore, there is an unseemly distortion to the image of states enacting laws to pay for utility relocations only when a substantial portion of those payments will come from the federal government.

SOME PROBLEMS TO BE SOLVED

Some of the problems that need to be addressed in this area include:

- Determining reasonable lead time for engineering, procurement, and performance for utility relocations;
- Determining the equitable distribution of responsibility among highway owners, utility owners, and contractors when things go wrong;
- Developing a reliable, inexpensive, and simple device for locating subsurface facilities; and

- Developing a continuity of concern, and a recallable memory of successes and failures, amidst changing personnel.

RESEARCH NEEDS

There is a paucity of reliable, verifiable data on costs of performing highway construction because of utility conflicts, and the cost of performing utility work because of highway conflicts. Because all such costs have to be authorized and disbursed for the approval of others, they must be recorded, and therefore are discoverable. The discovery and collation of such data would be of inestimable value in taking the measure of the highway/utility problem.

REFERENCES

1. "Policies and Procedures for the Accommodation of Utilities within Highway Right of Way." New Jersey Department of Transportation (Dec. 1973).
2. "Highway Statistics 1982." Federal Highway Administration, Washington, D.C. (1983).
3. Kirk, J. E., "Utility Relocation and Accommodation: A History of Federal Policy Under the Federal-Aid Highway Program." Part I: Utility Relocation. Federal Highway Administration, Washington, D.C. (June 1980).
4. Survey of Contractor Protests on Caltrans Contracts Compiled between July 1, 1976 and June 30, 1977 (unpublished).
5. Utility Agreement No. 3 between New Jersey Department of Transportation and New Jersey Bell for Route 1, Section 2D, 3D, 4B, 5C, & 6M (Nov. 1978).
6. "Supplementary Specifications." California Department of Transportation (1981).
7. "Special Provision for Delays Caused by Unknown Utilities." Illinois Department of Transportation, Preliminary Draft (April 2, 1982).
8. "Construction Supervision Manual." New York State Department of Transportation (1982).
9. "Time Schedules for Relocating Utility Facilities Affected by State Public Construction Contracts." Engineering Instruction EI 82-4, New York State Department of Transportation (1982).
10. Highway Research Board, *Special Report 91: Relocation of Public Utilities 1956-1966: An Analysis of Legal Aspects*. Highway Research Board, National Research Council, Washington, D.C. (1966) 86 pp.
11. "Utility Accommodation Policy." State Department of Highways and Public Transportation, Austin, Texas (July, 1974).
12. Kuykendall, C. R., "Need for and Application of Utility-Transportation Coordination." *Transportation Research Record 571: Utility Facilities in Transportation Corridors*. Transportation Research Board, National Research Council, Washington, D.C. (1976) pp. 17-27.
13. "Accommodation of Utility Plant Within the Rights of Way of Urban Streets and Highways: State of the Art." Federal Highway Administration, Washington, D.C. (July 1974). 160 pp. Also published as Special Report No. 44, Amer. Public Works Assn. (July 1974).
14. "Utility Manual: Volume I." State of Florida, Department of Transportation (1981).
15. "Policy on High and Low Risk Underground Facilities within Highway Rights of Way." California Department of Transportation.
16. "Supplemental Specification for Cooperation with Utilities." Illinois Department of Transportation, draft (Feb. 24, 1982).
17. Thomas, L. W., "Payments to Public Utilities for Relocation of Facilities in Highway Rights-of-Way." National Cooperative Highway Research Program, Research Results Digest 116, Transportation Research Board, National Research Council, Washington, D.C. (Feb. 1980).
18. Williams, R. L., "Coordinating Utility Relocations as a Function of State Highway Agencies." *Transportation Research Record 631: Geometrics, Water Treatment, Utility Practices, Safety Appurtenances, and Outdoor Advertisement*. Transportation Research Board, National Research Council, Washington, D.C. (1977) pp. 56-61.
19. Laube, A. F., "How to Minimize Highway Construction Delays." *Right of Way*, Vol. 28, No. 4 (August 1981) pp. 27-29.

APPENDIX A

TEXAS UTILITY ACCOMMODATION POLICY

Utility Manual

**UTILITY
ACCOMMODATION
POLICY**

Governing

**ACCOMMODATION, LOCATION AND METHODS
FOR INSTALLING, ADJUSTING, ACCOMMODATING
AND MAINTAINING
UTILITY LINES ON THE STATE HIGHWAY SYSTEM**



**STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION**

Austin, Texas

Rev. 8-75

Adopted July, 1974

Plate 8

Utility Manual

MINUTE ORDER 69035

WHEREAS, proper regulation of the accommodation, location, and methods for installation and adjustment of all utility lines on the State Highway System is necessary for safety, public service and orderly development; and

WHEREAS, it is the desire of the Commission that such regulations be established and uniformly administered in a manner which will be in the best interest of the Highway System and public use thereof, with due consideration given to the public service afforded by adequate and economical utility installations; and

WHEREAS, the publication of a policy establishing regulations for all utilities was implemented by Minute #52971, dated June 28, 1963; and

WHEREAS, the expansion of the highway and utility systems requires a re-evaluation and revision to the present Utility Policy.

NOW, THEREFORE, IT IS ORDERED that Minute #52971 be and is hereby rescinded; and

FURTHER, that the attached Utility Accommodation Policy be and is hereby adopted for guidance in the regulation of utility installations, adjustments, relocations and accommodation on all highways and Farm-to-Market Roads under the jurisdiction of the Texas Highway Department.

July 31, 1974

Utility Manual

MINUTE ORDER 70376

WHEREAS, proper regulation of the accommodation, location and methods for installation and adjustment of all utility lines on the State Highway System is necessary for safety, public service and orderly development; and

WHEREAS, it is the desire of the State Highway and Public Transportation Commission that such regulations be established and uniformly administered in a manner which will be in the best interest of the Highway System and public use thereof, with due consideration given to the public service afforded by adequate and economical utility installations; and

WHEREAS, the publication of a policy establishing regulations for all utilities was implemented by Minute #69035, dated July 31, 1974; and

WHEREAS, changes in method and technology of the highway and utility systems require a re-evaluation and revision to the present Utility Accommodation Policy.

NOW, THEREFORE, IT IS ORDERED that the attached revisions be and are hereby adopted to supplement the Utility Accommodation Policy as promulgated by Minute Order #69035 for guidance in the regulation of utility installations, adjustments, relocations and accommodation of all highways and Farm-to-Market Roads under the jurisdiction of the State Department of Highways and Public Transportation.

August 18, 1975

Utility Manual
UTILITY ACCOMMODATION POLICY

TABLE OF CONTENTS

INTRODUCTION

- 101. Purpose
- 102. Application
- 103. Scope
- 104. Prior Instructions
- 105. Exceptions
- 106. Authority of Utilities

DEFINITIONS

- 201. Utilities
- 202. Low Volume Highways
- 203. High Pressure Gas Lines
- 204. Clear Roadside Policy
- 205. Pavement Structure
- 206. Active Project
- 207. District Engineer

GENERAL

- 301. Location
- 302. Design
- 303. Aesthetics
- 304. Safety

PIPELINES

- 401. General
- 402. High Pressure Gas and Liquid Petroleum Lines
- 403. Low Pressure Gas Lines
- 404. Water Lines
- 405. Sanitary Sewer Lines

UTILITY LINES ON STRUCTURES

- 501. Utility Structures
- 502. Traffic Structures

OVERHEAD POWER AND COMMUNICATION LINES

- 601. General

UNDERGROUND POWER LINES

- 701. General

Utility Manual

UNDERGROUND COMMUNICATION LINES

801. General

IRRIGATION AND DRAINAGE PIPES DITCHES AND CANALS

901. General

MISCELLANEOUS

1001. General

FORMS

- 1101. General
- 1102. Use and Occupancy Agreement Forms
- 1103. Notice Forms
- 1104. Abandoned Interests
- 1105. Examples

1201. OUTLINE OF POLICY - Chart1202. ILLUSTRATION OF DEPTH REQUIREMENTS

Fig. 1 With encasement

Fig. 2 Without encasement (High Pressure Gas and Liquid Petroleum)

Utility Manual

UTILITY ACCOMMODATION POLICY

1 - INTRODUCTION101. PURPOSE

This policy is established to regulate the accommodation of utilities within the rights of way of highways on the State Highway System. It provides certain administrative procedures and establishes requirements for the location and method of installation, adjustment and maintenance of utilities including privately-owned lines. This policy is developed in the interests of safety and protection, utilization and future development of highways with due consideration given to public service afforded by adequate and economical utility installations.

102. APPLICATION

This policy shall apply to new utility installations, to additions to existing installations, to adjustments or relocations of utilities incident to highway construction and to existing utility installations retained within the rights of way of highways under the jurisdiction of the State Department of Highways and Public Transportation. It does not apply retroactively to utility facilities presently located within the rights of way of completed highways unless such facilities constitute a definite safety hazard to the traveling public.

103. SCOPE

While this policy governs on matters concerning accommodation, location and methods for the installation, adjustment, relocation and maintenance of utilities on highway rights of way, it does not alter current policies pertaining to authority for their installation nor determination of financial responsibilities for placement or adjustment thereof. Where industry or governmental codes, orders or laws require utilities to provide a higher degree of protection than provided herein, the higher degree of protection shall prevail.

104. PRIOR INSTRUCTIONS

This policy shall supersede and replace all portions of policies pertaining to the accommodation, location and methods governing utility installations, adjustments and maintenance which are in conflict herewith. Accordingly, Commission Minute #52971 has been rescinded, and Administrative Circulars 151-63, 27-65, 118-67 are cancelled. Portions of this policy pertaining to controlled access highways conform to and supplement the American Association of State Highway and Transportation Officials policy entitled "A Policy on the Accommodation of Utilities on Freeway Rights-of-Way", as adopted on February 15, 1969, and any future modifications thereto and Policy and Procedure Memorandum 30-4.1 dated November 29, 1972, and amendments thereto.

105. EXCEPTIONS

Exceptions to any provisions contained in this policy may be authorized by the State Engineer-Director for Highways and Public Transportation in any instance where it is shown that extreme hardship and/or unusual conditions provide justification and where alternate measures can be prescribed in keeping with the intent of this policy. All requests for such exception shall be fully documented with design data, cost comparisons, and other information which may be pertinent.

Utility Manual

106. AUTHORITY OF UTILITIES

Under existing State laws, various utility firms and agencies have a right to install their lines along and/or across highway right of way. This includes those firms which are authorized by the laws of this State to transport and/or distribute natural gas, water, electric power, telephone (including CATV), and salt water and those which are authorized to construct and operate common carrier petroleum and petroleum product lines.

Private lines should normally be allowed to cross, but should not be permitted longitudinally on highway right of way. This includes but is not limited to privately owned lines from gas or oil wells, lines owned by oil companies within refinery and oil storage complexes, by firms which are engaged in businesses other than those described in the previous paragraph and domestic lines owned by individuals.

Utility Manual

2 - DEFINITIONS201. UTILITIES

This term, where used herein, applies to all lines and/or their accessories within the highway rights of way except those for highway oriented needs. Such utilities may involve underground, surface or overhead facilities either singularly or in combination.

202. LOW VOLUME HIGHWAYS AND LOW VOLUME FARM TO MARKET ROADS

Any roadways other than controlled access highways which carry traffic volumes of 750 vehicles per day or less and upon which projected traffic volume at the design year is not anticipated to exceed 1,300 vehicles per day.

203. HIGH AND LOW PRESSURE GAS LINES

High pressure gas lines are pipelines which carry a gaseous substance and which are operated or may reasonably be expected in the future to operate at a pressure of over 60 pounds per square inch. Conversely, low pressure gas lines are those with an operating pressure not expected to exceed 60 pounds per square inch.

204. CLEAR ROADSIDE POLICY

A policy to increase safety, improve traffic operation, and enhance the appearance of highways by designing, constructing, and maintaining highway roadsides as wide, flat and rounded as practical and as free as practical from physical obstructions above the ground and travel way such as trees, drainage structures, massive sign supports, utility poles, and other ground-mounted obstructions.

205. PAVEMENT STRUCTURE

The combination of the surface, base course, subbase and up to 8 inches of stabilized subgrade material which supports the traffic load and distributes it to the roadbed. A maximum of 8 inches of subgrade stabilization is to be considered a part of the pavement structure.

206. ACTIVE PROJECT

A highway project for which any phase of development has been programmed or an I.P.E. issued. A project is considered "active" until construction is completed and the project is placed under maintenance.

207. DISTRICT ENGINEER

District Engineer as referred to herein shall mean the District Engineer of the State Department of Highways and Public Transportation.

Utility Manual

3 - GENERAL301. LOCATION

(1) Utility lines shall be located to avoid or minimize the need for adjustment for future highway improvements and to permit access to the utility lines for their maintenance with minimum interference to highway traffic.

(2) On controlled access highways, the location shall permit maintenance of the utility by access from frontage roads where provided, nearby or adjacent roads and streets, or trails along or near the highway right of way line, to the extent practicable, without access from the through traffic roadways or ramps.

On designated controlled access highways where frontage roads are not provided and where it is necessary to accommodate a longitudinal trunkline or transmission type utility line within the right of way, a multiple use area may be established by an inward relocation of the control of access line to the extent necessary to permit installation of the utility facility outside the access control limits. The relocation of the control of access line is for utility installation and maintenance purposes only and does not alter the denial of access as regards property adjoining the right of way line. Aerial installation will be limited to self-supporting, single pole construction and the multiple use area will be serviced without access from the through traffic roadways or ramps as discussed above.

(3) Longitudinal installations shall be located on uniform alignment as near as practicable to the right of way line to provide space for future highway construction and for possible future utility installations.

(4) On highways with frontage roads, longitudinal utility installations will be located between the frontage roads and the right of way line. Utility lines shall not be placed or remain in the center median, or beneath through-traffic roadways, ramps or connecting roadways (including shoulders).

(5) Utility lines crossing the highway should be located at approximate right angles to the highway to the extent feasible and practicable. Reasonable latitude may be exercised as regards the crossing angle of existing lines which are otherwise qualified to remain in place.

(6) The horizontal and vertical location of utility lines should conform with the clear roadside practices of the Department, consistent with the clearances applicable to all roadside obstacles.

(7) In utility installations, consideration shall be given to State and local requirements.

Utility Manual

302. DESIGN

(1) The design of any utility installation will be the responsibility of the utility company. Any installation within the highway right of way must be reviewed and approved by the Department with regards to the location and the manner of adjustment. This includes the measures to be taken to preserve the safety and free flow of traffic, structural integrity of the roadway or highway structure, ease of highway maintenance, appearance of the highway, and the integrity of the utility facility.

Utility installations on, over or under the right of way of the State Highway System shall conform with requirements contained herein and/or, as a minimum, the appropriate requirements outlined in the following:

(a) Electric power and communication utility installations

- (1) National Electric Safety Code
- (2) Safety Rules for the Installations and Maintenance of Electric Supply and Communication Lines - National Electric Safety Code

(b) Water lines - American Water Works Association

(c) Gas pipelines - Title 49, CFR, Part 192, Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards and amendments.

(d) Liquid petroleum pipelines - Title 49, CFR, Part 195, Transportation of Liquids By Pipelines and amendments.

(e) Latest American Society for Testing and Materials (ASTM) specifications.

(2) All utility installations will be of durable materials designed for long life expectancy and relatively free from routine servicing or maintenance. In addition to the requirements herein, any existing utility lines to remain in place must be of satisfactory design and condition in the opinion of the District Engineer.

(3) Care shall be taken in utility installations to avoid disturbing existing drainage facilities. Underground utility installations should be backfilled with pervious material and outlets provided for entrapped water. Underdrains shall be provided where necessary. No jetting or puddling beneath the roadway will be permitted.

(4) On new installations or adjustment of existing utility lines provision for known or planned expansion of the utility facilities may be made, all at the sole expense of the utility firm. Any such expansion should be planned so as to minimize hazards and interference with highway traffic at a future date.

Utility Manual

(5) Manholes shall be limited to those necessary for installation and maintenance of underground lines. In no case shall they be placed or permitted to remain in the pavement or shoulders of high volume roadways except at those locations on non-controlled access highways in urban areas where necessary for existing lines which may be permitted to remain in place under existing or proposed roadways. Manholes may remain in place or be installed under traffic lanes of low volume roadways in municipalities provided measures are taken to minimize such installations and to avoid their locations at intersections insofar as possible.

Manholes vary as to size and shape depending on the type of utility they serve. To conserve space their dimensions should be the minimum acceptable by good engineering and safety standards. Where soil conditions require, outside forms shall be used. In general the only equipment to be installed in manholes located on highway right of way is that which is essential to the normal flow of the utility, such as circuit reclosers, cable splices, relays, valves and regulators. Other equipment such as sub-station equipment, large transformers, pumps, etc. should be located outside the limits of the highway right of way. All manhole covers shall be installed flush with the ground and/or pavement surface, whichever is applicable. Manhole covers shall have sufficient structural capacity to withstand vehicular loading.

303. AESTHETICS

(1) To protect trees and shrubbery on the highway right of way the Department shall specify the extent and methods of tree removal and trimming in making underground or overhead utility installations. Where justified by conditions, the Department may permit removal of trees or shrubbery of value to the highway, contingent upon replacement in kind by the utility firm.

(2) The Department shall specify prompt replacement of sod, removal of debris and any other restoration necessary to place the highway in condition equal to that prior to the utility installation.

(3) There is no legal authority whereby the State may expend highway funds to relocate or adjust utilities for aesthetic purposes nor is there any legal authority to require utility owners to expend funds for such purpose. Nevertheless, consideration is to be given to the aesthetic features of new and relocated utility installations and utility owners may voluntarily elect and are encouraged to place their facilities in such a manner as to achieve an aesthetic environment.

304. SAFETY

Appropriate measures shall be required in the interests of safety, traffic convenience and access to adjacent property. Necessary signs, barricades, and protective devices shall be used, as required by the District Engineer, in order to warn highway users and to provide protection to workers and the traveling public.

Utility Manual

4 - PIPELINES401. GENERAL(1) Method of Protection

(a) Encasement. In general underground utility line crossings shall be encased in the interest of safety, protection of the utility, protection of the highway, and for access to the utility. Encasement shall be as specified for each type of line discussed herein. Casing shall consist of a pipe or other separate structure around and outside the carrier line and shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the casing shall equal or exceed structural requirements for drainage culverts and it shall be composed of materials of satisfactory durability under conditions to which it may be subjected.

(b) Optional for Gas or Liquid Petroleum Pipelines. Welded steel pipeline crossings may be installed without encasement provided such pipelines conform with 49 CFR, Part 192, Transportation of Natural and Other Gas By Pipeline or Part 195, Transportation of Liquids By Pipeline as applicable. In accordance thereof such pipelines shall provide (1) increased wall thickness and/or higher strength steel, (2) greater depth of cover and (3) adequate markings as specified for each type of line discussed herein. Such pipelines shall also be designed to withstand internal design pressures and the superimposed loads of the roadway and traffic, including that of construction machinery.

(2) Manholes. Manholes serving this type of utility should be straight on line installations with a minimum overall width necessary to operate and maintain the enclosed equipment.

(3) Depth of Underground Lines. The depth of underground lines shall be as specified herein for each type of utility. Where placements at such depths are impractical or where unusual conditions exist, the Department shall specify other protection as may be appropriate in lieu of the depth of bury required for the particular utility line.

(4) Methods of Installation.

(a) Lines placed under any existing roadway shall be installed by boring or tunneling in accordance with appropriate specifications. Jacking may be used only when approved by the District Engineer. When installed by jacking or boring, encasement of the line may be required. Bore pits should be located at least thirty feet from the edge of the nearest through traffic lane and not less than twenty feet from the edge of pavement on ramps. On low traffic roadways and frontage roads, bore pits should not be less than ten feet from the edge of pavement or five feet from face of curb. Adequate warning devices, barricades and protective devices will be used to prevent creation of a traffic hazard. Where circumstances necessitate the excavation of a bore pit closer to the edge of pavement than set forth above, guard fence or other approved protective devices will be installed for protection of the traveling public in accordance with current Departmental standards. Bore pits shall be located and constructed in such a manner as not to interfere with highway structural footings, safe roadside clearance or traffic operations. If necessary, shoring shall be utilized.

Utility Manual

(b) The use of explosives for any excavations on the right of way incident to utility line installation shall be permitted only when the Department has adequate assurance that no damage or hazard will be caused thereby. Such assurance should normally include detailed plans and procedures approved by a person who is qualified and experienced in the use of demolitions.

(c) Where longitudinal trenching on the right of way is permitted, backfill shall be compacted to densities equal to that of the surrounding soil. Trenching across jointed concrete pavement should not be permitted, and in no instance shall trenching across continuously reinforced concrete pavement be permitted. Exceptions may be made to permit trenching across low volume roadways or urban noncontrolled access roadways where conditions justify. Where trenching across other type pavements is justified, the Department shall specify detailed methods for removal and replacement of embankment, base and surfacing.

(5) Conditions which are generally unsuitable or undesirable for pipeline crossings should be avoided. These include locations such as deep cuts; near footings or bridges and retaining walls; across intersections at-grade or ramp terminals; at cross-drains where flow of water, drift or stream bedload may be obstructed; within basins or an underpass drained by a pump if pipeline carries a liquid or liquified gas; and in wet or rocky terrain where minimum depth of cover would be difficult to attain.

(6) Vertical and horizontal clearances between a pipeline and a structure or other highway or utility facilities should be sufficient to permit maintenance of the pipeline and the other facilities.

(7) Drainage Easements. Where it is necessary for pipelines to cross drainage easements, outside of the right of way, the same minimum depth of cover shall be maintained as required for crossing ditches inside of the right of way. In cases where soil conditions are such that erosion might occur or where it is not feasible to obtain specified depth, it shall be the responsibility of the utility owner to install retards, encasement, concrete slabs over the pipe, or take such other measures as needed for safety and to protect the highway and the pipe line. Where grades on the pipelines must be maintained, such as gravity flow sewer lines, each case will be worked on an individual basis, keeping in mind that the main purpose of the channel is to carry drainage water and that this flow must not be obstructed.

402. HIGH PRESSURE GAS AND LIQUID PETROLEUM LINES

(1) Depth of Cover.

(a) For encased high pressure gas or liquid petroleum lines the minimum total clear depth of cover for casing pipe shall be thirty inches. For that portion of the carrier line outside of the casing pipe the minimum depth of cover within the highway right of way shall be thirty-six inches. Exceptions may be authorized to permit existing lines to remain in place with a reduction of six inches in the above specified depths of cover. All lines normally shall be a minimum of eighteen inches or one-half the diameter of the pipe, whichever is greater, beneath the bottom of the pavement structure. Where materials and other conditions justify, such as on existing lines with encasement which are to remain in place, a minimum depth under the pavement structure of twelve inches or one-half the diameter of the pipe, whichever is greater, may be permitted.

(b) For unencased high pressure gas or liquid petroleum lines the minimum depth of cover shall be sixty inches under the pavement surface or eighteen

Utility Manual

inches under the pavement structure, whichever is greater. Under ditches the minimum depth of cover shall be forty-eight inches. Exceptions may be authorized to permit a reduction in the specified depths of cover where the pipeline is protected by a reinforced concrete slab.

As used herein, depth of lines is the depth to top of carrier, (if unencased) or casing (if required). For graphic illustration, see Figure 1 and Figure 2.

(2) Crossings. Pipeline installations across highways may be encased or unencased. Where encasement is to be employed such encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets, and five feet beyond any overpass or other structure where the line passes under it. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards.

Where encasement is not employed the welded steel carrier pipe shall provide sufficient strength to withstand the internal design pressure and the dead and live loads of the pavement structure and traffic. Additional protective measures should include the following:

- (a) Heavier wall thickness and/or higher factor of safety in design
- (b) Adequate coating and wrapping
- (c) Cathodic protection
- (d) Other measures as required by Title 49, CFR, Part 192 or Part 195

The minimum length of the additional protection as set forth above shall be the same as that required by encasement.

Existing lines under low volume Farm-to-Market Roads and low volume highways may be permitted to remain in place without encasement or extension of encasement if they are protected by a reinforced concrete slab or equivalent protection or if they are located at a depth of six feet under the pavement surface and not less than four feet under the roadway ditch. If a reinforced concrete slab is to be used, it should meet the following standards:

- Width - three times the diameter of the pipe or five foot minimum,
whichever is greater
- Thickness - six inch minimum
- Reinforcement - #4 bars @ twelve inch centers each way or equivalent
wire mesh
- Cover - the cushion between the bottom of slab and top of pipe shall
be not less than six inches

(3) Vents. One or more vents shall be provided for each casing or series of casings. For casings longer than 150 feet vents should be provided at both ends. On shorter casings a vent should be located at the high end with a marker placed at the low end. Vents shall be placed at the right of way line immediately above the pipeline, situated so as not to interfere with highway maintenance or concealed by vegetation. Ownership of the lines shall be shown on the vents.

(4) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by any high pressure gas or liquid petroleum line except where marked by a vent.

(5) Exceptions to Location Requirements. In urban areas, existing longitudinal lines which are not under the pavement or shoulder of any roadway or in the

Utility Manual

center median of a controlled access highway, may be permitted to remain in place provided all other requirements are met.

403. LOW PRESSURE GAS LINES

(1) Depth of Cover. For low pressure gas lines the minimum depth of cover within the right of way and under highway ditches, but outside the pavement structure, shall be twenty-four inches for either encased or unencased installations. Exceptions may be authorized to permit existing lines to remain in place with a reduction of six inches in the above specified depth. Low pressure gas lines shall be a minimum of eighteen inches or one-half the diameter of the pipe, whichever is greater, beneath the bottom of the pavement structure. Where materials and other conditions justify, such as on existing lines to remain in place, a minimum depth under the pavement structure of twelve inches or one-half the diameter of the pipe, whichever is greater, may be permitted.

As used herein, depth of lines is the depth to the top of carrier pipe or casing as applicable. For graphic illustration, see Figure 1.

(2) Encasement. Low pressure gas lines shall be encased as required for high pressure gas and liquid petroleum lines or they may be placed without encasement if they are of welded steel construction and are protected from corrosion by adequate and approved cathodic protective measure, with specific agreement that the pavement will not be cut for repairs to the pipeline at any time in the future.

(3) Vents. See High Pressure Gas and Liquid Petroleum Lines, Paragraph 402(3).

(4) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by a low pressure gas line except where marked by a vent.

(5) Plastic Lines. Plastic lines may be used provided the internal pressure will not exceed sixty pounds per square inch, they are encased right of way line to right of way line on crossings and have at least thirty inches of cover. The maximum size of plastic lines shall not exceed six inches. Where plastic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.

(6) Exception to Location Requirements. In urban areas, existing longitudinal lines which can be maintained without violating access control and which are not under the pavement or shoulder of any proposed roadway or existing roadway which is scheduled for a major improvement may remain in place provided all other requirements are met and provided further that measures are taken to minimize any future need for cutting pavement to make service connections on any high traffic roadway.

404. WATER LINES

(1) Depth of Cover. The depth of cover for water lines shall be the same as stipulated for LOW PRESSURE GAS LINES, Paragraph 403(1).

(2) Encasement. Encasement shall be provided under normal width center medians and from center of ditch to center of ditch for cut sections (or five feet behind toe of slope for fill sections or face of curb) of all roadways. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards. Encasement under side road entrances may be omitted in consideration of traffic volume, condition of roadway, maintenance responsibility and local practice. Encasement under low traffic roadways may be omitted on

Utility Manual

existing water lines having an inside diameter of twenty-four inches or more and on new lines having an inside diameter of thirty inches or more, provided all other requirements are met.

- (3) Plastic Lines. Plastic lines may be used provided they have at least thirty inches of cover for both crossing and longitudinal segments. Crossings shall be encased in accordance with Paragraphs 401(1)(a) and 404(2).
- (4) Where nonmetallic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.
- (5) Exceptions to Location Requirements. Same as stipulated for LOW PRESSURE GAS LINES, Paragraph 403(6).
- (6) Manholes. The outside diameter of the manhole chimney at the ground level shall not exceed thirty-six inches.
- (7) The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by a water line.

405. SANITARY SEWER LINES

- (1) Depth of Cover. The depth of cover for sanitary sewer lines shall be the same as stipulated for LOW PRESSURE GAS LINES, Paragraph 403(1).
- (2) Encasement. Lines to be operated under pressure and those composed of materials not conforming to material or depth of cover requirements herein shall be encased as prescribed for WATER LINES, Paragraph 404(2).
- (3) Materials. New and relocated sewer lines crossing through traffic roadways, ramps and connecting roadways, ramps and connecting roadways of controlled access highways and any other high traffic roadways shall be cast iron, with satisfactory joints, or materials and designs which will provide equal strength and resistance to damage from sulfide gases and other corrosive elements to which they may be exposed. Concrete pipe may be used in those areas where its use has been proven acceptable.

New and relocated longitudinal lines and those crossing low traffic roadways may be of any material which has been proven to be of satisfactory strength and durability in local use, provided all other requirements are met.

- (4) Where nonmetallic pipe is installed longitudinally a durable metal wire shall be concurrently installed or other means shall be provided for detection purposes.
- (5) Manholes. Manholes serving sewer lines up to 12 inches shall have a maximum ID of 4 feet. For any increase in line size greater than 12 inches, the manhole ID may be increased a like amount. Manholes for large interceptor sewers should be specially designed, keeping the overall dimensions to a minimum. The outside diameter of the manhole chimney at the ground level shall not exceed 3 feet.
- (6) Exception for Existing Lines in Urban Areas. Except where relocation is necessary to clear existing sewer lines from structures or other highway appurtenances or for other specific reasons, the Department may permit existing lines in urban areas to remain in place at any location (except longitudinally under the center median, through traffic lanes or ramps of controlled access highways) provided the line is of satisfactory quality and depth, manholes are adjusted in conformance with general requirements herein, and provisions are made to assure that future service lines requiring violation of access control or disturbing any roadway will be avoided.

Utility Manual

5 - UTILITY LINES ON STRUCTURES501. UTILITY STRUCTURES

(1) Interstate Highways. Where it would be more economical to carry one or several utility lines across a freeway in a tunnel or on a bridge rather than in separately trenched and encased crossings, consideration should be given to providing a separate structure, specifically for the utility crossing. Such a structure may serve a joint purpose as a utility and pedestrian facility and/or sign support structure. In providing a utility tunnel or bridge, the following should be met:

(a) Mutually hazardous transmittants, such as fuels and electric energy, shall be isolated by compartmentalizing or by auxiliary encasement of incompatible carriers.

(b) The utility tunnel or utility bridge structure shall conform in design, appearance, location, bury, earthwork, and markings to the culvert and bridge practices of the Department.

(c) Where a pipeline on or in a utility structure is encased, the casing shall be effectively opened or vented at each end to prevent possible build up of pressure and to detect leakage of gases or fluids.

(d) Where a casing is not provided for a pipeline on or in a utility structure, additional protective measure shall be taken, such as employing a higher factor of safety in the design, construction and testing of the pipeline than would normally be required for cased construction.

(e) Communication and electric power lines shall be suitably insulated, grounded and preferably carried in protective conduit or pipe from the point of exit from the ground to re-entry. The cable should preferably be carried to a manhole located beyond the backwall of the structure. Carrier and casing pipe should be suitably insulated from electric power line attachments.

(f) Shut-off valves, preferably automatic, shall be installed in lines at or near ends of utility structures unless segments of the lines can be isolated by other sectionalizing devices within a reasonable distance.

(g) It is agreed by the utility companies that any maintenance, servicing or repair of the utility lines will be their responsibility.

(2) Non-Interstate Highways. If a utility line (or lines) is on its own easement and it would be more economical to the Department to adjust the line (or lines) across a highway by use of a utility tunnel or bridge rather than to provide separately trenched and cased crossing, consideration should be given to provision of such a structure. Where the utility line (or lines) is on public right of way by sufferance and the adjustment of the utility is the sole responsibility of the

Utility Manual

private or public utility company, the Department may permit the provision of a utility structure without cost to the Department provided the conditions outlined in Paragraph 501(1) and all other pertinent requirements are met. If a structure is to serve as a joint utility-pedestrian crossing or a joint utility-sign support structure, the Department will participate in the same to the extent necessary for accommodation of pedestrians and/or highway signs only.

502. TRAFFIC STRUCTURES

(1) The attachment of utility lines to bridges and separation structures is discouraged, since the proliferation of such lines and their maintenance constitute a hazard to traffic as well as complicating the widening or repair of such structures. Attaching utility lines to a highway structure can materially affect the structure, the safe operation of traffic, the efficiency of maintenance, and the overall appearance. Therefore, when it is feasible and reasonable to locate utility lines elsewhere, attachment to bridge structures will not be allowed.

(2) Where other arrangements for a utility line to span an obstruction are not feasible, the Department may consider the attachment of such line to a bridge structure. Any exceptions which are permitted shall be handled in accordance with the conditions set forth in Paragraph 501(1) and other pertinent requirements contained herein. Each such attachment will be considered on an individual basis and permission to attach will not be considered as establishing a precedent for granting of subsequent requests for attachment. The following guides are established for attachment of utilities to bridges:

(a) When it is impractical to carry a self-supporting communication line across a stream or other obstruction, Department policy is to permit the attachment of the line to its bridges. On existing bridges the State generally requires that the line be enclosed in conduits and so located on structures as not to interfere with stream flow, traffic or routine maintenance operations. When a request is made prior to construction of a bridge, suitable conduits will be provided in the structure if the utility company bears the cost of all additional work and materials involved.

When a line is attached to a bridge, the State will enter into a special agreement or contract with the utility company.

In urban areas where it is the State's responsibility to provide for the adjustment of telephone lines or telephone conduits to accommodate the construction of a highway, and the adjustment provides for the placement of telephone conduits in a highway grade separation structure, the Department will allow a reasonable number of spare telephone conduits in the structure provided the spares are placed at the time of construction and the telephone company bears the cost of these spare conduits.

Where the construction of a highway makes it necessary to relocate telephone conduits and the proper adjustment, in the opinion of the Department, provides for the placement of telephone conduits in the highway grade

Utility Manual

separation structure, the Department will permit the telephone company to install replacement telephone conduits and a reasonable number of spares in the structure provided such conduits are placed at the time of construction and provided the company bears any extra structure cost occasioned by the presence of the telephone conduits.

(b) No gas or liquid fuel lines shall be attached to a bridge or grade separation structure without the specific approval of the State Engineer-Director.

(c) Power lines are not permitted on bridges under any condition with the exception of low-voltage distribution lines where the cost of independent facilities to carry these lines would be prohibitive.

When a municipality or utility company requests permission to attach a pipeline to a proposed bridge prior to construction, and the added load is sufficient to require an increase in the strength of the structure, or use of more costly materials or type of construction, the utility owner is required to pay for the increase in cost.

When a utility company requests permission to attach a pipeline to an existing bridge, sufficient information should be furnished to allow a stress analysis to determine the effect of the added load on the structure. Other details of the proposed attachment as they effect safety and maintenance should also be presented. If the bridge structure is not of adequate strength to carry the increased weight or forces with safety, permission will not be granted.

(3) All requests for attachment to structures should originate with the Utility Company by its making application to the appropriate District Engineer. For structures in the planning stage or under construction, requests for attachment along with the District Engineer's recommendation should be forwarded to D-5 for its review and concurrence. Adequate details and an estimate for an independent utility crossing should accompany the submission. If the attachment is allowed, D-5 will develop a suitable maintenance agreement and furnish to the District for its handling with the utility company for execution. Modification of the structural details to accommodate the utility and the responsibility of cost therefor will be developed by D-5. Where applicable, D-5 will coordinate the submission with D-15.

Requests for attachments to existing bridges or structures should be forwarded by the District Engineer along with his recommendation to D-18 and/or D-15, whichever is applicable, for review and concurrence. The proposal will then be forwarded to D-5 for review and determination of the effect of the proposed attachment on the existing structure. If the attachment is allowed, D-5 will prepare a suitable maintenance agreement and forward it to the appropriate Division who upon concurrence will submit it to the District for handling with the utility company for execution.

Use and occupancy agreement forms or notice forms shall be required in accordance with Paragraph 11.

Utility Manual

6 - OVERHEAD POWER AND COMMUNICATION LINES601. GENERAL

(1) Type of Construction. Longitudinal lines on the right of way shall be limited to single pole construction. Transverse lines should desirably be limited to single pole construction; however, where an existing or proposed utility is supported by "H" frames, towers, etc., the same type structures may be utilized for the crossing provided all other requirements herein are met.

(2) Vertical Clearance. Except as stated in 601(3)(c), the minimum vertical clearance for overhead communication and power lines above the highway shall be not less than eighteen feet and twenty-two feet, respectively, or greater, as required by the National Electric Safety Code and governing laws.

(3) Location.

(a) In rural areas and at uncurbed sections in urban areas, poles supporting longitudinal lines shall be located from one to three feet from the right of way edge, except that at the option of the Department this distance may be varied at short breaks in the right of way line. Guy wires placed within the right of way shall be held to a minimum and should normally be in line with the pole line; however, other locations may be permitted, but in no case shall the guy wires or poles be located closer than a minimum of thirty feet from the edge of main lane or connecting roadway shoulders and twenty feet from the shoulder edge of ramps or frontage roads. At curbed sections, in urban areas, poles shall be located as far as practical behind the outer curbs and preferably adjacent to the right of way line.

(b) At crossings, no poles will be permitted in the center median of any highway. Poles will only be permitted in outer separations or more than three feet inside the right of way where the right of way is of such extreme width (over 300 feet) that the cost of spanning it is excessive and where poles can be located in accordance with the intent and provisions of this policy.

(c) As a general rule, overhead power and communication line crossings, at bridges or grade separation structures should be avoided, if possible. If rerouting the line completely around the structure and approaches is not economically feasible, a minimum horizontal distance of one hundred and fifty feet or a minimum vertical clearance of thirty feet should be provided to insure adequate safety for construction and maintenance operations.

Utility Manual

7 - UNDERGROUND POWER LINES701. GENERAL

(1) Depth of Cover. The depth of cover for underground power lines should be the same as stipulated for encased High Pressure Gas and Liquid Petroleum Lines, Paragraph 402.

(2) Encasement. Encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets and beneath and five feet beyond any overpass or other structure where the line passes under it. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards.

Existing lines under low volume Farm-to-Market Roads and low-volume highways may be permitted to remain in place without encasement or extension of encasement if they are protected by a reinforced concrete slab or equivalent protection or if they are located at a depth of six feet under the pavement surface and not less than four feet under the roadway ditch. If a reinforced concrete slab is to be used, it should meet the following standards:

Width - five foot minimum

Thickness - six inch minimum

Reinforcement - #4 bars @ twelve inch centers each way or equivalent wire mesh.

Cover - the cushion between the bottom of slab and top of cable shall be not less than six inches

(3) Markers. The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by an underground power line.

(4) Longitudinal underground power lines may be placed by plowing or open trench method and shall be located as set forth in Paragraph 301.

(5) Above ground utility appurtenances installed as a part of an underground power line shall be located at or near the right of way line, well outside the highway maintenance operation area.

(6) Manholes. Straight line manholes are the only type normally permitted within the right of way. Overall width dimensions should be no larger than necessary to hold the equipment involved and for safety standards to be assured for maintenance personnel. Outside width should not exceed 7 feet, length should be held to be reasonable minimum and the top of the roof should be 5 feet below ground level. The outside diameter of the manhole chimney at the ground level should not exceed 36 inches.

8 - UNDERGROUND COMMUNICATION LINES801. General

(1) Depth of Cover - The minimum depth of cover for underground communication lines along and/or across the rights of way including highway ditches, but outside the pavement structure, shall be twenty-four inches for either encased or unencased installations. Under the pavement structure a minimum depth of eighteen inches shall be maintained. Where materials and other conditions justify, exceptions may be authorized to permit existing lines to remain in place with a reduction of six inches in the above specified depths.

(2) Crossings - Lines should be located at approximate right angles to the highway to the extent feasible and practicable. Reasonable latitude may be exercised as regards the crossing angle of existing lines which are otherwise qualified to remain in place.

Lines crossing highways do not require encasement except where in the judgment of the District Engineer such encasement is necessary for the protection of the highway facility. Consideration should be given to encasement or other suitable protection for any communication facilities (a) with less than minimum bury, (b) near footings of bridges or other highway structures, or (c) near other locations where there may be hazards.

When the installation of the line is to be accomplished by boring a hole the same or about the same diameter as the line and pulling it through, then encasement is not necessary. Where such conditions cannot be met, encasement should be provided. The annular void between the drilled hole and the line or casing should be filled with a satisfactory material to prevent settlement of any part of the highway facility over the line or casing.

Encasement may be of metallic or nonmetallic material. Such encasement material shall be designed to support the load of the highway and superimposed loads thereon, including that of construction machinery. The strength of the encasement material shall equal or exceed structural requirements for drainage culverts and it shall be composed of materials of satisfactory durability under conditions to which it may be subjected. The length of any encasement shall be provided under center medians and from top of backslope to top of backslope for cut sections (or five feet beyond the toe of slope for fill sections, or face of curb) of all roadways including side streets. Encasement may be omitted under center medians where their width is appreciably greater than normal rural standards. Where encasement is not installed, specific agreement should be reached with the utility company that the pavement will not be cut for repairs any time in the future.

(3) Markers - The utility company shall place a readily identifiable and suitable marker at each right of way line where it is crossed by an underground communication line.

Utility Manual

(4) Longitudinal - Lines may be placed by plowing or open trench method and shall be located on uniform alignment as near as practical to the right of way line to provide space for possible future highway construction and for possible future utility installations. Distance from the right of way line will depend upon the terrain involved and obstructions such as trees and other existing underground utility lines. On highways with frontage roads, such installation will be located between the frontage roads and the right of way line. Unless authorized by the State Engineer-Director lines shall not be placed or remain in the center median, or beneath through-traffic roadways or connecting roadways (including shoulders).

(5) Above ground pedestals or other utility appurtenances installed as a part of an underground communication line shall be located at or near the right of way line, well outside the highway maintenance operation area.

(6) Manholes - Manholes shall be limited to those necessary for installation and maintenance of underground lines. Straight line manholes are the only type normally permitted within the right of way. In no case shall they be placed or permitted to remain in the pavement of shoulders of high volume roadways except at those locations on noncontrolled access highways in urban areas where necessary for existing lines which may be permitted to remain in place under existing or proposed roadways. Manholes may remain in place or be installed under traffic lanes of low volume roadways in municipalities provided measures are taken to minimize such installations and to avoid their locations at intersections insofar as possible.

To conserve space within the right of way for highway and other utility services manhole dimensions should be the minimum acceptable for good engineering and safety standards. The width dimensions should be no larger than is necessary to hold equipment involved and for safety standards to be assured for maintenance personnel. Outside width should not exceed seven and one-half feet, with the length to be held to a reasonable minimum. The outside diameter of the manhole chimney at the ground level should not exceed 36 inches. Where proven necessary the outside diameter of the chimney may be up to 50 inches. Manhole covers shall be installed approximately flush with the ground. The top of the roof of the manhole should be five feet below ground level. Where such depth factor is impracticable sufficient data should be submitted to the appropriate Austin office for Administrative handling.

IN WITNESS WHEREOF this instrument is executed on this the _____ day of _____, 19 ____.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS }
County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 ____

Notary Public in and for _____ County, Texas.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS }
County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 ____

Notary Public in and for _____ County, Texas.

Form D-15-17
Page 4 of 4
Rev. 10-61

CORPORATION ACKNOWLEDGMENT

STATE OF TEXAS

County of _____

BEFORE ME, the undersigned authority, a notary public in and for _____ County, Texas, on this day personally appeared _____

_____ of _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said _____, a corporation and that he executed the same as the act of such corporation for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, this the _____ day of _____, 19_____.

Notary Public in and for _____ County, Texas.

Parcel No. _____	TO THE STATE OF TEXAS Released for Record This _____ day of _____ A. D. 19____, at _____ o'clock _____ M. Recorded This _____ day of _____ A. D. 19____, in _____ County, Texas, Records of Deeds, Book _____ Page _____ Clerk _____ Deputy _____
County _____	
Highway No. _____	
Control _____ Sec. _____ Job _____	
Account or Federal No. _____	
Between _____ and _____	

ENDORSEMENTS

THE STATE OF TEXAS,
County of _____

I, _____, Clerk of the County Court of said County, do hereby certify that the foregoing instrument of writing, dated the _____ day of _____ A. D. 19____ with its authentication, was filed for record in my office on the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., and duly recorded this the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., in the Deed Records of said County, in Volume _____ on Page _____

Witness my hand and the seal of the County Court of said County, at office in _____ Texas, the day and year last above written.

Plate # _____ Clerk of Court, _____ County, Texas.

Utility Manual

State Department of Highways
and Public Transportation
Form D-15-30
Page 1 of 4
Rev. 8-75

QUITCLAIM

STATE OF TEXAS |
 |
COUNTY OF _____|

KNOW ALL MEN BY THESE PRESENTS:

That _____

of the County of _____, State of Texas, hereinafter referred to as
Grantors, whether one or more, for and in consideration of the sum of _____
_____ (\$ _____)
Dollars, and other good and valuable consideration to Grantors in hand paid by the
State of Texas, acting by and through the State Highway and Public Transportation
Commission, the receipt of which is hereby acknowledged, and for which no lien is
retained, either expressed or implied, have quitclaimed, and do by these presents
Bargain, Sell, Release and forever Quitclaim unto the State of Texas all of Grantors'
right, title, interest, claim and demand in and to that certain tract or parcel of
land, situated in the County of _____, State of Texas, and being more
particularly described as follows, to wit:

Form D-15-30
Page 2 of 4
Rev. 4-75

Utility Manual

Rev. 5-77

Plate 8
Sheet 49 of 61

TO HAVE AND TO HOLD for said purposes together with all and singular the rights, privileges, and appurtenances thereto in any manner belonging unto the said State of Texas forever.

IN WITNESS WHEREOF, this instrument is executed on this the _____ day of _____, 19____.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }
_____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 _____

Notary Public in and for _____ County, Texas.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }
_____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 _____

Notary Public in and for _____ County, Texas.

Utility Manual

Form D-15-30
Page 4 of 4

CORPORATION ACKNOWLEDGMENT

STATE OF TEXAS

County of _____

BEFORE ME, the undersigned authority, a notary public in and for _____ County, Texas, on this day personally appeared _____

of _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said _____, a corporation and that he executed the same as the act of such corporation for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, this the _____ day of _____, 19_____.

Notary Public in and for _____ County, Texas.

Tract No. _____	QUITCLAIM DEED	TO THE STATE OF TEXAS	Filed for Record	Recorded	County, Texas, Records of Deeds, Book _____ Page _____	Clerk. Deputy.
County _____			This _____ day of _____			
Highway No. _____			A. D. 19_____, at _____ o'clock _____ M.			
Control _____ Sec. _____ Job _____			This _____ day of _____			
Federal No. _____			A. D. 19_____, in _____			
Between _____ and _____						

ENDORSEMENTS

THE STATE OF TEXAS,
County of _____

I, _____, Clerk of the County Court of said County, do hereby certify that the foregoing instrument of writing, dated the _____ day of _____ A. D. 19_____, with its authentication, was filed for record in my office on the _____ day of _____, A. D. 19_____, at _____ o'clock _____ M., and duly recorded this the _____ day of _____, A. D. 19_____, at _____ o'clock _____ M., in the Deed Records of said County, in Volume _____ on Page _____.

Witness my hand and the seal of the County Court of said County, at office in _____ Texas, the day and year last above written.

Clerk of Court, _____ County, Texas.

State Department of Highways
and Public Transportation
Form D-15-17
Page 1 of 4
Rev. 8-75

Utility Manual

RELEASE OF EASEMENT

STATE OF TEXAS

COUNTY OF _____

||
||
||

WHEREAS, by that certain instrument dated the _____ day of _____, 19____, recorded in Volume _____ at Page _____, Deed Records of _____ County, Texas, the undersigned are the owner(s) of an easement for _____ purposes in, along, over, upon and across certain property more particularly described therein; and,

WHEREAS, the State of Texas, acting by and through the State Highway and Public Transportation Commission, has acquired or is in the process of acquiring the hereinafter described property and desires that said easement be remised, released and forever relinquished insofar as it affects or appertains to the hereinafter described land;

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

That _____

_____ of the County of _____, State of _____, for and in consideration of the sum of _____ (\$ _____) Dollars cash in hand, the receipt of which is hereby acknowledged, have remised, released and relinquished and by these presents do remise, release and forever relinquish unto _____ all that certain easement interest created and established in the above mentioned instrument and located in, along, over, upon, and across the following described premises in _____ County, Texas, and being more particularly described as follows, to wit:

Form D-15-17
Page 2 of 4
Rev. 10-61

Utility Manual

the depth and/or location of said lines as specified by said State Department of Highways and Public Transportation at Lessee's own expense, and that no additional lines may be laid or installed across said right of way without the approval of the State Department of Highways and Public Transportation.

IN WITNESS WHEREOF, this instrument is executed this the _____ day of _____, 19____.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19____

Notary Public in and for _____ County, Texas.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19____

Notary Public in and for _____ County, Texas.

CORPORATION ACKNOWLEDGMENT

STATE OF TEXAS

County of _____

BEFORE ME, the undersigned authority, a notary public in and for _____ County, Texas, on this day personally appeared _____, of _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said _____, a corporation and that he executed the same as the act of such corporation for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, this the _____ day of _____, 19_____.

Notary Public in and for _____ County, Texas.

Tract No.	SUBORDINATION OF MINERAL LEASE	TO	THE STATE OF TEXAS	Filed for Record	This _____ day of _____, A.D. 19____, at _____ o'clock _____ M.	Recorded	This _____ day of _____, A.D. 19____, in _____ County, Texas, Records of Deeds,	Book _____ Page _____	Clerk. _____	Deputy. _____
County _____										
Highway No. _____										
Control _____ Sec. _____ Job _____										
Federal No. _____										
Between _____ and _____										

ENDORSEMENTS

THE STATE OF TEXAS, }
County of _____

I, _____, Clerk of the County Court of said County, do hereby certify that the foregoing instrument of writing, dated the _____ day of _____, A. D. 19____ with its authentication, was filed for record in my office on the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., and duly recorded this the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., in the Deed Records of said County, in Volume _____ on Page _____.

Witness my hand and the seal of the County Court of said County, at office in _____, Texas, the day and year last above written.

Clerk of Court, _____ County, Texas.
By _____ Deputy.

State Department of Highways
 and Public Transportation
 Form D-15-85
 Page 1 of 4
 Rev. 8-75

SUBORDINATION OF MINERAL LEASE

STATE OF TEXAS §
 §
 COUNTY OF _____ §

WHEREAS, on the _____ day of _____, 19____, _____
 _____ executed an Oil, Gas and Mineral Lease, which appears of
 record in Volume _____ at Page _____ of the _____
 Records of _____ County, Texas, which lease covering the
 hereinafter described tract of land is now owned and held by _____
 _____, the undersigned, hereinafter called "Lessee" whether one
 or more;

WHEREAS, by virtue of the terms of said mineral lease said Lessee is operating a
 number of, to wit _____, oil and/or gas gathering lines over,
 across and upon said hereinafter described tract of land, same being _____
 acres located in _____ County, Texas, and being a part of
 the same land described in the aforesaid mineral lease, said _____
 acre tract being more particularly described by metes and bounds as follows:

Utility Manual

Form D-15-85
Page 2 of 4
Rev. 8-75

WHEREAS, the State of Texas, acting by and through the State Highway and Public Transportation Commission, has acquired or will acquire the above described _____ acre tract as right of way for the purpose of opening, constructing and operating a highway thereon;

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

That _____

Lessee aforesaid, for and in consideration of the sum of \$ _____ cash in hand paid by the State of Texas, has Subordinated and by these presents does subordinate all of Lessee's surface rights in said land to the State of Texas forever; Save and Except that by the acceptance of and the recording of this instrument it is understood and agreed that Lessee shall be and does hereby retain the right of maintaining and operating the aforesaid gathering lines over and across said tract of land and right of way with the understanding that Lessee will make whatever adjustments in

and welfare of the public, the Lessee shall have a temporary right of access to and from the through-traffic roadways and ramp as necessary to accomplish the required emergency repairs.

IN WITNESS WHEREOF, this instrument is executed this the _____ day of _____, 19 _____.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 _____

Notary Public in and for _____ County, Texas.

SINGLE ACKNOWLEDGMENT

THE STATE OF TEXAS

County of _____ }

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____

_____, known to me (or proved to me on the oath of _____, a credible witness) to be the person _____ whose name _____ subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and consideration therein expressed.

Given under my hand and seal of office, this the _____ day of _____ 19 _____

Notary Public in and for _____ County, Texas.

CORPORATION ACKNOWLEDGMENT

STATE OF TEXAS

County of _____ }

BEFORE ME, the undersigned authority, a notary public in and for _____ County, Texas, on this day personally appeared _____, of _____, known to me to be the person and officer whose name is subscribed to the foregoing instrument and acknowledged to me that the same was the act of the said _____, a corporation and that he executed the same as the act of such corporation for the purposes and consideration therein expressed, and in the capacity therein stated.

Given under my hand and seal of office, this the _____ day of _____, 19_____.

Notary Public in and for _____ County, Texas.

Tract No. _____	SUBORDINATION OF MINERAL LEASE	TO THE STATE OF TEXAS	Filed for Record This _____ day of _____, at _____ o'clock _____ M. A.D. 19_____.	Recorded This _____ day of _____, in _____, in _____ County, Texas, Records of Deeds, Book _____ Page _____	Clerk. Deputy.
County _____					
Highway No. _____					
Control _____ Sec. _____ Job _____					
Federal No. _____ Between _____ and _____					

ENDORSEMENTS

THE STATE OF TEXAS, }
County of _____

I, _____, Clerk of the County Court of said County, do hereby certify that the foregoing instrument of writing, dated the _____ day of _____ A. D. 19____ with its authentication, was filed for record in my office on the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., and duly recorded this the _____ day of _____, A. D. 19____ at _____ o'clock _____ M., in the Deed Records of said County, in Volume _____ on Page _____

Witness my hand and the seal of the County Court of said County, at office in _____ Texas, the day and year last above written.

Clerk of Court, _____ County, Texas.

By _____ Deputy.

State Department of Highways
and Public Transportation
Form D-15-88
Page 1 of 4
Rev. 8-75

**SUBORDINATION OF MINERAL LEASE
(Controlled Access)**

STATE OF TEXAS |
 |
COUNTY OF _____ |

WHEREAS, on the _____ day of _____, 19____, _____
executed an Oil, Gas and Mineral Lease, which appears of
record in Volume _____ at Page _____ of the _____ Records
of _____ County, Texas, which lease covering the here-
inafter described tract of land is now owned and held by _____
_____, the undersigned, hereinafter called "Lessee"
whether one or more;

WHEREAS, by virtue of the terms of said mineral lease said Lessee is operating a
number of, to wit _____, oil and/or gas gathering lines
over, across and upon said hereinafter described tract of land, same being
_____ acres located in _____ County, Texas, and being
a part of the same land described in the aforesaid mineral lease, said _____
acre tract being more particularly described by metes and bounds as follows:

Utility Manual

Form D-15-88
Page 2 of 4
Rev. 8-75

WHEREAS, the State of Texas, acting by and through the State Highway and Public Transportation Commission, has acquired or will acquire the above described _____ acre tract as right of way for the purpose of opening, constructing and operating a controlled access highway thereon;

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

That _____

Lessee aforesaid, for and in consideration of the sum of \$ _____ cash in hand paid by the State of Texas, has Subordinated and by these presents does subordinate all of Lessee's surface rights in said land to the State of Texas forever; Save and Except that by the acceptance of and the recording of this instrument it is understood and agreed that Lessee shall be and does hereby retain the right of maintaining and operating the aforesaid gathering lines over and across said tract of land and right of way with the understanding that Lessee will make whatever adjustments in the depth and/or location of said lines as specified by said State Department of Highways and Public Transportation at Lessee's own expense, and that no additional lines may be laid or installed across said right of way without the approval of the State Department of Highways and Public Transportation, and Lessee hereby agrees that access for servicing its facilities will be limited to access via (a) Frontage roads where provided (b) Nearby or adjacent public roads and streets, or (c) Trails along or near the highway right of way lines, connecting only to an intersecting road; from any one or all of which entry may be made to the outer portion of the highway right of way for normal service and maintenance operations. The Lessee's rights of access to the through-traffic roadways and ramps shall be subject to the same rules and regulations as apply to the general public, except, however, if an emergency situation occurs, and usual means of access for normal service operations will not permit the immediate action required by the Lessee in making emergency repairs

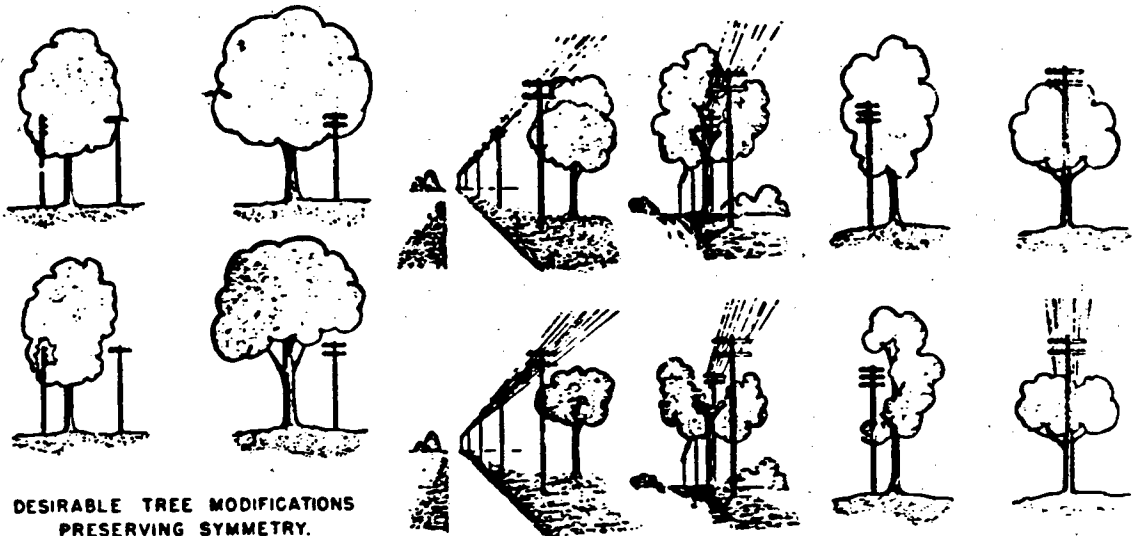
Utility Manual

SUGGESTED PRACTICES

- I** Locate utility lines with the least possible interference with major plantings or specimen plants.
- II** Maintain adequate clearance for lines---not excessive clearance.
- III** All pruning should conform to recognized tree surgery practices.
 - A.** Preserve natural character of tree.
 - B.** Remove minimum number of branches to provide adequate clearance.
 - C.** Amount of clearance should be determined by the rate of tree growth.
 - D.** Removal of branches as illustrated prevents stripping of the bark.
 - E.** In removing branches the cut should be made at a fork with the remaining branch at least one third the diameter of the one removed.
 - F.** No stub should be left.
 - G.** All cuts two inches or over should be painted with an approved tree dressing or paint.
 - H.** Trees which must remain unsightly because of repeated pruning for clearance should be removed.
- IV** All wood must be removed from the right-of-way and disposed of in accordance with the laws and regulations of the community, county, and state.

PRUNING SUGGESTIONS

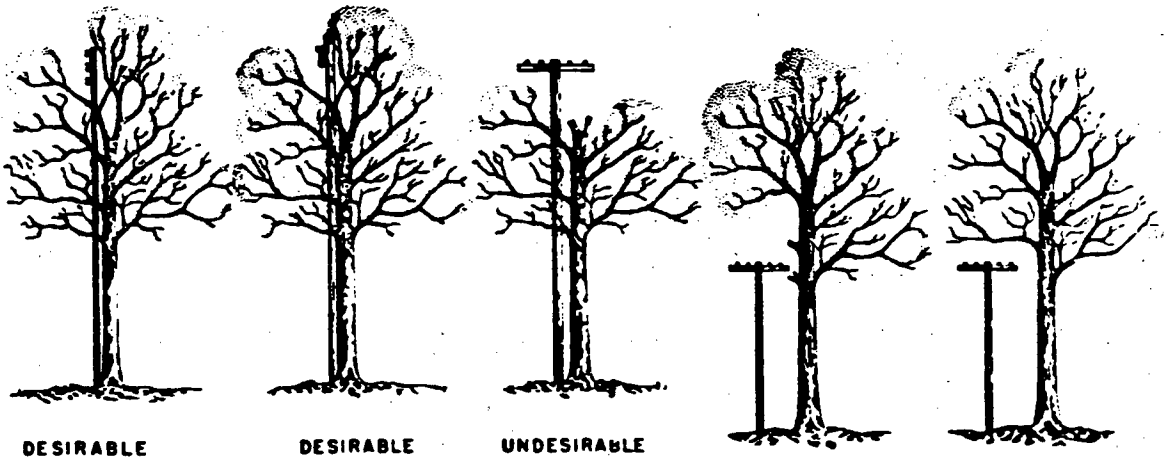
Supplement to Form 1023



DESIRABLE TREE MODIFICATIONS PRESERVING SYMMETRY.

UNDESIRABLE TREE MODIFICATIONS

Such tree-line relationships as illustrated perpetuates high maintenance costs and right-of-way unsightliness.



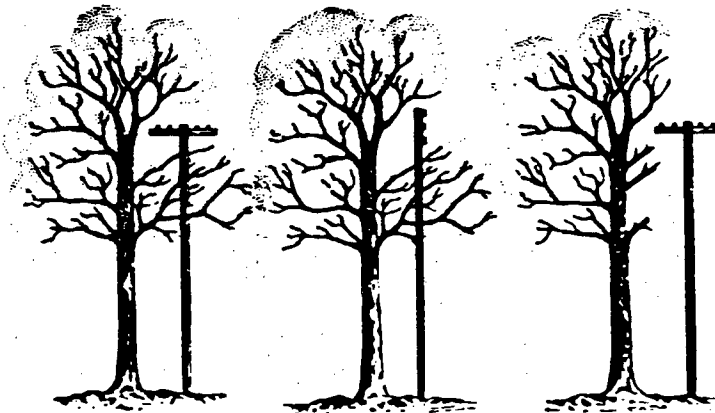
DESIRABLE

DESIRABLE

UNDESIRABLE

UNDESIRABLE

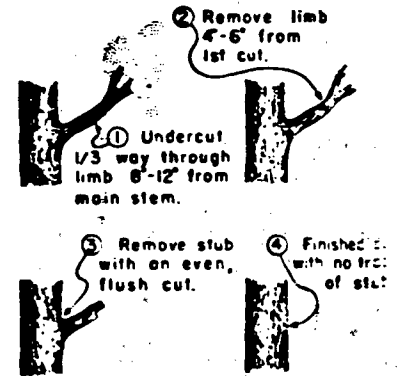
DESIRABLE



DESIRABLE

DESIRABLE

UNDESIRABLE



PROPER LIMB REMOVAL (2" dia. or more)

Utility Manual

Form 1023
(2-77)

APPROVAL

TO: _____ Control _____ Section _____
 _____ Maintenance Section No. _____
 _____ Hwy. No. _____
 _____ County _____
 _____ Date _____

The State Department of Highways and Public Transportation offers no objection to the location on the right-of-way of your proposed _____ line as shown by accompanying drawings and notice dated _____ except as noted below.

It is expressly understood that the State Department of Highways and Public Transportation does not purport, hereby, to grant any right, claim, title, or easement in or upon this highway; and it is further understood that the State Department of Highways and Public Transportation may require the owner to relocate this line, subject to provisions of governing laws, by giving thirty (30) days written notice.

You are requested to notify this office prior to commencement of any routine or periodic maintenance which requires pruning of trees within the highway right-of-way, so that we may provide specifications for the extent and methods to govern in trimming, topping, tree balance, type of cuts, painting cuts and clean-up. These specifications are intended to preserve our considerable investment in highway planting and beautification, by reducing damage due to trimming.

The installation shall not damage any part of the highway and adequate provisions must be made to cause minimum inconveniences to traffic and adjacent property owners. In the event the Owner fails to comply with any or all of the requirements as set forth herein, the State may take such action as it deems appropriate to compel compliance.

Minimum clearances above the roadway for aerial utilities shall be 22' for power lines and 18' for communication lines.

SPECIAL PROVISIONS:

Please notify _____ telephone _____ at least forty-eight (48) hours prior to starting construction of the line in order that we may have a representative present.

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

By: _____
 District Engineer - District Number _____

NOTICE OF PROPOSED INSTALLATION
UTILITY LINE ON NON-CONTROLLED ACCESS HIGHWAY

Date _____

TO THE STATE HIGHWAY AND PUBLIC TRANSPORTATION COMMISSION
c/o DISTRICT ENGINEER
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
_____, TEXAS

Formal notice is hereby given that _____
Company proposes to place a _____
line within the right-of-way of _____ Highway No. _____
in _____ County, Texas as follows:
(give location, length, general design, etc.)

The line will be constructed and maintained on the highway right-of-way as shown on the attached drawings and as directed by the State Department of Highways and Public Transportation in accordance with governing laws.

Our Firm further understands that the State considers proper traffic control measures as those complying with applicable portions of the Texas Manual of Uniform Traffic Control Devices required for adoption by the "Uniform Act Regulating Traffic on Highways" (V.C.S. 6701d).

The location and description of the proposed line and appurtenances is more fully shown by _____ complete sets of drawings attached to this notice.

Construction of this line will begin on or after the _____ day of _____, 19 ____.

Firm _____

By _____

Title _____

Address _____

Utility Manual

Form 1082
(2-77)

APPROVAL

To: _____ Control _____ Section _____
 _____ Hwy. No. _____
 _____ County _____
 _____ Date _____

The State Department of Highways and Public Transportation offers no objection to the location on the right-of-way of your proposed _____ line as shown by accompanying drawings and notice dated _____ except as noted below.

Your attention is directed to governing laws, especially to Article 6674w-1, Vernon's Annotated Civil Statutes of Texas, pertaining to Control of Access. Access for servicing this installation shall be limited to access via (a) frontage roads where provided (b) nearby or adjacent public roads or streets, or (c) trails along or near the highway right-of-way lines, connecting only to an intersecting road; from any one or all of which entry may be made to the outer portion of the highway right-of-way for normal service and maintenance operations. The Utility Owner's rights of access to the through-traffic roadways and ramps shall be subject to the same rules and regulations as apply to the general public except, however, if an emergency situation occurs and usual means of access for normal service operations will not permit the immediate action required by the Utility Owner in making emergency repairs as required for the safety and welfare of the public, the Utility Owner shall have a temporary right of access to and from the through-traffic roadways and ramps as necessary to accomplish the required emergency repairs, provided the State Department of Highways and Public Transportation is immediately notified by the Utility Owner when such repairs are initiated and adequate provision is made by the Utility Owner for convenience and safety of highway traffic.

It is expressly understood that the State Department of Highways and Public Transportation does not purport, hereby, to grant any right, claim, title, or easement in or upon this highway; and it is further understood that the State Department of Highways and Public Transportation may require the owner to relocate this line, subject to provisions of governing laws, by giving thirty (30) days written notice.

All work on the highway right-of-way shall be performed in accordance with State Department of Highways and Public Transportation instructions. The installation shall not damage any part of the highway and adequate provisions must be made to cause minimum inconvenience to traffic and adjacent property owners. In the event the Owner fails to comply with the requirements as set forth herein, the State may take such action as it deems appropriate to compel compliance.

Please notify _____ forty-eight (48) hours prior to starting construction of the line in order that we may have a representative present.

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

By: _____
District Engineer - Dist. No. _____

Utility Manual

Form 1082
(2-77)

NOTICE OF PROPOSED INSTALLATION
UTILITY LINE ON CONTROLLED ACCESS HIGHWAY

Date _____

TO THE STATE HIGHWAY AND PUBLIC TRANSPORTATION COMMISSION
c/o DISTRICT ENGINEER
STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
_____, TEXAS

Formal notice is hereby given that _____
Company proposes to place a _____
line within the right-of-way of _____ Highway No. _____
in _____, County, Texas as follows:
(give location, length, general design, etc.)

The line will be constructed and maintained on the highway right-of-way as directed by the State Department of Highways and Public Transportation in accordance with governing laws.

Our Firm further understands that the State considers proper traffic control measures as those complying with applicable portions of the Texas Manual of Uniform Traffic Control Devices required for adoption by the "Uniform Act Regulating Traffic on Highways" (V.C.S. 6701d).

The location and description of the proposed line and appurtenances is more fully shown by _____ copies of drawings attached to this notice.

Construction of this line will begin on or after the _____ day of _____, 19 ____.

Firm _____

By _____

Title _____

Address _____

State Department of Highways
and Public Transportation
Right of Way Division
Form D-15-24A
Page 1 of 2
Rev. 8-75

UTILITY JOINT USE AGREEMENT
(non-controlled access highway)

THE STATE OF TEXAS	I	COUNTY	_____
		PROJECT	_____
COUNTY OF TRAVIS	I	ACCT. NO.	_____
		HIGHWAY	_____
		LIMITS: From	_____
		To	_____

WHEREAS, the State of Texas, hereinafter called the State, acting by and through the State Department of Highways and Public Transportation, proposes to make certain highway improvements on that section of the above indicated highway.

WHEREAS, the _____, hereinafter called the Owner, proposes to retain, locate or relocate certain of its facilities and retain title to any property rights it may have on, along or across, and within or over such limits of the highway right of way as indicated on the plans attached to Utility Agreement as executed by Owner on the _____ day of _____, 19____, or on location sketches attached hereto except as provided below.

NOW, THEREFORE, it is hereby mutually agreed that joint usage for both highway and utility purposes will be made of the area within the highway right of way limits as such area is defined and to the extent indicated on the aforementioned plans or sketches. Where Owner by reason of ownership of an easement or fee title or otherwise under law has the right to alter, modify or add to facilities presently located within the area above described or construct additional facilities therein, such right is hereby retained, provided, however, if existing facilities are to be altered or modified or new facilities constructed within said area the Owner agrees to notify the State Department of Highways and Public Transportation prior thereto, to furnish necessary sketches showing location, type of construction, and methods to be used for protection of traffic, and if, in the opinion of the State Department of Highways and Public Transportation, such alteration, modification, or new construction will injure the highway or endanger the traveling public using said highway, the State Department of Highways and Public Transportation shall have the right, after receipt of such notice, to prescribe such regulations as necessary for the protection of the highway facility and the traveling public using said highway; provided further, however, that such regulations shall not extend to the requiring of the placement of intended overhead lines underground or the routing of any lines outside of the area of joint usage above described.

In the event of an emergency, it being evident that immediate action is necessary for protection of the public and to minimize property damage and loss of investment, either party hereto may at their own responsibility and risk make necessary emergency repairs, notifying the other party hereto of this action as soon as is practical.

Participation in actual costs incurred by the Owner for any future relocation or adjustment of utility facilities required by highway construction shall be in accordance with and to the extent possible under applicable laws of the State of Texas. Except

State Department of Highways
and Public Transportation
Right of Way Division
Form D-15-24A
Page 2 of 2
Rev. 8-75

Utility Manual

as expressly provided herein, (1) The Owner's rights of access to the through-traffic roadways and/or ramps shall be subject to the same rules and regulations as apply to the general public, and (2) The Owner and the State, by the execution of this agreement, do not waive or relinquish any right which they may have under the law or Constitution, State or Federal.

In the event the Owner fails to comply with the requirements as set out herein, the State may take such action as it deems appropriate to compel compliance.

IN WITNESS HEREOF, the parties hereto have affixed their signatures.

STATE OF TEXAS
State Department of Highways
and Public Transportation

OWNER: _____

District Engineer

By _____

Right of Way Engineer

Title _____

Date

Date _____

State Department of Highways
and Public Transportation
Right of Way Division
Form D-15-80A
Page 1 of 2
Rev. 8-75

Utility Manual

UTILITY JOINT USE AGREEMENT
(controlled access highway)

THE STATE OF TEXAS I
COUNTY OF TRAVIS I

COUNTY _____
PROJECT _____
ACCT. NO. _____
HIGHWAY _____
LIMITS: From _____
 To _____

WHEREAS, the State of Texas, hereinafter called the State, acting by and through the State Department of Highways and Public Transportation, proposes to make certain highway improvements on that section of the above indicated highway.

WHEREAS, the _____, hereinafter called the Owner, proposes to retain, locate or relocate certain of its facilities and retain title to any property rights it may have on, along or across, and within or over such limits of the highway right of way as indicated on the plans attached to Utility Agreement as executed by Owner on the _____ day of _____, 19____, or on location sketches attached hereto except as provided below.

NOW, THEREFORE, it is hereby mutually agreed that joint usage for both highway and utility purposes will be made of the area within the highway right of way limits as such area is defined and to the extent indicated on the aforementioned plans or sketches. Where Owner by reason of ownership of an easement or fee title or otherwise under law has the right to alter, modify or add to facilities presently located within the area above described or construct additional facilities therein, such right is hereby retained, provided, however, if existing facilities are to be altered or modified or new facilities constructed within said area the Owner agrees to notify the State Department of Highways and Public Transportation prior thereto, to furnish necessary sketches showing location, type of construction, and methods to be used for protection of traffic, and if, in the opinion of the State Department of Highways and Public Transportation, such alteration, modification, or new construction will injure the highway or endanger the traveling public using said highway, the State Department of Highways and Public Transportation shall have the right, within 30 days after the receipt of such notice, to prescribe such regulations as necessary for the protection of the highway facility and the traveling public using said highway; provided further, however, that such regulations shall not extend to the requiring of the placement of intended overhead lines underground or the routing of any lines outside of the area of joint usage above described.

OWNER hereby agrees that access for servicing its facilities normally will be limited to access via (a) Frontage roads where provided (b) Nearby or adjacent public roads and streets, or (c) Trails along or near the highway right of way lines, connecting only to an intersecting road; from any one or all of which entry may be made to the outer portion of the highway right of way. Where supports, manholes, or other appurtenances of the Owner's facilities are located in medians or interchange areas, access to them from the through-traffic roadways or ramps

Utility Manual

State Department of Highways
and Public Transportation
Right of Way Division
Form D-15-80A
Page 2 of 2
Rev. 8-75

will be permitted but only by permits issued by the State to the Owner setting forth the conditions for policing and other controls to protect highway users. If an emergency situation occurs, and the usual means of access for service operations as herein provided will not permit the immediate action required by the Owner in making emergency repairs as required for the safety and welfare of the public, the Owner shall have a temporary right of access to and from the through-traffic roadways and ramp as necessary to accomplish the required emergency repairs.

Participation in actual costs incurred by the Owner for any future relocation or adjustment of utility facilities required by highway construction shall be in accordance with and to the extent possible under applicable laws of the State of Texas. Except as expressly provided herein, (1) The Owner's rights of access to the through-traffic roadways and/or ramps shall be subject to the same rules and regulations as apply to the general public, and (2) The Owner and the State, by the execution of this agreement, do not waive or relinquish any right which they may have under the law or Constitution, State or Federal.

In the event the Owner fails to comply with the requirements as set out herein, the State may take such action as it deems appropriate to compel compliance.

IN WITNESS HEREOF, the parties hereto have affixed their signatures.

STATE OF TEXAS
State Department of Highways
and Public Transportation

OWNER: _____

District Engineer

By _____

Right of Way Engineer

Title _____

Date

Date _____

Utility Manual

9 - IRRIGATION AND DRAINAGE PIPES, DITCHES AND CANALS901. GENERAL

(1) Irrigation and drainage facilities installed across any highway right of way shall be designed and constructed in accordance with Departmental standards for highway culverts or bridges.

(2) Longitudinal ditches and canals which would closely parallel the highway shall not be permitted nor will any appurtenances be permitted within the clear roadside area which would constitute a hazard to traffic.

(3) Extreme care shall be exercised in the location of levee roads or ditch rider roads where they intersect the highway so as to avoid establishing any hazards at points of critical sight distance.

Utility Manual

10 - MISCELLANEOUS1001. GENERAL

(1) Various types of utility lines not specifically covered herein shall be considered within the provisions of this policy in accordance with the nature of the line. It shall be a general practice to consider all lines carrying caustic, flammable, or explosive materials under the provisions for high pressure gas and liquid fuel lines.

(2) Where the cost of installation is the responsibility of the utility firm, the Department shall require reimbursement for its cost of measures which the Department may take in the interests of traffic safety, or restoration and repairs to the highway, which are made necessary by the utility installation.

(3) It is the responsibility of the District Engineer to provide inspection as needed to insure that installations are accomplished in a safe manner as approved by the Department.

Utility Manual

11 - FORMS1101. GENERAL

Use and occupancy agreement forms and notice forms are provided for use for utility facilities installed, adjusted, relocated or retained within highway right of way. These forms provide for a definite understanding as to the location and manner in which utilities will be installed and/or maintained and, where applicable, provide the necessary rights needed by the State to occupy the property interests held by the utility company.

On highway routes within the corporate limits of municipalities, the Municipal Maintenance Agreement, Form 1038, requires that all utility installations are to be in accordance with the Department's Utility Policy and subject to the State's approval.

Other forms are also provided for conveyance of utility company property interests to the State when such interests within highway rights of way are abandoned.

1102. USE AND OCCUPANCY AGREEMENT FORMS

The following forms are to be used when in connection with "active" highway projects an adjusted or relocated utility facility occupies part of the highway right of way or when a utility facility is retained within the highway right of way without adjustment unless the utility has a previously approved Department use and occupancy agreement or approved notice form covering the right of way limits and which includes provisions for control of access when applicable. Such forms are used also when a utility has a prior property interest which is being retained within the highway right of way. A minimum of three executed copies of the appropriate form with plans attached should be forwarded to D-15 except four copies are required to accompany an Interstate utility agreement. At least two copies are to carry original signatures of all parties signing the form.

- (1) D-15-80A, Utility Joint Use Agreement (controlled access highways) is provided for use on all controlled access highways.
- (2) D-15-88, Subordination of Mineral Lease (controlled access) is used in lieu of D-15-80A where the utility is occupying land by a mineral lease on a controlled access highway.
- (3) D-15-24A, Utility Joint Use Agreement (non-controlled access highway) is provided for use on all non-controlled access highways including Farm and Ranch to Market Roads.
- (4) D-15-85, Subordination of Mineral Lease is used in lieu of Form D-15-24A where the utility is occupying land by a mineral lease on a non-controlled access highway.

1103. NOTICE FORMS

These forms are provided for use for new utility installations after highway construction is completed. They are also provided for new utility installations placed before or during highway construction except (1) where the utility has a compensable property interest or (2) the State is participating in the adjustment or relocation

Utility Manual

cost of the utility installation. The District Engineer is authorized to approve all notice forms except those on utility bridges, attachments to highway structures or those which include exceptions to the Department's Utility Accommodation Policy. Four copies of the notice form covering the latter situations are to be forwarded to D-18 for necessary approvals.

(1) 1082, Notice of Proposed Installation, Utility Line on Controlled Access Highway is provided for use on Interstate Highways and on controlled access sections of other highways.

(2) 1023, Notice of Proposed Installation, Utility Line on Non-Controlled Access Highway is provided for use for the applicable utilities on non-controlled access highways and on Farm and Ranch Roads.

1104. ABANDONED INTERESTS

When a utility installation is relocated off its property interests or outside the highway rights of way the abandoned interest or rights of the utility company within the new highway right of way should be conveyed to the State. Quitclaim, Form D-15-30, or Release of Easement, Form D-15-17, whichever is applicable, may be used for such conveyance. It is suggested that the utility quitclaim or release its interest by the metes and bounds description of the right of way parcel acquired by the State of Texas at the location where the utility property interest is affected. This procedure will facilitate processing of the required instrument.

1105. EXAMPLES

The following are examples of the forms discussed above.

Utility Manual

UTILITY POLICY CHART (Not complete, see written policy for details.)		CONTROLLED ACCESS HIGHWAYS	
		STANDARD REQUIREMENTS	EXCEPTIONS FOR EXISTING LINES
HIGH PRESSURE GAS AND LIQUID PETROLEUM - ENCASED	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Vent</u> - At least one required.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. of casing under subgrade. 30" total clear depth at all points where encased. 36" total clear depth where not encased. (Longitudinal)</p> <p><u>Encasement</u> - Under roadways, ditches, structures and center medians. Exceptions allowed for wide medians.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain in outer separation.</p> <p><u>Depth</u> - Minimum total depth of 24" if encased or 30" if not encased may be permitted. (Longitudinal)</p> <p><u>Encasement</u> - Under roadways, ditches, structures and center medians. Exceptions allowed for wide medians.</p>	
HIGH PRESSURE GAS AND LIQUID PETROLEUM - UNENCASED	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - Minimum 18" under subgrade or 60" under pavement surface. 48" minimum under ditches. Exceptions may be allowed if protected by reinforced concrete slab.</p> <p><u>Encasement</u> - Not required if welded steel construction of heavier wall thickness and/or higher strength steel, coated and wrapped, cathodically protected and other measures as required. Limits of protection are the same as that for encasement.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain in outer separation.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - No exceptions permitted.</p> <p><u>Encasement</u> - Not required if welded steel construction of heavier wall thickness and/or higher strength steel, coated and wrapped, cathodically protected and other measures as required. Limits of protection are the same as that for encasement.</p>	
LOW PRESSURE GAS	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Same as for encased high pressure lines or none if cathodically protected and agree to no future pavement cuts.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain except under center medians, roadways in the controlled access area, or any other roadway to be (re) constructed, provided there will be no future pavement cuts other than on low volume frontage roads.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p> <p><u>Encasement</u> - No exception permitted.</p>	
WATER	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Under roadways to center of ditch and under medians. Exception allowed for wide median, for pipe of 30" or greater diam. under low volume frontage roads, and under side road entrances where justified by traffic, road condition, and local practice.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain except under center medians, roadways within the controlled access area, or any other roadway to be (re) constructed, provided there will be no future pavement cuts other than on low volume frontage roads.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p> <p><u>Encasement</u> - May be omitted for pipe of 24" or greater diam. under low volume frontage roads.</p>	
SANITARY SEWERS	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Only if under pressure or does not meet standards. If encased, same as water lines.</p> <p><u>Materials</u> - Cast iron or equal at crossings of high volume roadways. Others permitted for longitudinal lines and crossings of low volume roadways.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain except under center medians and roadways in the controlled access area, provided they are of satisfactory quality and depth, manholes are adjusted, and future service lines will not violate access control or disturb any roadway.</p> <p><u>Materials</u> - Requirements for materials may be waived if line is of satisfactory quality.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p>	

Utility Manual.

UTILITY POLICY CHART (Not complete, see written policy for details.)	OVERHEAD POWER AND COMMUNICATION	CONTROLLED ACCESS HIGHWAYS	
		STANDARD REQUIREMENTS	EXCEPTIONS FOR EXISTING LINES
		<p><u>Location</u> - Longitudinal--1' to 3' from ROW or behind outer curb. Short exceptions permitted.</p> <p><u>Crossings</u>--No poles in median. Pole in outer separation only when ROW is over 300', and must be 30' from main lane and 70' from ramp shoulder edge. Crossings approx. perpendicular. At structures, reroute around approaches or sufficient to provide 150' horizontal or 30' vertical clearance.</p> <p><u>Vertical Clearance</u> - 18' for communication lines and 22' or greater as required by law for power lines.</p> <p><u>Type of Construction</u> - Longitudinal lines shall be single pole construction.</p>	<p><u>Location</u> - May deviate from perpendicular.</p> <p><u>Vertical Clearance</u> - No exception permitted.</p> <p><u>Type of Construction</u> - No exception permitted.</p>
UNDERGROUND POWER	<p><u>Location</u> - Near ROW line, crossings approx. perpendicular. Longitudinal lines may be placed by plowing or open trench.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - 18" usual and 12" minimum of 1/2 diam. of casing under subgrade. 30" total clear depth at all points where encased.</p> <p><u>Encasement</u> - Under roadways, ditches, structures and center medians. Exceptions allowed for wide medians.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain in outer separation.</p> <p><u>Depth</u> - Minimum total depth of 24" if encased or 30" if not encased may be permitted.</p> <p><u>Encasement</u> - No exceptions permitted.</p>	
UNDERGROUND COMMUNICATION	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" under pavement. 24" outside pavement area, including ditches.</p> <p><u>Encasement</u> - None required unless directed by District Engineer for hazardous locations such as near bridges, structures, etc. Where encasement not installed, utility should agree to no pavement rule.</p>	<p><u>Location</u> - May deviate from perpendicular. Where encasement not installed, utility should agree to no pavement rule. Longitudinal lines may remain except under center medians, through-traffic road ways or connecting roadways (including shoulders)</p> <p><u>Depth</u> - Where materials and other conditions just exceptions may be permitted for reduction of 6" i standard requirements.</p>	

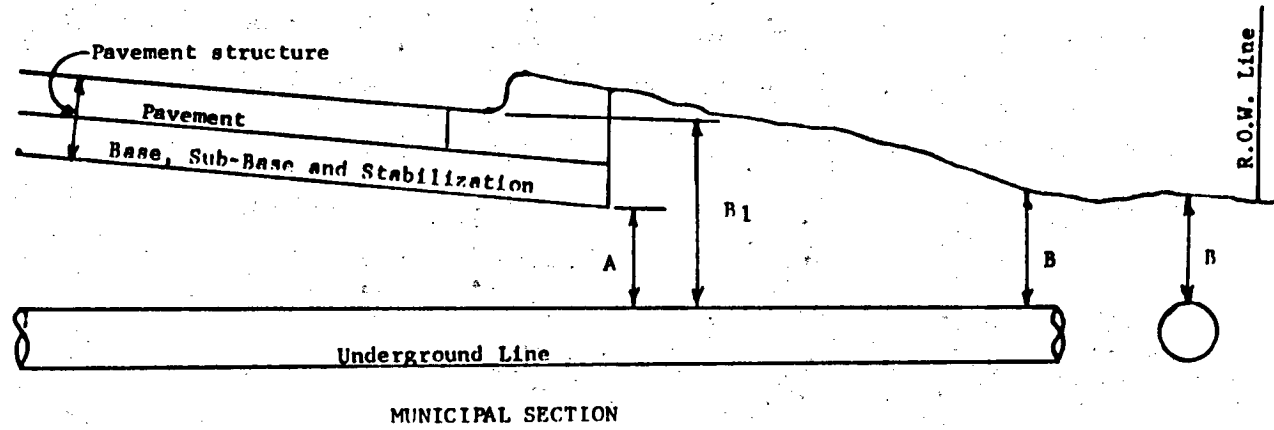
Utility Manual

UTILITY POLICY CHART (Not complete, see written policy for details.)		NON-CONTROLLED ACCESS HIGHWAYS AND FARM TO MARKET ROADS	
		STANDARD REQUIREMENTS	EXCEPTIONS FOR EXISTING LINES
HIGH PRESSURE GAS AND LIQUID PETROLEUM - ENCASED	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Vent</u> - At least one required.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. of casing under subgrade. 30" total clear depth at all points where encased. 36" total clear depth where not encased. (Longitudinal)</p> <p><u>Encasement</u> - Under roadways, ditches and structures.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain except under roadways.</p> <p><u>Depth</u> - Minimum total depth of 24" if encased or 30" if not encased may be permitted.</p> <p><u>Encasement</u> - May be omitted on low volume Farm to Market Roads and low volume highways if protected by a reinforced concrete slab or if 6' under pavement surface and 4' under ditch.</p>	
HIGH PRESSURE GAS AND LIQUID PETROLEUM - UNENCASED	<p><u>Location</u> - Near ROW Line. Crossings approx. perpendicular.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - Minimum 18" under subgrade or 60" under pavement surface. 48" minimum under ditches. Exceptions may be allowed if protected by reinforced concrete slab.</p> <p><u>Encasement</u> - Not required if welded steel construction of heavier wall thickness and/or higher strength steel, coated and wrapped, cathodically protected and other measures as required. Limits of protection are the same as that for encasement.</p>	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - No exceptions permitted.</p> <p><u>Encasement</u> - Not required if welded steel construction of heavier wall thickness and/or higher strength steel, coated and wrapped, cathodically protected and other measures as required. Limits of protection same as that for encasement. Such increased measures not required on low volume Farm to Market Roads and low volume highways if protected by a reinforced concrete slab or if 6' under pavement surface and 4' under ditch.</p>	
LOW PRESSURE GAS	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Same as for high pressure lines or none if cathodically protected and agree to no future pavement cuts.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain in place except under any roadway to be (re) constructed, provided there will be no future pavement cuts other than on low volume roads.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p> <p><u>Encasement</u> - No exception permitted.</p>	
WATER	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Under roadways to center of ditch and under medians. Exception allowed for wide medians. Exception allowed for wide medians, for pipe for 30" or greater diam. under low volume roadways, and under side road entrances where justified by traffic, road condition, and local practice.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain in place except under any roadway to be (re) constructed, provided measures are taken to avoid future pavement cuts on any high volume roadway.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p> <p><u>Encasement</u> - May be omitted for pipe of 24" or greater diam. under low volume roads.</p>	
SANITARY SEWERS	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. under subgrade. 24" total clear depth below surface.</p> <p><u>Encasement</u> - Only if under pressure or does not meet standards. If encased, same as water lines.</p> <p><u>Materials</u> - Cast iron or equal at crossings of high volume roadways. Others permitted for longitudinal lines and crossings of low volume roadways.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines of satisfactory quality may remain at any location provided manholes can be satisfactorily adjusted and measures are taken to avoid future pavement cuts.</p> <p><u>Materials</u> - Requirements for materials may be waived if line is of satisfactory quality.</p> <p><u>Depth</u> - Minimum total depth of 18" may be permitted.</p>	

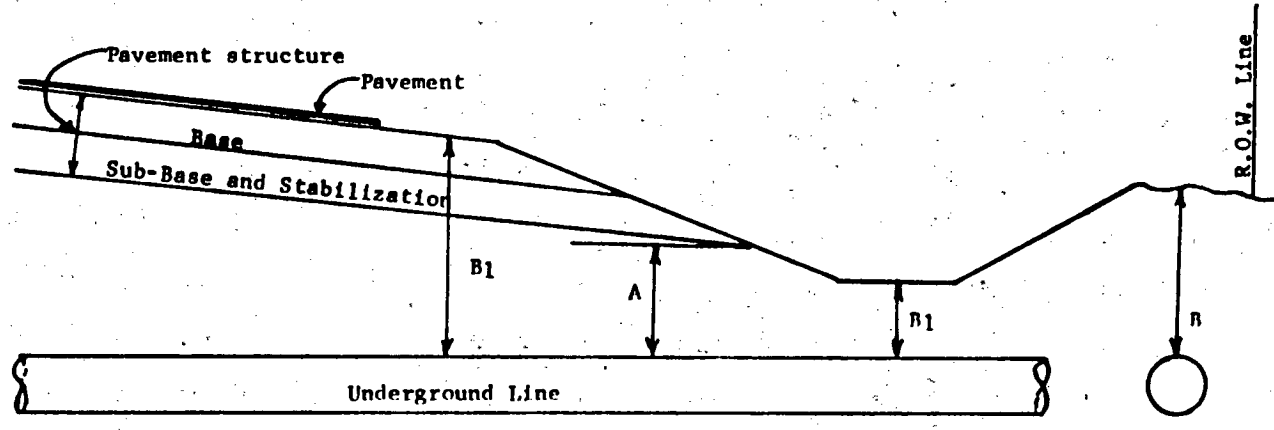
Utility Manual

UTILITY POLICY CHART (Not complete, see written policy for details.)	OVERHEAD POWER AND COMMUNICATION	NON-CONTROLLED ACCESS HIGHWAYS AND FARM TO MARKET ROADS	
		STANDARD REQUIREMENTS	EXCEPTIONS FOR EXISTING LINES
		<p><u>Location</u> - Longitudinal--1' to 3' from ROW or behind outer curb. Short exceptions permitted.</p> <p><u>Crossings</u>--No poles in median. Poles 1' to 3' from ROW or behind outer curb, with variation permitted only where ROW is over 300'. Crossings shall be approx. perpendicular. At structure, reroute around approaches or sufficient to provide 150' horizontal or 30' vertical clearance.</p> <p><u>Vertical Clearance</u> - 18' for communication lines and 22' or greater as required by law for power lines.</p> <p><u>Type of Construction</u> - Longitudinal lines shall be single pole construction.</p>	<p><u>Location</u> - May deviate from perpendicular.</p> <p><u>Vertical Clearance</u> - No exception permitted.</p> <p><u>Type of Construction</u> - No exception permitted.</p>
UNDERGROUND POWER	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular. Longitudinal lines may be placed by plowing or open trench.</p> <p><u>Markers</u> - Required.</p> <p><u>Depth</u> - 18" usual and 12" minimum or 1/2 diam. of casing under subgrade. 30" total clear depth at all points where encased. 36" total clear depth where not encased.</p> <p><u>Encasements</u> - Under roadways, ditches and structures.</p>	<p><u>Location</u> - May deviate from perpendicular. Urban longitudinal lines may remain except under roadways.</p> <p><u>Depth</u> - Minimum total depth of 24" if encased or 30" if not encased may be permitted.</p> <p><u>Encasement</u> - May be omitted on low volume farm to market roads and low volume highways if protected by a reinforced concrete slab or 1/2 6' under pavement surface and 4' under ditch.</p>	
UNDERGROUND COMMUNICATION	<p><u>Location</u> - Near ROW line. Crossings approx. perpendicular.</p> <p><u>Depth</u> - 18" under pavement. 24" outside pavement area, including ditches.</p> <p><u>Encasement</u> - None required unless directed by District Engineer for hazardous locations such as near bridges, structures, etc. Where encasement not installed, utility should agree to no pavement cuts.</p>	<p><u>Location</u> - May deviate from perpendicular. Where encasement not installed, utility should agree to no pavement cuts. Longitudinal lines may remain except under center medians, through-traffic roadways or connecting roadways (including shoulders).</p> <p><u>Depth</u> - Where materials and other conditions justify, exceptions may be permitted for a reduction of 6" from standard requirements.</p>	

MINIMUM COVER FOR UNDERGROUND LINES
 (Except Unencased High Pressure Gas and Liquid Fuel Lines)



MUNICIPAL SECTION



RURAL SECTION

- A. Usual - 18" or 1/2 Diam. of Pipe or Casing if Greater (All Lines)
 Minimum - 12" or 1/2 Diam. of Pipe or Casing if Greater (All Lines)
- B. 36" for High Pressure Gas or Liquid Fuel Lines Longitudinally
- B&B1 30" for High Pressure Gas, Liquid Fuel and plastic lines which are Encased. (Also applies to Longitudinal plastic lines.)
- B&B1 24" for all other Lines

NOTE: Exception may be authorized to permit existing lines to remain in place at depths of 6" less than specified for "B" or "B1".

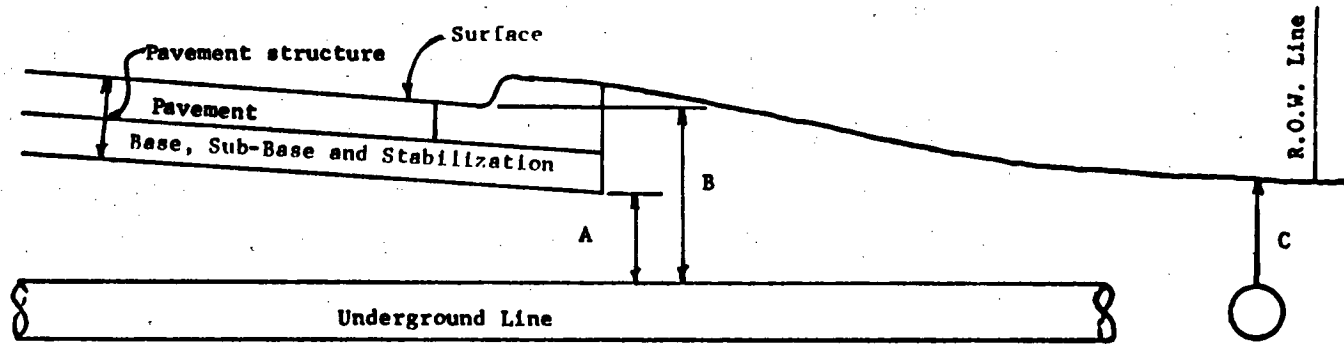
KOV. 8-75

Figure 1

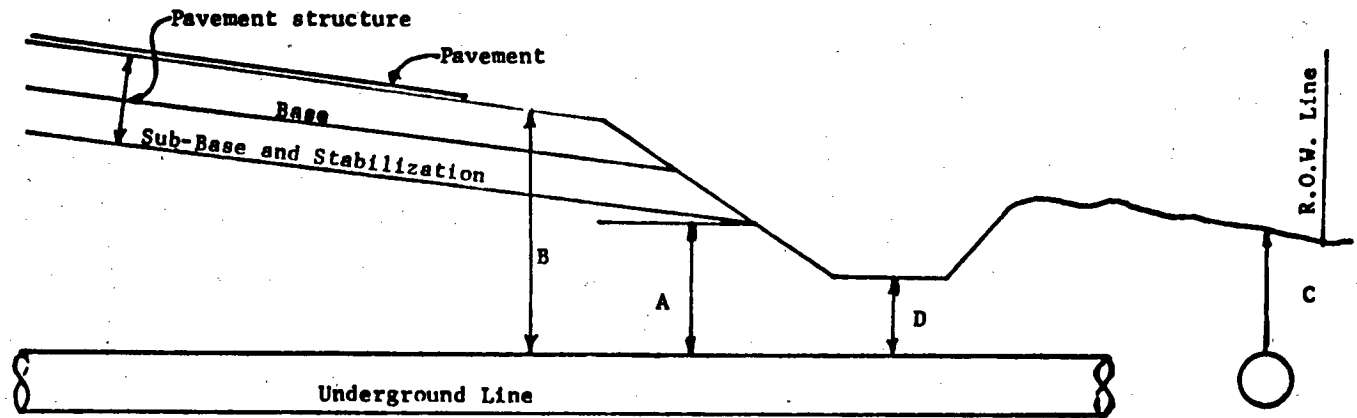
Plate 8
 Utility Manual

Utility Manual

MINIMUM COVER FOR UNENCASED HIGH PRESSURE GAS AND LIQUID FUEL LINES



MUNICIPAL SECTION



RURAL SECTION

- A. Minimum - 18"
- B. 60" for High Pressure Gas or Liquid Fuel Lines without Encasement
- C. 36" for High Pressure Gas or Liquid Fuel Lines Longitudinally
- D. 48"

NOTE: Exception may be authorized to permit less than specified depths if protected by a reinforced concrete slab.

Figure 2

Plate 8
Sheet 61 of 63

Utility Manual

APPENDIX B

A CASE HISTORY

A contract in an eastern state was awarded for \$16.4 million. In addition, utility relocations cost \$10.2 million. A claim for utility-related delays was settled for \$1.4 million. Thus, the total cost for relocating utilities was equal to 71 percent of other construction costs.

Delay and Interference

Throughout the life of the project the contractor claimed delays and interference by the state and a large part of the contractor's claim was based on this allegation.

Extensive utility relocations were necessary on this project by private utility companies. Numerous municipal utility lines also had to be relocated.

The total value of the utility relocations work by the electric company was \$7,536,000, of which \$3,844,983 was performed under contract. The cost of relocation work by the telephone company amounted to \$2,287,000, which can be broken down into \$377,000 for temporary relocations, \$1,170,000 for constructing a new conduit system, and \$740,000 for installing new cables in conduits. The water company had \$369,279 worth of work in water main relocations, \$169,279 of which was reimbursable by the state. A major portion of the municipal utility relocation work was included in the contract.

It is evident that there were substantial delays caused by utility relocations on the project. The primary cause of delay was the conflict between drains and pipe lines to be installed under the contract and the electric company's lines, which could not be removed until a new system was installed and energized. Their gas mains posed a similar problem. The electric company did not begin their relocation in the southerly half of the project until four months after the start of contract work and in the northerly half until nine months after start of work. Nor did their relocation progress in a timely fashion.

The water company delayed letting a contract for their water main relocations. Further delays caused by prohibition of water shut-downs also occurred. The telephone company also contributed delays but to a lesser degree. Early in the contract they relocated

all of their existing overhead lines into a temporary overhead system thereby reducing potential conflicts with contract work.

There were no major changes in the nature and quantity of contract work. The 108 field changes and 64 additional designs issued during the life of the contract contemplated revisions and modifications of existing work, which can be anticipated for an urban project of this magnitude. The increase of about \$2 million in the value of work over the original bid includes about \$220,000 of force account work and about \$665,000 of work at agreed prices, leaving about \$1.1 million of additional work that could be viewed as unilaterally ordered extra work.

THE TRANSPORTATION RESEARCH BOARD is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 270 committees, task forces, and panels composed of more than 3,300 administrators, engineers, social scientists, attorneys, educators, and others concerned with transportation; they serve without compensation. The program is supported by state transportation and highway departments, the modal administrations of the U.S. Department of Transportation, the Association of American Railroads, the National Highway Traffic Safety Administration, and other organizations and individuals interested in the development of transportation.

The National Research Council was established by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and of advising the Federal Government. The Council operates in accordance with general policies determined by the Academy under the authority of its congressional charter of 1863, which establishes the Academy as a private, nonprofit, self-governing membership corporation. The Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in the conduct of their services to the government, the public, and the scientific and engineering communities. It is administered jointly by both Academies and the Institute of Medicine.

The National Academy of Sciences was established in 1863 by Act of Congress as a private, nonprofit, self-governing membership corporation for the furtherance of science and technology, required to advise the Federal Government upon request within its fields of competence. Under its corporate charter the Academy established the National Research Council in 1916, the National Academy of Engineering in 1964, and the Institute of Medicine in 1970.

TRANSPORTATION RESEARCH BOARD

National Research Council

2101 Constitution Avenue, N.W.

Washington, D.C. 20418

ADDRESS CORRECTION REQUESTED