TEXAS HIGHWAY DEPARTMENT

PLAN PREPARATION

BOOK I

ROAD DESIGN DIVISION

INSTRUCTORS SCHOOL

PLAN PREPARATION

BOOK I

Prepared by the Road Design Division
of the Texas Highway Department
for the Instructors School

Austin, Texas December 1952

FOREWORD

The discharge of our responsibilities and completion of our assigned tasks as employees of the Highway Department can best be accomplished by working together as a team. This volume is dedicated to a better understanding of our common problems.

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THE SHORTAGE OF ENGINEERS

AND WHAT CAN BE DONE ABOUT IT

It is now evident that there are too few Engineers to meet the demand. This condition has existed since the war. Recently, however, the shortage has become acute. During the war a large backlog of planning was built up. When the war ended these plans were available for construction and contracts were let in spite of the shortage of Engineers. Our backlog of plans has now been almost entirely exhausted. The new programs list few projects on which plans are ready.

Estimates of engineering man power made several years ago indicated that an ample number of Engineers would be available to meet the demand by 1952. Recent estimates, however, predict engineering man power shortages for a long time in the future.

Production line methods and machines have reduced the man hours per unit of production in many fields. Engineering, however, is difficult to accomplish by such methods. New techniques and the increased use of old techniques will undoubtedly help overcome the engineering man power shortage. The increased use of aerial photography is an example.

As Engineers we should be interested in techniques. Techniques, however, will never solve our man power problem. Principles must be employed. Engineers must learn to employ assistants, reserving to

themselves only engineering matters that require engineering ability, training and judgment. Engineers must become leaders of a team of assistants and must know how to instruct their teams.

Leadership has always been important to Engineers and will become increasingly important in the future. Let us then examine leadership in detail in order that we may become better leaders.

Leadership is simply the art of influencing human behavior - the ability to handle men. Each of you aspires or should aspire to a position of leadership in your profession and community. Any reasonably intelligent, morally sound, forceful man can become a leader. The principles of leadership can be learned and applied just as any other human accomplishment may be mastered.

There are two types of leadership: authoritarian and persuasive. The authoritarian type is recognized by the dogmatic use of authority and power. It is distasteful to Americans and should be avoided. The persuasive leader bases his skill in leadership on example and ability, with high standards of efficiency for himself and his associates. Engineers should concern themselves solely with persuasive leadership.

The average American will endure almost any fault in his leader except ignorance. You have all heard some one say, "He is a tough so and so but he knows his stuff." It therefore behooves us to examine ourselves so that we may know our capabilities and limitations. A man who cannot master his limitations can never become a leader.

You will not receive the full benefit of your subordinates abilities if you do not keep them informed, for soon they will be performing blindly. The better a man is informed about his particular task the more effective he will be. When instructions are given they should be clear and concise. Vague instructions are worse than none for they produce confusion and doubt.

Men are quick to sense indifference to their welfare. Support a safety program and interest yourself in their living conditions. Be friendly and approachable. See that the work load is equalized.

It is not enough to give instructions, the task must be understood, supervised and accomplished. This is the ancient principle of follow up.

A leader must accept responsibility and must develop a sense of responsibility in his subordinates by delegating authority. Keep uppermost in your mind that you as a leader are responsible for every thing that is done or is not done. This responsibility cannot be delegated.

As a leader it is your responsibility to make sound and timely decisions. Experience and wisdom are the requisites for a decision but even the experienced leader needs to follow logical steps in making his decision. These steps are: First, get firmly in your mind what is to be done or accomplished. Second, get the facts bearing on the problem. Third, determine all practical courses of action. Fourth, consider the advantages and disadvantages of each and compare these advantages and disadvantages. Then make a decision.

There was a time not long ago when on the job training was sufficient to provide Engineers with assistants. This time has passed. If Engineers are to meet the increased demands for engineering work in the future, a well rounded training program must be set up and operated during working hours. On the job training is still important but it is no longer enough. As Engineers we must train our draftsmen, instrument men and inspectors. Engineers who cannot learn to train men will likely fail in their assignment. A knowledge of methods of instruction is necessary.

I am sure that by this time some of you are thinking about like this: I am not an instructor; someone else in the organization could do a better job. The answer to your reluctance is that someone has already evidenced their confidence in your ability or you would not be here. Then too, you are the most available person in your organization.

In order to assist you to become better instructors, we have included the following outline on methods of instruction.

OUTLINE

Methods of Instructions

I. Emphasize the importance of the instructor

1. Training is only as good as the instruction and the instructor.
2. Instructors must know how to teach.
3. Instructors must control & guide the class.

II. Instructors must keep in mind the channels of learning

1. How we learn - 5 senses
2. We learn by sight 85% of what we know
3. We learn by hearing 10% of what we know
4. We learn by smell, touch and taste 5% of what we know

III. Steps in the teaching process

1. Preparation
2. Presentation
3. Demonstration
4. Application
5. Examination
6. Discussion

1. Preparation
   (1) The instructor must know the subject
      (a) The instructor may learn the subject by study
      (b) The instructor may learn the subject by his own experience or the experience of others
   (2) The instructor must determine the scope and objective of the teaching
      (a) From the scope and objective determine the method
   (3) The instructor must analyse the class
      (a) Instruction must be given at the proper level
      (b) Instruction must be given at the proper rate
   (4) The instructor must select the material and organize it around key points
      (a) Prepare a lesson plan

2. Presentation
   (1) Introduction

(a) Proper

(2) Motivation
- (a) Bring out motive
- (b) Arouse interest

(3) Explanation
- (a) Relate new material to old
- (b) Build new learning on old
- (c) Explanation facilitates learning
- (d) Explanation saves time
- (e) Go from simple to complex
- (f) Do not cover too many new points
- (g) Summarize and emphasize main points

3. Demonstration
   - (1) Actual portrayal of operation or procedure
   - (2) Set a high standard of performance
   - (3) Keep as simple as possible

4. Application
   - (1) Learn by doing
   - (2) Student must understand what he is doing
   - (3) Instructor must supervise
     - (a) Assist but do not do the work for the student
     - (b) Prevent wrong learning by proper supervision
     - (c) Patience is necessary
     - (d) Be willing to go over a subject again

5. Examination
   - (1) Make practical
   - (2) Use as measure of what has been learned
   - (3) Determines how well teaching has been done
   - (4) Indicates weak spots in teaching

6. Discussion
   - (1) Should always be held when applicable
   - (2) Clarifies and clinches important points and questions
   - (3) Point out mistakes and points not thoroughly understood
   - (4) Criticism must be constructive
   - (5) Praise good points

IV. Methods of Instruction

1. Lecture
   - (1) Least effective
   - (2) Suitable for large groups

2. Conference
   (1) Not suited for large groups
   (2) Difficult to control

3. Demonstration
   (1) Suitable for large groups
   (2) Effective when applicable

4. Group performance
   (1) Must be applicable

5. Coach and pupil
   (1) Expensive
   (2) Slow
   (3) Very effective

V. Common mistakes in presentation

1. Poor Delivery
   (1) Too fast
   (2) Too slow
   (3) Too loud
   (4) Too soft

2. Cultivate conversational tones just loud enough for all to hear

3. Never read material

4. Remember you do not have to be an orator to be a good teacher

5. Distractions
   (1) Instructors habits
   (2) Charts uncovered when not in use
   (3) Material on black board
   (4) How to use black board so all can see
   (5) Smoking during lectures

6. Questioning technique
   (1) Never designate student then ask question
   (2) Require student to stand and answer so all can hear
   (3) Never repeat answer - this just wastes time
   (4) Build up discussions
   (5) Redirection technique

7. Instructor must be alert to find points not understood
   (1) Note what must be retaught
   (2) Give constructive criticism
   (3) Evaluate student learning

8. Training aids
   (1) Instructor must improvise when aids are not available
   (2) Do not use complicated aids, keep them simple
   (3) Learn the technique of using models and charts
   (4) When possible emphasize the sense of sight
   (5) Select training aids and equipment
       These must be available when needed
   (6) Rehearsal

9. Films
   (1) Films are not a substitute for an instructor
   (2) Always review a film before showing
   (3) Tell the class what to look for in the film
   (4) Point out principles covered.
   (5) Hold a discussion after film

VI. Summary

1. Remember your responsibility to:
   (1) Class
   (2) Your organization
   (3) Tax payer (Estimate per minute cost for importance)
   (4) Instructor and instructor alone is responsible for
       what student learns or does not learn
   (5) Be prepared to use the proper methods of instruction

EXAMINATION

Q. Describe the proper methods for using films?

Q. What is the purpose of the examination step in teaching?

Q. Why is a discussion important?

Q. What points should be covered in a discussion?

Q. Why is a rehearsal important and necessary for the instructor?

Q. Why is application by student important?

Q. What is the least effective method of teaching?

Q. What are some of the most common mistakes an instructor can make?

Q. Why must instructor prepare and use a lesson plan?

Q. Why is it important to keep your subordinates informed?

Q. What is your responsibility as a leader?

THE USE OF HIGHWAY PLANNING SURVEY DATA BY THE ROAD DESIGN DIVISION

OUTLINE

I. INTRODUCTION

A. BALANCED ENGINEERING
1. The relation of traffic service requirements to design
a. Relative costs

2. Classification

II. DATA FURNISHED BY HIGHWAY PLANNING SURVEY

A. MAPS
1. Statewide Maps
a. Travel map
(1) published annually
(2) minor FM roads not included

b. General Map
(1) published annually
(2) includes all highways under maintenance

c. Departmental Map
(1) published quarterly
(2) includes all designated highways
(3) note symbol..... on all Primary Federal Routes

d. Traffic Map
(1) published annually

e. Traffic Flow Map
(1) not published regularly

2. District Maps
a. Controls and Sections
(1) published annually
(2) future editions to combine state highways and farm roads on same map

b. Traffic Map

(1) published annually

c. Loadometer Map (Truck Weights)
(1) published for 1948 and proposed for publication in 1952

d. Mosaic of half scale county maps
(1) prepared by special request only

3. County Maps
a. Base Map
(1) published at four to five year intervals, but revised annually with respect to State maintained roads

b. Traffic Map
(1) published at three to four year intervals
(2) contains traffic counts on all county and state roads

c. Projected Farm Road System Map
(1) confidential and not for general distribution

4. City Maps
a. All incorporated cities and towns
(1) reference only

b. All cities of over 5000 population
(1) being prepared for distribution

5. Special Maps
a. U. S. Coast and Geodetic Survey Controls
(1) horizontal and vertical
(2) distributed at special request

b. Maps furnished by special requests

B. ACQUISITION OF TRAFFIC DATA

1. Coverage for general traffic maps
a. 125 permanent automatic traffic recorders

b. 350 portable traffic recorders

c. Vehicle classification
(1) manual counts

d. Loadometer - (Truck Weights)
   (1) 20 stations operated monthly
   (2) 60 stations operated four times yearly

2. Origin and Destination Surveys
   a. Description
      (1) internal
      (2) external

   b. Justification

   c. Initiation
      (1) internal by local request to Commission
      (2) external by district engineer or affected division

3. Load zoning on FM Roads

4. Speed Surveys

5. Special Surveys
   a. Turning counts, intersection control

   b. For changed conditions
      (1) opening of new route
      (2) checking FM Road projections

   c. County Road plan

C. SPECIAL DATA AVAILABLE UPON REQUEST

1. Straight Line Diagrams Showing:
   a. History of all construction
      (1) supplement showing construction costs of all components

   b. Description of Existing Highway
      (1) dimensions, types, stationing, etc. of all features

2. Remaining Investment of Specified Sections of Highway
   a. Represents costs of components of highway minus retired sections
      (1) no maintenance or depreciation allowances considered

3. Probable life of components of the highway

4. Cost Records of Highway System
   a. Total cost 1/4 cent per vehicle mile in 1952 values

5. Condition Surveys
   a. Loadometer and crack survey
      (1) cooperative Highway Planning Survey and Road Design Division project

6. Photographic Record of all Railroad Grade Crossings

7. Aerial photo contact prints and index maps of several counties available to districts on loan basis

III. THE APPLICATION OF HIGHWAY PLANNING SURVEY DATA TO SPECIFIC PROBLEMS

A. PREPARATION OF THE CLASSIFICATION MAP

1. Limited to Primary Federal System
   a. Includes most of major traffic arteries

   b. Association of Primary System with higher design standards

2. Selection of control years

3. Method of calculating traffic trends

4. Translation of predicted 1965 traffic into Classification as used in Geometric Design Standards

B. HIGHWAY ROUTING

1. Definition

2. Authority

3. Responsibility
   a. Initiated and approval received by District Engineer

   b. Approval recommended by Engineer Road Design

   c. Approval by Chief Engineer of Planning

4. Compilation of Data
   a. Classification

b. Base Maps

c. Traffic

d. O & D Survey

e. Population

5. The Route Selection
   a. Joint State-local responsibility
      (1) degree of local participation
         (a) programmed projects
         (b) cooperative agreement with local governments through a Minute tender
         (c) by delegation of authority to the State Highway Engineer

   b. General suggestions
      (1) follow existing route except in special cases
      (2) special cases where rerouting can be justified
         (a) indirection
         (b) if original route is wrong
         (c) to balance FM Roads and State Highway Systems
         (d) if inside a City

      (3) right of way cost reduction alone will not justify rerouting

      (4) necessary actions to be taken when rerouting is done
         (a) consider large bridges which may be left on abandoned roads as responsibility to public to reconstruct
         (b) take into account necessary spurs to towns and villages which are bypassed
         (c) reconnections for lateral roads
         (d) secure agreement from local authorities to retain existing road

   c. Special suggestions
      (1) four lane roads
         (a) freeway consideration
         (b) system balance
         (c) right of way adequacy

      (2) two lane roads of higher classification

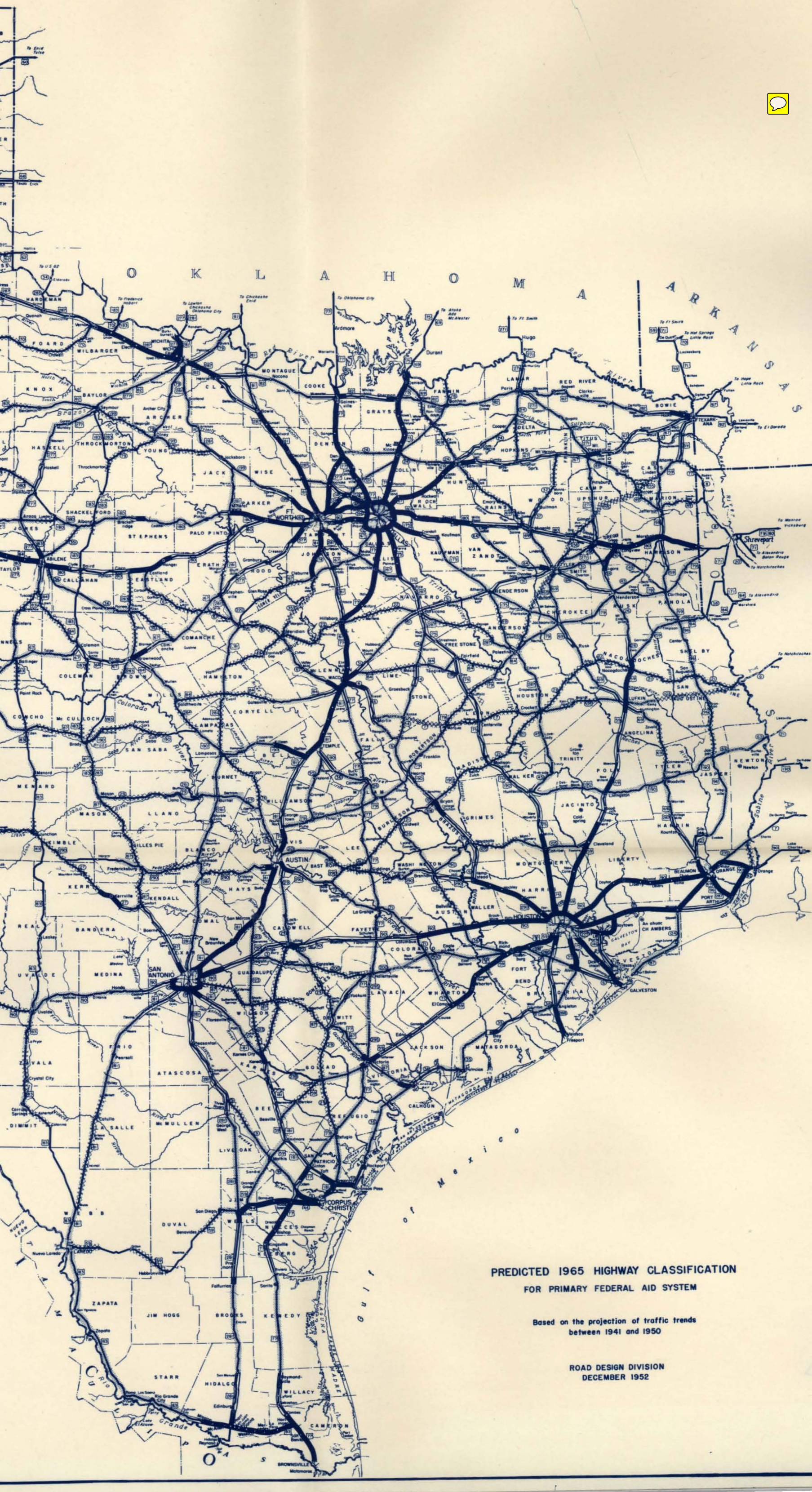
(a) importance of classification
(1) diverse conditions in Texas
(1a) speed and character of traffic
(b) rural characteristics
(c) added importance of staying with existing road
(1) F. M. relation

(3) two lane roads of lower classification
(a) relation to F. M. Road
(b) possible expansion
(1) limited to ultimate two lanes of higher class

C. HIGHWAY LOCATION AND DESIGN
1. Relation to routing
a. Economics to be effected within predetermined route limitations

IV. CONCLUSION

A. CORRELATION OF REQUESTS FOR STATISTICAL DATA THROUGH ALL INTERESTED DIVISIONS



PREDICTED 1965 HIGHWAY CLASSIFICATION

FOR PRIMARY FEDERAL AID SYSTEM

Based on the projection of traffic trends
between 1941 and 1950

ROAD DESIGN DIVISION
DECEMBER 1952

LEGEND

Class AA Highways 6000 & Over vpd
Class A Highways 3500 to 6000 vpd
Class B Highways 1800 to 3500 vpd
Class C Highways 1000 to 1800 vpd
Class D Highways 400 to 1000 vpd

THE USE OF HIGHWAY PLANNING SURVEY DATA BY THE ROAD DESIGN DIVISION

I. INTRODUCTION

A. BALANCED ENGINEERING

Prior to 1935 the highway engineer was forced to consider all route, location and design problems without the benefit of adequate information to reflect the service requirements of the highway being designed. For example, traffic volumes, types, and behavior were, in most cases, subjects of casual observation by individuals and were often translated into design requirements in as many directions as there were individuals involved. Accurate base maps showing existing roads, culture, etc. were almost as scarce as traffic maps.

In 1936 the states, through their highway planning survey divisions, began assembling statistical data which has put highway planning on a more scientific basis. The information consists of maps of all kinds, complete traffic data and detailed economic studies. The acquisition of the material has been continuous and as regards Texas, our highway planning survey division can on short notice provide a complete picture of any section of highway in the State.

What effect has this service had on highway planning? Generally speaking it has enabled the highway engineer, for the first time, to perform "Balanced Engineering." He is now able to cut the design pattern to fit traffic service requirements. An under-engineered expressway

resulting in a poor location, excessive construction costs, and low traffic service standards is a tragedy. Likewise, an over-engineered land service road is wasteful. In either case the engineer performs a poor service for his client, the travelling public. With the material now available for assessing traffic needs and construction costs, there is small excuse for letting the traditional "cost-benefit" relation become unbalanced.

An attempt is being made to effect "Balanced Engineering" at the very beginning of the planning operation by classifying the highways into groups having similar traffic volumes and characteristics. The Texas classification, the AASHO Policy on Classification, and classification systems of other states are all based on traffic and its behavior.

Typical examples of data furnished by HPS and some applications are included at the end of this chapter.

II. DATA FURNISHED BY HIGHWAY PLANNING SURVEY

A. MAPS

All maps and services provided by the Texas Highway Planning Survey which are considered useful to highway planning are catalogued under Part II of the Outline preceding this chapter.

B. ACQUISITION OF TRAFFIC DATA

The acquisition of all Highway Planning Survey data is directed from the Division's office in Austin.

There are 125 permanent automatic traffic recorders located throughout the State. Seventeen of these have remained in their original positions since 1939. In addition to the 125 permanent machines which operate exclusively on the highway system, there are 350 portable traffic recorders which operate on county roads and State highways. The latter machines operate in ten groups; thirty-five to a county. Two weeks to two months are required to acquire adequate traffic information for all roads in a county. The cumulative results of the 475 traffic recorders, together with information from other special sources, go into the make-up of the State, district and county traffic maps.

It is interesting to note that the traffic recording machines were constructed by the personnel of the Highway Planning Survey.

The vehicle classification and loadometer surveys operate continuously throughout the State. A sufficient number of stations of both are operated on a 24-hour schedule to determine the number, type, and load of all trucks on every highway in the State. A thorough knowledge of the effect of trucks on traffic and on the highway structure is absolutely necessary.

The orgin and destination survey is a valuable tool in making route studies. The traffic pattern in a given community appears to be constant throughout the years. Resurveys made in two or three cities after traffic has doubled in volume have shown that a fairly constant ratio has been maintained among the several highways in the area.

Also a constant ratio between through and local traffic movements had been maintained.

There are two kinds of origin and destination surveys, namely, (1) internal and (2) external. The former type is all inclusive. Internal to external distribution of traffic, together with parking surveys and interzone movements, are determined. The detail to which the internal survey goes will depend upon the cooperating city. Since the material derived from this type of survey is of great value to the affected city in its internal planning, the cost of the work is usually shared equally between city and State.

The external origin and destination survey is more limited in scope than that of the internal survey. Traffic determinations usually are limited to external-to-external and external-to-internal movements. Special data are sometimes required, which usually consist of the percent of commercial vehicles, turning movements at intersections, and traffic densities on the principal city streets. This type of survey usually can be obtained upon request, and is considered sufficient for determining highway routes in or around the community.

Careful planning for an origin and destination survey is important. Special information can be requested which will make it possible to solve more easily the problem at hand. Also, the wide awake planner will look forward to probable future programs and begin acquiring valuable special data. For example, a route for a future river bridge in a

city may be a subject of disagreement between interested parties. The proper selection of zone boundaries and an origin and destination count on existing bridges may result in an amicable solution of an otherwise difficult problem.

Special surveys made at irregular intervals include periodic determination of the average speed of all vehicles on the Texas highway system. It is interesting to note that the increase has been from 46 m.p.h. in 1946 to 52 m.p.h. in 1952. A practical use was made of the average speed of truck combinations in designing the climbing land chart which was distributed with Road Design and Maintenance Information Circular 1-52.

Special surveys to determine changed conditions are often necessary. For example, (1) what may be valuable information which can be applied to future routing problems is being acquired on the recently opened Galveston-Houston Expressway. (2) In the farm road field, rechecks are required to keep the projected 35,000 mile system up to date. Also in the field of special surveys is the work toward preparing county road plans. This is a service which the State Highway Commission can give free of cost to any county which requests it.

C. SPECIAL DATA AVAILABLE UPON REQUEST

The straight line diagram prepared by the road life section of Highway Planning Survey presents a complete history of all construction

that has ever gone into the highway. Types, general descriptions, and year constructed are among the facts shown. This information is up to date and is available for the entire highway system. Supplemental data showing actual costs of the components of the highway can be furnished on a limited basis.

The straight line inventory diagram shows all existing features of the road and is available for every highway on the system.

The remaining investment of a road, or section thereof, is considered to be the actual cost; maintenance and depreciation not being considered. The cost of any sections retired by relocation and reconstruction are not included.

The probable life of any component of the highway is calculated by actuarial principles just as human life expectancy is estimated. Samples of this data were distributed to the field in 1949.

A recent economic study has resulted in the determination of the cost of the highway system up to the present time. The cost, according to the study, has been about 1/4 cent per vehicle mile in 1952 value currency. The accepted figure to retire toll road costs is one cent or more per vehicle mile.

Conditions surveys are being conducted in cooperation with the Road Design Division and are related to the loadometer surveys. Cracking of concrete pavement is being studied at this time.

III. THE APPLICATION OF HIGHWAY PLANNING SURVEY DATA TO SPECIFIC PROBLEMS

A. PREPARATION OF THE CLASSIFICATION MAP

The classification map included in the text for this school was prepared from traffic volumes shown on the State traffic maps. Only the Primary Federal-aid system was considered because most of the major traffic arteries are included and also because there are certain design requirements which are associated with the Federal-aid system.

The predicted traffic classifications for the year 1965 were determined by projecting traffic volumes from 1941 on a straight line through 1950 to the year 1965. The arbitrary selection of these three years was based upon the following reasons:

1. 1941 was the last prewar year and the traffic map for that year contained traffic data on many recently completed highways.

2. 1950 was the last year in which Statewide data was available when the classification map was prepared. Subsequent trends prove it a good selection. The traffic curve through the postwar years is now curving downward in the latter half of 1952.

3. 1965 is considered about the maximum time in the future at which rational traffic estimates can be made. On the other hand, estimates for a shorter length of time would be of small value in planning for immediate development. The method of projection has produced what are believed to be conservative results.

An auxiliary map was prepared of the Federal-aid system on which traffic increases between 1941 and 1950 were bracketed in four groups, namely 0 to 3%; 3% to 6%; 6% to 9%; and above 9%. Instead of

projecting an average figure for the respective groups, the following per cent increases were used for the respective brackets: 2%, 5%, 8%, and 12%.

Due to there being more complete traffic data in 1950 than existed in 1941, it was considered advisable to convert 1950 into the base year. The figure representing the increase per year with 1941 as a base, namely, 2, 5, 8, and 12 became 1.7%, 3.5%, 4.7%, and 5.7% when 1950 became the base year. Every significant traffic volume count on the Statewide traffic map for 1950 was then expanded using the latter figures. The predicted 1965 traffic was in turn translated into Texas classification.

The volume of traffic was the only factor considered in preparing the predicted 1965 classification map. For specific projects it will be necessary to consider traffic types and behavior. Also, the influence of terrain on sight distance, contiguous development, and other special features may help determine design, especially in the field of capacity.

Even when dealing with traffic, the classification map should be re-examined for each project being designed. It is recognized that the constantly changing traffic pattern will no doubt make this map obsolete before 1965. If properly used, it can be of inestimable benefit to the highway engineer. He should use this or some other method of predicting future traffic and quit designing highways from information found on last years traffic maps. If he will design by some intelligent traffic pre-

diction, perhaps the roads we are now developing will be adequate in 1965 and not ready for relocation.

B. HIGHWAY ROUTING

The highway route can be defined as a traffic way for motor vehicles. It follows, then, that the ideal highway route will provide the quickest and safest way for the uninterrupted flow of the maximum number of motor vehicles to their desired destinations. Its final selection should, therefore, be based, primarily, upon traffic service requirements. Probable costs and availability of right of way are proper subjects for consideration, but in many cases it will be found that the proper route is longer and will cost more than some alternate plan. The right of way for the best route in many cases will be more expensive than on other possible routes.

Route studies must be confined to projects on the State highway system. Expenditure of funds for studies must be limited to projects on which IPE authority has been granted. The latter authority is granted for programmed projects and for advance planning. Regular programs include State, State Senate Bill, State Bond Assumption, and the three types of Federal-aid programs. State and Federal Laws, together with general Commission Policy, govern the handling of these types of projects. Special conditions in addition to general Commission Policy are often imposed upon advance planning projects and upon "single shot" interim programs. These conditions sometimes specifically outline the

respective responsibilities of the local and State governments. Where a conflict exists between special conditions in a Commission minute and general Commission Policy, the former will govern. Advance planning projects are usually limited to, (1) projects which are a long time developing and (2) an improvement on a section of highway which must overlap several programs and which requires coordinated planning on its entire length.

The district engineer is responsible for initiating the route selection, preparing the map, and recommending approval. The affected design division examines the route, makes such comments and suggestions as are necessary, comes to agreement with the district engineer, recommends approval, and submits it to the office of the Chief Engineer of Planning, where it is processed to final approval. The most satisfactory medium for preparing the route map is a mosaic of half-scale county maps. Those route maps which are processed through D-8 are supplemented with a title sheet in that office. The mechanics of handling route maps through the Bureau of Public Roads are discussed elsewhere.

The first step in the compilation of data for route studies is to determine the classification for some future year. The predicted classification year of 1965 is average, and where new location is anticipated a longer time should be considered. Where permanent components of the road, such as right of way, bridges, and the grade line are to be

developed in the near future stages, a future classification year of 20 to 30 years ahead may be justified. After the classification has been established, base maps should be prepared. The Highway Planning Survey county maps are sufficient for this purpose. If the need for more detailed maps is anticipated in the location stage, they might also properly be accumulated for that phase of the work.

Next, all standard traffic maps should be assembled, including, but not limited to, State, district and county traffic maps. A determination should be made at this point as to whether special traffic surveys are required. This might include one or more origin and destination surveys, special traffic counts inside a city, or for changed conditions on a rural road.

All traffic data whenever possible should be prepared in the form of a trend since 1940 or 1941. This method of predicting traffic for a future year by past trends can be compared to running a transit line forward from a back sight.

City planners use population growth in studying the future needs of streets, water works, sewage disposal, etc. This particular statistic is of perhaps equal importance to the highway engineer in route planning. Population data for all counties, cities and towns in Texas are available in the Texas Almanac. The personnel of one district when surveying an interdistrict route will find it necessary to consider conditions in the adjoining districts and discuss the route with the personnel of the affected districts.

There are always special conditions to be considered on every project. For example: There may be political considerations having to do with future right of way acquisition. Special origin and destination information and a lot of large scale air photos may be of use. One district engineer is known to have made detailed studies up to the location stage on air photos of 1"=200' scale in order to avoid real estate promoters.

The Commission grants authority to plan highways through three channels, namely:

1. Programmed projects
2. Cooperative agreement with local governments through a Minute tender
3. By delegation of authority to the State Highway Engineer

Restrictions of one kind or another are often placed on any of the three types of authority, particularly the latter two. State and local responsibilities are usually outlined when extraordinary conditions exist. For routine conditions Commission Policy will govern.

The degree to which local authorities participate in the selection of a route should depend upon the amount of financial participation in the project by the local government. Under existing practices the participation is generally limited to the acquisition of rights of way, cost of curbs and gutters, part of the cost of necessary storm sewers and stockpasses.

After all pertinent information has been compiled and analyzed, the affected district and Road Design Division should come to a common understanding, based on broad principles, as to the proper routing. The problem of whether or not to incorporate the existing highway into the new route should be considered and if possible decided at this stage. As explained hereinafter, it is nearly always desirable from the State's viewpoint to expand the existing route. However, there are many cases where it is obvious that an existing route cannot be expanded because of excessive property damage. Even so, if the existing route best serves traffic, the county and city should be advised of the State's desire to expand the existing route. Official recognition may be made of the property damage problem when the request for local copperation is extended. This leaves the door open for counter proposals and puts the local people in the position of requesting the route change. This method of handling has at least two advantages, namely:

1. The responsibility for real or imaginary damage to local interests due to moving the road will be a local issue.

2. The State will be in a position to request the local government to assume responsibility for any sections of an abandoned route if traffic use is purely local in character. If an abandoned section fits into the future FM road plan, the county may be requested to commit it to a near future nomination for the Farm Road System in that county.

Extreme caution must be exercised in permitting locally initiated route changes. Conclusions and agreements previously reached with

D-8 must perforce be on a broad basis and at that stage should be on a "paint brush" width scale. Locally instigated changes should be confined within that "band".

On both advance planning and programmed projects, the studies made by the Highway Department personnel should be made available to the local officials if requested. Most difference can be resolved if a common understanding of all problems and aims exists.

On advance planning projects where the city and county have a large stake, it is anticipated that future authority for planning will be in two distinct steps, namely:

1. By cooperative minute whereby the work will be limited to the simultaneous acquisition of data by the local governments which will determine their probable costs and by the Highway Department to determine its probable costs. In simple cases these operations may be performed by using large scale air maps.

2. If, after determining its estimated costs, and the local governments so desire, a second cooperative minute may be extended by the Highway Department detailing the respective responsibilities of the local and State governments.

General suggestions for selecting the route:

Follow the existing road wherever possible. The majority of the counties are opposed to the reassumption of responsibility for roads which were ever on the State highway system. Recent experience indicates the counties will successfully resist the State's efforts to return the abandoned roads to them. This will result in the State being responsible for the perpetual maintenance and future reconstruction of all

roads abandoned by rerouting. Moreover, the incorporation of an existing road into the ultimate facility makes it possible to expand to four-lanes at about half the cost of reconstructing on new location. Also short sections of stage construction are possible on the existing route. On long sections of rerouted road, finance limitations may require two or more programs to place the new route in service.

The abandonment of an existing route can seldom be justified except under conditions similar to the following:

1. The original route is in the wrong place and needs revising to provide adequate traffic service.

2. Indirection of the existing route is such that savings to the traveling public on a new route will justify the additional costs.

3. When system study of an area indicates that the newly routed section will relieve the need for a farm road and that the old route will continue to carry substantial volumes of traffic.

4. Inside a city where the existing highway identity has been lost.

A reduction in right of way costs will seldom justify rerouting. Where doubt exists, comparative economic studies should be made, taking into account right of way, construction and maintenance costs, together with savings to the traveling public. A million dollars worth of road should never be abandoned to save one hundred thousand dollars in right of way cost.

When an existing route must be abandoned the following actions should be taken:

1. Examine the abandoned sections for large bridges which need reconstructing. Ask the county for formal resolution to either agree to closure of the section or to its incorporation in the county system. Failure of the county to take action will justify re-examination of the route.

2. Make a study of bypassed towns and villages for possible spur or business loop requirements. Their design and costs are important increments of a new route. If the new route is on the opposite side of a trunk line railroad as regards the old highway and one or more communities, the future need for connecting railroad grade separations should be studied.

3. In thickly populated areas where numerous lateral roads always tie into an arterial highway (often as dead ends), their necessary rearrangement must be considered.

4. Secure agreement from county to effect disposition of old road.

The foregoing general suggestions are applicable to all classes of highways.

Specific suggestions are offered for the following groups:

1. Class AA and A Highways. This group includes all four lane and potential four lane highways.

   a. All potential four lane highways, particularly those which are situated inside or near large centers of population, should be considered for recommendation for Freeway designation. This designation, which the Commission must make, should be made during the route determination stage.

   b. System balance with other highways in the area must be maintained. For both towns and large

cities the "ring and cross" theory of routing is sound. Traffic service is thus provided both through the city and around it. As stated before, negotiations with the local officials must be done with system balance in mind.

c. Adequate right of way is essential to the proper development of a four lane road. The following requirements are recommended:

(1) Right of way adequate for frontage roads either present or future.

(2) Where "T" type traffic exists a minimum 50' width median should be provided.

(3) Provide 30' minimum width between through lanes and frontage roads.

(4) Provide right of way for present or future grade separation of cross traffic.

2. Class B and C Highways

a. Particular regard must be taken of the Class B highway. If rerouting is necessary, basic design conformance to four lane requirements may be feasible. This in general will be limited to right of way acquisition and grade line. For extremely long range planning, some form of right of way reservation plan may be applicable.

b. Diverse conditions in Texas as regards speed and character of traffic on two lane roads result in variable routing practices throughout the State. High speed traffic including large volumes of heavily loaded combination trucks plying the arterial highways into Ft. Worth, San Angelo, Wichita Falls and the Gulf Ports from the cattle and grain counties requires routing on which horizontal alignment and grades are favorable. Also routing inside of towns should strictly avoid right angle turns. On the other hand Class B and C highway routing in many instances will be required to help carry the land service burden. This condition exists in densely populated rural areas and where towns and villages are closely spaced.

c. The Class B and C highways are predominantly rural, and routing agreements are usually with county officials. Where a town is traversed, unless extraordinary conditions prevail, preference in routing should be given to through traffic. In order to exact the utmost cooperation from local sources, it may be necessary to plan a double route; the business loop and truck route principle.

d. The principle of routing along the existing highway, stressed hereinbefore, is doubly important when the Class B and C highways are considered. By present day standards, the two lane road carries a modest amount of traffic. A new route doubles the facility and hence divides the traffic. The revenue per mile of highway operated is reduced, whereas if the existing route were to be expanded there would likely be an increase in traffic due to improved conditions. This would occur without a corresponding increase in highway mileage.

3. Class D and E Highways.

a. The Texas Standards for the Class D highway are being accepted by the Bureau of Public Roads with certain modifications noted on the Geometric Design Standards. Routing of the high type Class D highway properly belongs with the discussion of routing for Class B and C highways.

b. This discussion is therefore limited to the low Class D highway and the Class E highway. They can be considered as the common meeting ground for the arterial highway system and the farm road system. In general, roads in this category should be designed for local traffic. However, basic routing principles should look ahead to greater through traffic volumes.

c. The linking of farm roads across several districts to provide a future through route is being tried in at least one section of the State. The ultimate route was first agreed upon and subsequent farm road nominations by the counties are being guided

into the plan. Design standards for the unbuilt sections will be raised to conform to future traffic requirements.

d. The ultimate status of this class road will be two lanes. No consideration should be given to separating grades (except at Class AA or A crossing). Expansion to additional lanes must not be considered, nor should design requirements specify more right of way than is necessary to efficiently operate the road.

C. HIGHWAY LOCATION AND DESIGN

The engineer is apt to confuse the location phase of design with that of route selection. Location can be defined as being the most economical and safest highway which can be developed within predetermined route limitations. Detailed economic studies pertaining to grade lines, lengths of structures, etc., should not begin until all traffic service features have been considered and the route "band" determined. Details are then properly taken up within that limitation. All data assembled for route studies should be retained for use in location and design studies.

Location and design will be discussed in detail by others.

IV. CONCLUSION

A. CORRELATION OF REQUESTS FOR STATISTICAL DATA THROUGH ALL INTERESTED DIVISIONS

The presentation of this material regarding Highway Planning Survey Data and its application to highway planning has been, of necessity, sketchy and often in outline form. There are many unfilled gaps in the material and it is believed the more inquisitive engineer will provide himself with the missing material.

Requests for Highway Planning Survey material should be addressed to D-10. Where the material is to be used for design purposes, a copy of the request should be sent to the Road Design Division for work assigned to that Division. Assistance can be offered in planning the acquisition of the material.

Since the acquisition and interpretation of statistical data is becoming increasingly important, it is necessary that close liaison be maintained between those responsible for design and the Highway Planning Survey Division.

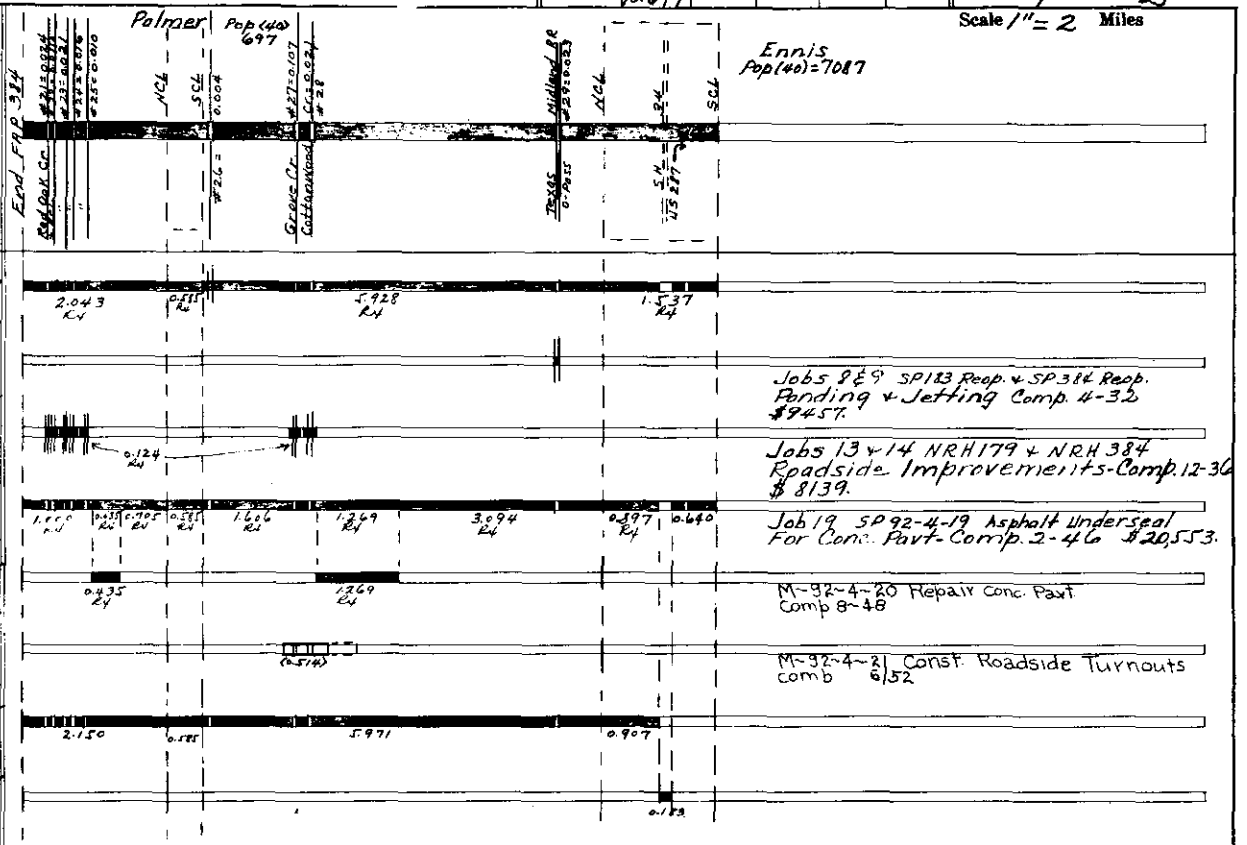
LOG RECORD OF PROJECT CONSTRUCTION AND RETIREMENTS

Termini: From Near South End Brushy Cr. Br. (End FAP 384)
To Ennis (SCL)

Year	1947
Rdwy.	8.121
Bridge	0.242
City	2.334
Total	10.697

County Ellis
Control 92 Section 4
Hwy. No. US 75 & 287
Road System 11-0
Sheet 1 Of 2
Scale 1" = 2 Miles

Date Completed	Project Class	Project Number	Job Number	Width Right-of-Way	Width Roadbed	Width Base	Width Surface	Width Imp. Shoulders	Type of Shoulders	Depth Base	Depth Surface	Kind of Work Code	Scope Of Work	Miles Improved	Surface Type Code
8-31	FAP 179 Reo. 384 Reo.	4+5	4	120	36	—	36	—	—	—	—	1-1-1	Gr & Dr Strs	10.023	10
10-31	SP 179 B 384 Reop.	—	7	—	—	—	24	—	—	—	—	1	Overpass	0.023	
11-31	FAP 384B	4	6	Var.	36	—	26	—	—	—	—	1-1-1	Gr & Dr Strs	0.337	10
11-32	FAP SP 179 B 384 Reo.	4	10,11,12	120	36	—	20	—	Earth	—	9-6-9	1-1-16	Conc. Pavt.	10.231	61
6-41	SP	92-4	16	120	36	26	20	—	—	9-6-9	1"	4-1-2	Asph. Conc. On Conc.	10.704	55
11-42	M	92-4	17	—	40'	—	—	—	—	—	—	1-1-13	Widen Shldrs.	10.542	—
												1-1-9	Flatten Slopes & Resection Ditches		
12-47	C	92-4	18	120	36	20	20	—	Earth	9-6-9	2"	4-1-6	Hot Mix Asph. Conc. Pvt.	9.613	55
10-47	C	92-4	18	—	30	30	30	—	C & G	—	2"	4-1-6	Hot Mix Asph Conc. Pvt.	6.183	55



Weighted Traffic for Section	
Passenger Cars	
Trucks	
Total	

Trucks and Passenger Car Traffic

YEAR

K862-749-2m

H. P. S. Form RL-1A Rev.

RECORD OF OPERATIONS

CC-1 Coded		
CC-2 Coded		
Strip Map Posted		
RL-5 Posted		
CC-3 Coded		

This Job Retires—Contr. ~~N C Rd~~ Sect. ____ Job ____ (Card No. ____)

Contr. ____ Sect. ____ Job ____ (Card No. ____)

Contr. ____ Sect. ____ Job ____ (Card No. ____)

CARD NO. 1 OF 2

TEXAS HIGHWAY DEPARTMENT
CONSTRUCTION RECORD FOR ROAD LIFE STUDY

Control No. 92 Sec. 4 Job 4
Highway No. - State ____ U. S. 75+287
Proj. No. FAP 179 Resp.
County Ellis
Compiled By DeBerry Date 10-7-37

1 — DESIGN AND CONSTRUCTION FEATURES

Widths: Rdbed. 36' Shoulders — R/W 120'
Type Subgr. Soil Compaction
Prime Coat: No. Appl. Kind Amt.
Dist. Asphalt: — 1st. Crs. 2nd 3rd
Dist. Fine Aggr.—1st. Crs. 2nd 3rd
Dist. Coarse Aggr. 1st. Crs. 2nd 3rd
Asphalt: Kind

4 — DESCRIPTION AND REMARKS

EXISTING WORK:

Grading	Base	Surf.	Sr. Typ.	Job	Year
None					

NEW WORK:
Gr + Dr Strs

Cost of Small Structures:
Length Rdy. Plus Br. Work: Ft.= Mi.

PERCENT SALVAGED

5	4	3	2	1

2 — CONSTRUCTION COSTS

Code	Description	Dollars
10	Gr. & Sm. Strs	34683
20	Surface	
30	Base	
04	Traffic Service	
05	Roadside Imp.	
06	Imp. Sh.&App.	
88	Maintenance	
89	Add'l. RoW	
00	TOTAL	34683

Nbr. Of Bridges None — Constr. Eng. 92: 2165
Total Length Ft. — Prelim. Eng. 91: 2184
Br. Nbrs. — Liq. Damg. 96:

5 — LOCATION

Sta. 679 + 50
Sta. 490 + 31

From: A Pt. 2.511 Mi. From S C L Palmer
To: N C L Ennis

Equations: None

Exceptions: 529 + 17.27 To 531 + 16.27

Res. Engr.: A. C. Love
Contractor: E. R. Leach

3 — DETAILS OF CONSTRUCTION

Description		Code
Dist. And Co. 18-Ellis	5	18071
Road System FAS-Rural	4	1100
Proj. Class FAP	2	01
Control And Sec. Nbr. 92-4	5	09204
Job Nbr. 4	2	04
Date Beg. Comp. 8-31	4	0831
Year Taken On System 00	2	00
Surface Type Gr + Dr	2	10
Kind of Work	4	1--1
X-Section Surf. 36' Rdbd.	4	36--
X-Section Base	5	-----
Type of Shldrs.	1	-
Type of Treatment	2	--
Asph. Mat'l. For Surf.	2	--
Asph. Mat'l., Prime Ct.	2	--
Surf. Crs. Aggregate	1	-
Base Crs. Material	1	-
Meth. of Stabilization	1	-
Gals. Asph./S.Y. or % Asph.	2	--
Aggr. S.Y./C.Y.	2	--
Improved Shldr. Width	1	-
Skip These Columns	5	--010
RL-1 Card Number	1	1
Card Control	1	1
Lg. Ft.= Mi.	5	03559
Sq. Yds. Built	6	------

6. RETIREMENTS OF THE ABOVE IMPROVEMENT

	Retirement Data: Location	MILES	SQ. YDS.	YEAR	REASON	METHOD	Identification of Replacement: Surface Type	CODE	Kind of Work	JOB	CD. NO.	Remaining: MILES	SQ. YDS.
1	All	3.559	—	32	44	05	Conc. Pvt.	61	--16	10	1	-0-	
2													
3													
4													
5													
6													

K642-549-5m

H. P. S. Form RL-1A Rev.

RECORD OF OPERATIONS

CC-1 Coded		
CC-2 Coded		
Strip Map Posted		
RL-5 Posted		
CC-3 Coded		

This Job Retires—Contr. none Sect. ____ Job ____ (Card No. ____)
Contr. ____ Sect. ____ Job ____ (Card No. ____)
Contr. ____ Sect. ____ Job ____ (Card No. ____) 2

Ennis
Pop(4c) = 7087

CARD NO. 2 OF 2

TEXAS HIGHWAY DEPARTMENT
CONSTRUCTION RECORD FOR ROAD LIFE STUDY

Control No. 92 Sec. 4 Job 4
Highway No. - State ____ U. S. 75 + 287
Proj. No. FAP 179 Reco.
County Ellis
Compiled By DeBerry Date 10-7-37

1 — DESIGN AND CONSTRUCTION FEATURES

Widths: Rdbed. 36' Shoulders — R/W 120'
Type Subgr. Soil ____ Compaction ____
Prime Coat: No. Appl. ____ Kind ____ Amt. ____
Dist. Asphalt: — 1st. Crs. ____ 2nd ____ 3rd ____
Dist. Fine Aggr.—1st. Crs. ____ 2nd ____ 3rd ____
Dist. Coarse Aggr. 1st. Crs. ____ 2nd ____ 3rd ____
Asphalt: Kind ____

PERCENT SALVAGED

5	4	3	2	1

2 — CONSTRUCTION COSTS

Code	Description	Dollars
10	Gr. & Sm. Strs	12245
20	Surface	
30	Base	
04	Traffic Service	
05	Roadside Imp.	
06	Imp. Sh.&App.	
88	Maintenance	
89	Add'l. RoW	
00	TOTAL	12245
92	Constr. Eng.	1480
91	Prelim. Eng.	723
96	Liq. Damg.	

Nbr. Of Bridges None
Total Length ____ Ft.
Br. Nbrs. ____

3 — DETAILS OF CONSTRUCTION

Description		Code
Dist. And Co. 18-Ellis	5	18071
Road System FAS-City	4	2100
Proj. Class FAP	2	01
Control And Sec. Nbr. 92-4	5	09204
Job Nbr. 4	2	04
Date Beg. Comp. 8-31	4	0831
Year Taken On System On	2	00
Surface Type Gr + Dr	2	10
Kind of Work	4	1--1
X-Section Surf. 36' Rdbd.	4	36--
X-Section Base	5	-----
Type of Shldrs.	1	-
Type of Treatment	2	--
Asph. Mat'l. For Surf.	2	--
Asph. Mat'l., Prime Ct.	2	--
Surf. Crs. Aggregate	1	-
Base Crs. Material	1	-
Meth. of Stabilization	1	-
Gals. Asph./S.Y. or % Asph.	2	--
Aggr. S.Y./C.Y.	2	--
Improved Shldr. Width	1	-
Skip These Columns	5	--010
RL-1 Card Number 2	1	2
Card Control 1	1	1
Lg. Ft.= 1.537 Mi.	5	01537
Sq. Yds. Built	6	------

4 — DESCRIPTION AND REMARKS

EXISTING WORK:

Grading	Base	Surf.	Sr. Typ.	Job	Year
None					

NEW WORK:
Gr + Dr Strs

Cost of Small Structures: ____
Length Rdy. Plus Br. Work: ____ Ft.= ____ Mi.

5 — LOCATION

Sta. 490 + 31
Sta. 397 + 95
From: NCL
To: SCL
Equations: None
Exceptions: 422+35 To 422+65
432+05 To 442+92.5
Res. Engr.: A. C. Love
Contractor: E. R. Leach

6. RETIREMENTS OF THE ABOVE IMPROVEMENT

	Retirement Data: Location	Miles	Sq. Yds.	Year	Reason	Method	Identification of Replacement: Surface Type	Code	Kind of Work	Job	Cd. No.	Remaining: Miles	Sq. Yds.
1	All	1.537	—	32	44	05	Conc. Pvt	61	--16	10	1	-0-	—
2													
3													
4													
5													
6													

K642-549-5m

H. P. S. Form RL-1A Rev.

RECORD OF OPERATIONS

CC-1 Coded		
CC-2 Coded		
Strip Map Posted		
RL-5 Posted		
CC-3 Coded		

This Job Retires—Contr. None Sect. ____ Job ____ (Card No. ____)

Contr. ____ Sect. ____ Job ____ (Card No. ____)

Contr. ____ Sect. ____ Job ____ (Card No. ____)

CARD NO. 1 OF 3

TEXAS HIGHWAY DEPARTMENT
CONSTRUCTION RECORD FOR ROAD LIFE STUDY

Control No. 92 Sec. 4 Job 5
Highway No. - State ____ U. S. 75+287
Proj. No. FAP 384 Recp
County Ellis
Compiled By DeBerry Date 10-5-37

1 — DESIGN AND CONSTRUCTION FEATURES

Widths: Rdbed. 36' Shoulders - R/W 120'
Type Subgr. Soil Compaction
Prime Coat: No. Appl. Kind Amt.
Dist. Asphalt: — 1st. Crs. 2nd 3rd
Dist. Fine Aggr.—1st. Crs. 2nd 3rd
Dist. Coarse Aggr. 1st. Crs. 2nd 3rd
Asphalt: Kind

4 — DESCRIPTION AND REMARKS

EXISTING WORK:

Grading	Base	Surf.	Sr. Typ.	Job	Year
None					

NEW WORK:
Gr + Dr Strs

Cost of Small Structures:
Length Rdy. Plus Br. Work: Ft.= Mi.

PERCENT SALVAGED / 2 — CONSTRUCTION COSTS

5	4	3	2	1	Code	Description	Dollars
					10	Gr. & Sm. Strs	42285
					20	Surface	
					30	Base	
					04	Traffic Service	
					05	Roadside Imp.	
					06	Imp. Sh.&App.	
					88	Maintenance	
					89	Add'l. RoW	
					00	TOTAL	42285

Nbr. Of Bridges 1 — Constr. Eng. 92 2070
Total Length 23 Ft. — Prelim. Eng. 91 2273
Br. Nbrs. 26 — Liq. Damg. 96

5 — LOCATION

Sta. 962+50 To 844+76
Sta. 813+87 To 679+50

From: S. End of Brushy Cr. Br. (Beg. of Sec.)
To: South of Palmer

Equations: None

Exceptions: 7 Br's. & Approaches = 1812'

Res. Engr.: A.C. Love
Contractor: J. Spencer & Son

3 — DETAILS OF CONSTRUCTION

Description		Code
Dist. And Co. 18-Ellis	5	18071
Road System FAS-Rural	4	1100
Proj. Class FAP	2	01
Control And Sec. Nbr. 92-4	5	09204
Job Nbr. 5	2	05
Date Beg. Comp. 8-31	4	0831
Year Taken On System	2	00
Surface Type	2	10
Kind of Work	4	1--1
X-Section Surf.	4	36--
X-Section Base	5	-----
Type of Shldrs.	1	-
Type of Treatment	2	--
Asph. Mat'l. For Surf.	2	--
Asph. Mat'l., Prime Ct.	2	--
Surf. Crs. Aggregate	1	-
Base Crs. Material	1	-
Meth. of Stabilization	1	-
Gals. Asph./S.Y. or % Asph.	2	--
Aggr. S.Y./C.Y.	2	--
Improved Shldr. Width	1	-
Skip These Columns	6	--010
RL-1 Card Number 1	1	1
Card Control 1	1	1
Lg. Ft.= 4.426 Mi.	5	04426
Sq. Yds. Built	6	------

6. RETIREMENTS OF THE ABOVE IMPROVEMENT

	Retirement Data: Location	MILES	SQ. YDS.	YEAR	REASON	METHOD	Identification of Replacement: Surface Type	CODE	Kind of Work	JOB	CD. NO.	Remaining: MILES	SQ. YDS.
1	All	4.426	-	32	44	05	Conc.	61	--16	11	1	-0-	
2													
3													
4													
5													
6													

K642-549-5m

H. P. S. Form RL-1A Rev.

RECORD OF OPERATIONS

CC-1 Coded		
CC-2 Coded		
Strip Map Posted		
RL-5 Posted		
CC-3 Coded		

This Job Retires—Contr. N of R Sect. ____ Job ____ (Card No. ____)
Contr. ____ Sect. ____ Job ____ (Card No. ____)
Contr. ____ Sect. ____ Job ____ (Card No. ____) X 2

Palmer
Pop(40)=697

CARD NO. 2 OF 3

TEXAS HIGHWAY DEPARTMENT
CONSTRUCTION RECORD FOR ROAD LIFE STUDY

Control No. 92 Sec. 4 Job 5
Highway No. - State ____ U. S. 75 + 287
Proj. No. FAP 384 Reop
County Ellis
Compiled By DeBerry Date 10-5-37

1 — DESIGN AND CONSTRUCTION FEATURES

Widths: Rdbed. 36' Shoulders — R/W 120'
Type Subgr. Soil ____ Compaction ____
Prime Coat: No. Appl. ____ Kind ____ Amt. ____
Dist. Asphalt: — 1st. Crs. ____ 2nd ____ 3rd ____
Dist. Fine Aggr.—1st. Crs. ____ 2nd ____ 3rd ____
Dist. Coarse Aggr. 1st. Crs. ____ 2nd ____ 3rd ____
Asphalt: Kind ____

4 — DESCRIPTION AND REMARKS

EXISTING WORK:

Grading	Base	Surf.	Sr. Typ.	Job	Year
None					

NEW WORK:
Gr + Dr Strs

Cost of Small Structures: ____
Length Rdy. Plus Br. Work: ____ Ft.= ____ Mi.

PERCENT SALVAGED / 2 — CONSTRUCTION COSTS

5	4	3	2	1	Code	Description	Dollars
					10	Gr. & Sm. Strs	5586
					20	Surface	
					30	Base	
					04	Traffic Service	16
					05	Roadside Imp.	
					06	Imp. Sh.&App.	
					88	Maintenance	
					89	Add'l. RoW	
					00	TOTAL	5602

Nbr. Of Bridges None — Constr. Eng. 92: 274
Total Length ____ Ft. — Prelim. Eng. 91: 301
Br. Nbrs. — Liq. Damg. 96: ____

5 — LOCATION

Sta. 844+76
Sta. 813+87
From: NCL
To: SCL
Equations: None
Exceptions: None
Res. Engr.: A. C. Love
Contractor: J. Spencer + Son

3 — DETAILS OF CONSTRUCTION

Description		Code
Dist. And Co. 18-Ellis	5	18071
Road System FAS-City	4	X2100
Proj. Class FAP	2	01
Control And Sec. Nbr. 92-4	5	09204
Job Nbr. 5	2	05
Date Reg. ____ Comp. 8-31	4	0831
Year Taken On System on	2	00
Surface Type Gr + Dr	2	10
Kind of Work	4	1--1
X-Section Surf 36' Rdbd.	4	36--
X-Section Base	5	-----
Type of Shldrs.	1	-
Type of Treatment	2	--
Asph. Mat'l. For Surf.	2	--
Asph. Mat'l., Prime Ct.	2	--
Surf. Crs. Aggregate	1	-
Base Crs. Material	1	-
Meth. of Stabilization	1	-
Gals. Asph./S.Y. or % Asph.	2	--
Aggr. S.Y./C.Y.	2	--
Improved Shldr. Width	1	-
Skip These Columns	5	--010
RL-1 Card Number 2	1	2
Card Control 1	1	1
Lg. Ft.=0.585 Mi.	5	00585
Sq. Yds. Built	6	------

6. RETIREMENTS OF THE ABOVE IMPROVEMENT

	Retirement Data: Location	MILES	SQ. YDS.	YEAR	REASON	METHOD	Identification of Replacement: Surface Type	CODE	Kind of Work	JOB	CD. NO.	Remaining: MILES	SQ. YDS.
1	All	0.585	-	32	44	05	Conc.	61	--16	11	2	-0-	
2													
3													
4													
5													
6													

K642-549-5m

Form RL 1 - D - Rev.

RECORD OF OPERATIONS

CC-1 Coded		
CC-2 Coded		
RL-6 Posted		
CC-3 Coded		

This Job Retires Br. No. Nore Contr. ..... Sect. ..... Job .....

TEXAS HIGHWAY DEPARTMENT
CONSTRUCTION RECORD FOR ROAD LIFE STUDY

MBC ONLY (Not Bridges)

Card No.	Bridge No.	Location
3 of 3	26	2.84

Control 92 Sect. 4 Job 5
Highway No. - State ..... U. S. 75
Project No. FAP-"E"384-Reop.
Compiled By DeBerry Date 10-5-37

1 — DESCRIPTION AND REMARKS

EXISTING WORK:
Rdy On Old Location

NEW WORK:
5-4x4x36' MBC

Resident Engineer: A. C. Love
Contractor: J. Spencer & Son

2 — DOLLAR LOSS AND YEAR WHEN LOSS OCCURRED

3 — CONSTRUCTION COSTS

Code	Description	Dollars
10	Superstructure	
12	Struct. Excv.	
45	Railing	
46	Surfacing	
47	Traffic Service	
48	Miscellaneous	
49	Incidentals	
00	TOTAL	1420
54	Prelim. Engr.	76
64	Constr. Engr.	69
74	Addl. RoW	
84	Bridge Ends	
99	Cost Per Ft.	62
70	Small City	

4 — DETAILS OF CONSTRUCTION

Description		Code
Dist. and Co. 18-Ellis	5	18071
Road System FAS-Rural	4	11-0
Proj. Class FAP	2	01
Control and Sect. No. 92-4	5	09204
Job No. 5	2	05
Date Beg. 3-31 Compl. 8-31	4	0831
Year Taken on System On	2	00
Traffic Vol. Group —	1	—
Kind of Work	3	110
Clear Roadway 36'	2	36
Curbs & Sidewalks - Nbr. Width	3	— — —
Type of Railing	2	— —
Lights — Deg. Skew. None	1	0
Main Span Type MBC	3	010
Number of Boxes 5	2	05
Span of Each Box 4'	3	040
Height of Each Box 4'	3	040
SKIP THIS FIELD	2	— —
Barrel Length 36'	3	036
Design Number	2	— —
Depth of Fill	3	— — —
Bridge Number 26	2	26
RL-1 Card Number 3	1	3
Card Control 1	1	1
SKIP THESE COLUMNS	6	— — — — — —
Added Barrel Length One Side Only	1	—
Linear Feet Built 23'	4	0023

5 — LOCATION

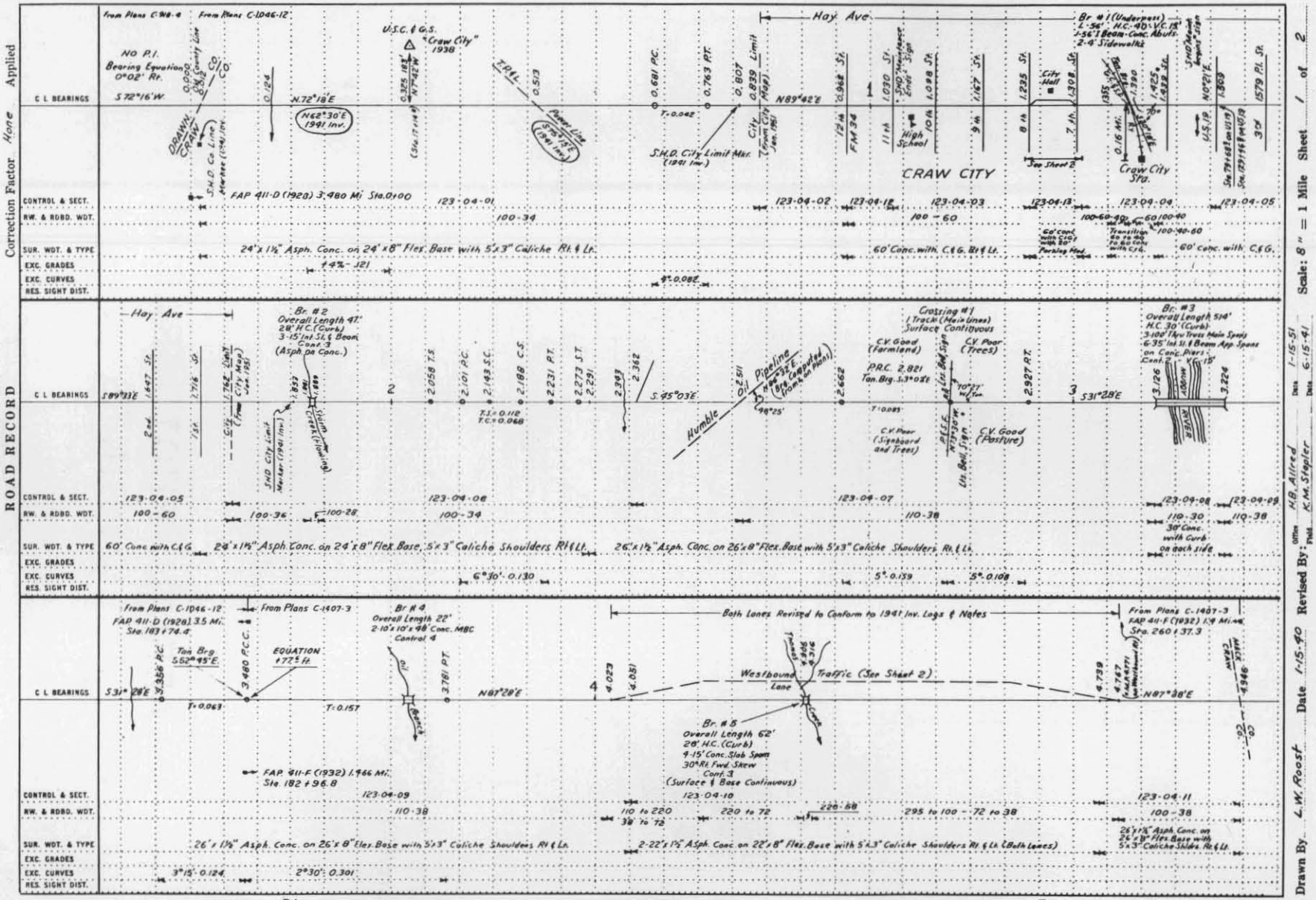
Stations - From — To 812+15
Name of Crossing: No Name
Length in Miles: 0.004

6 — RETIREMENTS

Station Numbers	Retirement Data					Identification of Replacement				Lin. Ft. Remaining
	Year	Reason	Method	Ad. Ln.	Lin. Ft. Ret.	Remarks	Job No.	Bridge No.	Card No.	

S882-246-3m

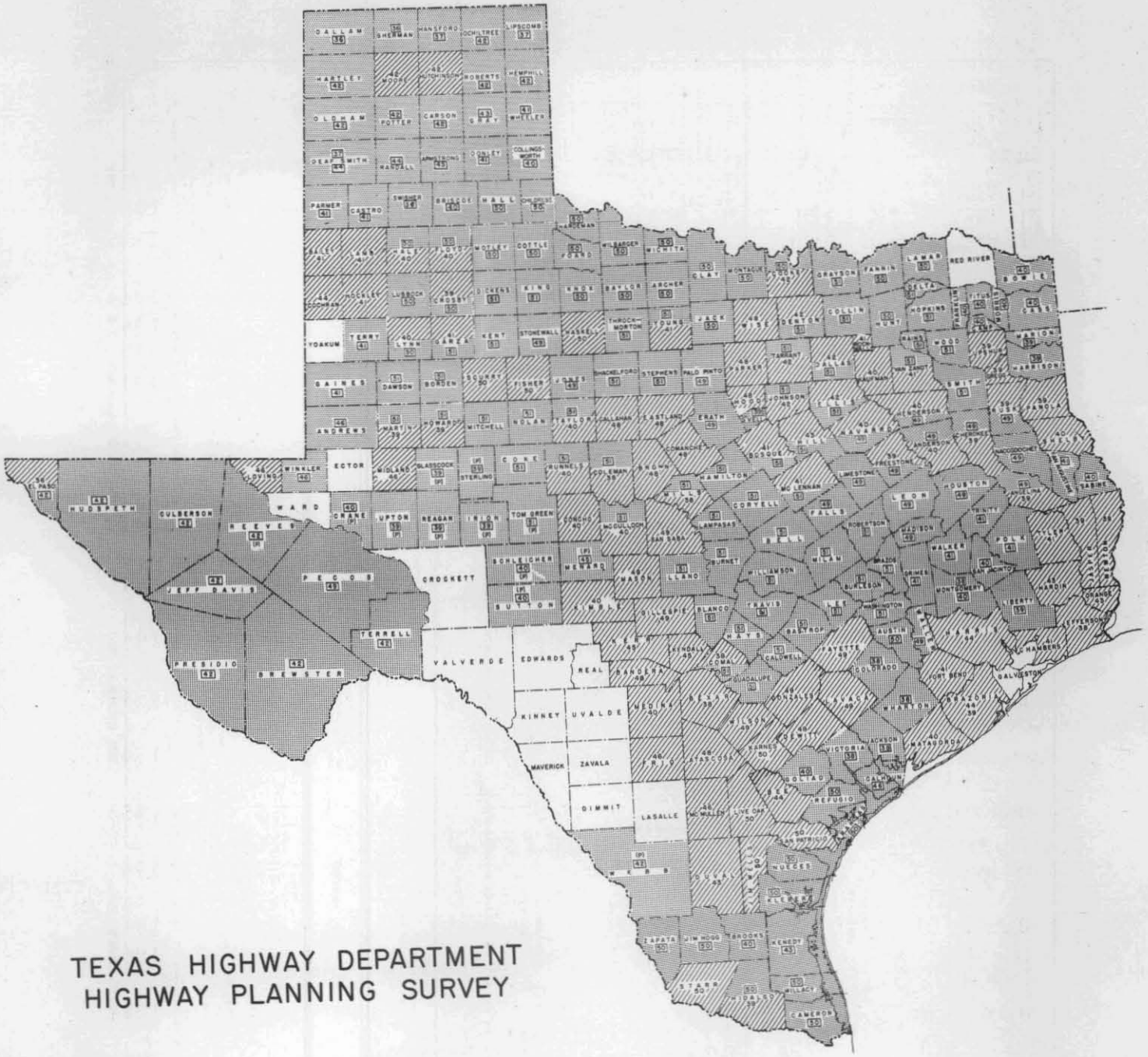
TEXAS HIGHWAY DEPARTMENT
ROAD RECORD



U. S. ROUTE NO. 91 STATE HIGHWAY NO. — F.M. HIGHWAY NO. — INVENTORY ROAD NO. 7 Craw COUNTY

Drawn By L.W. Roost Date 1-15-40 Revised By: Office K.B. Allred Date 1-15-51
Field K.M. Stapler Date 6-15-41
Scale: 8" = 1 Mile Sheet 1 of 2

Example A
Plate 14
(1 of 2)



TEXAS HIGHWAY DEPARTMENT
HIGHWAY PLANNING SURVEY

AERIAL PHOTOGRAPHIC PRINTS

CONTACT — DALLAS 42

INDEX — DALLAS 42

FIGURES REPRESENT YEAR AERIAL PHOTOGRAPHIC SURVEY WAS MADE

OCTOBER 15, 1952

ORIGIN-DESTINATION SURVEYS

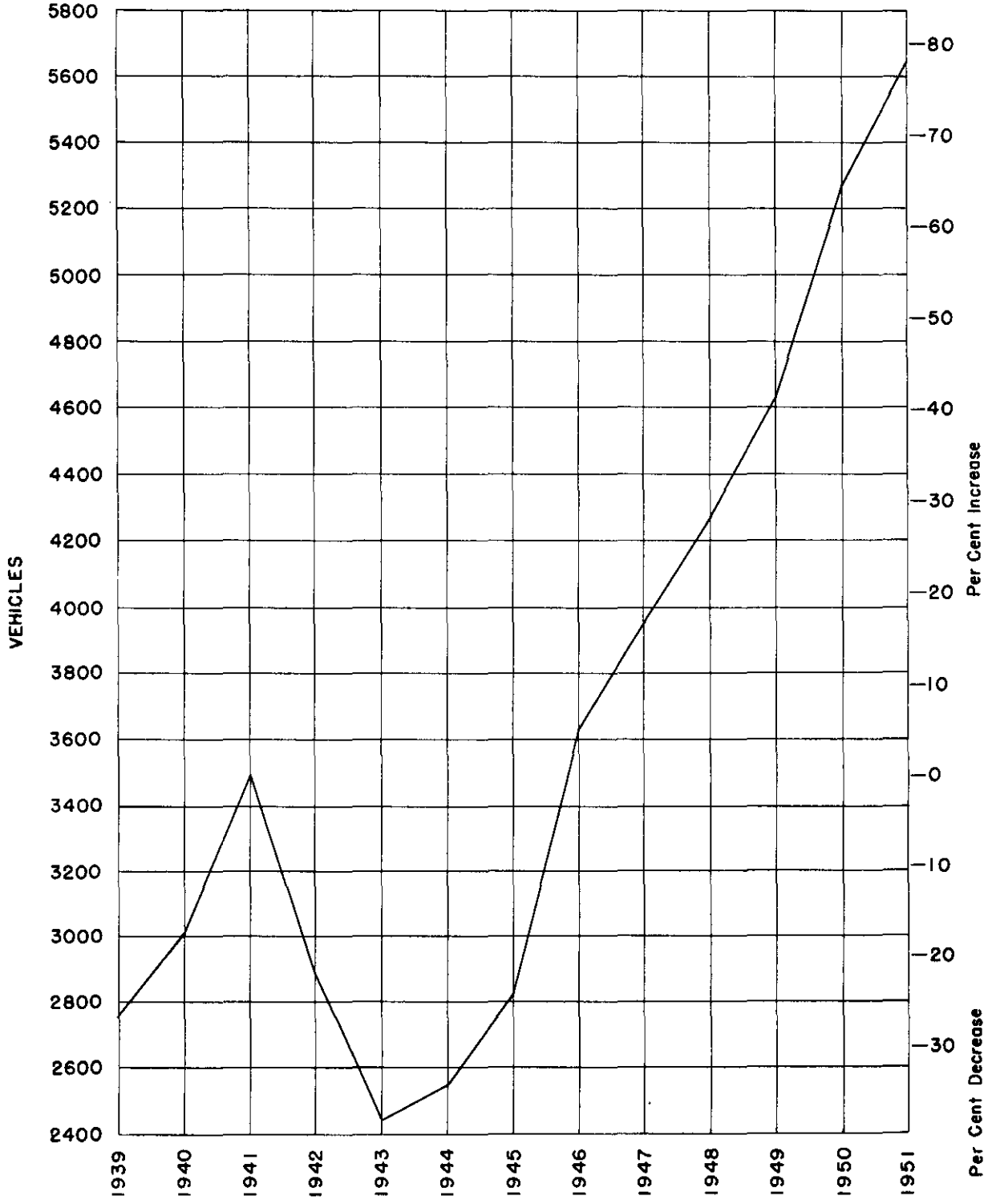
TEXAS HIGHWAY PLANNING SURVEY

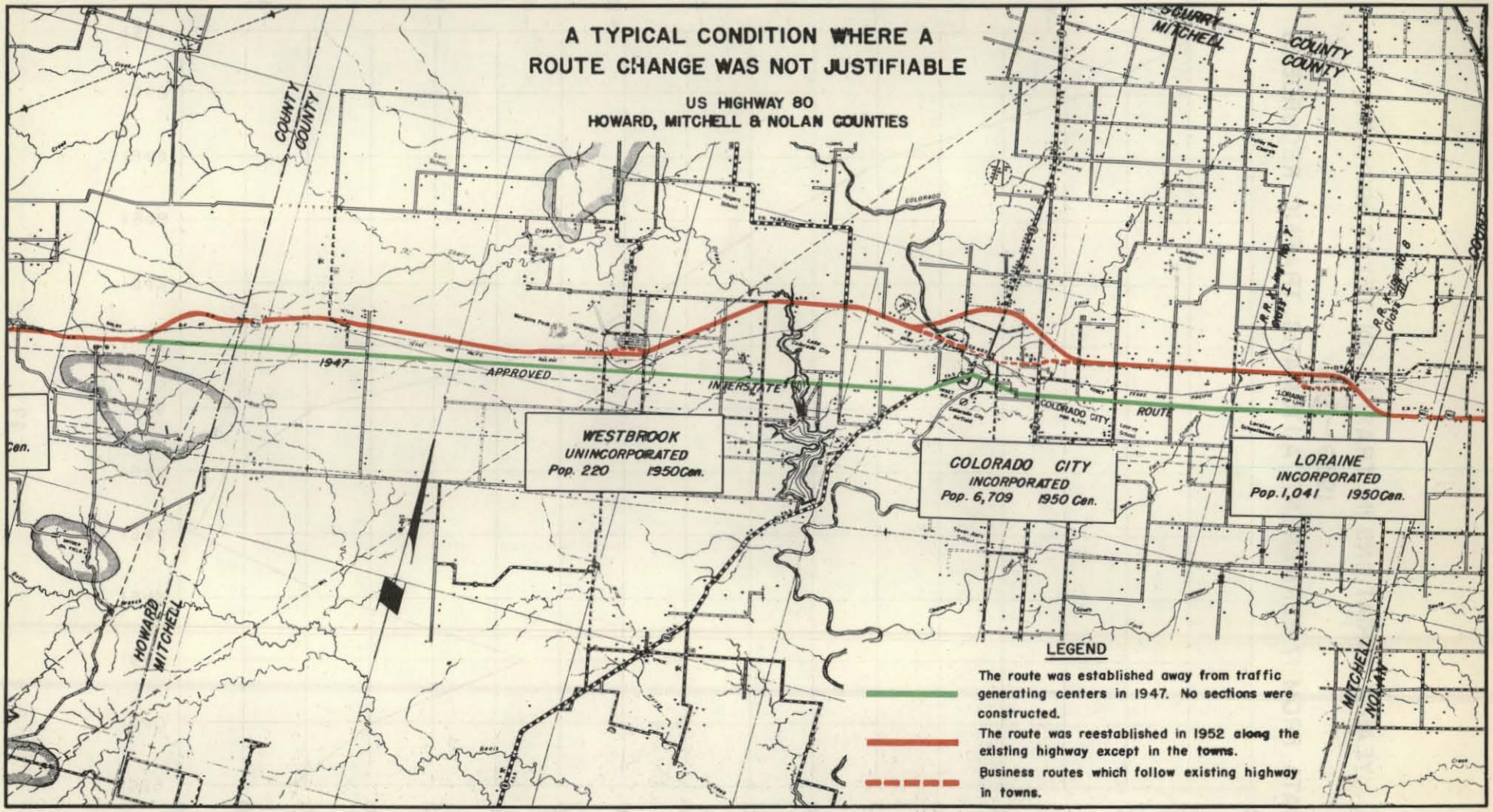
Name of Town	Type of Survey	Year
Abilene	External	1944
	External	1952
Alice	External	1948
Amarillo	External	1946
Austin	External (US 81, SH 29, South)	1939
	External	1944
Beaumont	External	1946
Beeville	External	1947
Big Spring	External	1947
Borger	External	1948
Brenham	External	1952
Burkburnett	External	1947
Coleman	External (US 67)	1941
	External	1952
Commerce	External	1947
Corpus Christi	External & Parking	1946
	External (US 181, North)	1952
Corsicana	External	1947
Dallas	External (US 75 & US 175)	1944
	External	1945
	Internal & External (Dallas Oak-Cliff)	1950
	Metropolitan Area - External-Internal & Parking Survey	1950-51
Eagle Pass	External	1941
Ennis	External (US 75, South)	1950

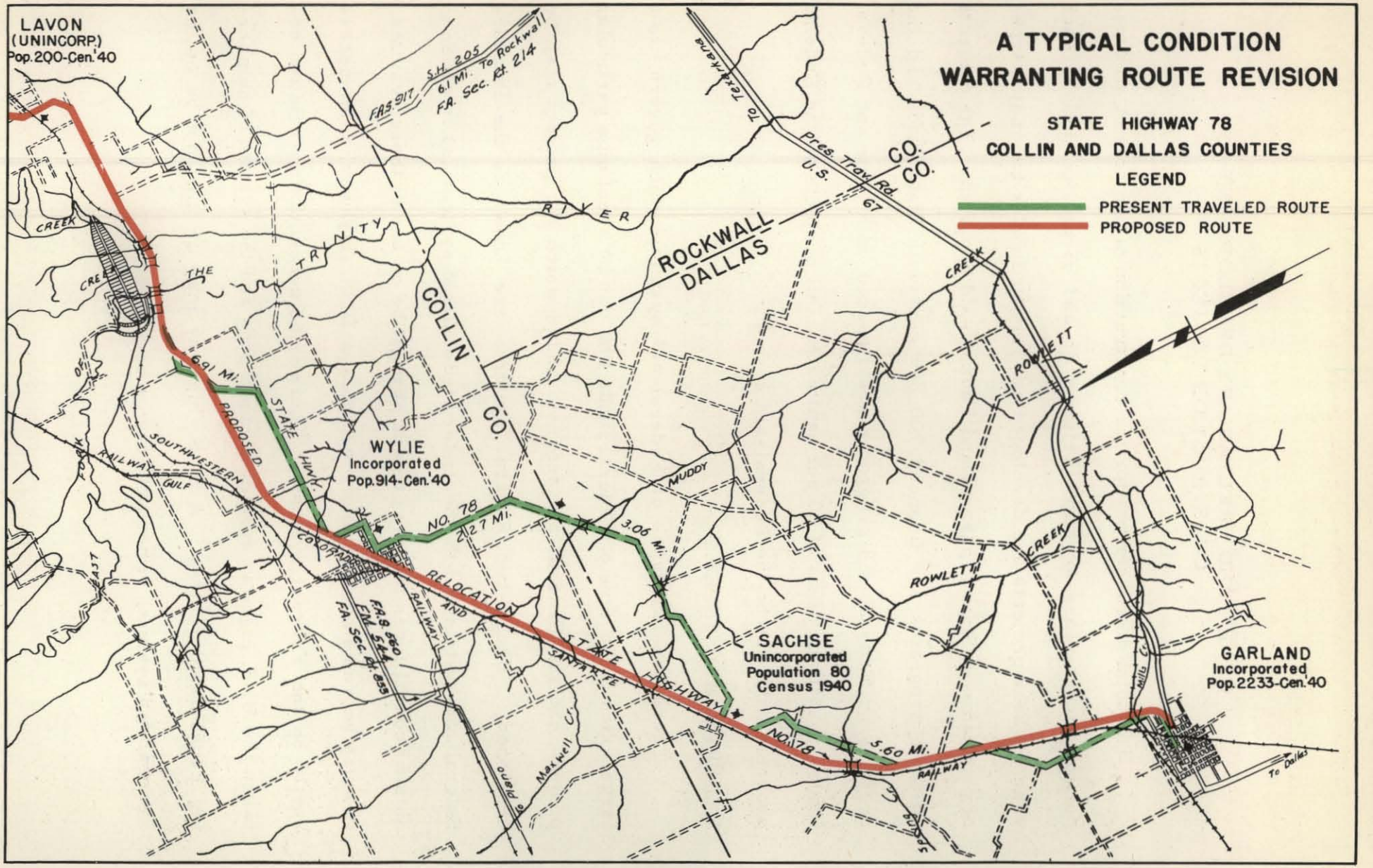
Name of Town	Type of Survey	Year
Fort Worth	External	1945
	External-Internal (E-W Expressway)	1951
Freeport	External (FM 1460)	1952
Gainesville	External	1947
	External (US 81, North)	1952
Galveston	External (SH 87)	1939
	External	1947
Greenville	External	1946
Harlingen	External	1941
Hillsboro	External	1940
	External (US 81, South)	1950
	External (US 81, North)	1952
Houston	External	1939
	External (US 75, North & US 290, NW)	1950
	Internal (Gulf Freeway)	1951
	Internal (Gulf Freeway - Woodridge Exit Ramp)	1952
Huntsville	External	1952
Jacksonville	External	1947
Kenedy	External	1947
Kingsville	External	1948
Longview	External (US 80 & SH 149)	1952
Lubbock	External	1950
Marshall	External	1948
Midland	External	1951
Mineola	External	1944
Mt. Pleasant	External	1938

Name of Town	Type of Survey	Year
Odessa	External	1950
Palacios	External (SH 35, North)	1945
Paris	External	1947
Port Arthur Area	External	1949
Rio Grande Valley	External (US 83)	1947
Rockwall	External (US 67)	1949
San Antonio	External (Highways North & East)	1947
Sherman	External	1952
Sherman-Denison	External	1947
Sulphur Springs	External	1947
Sweetwater	External	1946
Temple-Belton	External	1946
Texas City	External (Palmer Road)	1950
Tyler	External	1947
Victoria	External	1948
Waco	External & Partial Internal External & Partial Internal	1945 1952
Waxahachie	External	1946
Wharton	External	1947
Wichita Falls	External	1945
Wink-Kermit	External (SH 115)	1948

YEARLY VARIATIONS IN TRAFFIC ON TEXAS HIGHWAYS
1939 – 1951
DATA FROM 17 PERMANENT AUTOMATIC TRAFFIC RECORDERS




A TYPICAL CONDITION WHERE A
ROUTE CHANGE WAS NOT JUSTIFIABLE
US HIGHWAY 80
HOWARD, MITCHELL & NOLAN COUNTIES
1947 APPROVED INTERSTATE ROUTE
WESTBROOK
UNINCORPORATED
Pop. 220 1950 Cen.
COLORADO CITY
INCORPORATED
Pop. 6,709 1950 Cen.
LORAINE
INCORPORATED
Pop. 1,041 1950 Cen.
HOWARD
MITCHELL
MITCHELL
NOLAN
LEGEND
The route was established away from traffic generating centers in 1947. No sections were constructed.
The route was reestablished in 1952 along the existing highway except in the towns.
Business routes which follow existing highway in towns.


A TYPICAL CONDITION
WARRANTING ROUTE REVISION
STATE HIGHWAY 78
COLLIN AND DALLAS COUNTIES
LEGEND
PRESENT TRAVELED ROUTE
PROPOSED ROUTE
LAVON
(UNINCORP.)
Pop. 200-Cen. '40
F.A.S. 317
S.H. 205
6.1 Mi. To Rockwall
F.A. Sec. Rt. 214
To Texarkana
Pres. Trav. Rd.
U.S. 67
CO.
CO.
ROCKWALL
DALLAS
COLLIN CO.
TRINITY RIVER
CREEK
THE
6.91 Mi.
PROPOSED
STATE HWY.
WYLIE
Incorporated
Pop. 914-Cen. '40
SOUTHWESTERN
GULF
RAILWAY
MUDDY
NO. 78
2.27 Mi.
3.06 Mi.
ROWLETT
CREEK
RELOCATION
AND
STATE HIGHWAY
NO. 78
SACHSE
Unincorporated
Population 80
Census 1940
F.A.S. 550
F.M. 544
F.A. Sec. Rt. 655
Maxwell Cr.
5.60 Mi.
RAILWAY
Mills Cr.
GARLAND
Incorporated
Pop. 2233-Cen. '40
To Dallas

ORIGIN AND PRELIMINARY DEVELOPMENT OF CONSTRUCTION PROJECTS

The total disbursement for the construction of projects of all types during recent years averages between 85 and 95 million dollars each year. These projects are developed and financed under two major types of programs -- State programs and Federal-aid programs. The projects on State programs are financed 100 per cent with State funds and the projects on Federal-aid programs are financed with State and Federal funds, usually on basis of 50 per cent each. All projects on the Federal programs must be on the Federal-aid system.

FEDERAL-AID SYSTEMS

There are two types of Federal-aid systems which govern, to a large extent, the type of Federal funds that can be spent on a particular project and the Federal-aid program under which the project may be developed. These two Federal systems are known as the Primary federal-aid system and the Secondary federal-aid system and in order to obtain Federal funds for any project, it must be on one of these systems. It must be remembered, however, that a U. S. highway is not necessarily on the Federal system. There is no connection or relation between the U. S. highway system of numbering and the system of numbering Federal-aid routes. A U. S. highway may or may not be on the Federal-aid system, either primary or secondary.

The U. S. system of highways is merely a system of marking highways for the convenience of the traveling public, particularly the tourists or through traffic making long distance or cross-country trips. The U. S. system of marking highways is under the jurisdiction of the American Association of State Highway Officials. Additions to the system, changes in the routing or numbers allocated to the routes are made by the Executive Committee of the Association acting upon recommendations of, or consultation with, the State Highway Department of each of the affected states. The Bureau of Public Roads does not have any jurisdiction in such matters.

The Federal-aid system is a selected system of highways throughout the State that is eligible for Federal participation. Highways included in this system, both primary and secondary, are selected and recommended by the State Highway Department and approved by the Bureau of Public Roads. The Primary federal-aid system is a connected system of Federal-aid routes and is composed of the most important highways throughout the State. The Secondary federal-aid system includes practically all farm to market roads and the remaining highways that are not included in the Primary federal-aid system.

INTERSTATE HIGHWAY SYSTEM

The Federal-Aid Highway Act of 1944 designated a National system of interstate highways not to exceed 40,000 miles in extent. These highways are to be so located as to connect by routes as direct as

practicable the principal metropolitan areas, cities and industrial centers and to serve the National Defense and connect at suitable boundary points with routes of continental importance in the Dominion of Canada and the Republic of Mexico. The Act also requires that the Interstate highways be selected by joint action of the State Highway Departments of each state and the adjoining states on the same basis as that required for the selection of the Federal-aid system, with the understanding that all Interstate highways as finally approved, if not already included in the Primary federal-aid system, shall be added to such system without regard to any mileage limitation.

The routes comprising the Interstate highway system in Texas as agreed upon by the State Highway Department and the Bureau of Public Roads total approximately 2,800 miles and are briefly described as follows:

(1) From the New Mexico state line to the Oklahoma state line generally along the route of U. S. highway 66.

(2) From the New Mexico state line north of El Paso following approximately the route of U. S. highway 80 to Fort Worth, Dallas and the Louisiana state line.

(3) From a junction with U. S. highway 80 and U. S. highway 290 near Kent east along the route of U. S. highway 290, State Highway 27 and U. S. highway 87 to San Antonio thence to Houston over U. S. highway 90 and from Houston east

generally along the route of State highway 73 to near Winnie thence northeasterly to Beaumont and thence to the Louisiana state line north of Orange.

(4) From Dallas along the approximate route of U. S. highway 67 to Texarkana.

(5) From the Oklahoma state line north of Gainesville south to Denton and from Denton the route forks, one prong going by way of Fort Worth to Hillsboro and the other by way of Dallas to Hillsboro and thence south over U. S. highway 81 to San Antonio and the International Boundary at Laredo.

(6) From Dallas to Houston and Galveston following generally along the present route of U. S. highway 75.

A set of design standards has been adopted for the construction of all projects on the Interstate highway system, and all projects proposed for construction on an approved Interstate route must be designed according to Interstate standards unless stage development is proposed. For stage construction work the design must be such that ultimate construction will be in strict accordance with Interstate standards which usually provide for four lanes divided with service roads where necessary. When a project is proposed for construction on the Interstate system with Federal participation, it therefore is necessary that the proposed Interstate route be established and approved by the Bureau of Public Roads.

PROCEDURE FOR PROJECT DEVELOPMENT

Each and every project authorized for construction is either included in an official program approved by the State Highway Engineer and Commission or is covered by a Commission order, and practically all projects included in each program or authorized by a Commission order are based upon recommendations from the field organizations. When a project is programmed or otherwise authorized by Commission action, the inauguration of preliminary work is in order immediately upon approval of an I. P. E. authorization. The established procedure or sequence for the development of all construction projects, either with or without Federal participation, can logically be divided into four stages, as follows:

(1) Program Stage. This stage consists of such official actions as may be required to properly authorize a project for construction either by a program approval, Commission order or both.

(2) I. P. E. Authorization Stage. This stage consists of a proper disposal of all necessary arrangements for the approval and actual issuance of an I. P. E. authorization, which outlines the limits and scope of preliminary work and authorizes the expenditure of preliminary funds.

(3) Preliminary Stage. This stage represents the actual inauguration and proper completion of all investigation and

planning work required for the development of surveys and P. S. &E. covering proposed improvements.

(4) Construction Stage. This stage covers the actual construction of the proposed project in accordance with the approved plans and specifications.

FEDERAL PROGRAMS

Federal-aid is requested on a large percentage of all projects proposed for construction and each of these projects must be officially programmed with the Bureau of Public Roads. There are four types of Federal programs which are identified as follows:

(1) Primary Federal-Aid Program

(2) Secondary Federal-Aid Program

(3) Urban Program

(4) Interstate Program

The Primary federal-aid program is made up of proposed construction projects on the Primary federal-aid system, which are financed in part (usually 50 per cent) with Primary federal-aid funds. The Secondary federal-aid program is composed of projects on the Federal-aid secondary system, which are to be financed in part (usually 50 per cent) with Federal-aid secondary funds. All projects included in the Secondary federal-aid programs are selected in co-operation with the local authorities and are covered by Commission orders. These Commission orders usually contain certain provisions, particularly for those

projects on farm to market roads, and these provisions must be officially accepted by the local authorities.

In addition to the Primary and Secondary federal-aid programs, we have the Urban and Interstate programs. The Urban program is limited to projects on the Primary federal-aid system within Urban areas while the Interstate program may include any project located anywhere on the Interstate system. This does not mean that all projects on the Interstate system must be included in the Interstate program as projects on this system may also be developed under the Primary or Urban programs. It must be remembered, however, that a proposed project on the Primary federal-aid system cannot be included in the Secondary program and any project on the Secondary federal-aid system cannot be financed with Primary, Urban or Interstate funds.

Federal programs are usually formulated considerably in advance of the date on which Federal money is made available, and each and every project on which Federal participation in the construction cost is desired, and is officially programmed with the Bureau of Public Roads, must be developed in accordance with the Federal rules and regulations.

STATE PROGRAMS

The State programs include all authorized projects not included in the Federal programs with the exception of a few special jobs that are authorized by special Commission action. These projects are financed 100 per cent with State funds and are usually classified and grouped according to the proposed method of financing.

The Senate Bill 287 Program is identified as such because of the source of State funds used in financing the projects included in this program. Only those projects on designated farm to market roads can be included in this program and these projects are financed with funds made available for the construction of farm to market roads by the Farm to Market Road Fund as established by Senate Bill 287 of the 51st Legislature and the additional appropriation made by House Bill 426 of the 52nd Legislature.

State projects are usually considered as those projects that are financed 100 per cent from the State Highway Department General Fund, Motor Fuel Tax Fund or any other funds that are made available to the Department for the construction of state highways or farm to market roads. This type of financing can be employed in the construction of any project authorized for improvement on any part of the state highway system.

COMMISSION ORDERS

When a project is authorized by a Commission order, the minute usually contains certain conditions or provisions which must be officially accepted by the county and/or city before the minute becomes operative. All projects programmed for construction, particularly with State and Secondary federal-aid funds, are covered by Commission orders. In most instances, especially on farm to market roads, the Commission order authorizing the proposed improvements also provides

for the official designation of the county road as a State farm to market road. The designation does not become official until any conditions or provisions which might have been incorporated in the Commission order are officially accepted by the local authorities and the minute is declared operative. It therefore follows that it is illegal to inaugurate any survey or plan work for the proposed improvements before the minute is made operative. Quite often a minute is passed which authorizes only reconnaissance, location or preliminary work through the right of way stage and care should be exercised to see that the authority granted by the I. P. E. which is based on the Commission order is not exceeded.

It quite often becomes desirable and necessary that various types and stages of preliminary work be undertaken which is not covered by a Commission order or by program action. Such work may be required or needed for various reasons such as to establish proposed route and/or location, prepare right of way data, make special investigations, reports, estimates, etc., and possibly in some few instances provide profitable temporary employment for field personnel pending the inauguration of construction on projects let to contract. Authority for such work requires administrative approval, usually by the State Highway Engineer.

I. P. E. AUTHORIZATIONS

Each and every project on which investigation and planning work is proposed involving any appreciable amount of preliminary work or

expense requires an I. P. E. authorization which must be approved before the work is inaugurated. All I. P. E. authorizations are cleared through the Road Design Division and unless the projects have been programmed or authorized by Commission order, authority for the preliminary work cannot be issued without administrative approval. The procedure for the issuance and use of I. P. E. authorizations may be divided into two major steps; one, the appropriation of funds for the financing of investigation and planning work, and second, the actual issuance of the authorization and the performing of the preliminary work covered by the I. P. E.

APPROPRIATION OF PRELIMINARY FUNDS

At the beginning of each fiscal year a Commission order is prepared by the Road Design Division which provides for an appropriation of the estimated funds required for investigation and planning work during the ensuing fiscal year. This appropriation is made with the understanding that the money is to be used by the Austin office and field organizations on a basis of the needs of each, and the State Highway Engineer is authorized to direct the distribution of this fund and the issuance of I. P. E. authorizations. The Road Design Division is held responsible for the proper distribution of this fund, the issuance of I. P. E. authorizations and the development of investigation and planning work in accordance with the established procedure and such instructions as might be handed down from the Administrative Division.

I. P. E. BUDGETS

An I. P. E. budget has been set up for each District and each Urban Expressway office, and when the appropriation of funds for investigation and planning work is made at the beginning of each fiscal year, the Road Design Division prorates this fund to the Austin office and field organizations on the basis of the estimated needs of each. In the event the funds prorated prove insufficient for the period specified on the authorization (Form 149), a request should be submitted by the field organization for additional funds before the funds authorized are completely exhausted. In other words, this fund should not be allowed to overrun. Additional funds requested should be based on the preliminary engineering cost for the preceding six months' period with any possible increase or decrease in preliminary work or preliminary engineering costs taken into account.

REQUEST FOR I. P. E. AUTHORIZATION (FORM 254)

A form has been prepared (Form 254) for the convenience of the field organizations in making application for an I. P. E. authorization and to assist the Austin office in approving and issuing the authorizations. Each I. P. E. authorization is based on the I. P. E. request (Form 254) as submitted by the field. In order to avoid delay in the approval of an I. P. E. request, all pertinent information for which blanks have been provided on the I. P. E. request form should be furnished as accurately as possible. Separate I. P. E. requests should be submitted for each

project as proposed for contract letting. Requests for authority to proceed with investigation and planning work on those projects covered by Commission orders which contain certain provisions that must be accepted by the local authorities should not be submitted until after such provisions have been officially accepted by the county and/or city and the minute is declared operative.

Since it is illegal for the State to develop surveys and plans for the construction of roads not on the designated State highway system except in those rare instances permitted by State Statute, care should be exercised to see that requests are not submitted for preliminary work on those roads or projects where such work might be judged as illegal.

I. P. E. authorizations may be secured covering any particular stage of investigation and planning work and the I. P. E. request should clearly outline the preliminary work proposed. Therefore, the scope of work performed should not exceed that specified in the authorization without proper revision of the I. P. E. authorization. Under no condition shall preliminary expense be applied to an authorization for preliminary work not covered by the I. P. E.

STAGES OF PRELIMINARY WORK

In the submission of I. P. E. requests covering projects authorized for early construction, it is customary for the initial request to cover completion of surveys and plans in order that the investigation and planning work on such projects can be expeditiously prosecuted and carried

to completion without delay. In the event, however, the merit of undertaking certain preliminary work is established before the project involved is scheduled for construction by Commission order or program approval, the work should be carried forward in accordance with the present established stages of investigation and planning work. If it is proposed to undertake preliminary work by stages, the I. P. E. authorization should be requested accordingly, showing the scope of work proposed.

The investigation and planning work in the development of an ordinary project for grading and drainage structures is logically divided into five definite stages. Work may be suspended at the completion of any of the first four stages without any loss when work is again undertaken providing all information obtained from previous work is properly recorded. The five stages of work are identified as follows:

Stage 1. Reconnaissance -- consists of preliminary investigations necessary to determine the proposed route along which it is intended to locate and prepare route sketch map and such data as may be required to support the proposed route.

Stage 2. Location Surveys -- consists of such survey work as may be required to definitely establish the proposed location, proper right of way widths and prepare a location map if conditions warrant. This stage should not

be undertaken until Stage 1 is completed and the proposed route is agreed upon and approved.

Stage 3. Right of Way Map and Deeds -- consists of preparing right of way map and deeds on approved location, staking right of way limits and furnishing such assistance and additional information as may be requested by the counties in the acquisition of right of way. Right of way deeds should not be furnished the counties until the proposed right of way widths are agreed upon with the Austin office and the submission of this data to the counties is authorized by letter, program approval or Commission order.

Stage 4. Detailed Surveys and Graphical Representation of Field Work on Plans. This stage is a continuation of the field work under Stage 2 and consists of the completion of all field work incident to the design of the proposed improvements and the plotting of same on plan-profile and cross-section sheets for recording purposes and for use at such time as completion of P.S.&E. is authorized.

Stage 5. Design. This is the final stage and consists of the design of proposed improvements and completion of P.S.&E. This work, without exception, should be de-

layed until construction is authorized and early contract letting is assured.

PROCEDURE FOR ISSUING AND HANDLING I. P. E. AUTHORIZATIONS

Immediately upon receipt of an I. P. E. request, the Road Design Division carefully examines all pertinent information shown on the request and, if found in order, proceeds with the preparation of an I. P. E. authorization. At the same time a letter is written to the District Engineer furnishing the field with the authorization number and also outlining any pertinent information or instructions from the Administrative Division regarding the proposed project which should be brought to the attention of the field organization. When prepared, all three copies of the I. P. E. authorization are submitted to the Accounting Division where the I. P. E. is audited and distributed. The original, or white copy, is mailed to the field, the yellow copy is returned to the Road Design Division and the pink copy is retained in the Accounting Division.

All I. P. E. requests for programmed projects can be approved and an I. P. E. authorization issued immediately, provided the project is not covered by a Commission order containing certain provisions which have not been accepted officially by the local authorities. I. P. E. authorizations for preliminary work authorized by Commission orders can also be issued immediately after the Commission order is passed provided there are no conditions contained in the Commission order which require acceptance by the local authorities. Therefore, in the event the

Commission order does contain provisions which must be accepted by the local authorities, the I. P. E. authorization cannot be issued until the minute is declared operative and in no case should preliminary work be inaugurated prior to the approval of the authorization.

Each I. P. E. authorization clearly defines the limits and type or stage of preliminary work covered by the authorization and separate I. P. E. authorizations should be issued for each project as proposed for contract letting. Under no condition should preliminary expense be applied to an I. P. E. for preliminary work on an adjacent project or any other project which is not covered by the I. P. E. If such work can be justified and is properly authorized, an I. P. E. for that work can be obtained immediately. In the event an I. P. E. authorization is issued to cover investigation and planning work by stages, the stage authorized should not be exceeded without first obtaining a revision of the I. P. E. authorization providing for an increase in the scope of preliminary work previously authorized. For instance, if the I. P. E. authorization covers location surveys and preparation of right of way data, the preparation of plans must be withheld until the I. P. E. authorization is revised and scope of work increased to include plan preparation. All requests for such revisions must originate in the field.

DISTRIBUTIONS

Sometimes an I. P. E. authorization is written to cover preliminary work such as reconnaissance or location studies within certain limits

involving considerable length (possibly 15 or 20 miles). Later it may be decided to divide that particular section of highway into two or more projects for construction purposes or to let a contract on a short section only. When the limits of the proposed projects have been determined and are programmed or otherwise authorized for construction or various stages of preliminary work, a distribution of the preliminary expense applied to the I. P. E. should be submitted. A special form has been prepared for that purpose and is identified as Form Number 4-36-477. In addition to a distribution of the preliminary expense, this form also provides for complete information as to the limits, length, control section, scope of proposed preliminary work, proposed improvements, estimated cost and status of each section into which the I. P. E. is to be divided. When this distribution is received and found to be satisfactory, the original I. P. E. is revised usually to cover one section and new authorizations (Form 149) issued for each of the remaining sections.

In some instances an I. P. E. authorization is issued to cover P. S. & E. for a specified section of highway that is proposed for early construction. Later, the project is curtailed for various reasons and only a portion of the original length or proposed improvements is placed under contract. In this case, a distribution should be submitted along with the close out notice showing the expense applicable to the section contracted as well as the section remaining in the preliminary stage. For sample copy of Distribution see page 91.

I. P. E. CLOSE OUT NOTICE

An I. P. E. close out is the cancellation of an I. P. E. authorization and the transfer of expense applied to the authorization together with a like amount of funds to the project agreement covering the project for which the I. P. E. was issued. Unless otherwise agreed upon with the Road Design Division, the application of preliminary expense to an I. P. E. authorization should cease on the date work order is issued on day labor jobs and on the date contract is let on contract jobs and I. P. E. close out notice should be submitted not later than the 20th day of the following calendar month. A special form has been prepared for the convenience of the field in submitting request to the Austin office for the closing of I. P. E. authorizations to the various projects as they are placed under construction. This form has been prepared as a memorandum to File D-8 and is identified as I. P. E. Close Out Notice.

In the event only a portion of the length or improvements covered by the I. P. E. is placed under construction, the I. P. E. close out notice should show the amount applicable to the section placed under construction and should be accompanied by a distribution on Form Number 4-36-477, as previously explained under distributions. A partial I. P. E. close out will then be prepared transferring the proper amount of preliminary expense together with a like amount of funds to the construction project. If necessary, the limits of the I. P. E. authorization will also be changed and the I. P. E. will either be placed in the dormant

stage or remain open to cover any further preliminary work that may be authorized on the revised limits.

DORMANT I. P. E. AUTHORIZATIONS

An I. P. E. authorization may become inactive and preliminary work discontinued due to developments which render further investigation and planning work impractical or inadvisable. Work may be discontinued for various reasons such as completion of work authorized, location difficulties, right of way or financial complications or such other difficulties that might be encountered. All I. P. E. authorizations which become inactive with no intention of resuming preliminary work for several months should be placed in the dormant stage. When an I. P. E. authorization is placed in the dormant stage, no additional expenditures for further investigation and planning work can be applied to the I. P. E. until it is reopened. If and when it is desired to proceed with further investigation and planning work, a request for the reopening of the I. P. E. together with pertinent information to justify such procedure, should be submitted to the Road Design Division in the same manner as required for a new I. P. E. authorization.

CHARGE OFFS

The District office should occasionally, at least once each year, make a thorough investigation of all I. P. E. authorizations and notify the Road Design Division of those that appear questionable and possibly should either be revised, placed in the dormant stage or completely

disposed of by cancellation. In each case, the reasons for the disposition specified should be clearly indicated, bearing in mind that an I. P. E. authorization cannot be cancelled without making proper disposition of the preliminary expense applied to the authorization.

When investigation and planning work has been undertaken and later dropped with no intention of picking it up at a later date (such as is occasioned by the cancellation of a designation, change in control points, etc.) or should the work previously performed prove valueless to future construction due to conditions beyond the control of the department (such as the necessity for abandoning a satisfactory location and establishing a revised route because of right of way difficulties, etc.) the expense incurred can and should be charged off to Undistributable Investigation and Planning Expense. Such procedure, however, requires that ample justification for the proposed charge off be submitted to the Road Design Division. All charge offs must be approved by the State Highway Engineer and when a sufficient number of recommended charge offs from the various districts have accumulated, the Road Design Division prepares a recommended list for the consideration of the State Highway Engineer.

I. P. E. RECORDS

The Road Design Division is required to maintain a complete and up-to-date record of the progress being made in the development of investigation and planning work performed under each I. P. E. authorization

regardless of the stage or scope of preliminary work authorized. This record is indispensable in the proper handling of I. P. E. authorizations and in the co-ordination of investigation and planning work in keeping with the policies and instructions handed down from the State Highway Commission and Administrative Division. It also provides a historical record of the preliminary developments on each project and is the source of the information shown in the report "Status of Authorized Projects Not Under Construction" which is prepared and distributed by the Road Design Division each month. This record is entirely dependent on the "Monthly Report on Status of Investigation and Planning Work" (Form 278) submitted by the District and Urban Expressway offices.

MONTHLY REPORT ON STATUS OF INVESTIGATION AND PLANNING WORK (FORM 278)

This report is the principal source of information for all division heads and other personnel in the Austin office who might be interested in the progress being made and current status of investigation and planning work. The form used is self-explanatory as to the information required; however, a brief explanation of the form has been previously prepared and circulated among the field organizations and the contents of this explanation are quoted below for ready reference:

Brief Explanation of Form 278 (For sample copy see page 92)

1. Include all active I. P. E. authorizations on which preliminary expense has been incurred, regardless of stage of preliminary work authorized.

2. Under "Proposed Improvements" show type of construction contemplated, even though PS&E may not be authorized.

3. Under "Stage Authorized" show scope of preliminary work authorized by numerals as per description of various stages of work shown at bottom of form. Example: If preliminary work authorized through right of way stage, show Stage No. 3. If PS&E authorized, show Stage No. 5. In the event investigation and planning work is authorized through right of way stage only (Stage 3), the column for plan completion will not apply.

4. RIGHT OF WAY STATUS IS EXTREMELY IMPORTANT ON ADMINISTRATIVE LEVEL AND SHOULD BE REPORTED ON WITH UTMOST CARE. In the event all required right of way has been obtained under a previous project and no additional right of way is needed or contemplated for the improvements now proposed, show "none required" in the right of way columns; otherwise, be sure to indicate status by showing correct percentages in each column. If needed to properly explain the right of way situation for any particular project, two spaces may be used.

5. If for any reason, such as change in location, revision of plans, etc., the status shown for any particular stage of investigation and planning work is reduced to a lower percentage than that shown for the preceding month, the reasons should be briefed under "Remarks."

6. In the event an I. P. E. covers preliminary work through the PS&E stage (Stage 5) on a section of highway which will be divided into two (2) or more projects for contract letting and a distribution of the I. P. E. is considered inadvisable at this time, the status of each project as proposed for contract letting should be listed separately.

7. If for some reason considerable expense (approximately $100.00 or more) is required for some particular type of investigation or information which cannot logically be shown on the report as representing any change in the status of preliminary work authorized, such reasons should be briefed under "Remarks."

8. Under "Remarks" information should be given as to preliminary work being performed, such as running center line, taking cross sections, preparing right of way data, preparing plans, etc., provided there are no unusual conditions or difficulties affecting the development of the project which should be brought to attention. Information as to right of way difficulties encountered or anticipated is very desirable and helpful.

9. The report is due in the Austin office not later than the 6th of the month following the month covered by the report.

STATUS REPORT ON AUTHORIZED PROJECTS NOT UNDER CONSTRUCTION

This report is prepared each month by the Road Design Division and is made available for distribution on the fifteenth of the month. It

provides a complete list, by programs, of each and every project financed for improvement with the exception of maintenance and railroad grade crossing protection projects (signal lights). In addition to a complete description of each project programmed, the report also provides information as to the status of investigation and planning work as of the first day of the month in which the report is prepared. All information on status of preliminary work shown in this report is obtained from the I. P. E. records which, in turn, are maintained from the "Monthly Report on Status of Investigation and Planning Work" (Form 278). A sincere effort is made to keep this report as accurate as possible by properly indicating all program modifications or project revisions that may be authorized as well as the current status of the preliminary work on each. Copies of this report are distributed to the State Highway Engineer, each division head and all other personnel in the Austin office who are interested in and have certain responsibilities in connection with the proper development of the various program items. Each District office and each Engineer Manager's office is also furnished with one copy of that portion of the report covering the projects which come under their jurisdiction. Immediately upon receipt of this report by the field organization it should be carefully examined for any program modifications that might be indicated. Any erroneous information or apparent errors should be brought to the attention of the Road Design Division.

PRELIMINARY ENGINEERING COSTS

There has been a steady rise in the cost of preliminary engineering for many years but under prevailing conditions this increase is not considered abnormal or excessive. Based on the percentage of preliminary engineering cost to construction cost on the average project, there is little difference in the cost of investigation and planning work today as compared to that required several years ago.

Under no condition should adequate or necessary preliminary engineering work required for the proper design and development of any project be neglected or curtailed merely for the sake of effecting some reduction or economy in engineering cost. Such economy could very easily, in the final analysis, prove to be false and result in the adoption of an unsatisfactory design and increased construction cost. The cost of preliminary engineering is influenced by many factors, such as type of terrain traversed, accessibility of proposed project, local co-operation, ability to proceed with project in proper sequence, etc.; however, the principal governing feature in the proper development of any project with a minimum engineering cost is dependent upon the experience and ability of the engineering personnel.

Some of the contributing factors to excessive preliminary engineering cost can be enumerated as improper sequence of completing investigation and planning work, over-organization, duplication of work, reworking of P. S. & E. prepared considerably in advance of ability to

finance proposed improvements, development of preliminary engineering by stages without properly recording and preserving all engineering data for future use, improper application of preliminary expense, riding I. P. E. authorizations, etc. The greatest economy in the development of any project can be effected only when all necessary investigation and planning work can be carried forward to completion of plans and early award of contract without interference or delay.

INAUGURATION AND DEVELOPMENT OF PRELIMINARY WORK

The first step in the initial development of a highway is to establish the proposed route along which it is intended to locate. This is accomplished while the project is in the reconnaissance stage and in general does not require an instrument survey. However, the route should be established within reasonably narrow limits allowing for minor deviations that might be required in taking advantage of favorable topography when final location is made. In highly developed areas, such as oil fields and urban areas, considerably more accuracy is required. This is particularly true in towns where the acquisition of adequate right of way usually represents a major problem and the street along which the highway is located is of major importance in satisfying local sentiment.

One of the most important factors in the development of a highway is its location. The usefulness of any highway, as well as its permanency, safety, appearance, construction and future maintenance cost,

etc., is greatly dependent upon its location, and the adequacy and permanency of any location is governed by the thoroughness of reconnaissance and the engineering judgment used in determining the proposed route along which to locate. It therefore is quite obvious that adequate reconnaissance is of extreme importance and a major factor in the proper development of a highway and can only be accomplished by personnel having aptitude for and experience in the work, combined with vision, analytical ability and the courage and qualifications required to present conclusions in a clear and concise manner.

AIDS TO RECONNAISSANCE AND LOCATION STUDIES

A prerequisite to good engineering judgment in the selection of the proper route or location for a highway is a complete understanding of all the conditions pertaining to the proposed highway and a thorough knowledge of the country through which it passes. This can be obtained only by proper office and field investigations and the careful study of all available information. As outlined in previous discussion, there are various types of maps available which are very valuable in the development of a project, particularly during the reconnaissance and location stages. The maps considered most useful are the various types of topographic maps such as U.S. Geological Survey Maps, U. S. Coast and Geodetic Survey Maps, U. S. Army Grid Maps and the Planning Survey Maps, which are reasonably accurate and contain an abundance of information.

AERIAL PHOTOGRAPHIC MAPS

In addition to the topographic and Planning Survey Maps, there are also available various types of aerial photographic maps which are extremely valuable and which have become very popular with a large number of engineers. These maps have been used in many instances, particularly in the northeastern states to furnish all information needed to establish the proposed location, make a complete study of all drainage conditions and prepare plans for awarding of contract without placing a party in the field. However, the greatest value from the use of aerial photographs in Texas has been found on reconnaissance, location and the study of drainage conditions. The topographical features and nature of terrain as reflected on these maps enable the locating engineer to determine within narrow limits the basic advantages and disadvantages of all possible routes. Stereoscopic study of contact prints, which shows the particular area in relief, will reveal elevations of hills and valleys and will enable the engineer to select the most desirable location in rough and rugged country and will assist in finding feasible stream crossings. The most desirable route for the location of a highway can, in most instances, be readily determined by these maps, and the engineer will be in a position to confine the field investigations to the study of such routes and thereby eliminate unnecessary preliminary lines and simplify reconnaissance.

These maps are also very valuable in the regional planning of state highways, county roads and city streets through and adjacent to the more highly developed areas. The use of these maps will afford district engineers, division heads and various others interested in the location, design and construction of highways the opportunity of carefully studying the proposed route or location through office review and possibly make suggestions that might result in better locations and more economical construction costs.

AVAILABILITY AND TYPES OF AERIAL MAPS

There are various types and scales of aerial maps which can be obtained from different sources and each type is prepared on a given scale for a particular purpose. The principal source for obtaining reproductions is the United States Department of Agriculture. Photographs can be obtained from this agency in the form of photo index maps on scale of 1" or 2" equals 1 mile, which is an assembly of contact prints forming a continuous picture covering a particular area; contact prints (size 7"x9" or 9"x9"), which usually are on scale of 1" equals 1667' and can be used to study any area stereoscopically; and enlargements of contact prints, which can be secured on scales of 1" equals 1,000', 1" equals 660' and 1" equals 400'.

The cost of these photographs is very reasonable and they have proven very valuable in the saving of time, money and manpower. Contact prints can be obtained from this agency at a maximum cost of $ .65

each in lots of less than 100 and $.50 each in lots of over 100. Enlargements can be obtained for $2.00 each on scale of 1" equals 1,000', $2.25 each for scale of 1" equals 660' and $5.10 each for scale of 1" equals 400'. These prices are based on the purchase of less than 6 enlargements. If 6 or more are obtained, the cost is reduced from 15 to 25 per cent, the greatest reduction being for enlargements on scale of 1" equals 400'. Photo index maps are also very inexpensive, the cost of each being $1.10 with only 5 or 6 sheets being required for complete county coverage. Photo index maps are just a rough checkerboard assembly of the contact prints, and due to the scale and inaccuracy of these maps, they do not have any appreciable value in the development and study of routes and locations. Their principal value is in the location of contact prints and the identification of photographs desired for a particular area since each print is numbered and the number is usually visible on the index map.

MOSAICS

In the event mosaics, which can be prepared to cover any area in one composite picture, are desired, it is necessary that these maps be obtained from some commercial concern either by reproductions from a previous flight or a new flight. Mosaics are divided into three primary classifications; controlled, uncontrolled and semi-controlled.

Controlled mosaics are very accurate and can be depended upon for scaled distances. They are tied to established points of known distances

determined by ground surveys. Only the middle portion of the contact prints is used in the preparation of controlled mosaics due to the fact that the distortion increases in proportion to the distance from the center of the contact print. All points on each photograph mounted in the mosaic are within 1/16 of an inch of their true plotted position as located by a ground control survey.

An uncontrolled mosaic is not tied to geodetic controls or to a ground control survey and therefore cannot be depended upon for extreme accuracy. An uncontrolled mosaic may be built around a single photograph as a nucleus or it can be built laterally from a single flight accepted as a base line. In the construction of an uncontrolled mosaic, the prints are fitted together as accurately as possible by matching images. These mosaics have proven acceptable and very valuable on reconnaissance, location and drainage area studies.

In addition to the controlled and uncontrolled mosaics, it is also possible to obtain a semi-controlled mosaic which is only partially controlled and therefore cannot be depended on for extreme accuracy. However, they are tied to a certain amount of existing controls and are reasonably accurate. The same procedure for constructing an uncontrolled mosaic is also used in the preparation of a semi-controlled mosaic; however, considerably more care is exercised in their construction and the semi-controlled mosaic can be relied upon for considerably more accuracy and the additional cost is negligible. The

value of the semi-controlled mosaic is dependent upon the purpose for which it is intended and the accuracy required. Past experience, however, seems to indicate that for all practical purposes, especially on route, location and drainage area studies, the semi-controlled mosaic provides all accuracy normally needed.

Mosaics, either controlled, uncontrolled or semi-controlled, can be obtained for any given area on any scale and mounted in any manner which might be desired to more adequately serve the purpose for which the photographs are intended. In other words, a mosaic can be obtained in the form of a strip map mounted on linen to roll covering a long section of highway, or it can be divided into sections for convenience when using the map while making field studies. If preferred, the mosaic can also be mounted on masonite or similar material and divided into sections of any size which might be desired with butt joints to match.

For area studies or the development of highway routes through and adjacent to towns, similar to the expressway routes through the four major towns in Texas, controlled mosaics on scale of 1" equals 200' mounted in sections on masonite with butt joints to match have proven very popular and valuable. In many areas, semi-controlled mosaics on scale of 1" equals 500' have also been very popular and have proven to be very economical and valuable in the study of highway locations in and adjacent to the metropolitan areas.

PROCEDURE FOR OBTAINING AERIAL PHOTOGRAPHS

All requests for aerial photographs should be mailed to the Road Design Division and should furnish complete information as to the scale and type of photographs desired. In the event reproductions from the U. S. Department of Agriculture are considered satisfactory, the request should be prepared accordingly and should furnish information as to whether photo index maps, contact prints or enlargements are desired and the scale preferred if enlargements are requested. If identification numbers for the photographs desired are not available, a sketch (preferably Planning Survey) should be submitted showing the area to be covered. The request should also indicate the purpose for which the photographs are intended, the account against which the cost should be applied and whether or not the date of the photography is of any consequence.

If conditions are such that a new flight should be made because of the need for information regarding the latest local developments, bids are obtained from several photographic concerns for an aerial survey. This, of course, requires preparation of bid proposals, specifications and supporting sketch maps showing the area to be covered. Bid proposals are prepared by the Road Design Division and mailed to the various photographic concerns. A period of approximately two weeks is usually required for the submission of bids. Immediately after bids are received and the lowest best bid has been determined and accepted, the

successful bidder is notified and authorized to proceed with the survey. A period of several months (two to four months) is usually required for the delivery of photographs.

In making application for a new aerial survey, the following data is required for the preparation of bid proposals and supporting specifications:

(1) Planning Survey Map with area to be covered outlined in color.

(2) Type of photographs desired; that is, whether controlled, uncontrolled or semi-controlled mosaics are preferred and whether or not contact prints are needed for stereoscopic coverage on a portion or all of the area. If contact prints are desired for only a portion of the area, the area to be covered should be indicated on the sketch.

(3) Type of mounting preferred; that is, whether the mosaic is to be mounted on linen to roll or on masonite or equal, and whether or not the mosaic shall be prepared as a single unit or in sections with butt joints to match. If the mosaic is to be mounted in sections, the preferred arrangement for the proposed division into sections should be indicated on the sketch.

(4) Preferred scale for the mosaic. In selecting a desirable scale for the area to be covered, it should be remembered

that a three diameter enlargement is about as much enlargement as can be obtained without any appreciable loss of detail. It therefore follows that the scale of the mosaic governs to a large extent the scale of the contact prints which, in turn, are governed by the altitude of the plane taking the photographs and the focal length of the camera used. A 30 per cent overlap in line of flight on adjacent flight strips is also required which governs the effective width of each flight strip and the number of strips required for a given area.

The average unit cost of an aerial survey is extremely variable and exceedingly difficult to estimate as there are numerous conditions which influence the cost of aerial surveys and the furnishing of photographs such as type and scale of photographs required, area to be covered, specification requirements, etc. As an example, however, in December of 1951 the department obtained bids for an aerial survey covering two small adjacent areas in southeast Texas involving a total of approximately 40 square miles. The bid proposal provided for the construction of semi-controlled mosaics on scale of 1" equals 500' with a separate map being prepared and delivered for each area. Bids were received from three aerial photographic concerns located in Texas and the bids received were as follows:

$1,350.00 -- approximately $34.00 per square mile

$985.00 -- approximately $25.00 per square mile

$957.00 -- approximately $24.00 per square mile

The bid proposals also quoted a price of from $ .65 to $1.00 each for contact prints providing for stereoscopic coverage on the condition that 50 or more contact prints were ordered within 18 months from date of contract.

ROUTE SKETCH MAPS

The first step in clearing a project on the Primary and Secondary federal-aid system for the application of Federal funds, regardless of type of funds desired, is the submission of a route sketch map to the Bureau of Public Roads. Each Federal-aid route, both Primary and Secondary, is identified by a Federal route number which is officially described by a series of control points similar to our designated State Highway System.

Example: FEDERAL-AID ROUTE NUMBER 19. From a point on Federal-aid road number 30 at Athens via Palestine, Crockett, Trinity, Huntsville and Conroe to a point on Federal-aid road number 6 in Houston and from another point on Federal-aid road number 6 in Houston via Angleton to Freeport.

All route maps are prepared by the Road Design Division from information furnished by the field organizations. It is customary for the route map to be made to cover the entire distance between two or more official control points depending on the distance between control points. The section covered by the route map is assigned a Federal project number with the exact points of beginning and ending clearly indicated. Under no condition can one Federal project number assigned to a section of highway overlap another Federal project number previously assigned.

If and when a particular section of highway on either the Primary or Secondary Federal-aid system is approved by the Bureau of Public Roads and is assigned a Federal project number, no further route inspections or the submission of additional route maps are required for any future improvements with Federal-aid within the limits of the approved project unless a revision of the route previously approved is proposed or a modification of the project termini previously established is found necessary or desirable. If a route revision of any appreciable magnitude is proposed or a change in termini becomes necessary, a revised route sketch map must be submitted to the Bureau of Public Roads and their approval of the proposed modifications received before proceeding with any appreciable amount of investigation and planning work.

Before a route map can be submitted to the Bureau of Public Roads, it is essential that the proposed route along which it is intended to locate be agreed upon between the Austin office and the field and be approved by the proper authority in the Austin office. After administrative approval of the proposed route, the Road Design Division immediately proceeds with the preparation and submission of four copies of a satisfactory route map to the Bureau of Public Roads and arranges for a route inspection by a representative of the Bureau. After the field inspection is completed, the Federal Engineer making the inspection prepares a route inspection report. Two copies of this report, together with one copy of the approved route map, which is signed by the District Engineer of the Bureau of Public Roads, are furnished the Highway Department. The Austin office then furnishes the district office with one copy of the Federal Engineer's route report and supporting route sketch map for their information and files, the other copies being retained in the permanent files in the Austin office.

The approval of the proposed route by the Bureau of Public Roads, which is signified by signing the route map, makes the entire section covered by the Federal-aid project number shown on the route map eligible for Federal-aid on any improvements that might be proposed and developed in accordance with Federal rules and regulations. Each and every project programmed for construction with Federal-aid within the limits of the Federal-aid project number shown on the route map is

assigned a parenthesis number in numerical order as the construction projects are developed for contract letting.

Example: F 1032 (6) or S 1402 (3)

In other words, the parenthesis number identifies each stage of construction programmed for contract letting within the limits covered by the Federal project number.

4-36-477

DISTRIBUTION OF INVESTIGATION AND PLANNING EXPENSE

DATE: August 23, 1951

I.P.E. AUTHORIZATION NO. 975

COUNTY Union HWY. NO. US 81 LIMITS From: St. 780 in Rule, South To: North End of Black River Bridge

Prelim. work: Surveys and right of way

Auth. by I.P.E. deeds

RECOMMENDED DISTRIBUTION

	LIMITS OF NEW SECTIONS	LENGTH	FED. PROJECT	CONTROL SECTION AND JOB	SCOPE OF PRELIM. WORK RECOMMENDED	PROPOSED IMPROVEMENTS	ESTIMATED COST	PRELIMINARY EXPENSE		SURVEYS %	DEEDS PREP. %	DEEDS TO CO. %	R.O.W. SEC'D. %	PLANS COMP. %
								FIELD	AUSTIN					
A.	From St. 780 in Rule to North Approach of Hickory Creek Bridge (excl. CC&U Railroad Underpass)	8.67	F 1236(4)	61-7-3	PS&E for gr., strs., & surf.	Gr., Strs., & Surf.	$340,000.00	1563.11	76.10	78	87	0	0	0
B.	CC&U Railroad Underpass and Apprs. 2.0 Mi. S. of Rule	0.63	FG 1236( )	61-7-	Surveys, deeds & preliminary design studies	Underpass & Approaches	150,000.00	235.71	53.60	78	87	0	0	0
C.	Hickory Creek Bridge and Approaches South of Rule	0.33	F 1236( )	61-7-	Surveys, deeds, core borings, & design studies	Bridge & Approaches	84,000.00	75.00	18.00	78	87	0	0	0
D.	From South Approach of Hickory Creek Bridge to North End of Black River Bridge	7.83	F 1236( )	61-7-	None at present	Reconst. gr., strs., & surf.	287,000.00	137.00	----	33	0	0	0	0

REMARKS

A. This section included in approved 1952-53 Primary Federal-Aid Program

B. Will be recommended for inclusion in next Federal Program.

C. Timber bridge 20' roadway - should be replaced as soon as funds are available

D. Present pavement 22' roadway fair condition, R.O.W. 100'. No improvements needed in immediate future. Recommend I.P.E. be placed in dormant stage.

John Doe
District Engineer

NOTE: Distribution to be submitted in duplicate to file D-8

Texas Highway Department
Form 278 T.H.D.-5m

MONTHLY REPORT ON STATUS OF INVESTIGATION & PLANNING WORK

DISTRICT NO. 32

AS OF Oct. 1st, 1952

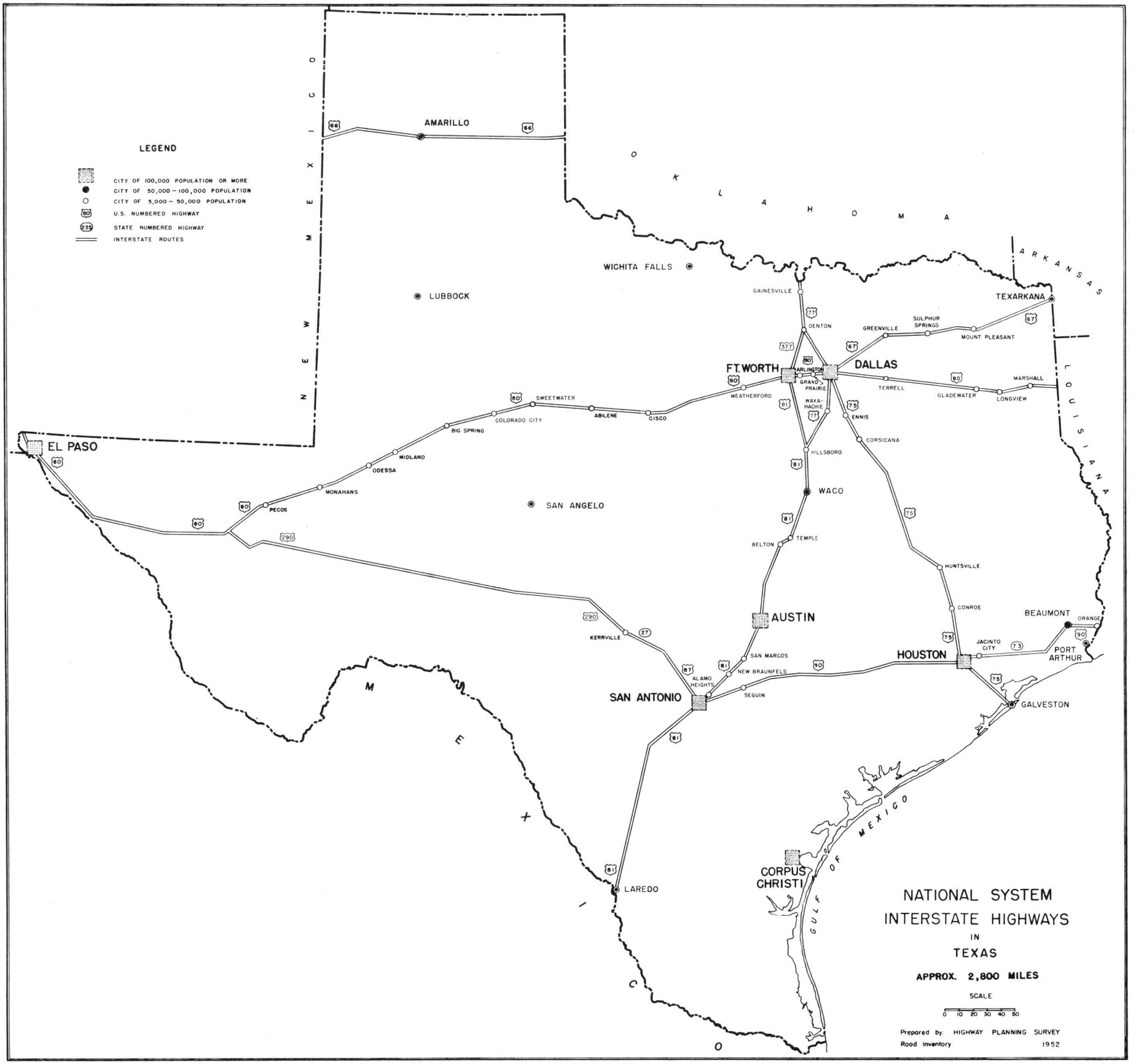
COUNTY	I.P.E. NO.	HWY. NO.	L'GTH. MILES	LIMITS	PROPOSED IMPROVEMENTS	STG.* AUTH.	STATUS OF R.O.W. SURVEYS & P.S. & E.							REMARKS
							RECONN-AISSANCE %	LOC. SURVEY %	DEEDS PREP. %	DEEDS TO CO. %	R.O.W. SEC'D %	SUR-VEYS %	PLANS COMP. %	
Faltinson	10	St. 55	10.00	From: Pecos, northeast To Junction St. Hwy. 1761	Gr.,Strs. & Surf.	3	95	10	0	0	0	0	0	Location Surveys.
Lott	66	FM 1111	5.40	From: St. Hwy. 100, south To Stevenson	" " "	5	100	10	0	0	0	10	0	Lack of available personnel delaying project.
Roberts	716	U.S. 99	6.30	From: Abilene To Pecos River	" " "	5	100	100	100	100	100	98	90	Completing Surveys and Plans
Kelly	77	St. 100	11.00	H.&T.C. Overpass and Approaches Near Eden	Overpass & Approaches	5	100	100	50	0	0	90	35	Checking overpass layout.
Puckett	99	FM 666	4.00	From: Maxdale To Ding Dong	Gr.,Strs.& Surf.	3	50	40	40	0	0	40	0	Location and drainage surveys.
Koch	33	U.S. 50	15.00	From: Junction F.M. Road 172, northeast To Gentry County Line	" " "	3	100	100	95	95	95	98	5	Two small tracts will have to be condemned
McCarty	44	St. 7	9.60	From: Roberts County Line To Paris	" " "	5	100	90	0	0	0	75	5	Route change req., see Minute 322277.
Nabers	49	U.S. 30	8.6	From: Lott County Line To Detroit	" " "	5	100	100	76	0	0	90	60	Reduction in status due to revision of plans and ROW to interstate standards.
Finley	50	U.S. 777	31.00	From: Cawthon County Line To Fort Worth	Widening Gr., Strs.& Surf.	5	100	100	100	100	80	95	95	Present 120' ROW being widened to 200'. Pencil plans in Austin,
Douglas	88	St. 12	6.00	From: Cornelius County Line To Davis County Line	Gr., Strs.& Surf.	3	95	70	0	0	0	0	0	Temporarily delayed due to location controversy.
Milligan	1000	FM 999	7.8	From: Intersection with FM 888 at Tye To Deacon	" " "	3	0	0	0	0	0	0	0	Project recently authorized. No work started.
Cawthon	1001	U.S. 28	4.3	From: Clinton County Line To Red Bug Creek	" " "	5	100	100	None Required-----			97	82	Reduction in plan status due to revisions now in progress.
Davis	1214	U.S. 26	0.3	Bear River Bridge and Approaches	Bridge & Appr. Emb.	5	100	100	100	100	100	100	98	Plans in Bridge Division.
Davis	1214	U.S. 26	4.1	From: St. 30 in Beavo to Roxton County Line (excl. Bear River Br. & Apprs.)	Gr.,Strs.& Surf.	5	100	100	100	100	75	50	15	Assisting County in securing ROW. Some difficulty encountered.
Mars	1004	FM 1891	9.7	From: Boon to Nedham	Surfacing	5	100	100	None Required -------			Mt'l. 75	30	Material Surveys.
Simmons	1018	U.S. 94	6.1	From: Pyrex to U.S. 46, 2.5 miles south of Raby	Gr.,Strs. & Surf.	5	100	100	100	100	100	100	85	Reduction in plan status due to change from St. to Fed. Prog.
Massey	1002	44	3.3	From: FM 211 at Newtown To 1.1 mile south of Silver Creek	" " "	4	100	100	95	0	0	60	20	Temporarily inactive due to work on Program Items.
Snyder	1116	St. 76	8.6	From: 2.1 miles east of Baker To 0.5 mile west of Gee River Bridge	" " "	4	100	100	100	100	0	85	0	County having difficulty securing ROW at Baker - Reloc. may be required.
Blair	1213	U.S. 481	0.8	From: West 2nd Street To Jct. with Travis Road in Blair City	Surfacing	5	60	60	None Required ------			60	0	Waiting on completion of curb and gutter by City.
Hodges	1141	U.S. 41	5.5	From: Laketon south to 0.6 mile north of G.P.&P.G. RR Overpass	Gr.,Strs.& Surf.	5	100	100	100	100	100	100	100	Unit I recommended for November letting, Surf. to be separate contract.

NOTE: UNDER REMARKS PLEASE STATE BRIEFLY ANY UNUSUAL CONDITIONS OR DIFFICULTIES AFFECTING THE DEVELOPMENT OF EACH PROJECT.

*1 RECONNAISSANCE
2 LOCATION SURVEYS
3 RIGHT-OF-WAY MAP & DEEDS
4 DETAILED SURVEYS & PLOTTING OF FIELD WORK ON PLANS
5 DESIGN, COMPLETION OF P. S. & E.

SIGNED: John Doe
DISTRICT ENGINEER

71120-652-5m


LEGEND
CITY OF 100,000 POPULATION OR MORE
CITY OF 50,000 – 100,000 POPULATION
CITY OF 5,000 – 50,000 POPULATION
U.S. NUMBERED HIGHWAY
STATE NUMBERED HIGHWAY
INTERSTATE ROUTES
NEW MEXICO
OKLAHOMA
ARKANSAS
LOUISIANA
MEXICO
AMARILLO
LUBBOCK
WICHITA FALLS
GAINESVILLE
DENTON
TEXARKANA
GREENVILLE
SULPHUR SPRINGS
MOUNT PLEASANT
FT. WORTH
ARLINGTON
GRAND PRAIRIE
DALLAS
TERRELL
GLADEWATER
MARSHALL
LONGVIEW
WEATHERFORD
WAXAHACHIE
ENNIS
CORSICANA
HILLSBORO
SWEETWATER
ABILENE
CISCO
COLORADO CITY
BIG SPRING
EL PASO
MIDLAND
ODESSA
MONAHANS
PECOS
SAN ANGELO
WACO
BELTON
TEMPLE
HUNTSVILLE
CONROE
BEAUMONT
ORANGE
PORT ARTHUR
JACINTO CITY
HOUSTON
AUSTIN
SAN MARCOS
NEW BRAUNFELS
SEGUIN
ALAMO HEIGHTS
SAN ANTONIO
KERRVILLE
GALVESTON
LAREDO
CORPUS CHRISTI
GULF OF MEXICO
NATIONAL SYSTEM
INTERSTATE HIGHWAYS
IN
TEXAS
APPROX. 2,800 MILES
SCALE
0 10 20 30 40 50
Prepared by: HIGHWAY PLANNING SURVEY
Road Inventory 1952

HIGHWAY CONTROL SECTION NUMBERING SYSTEM

The Highway Control Section Numbering System was inaugurated in 1935 and all recording and filing throughout the Department is now based on this system. Until this system was adopted, one of the major problems confronting our highway administrators and highway engineers, as well as the accounting or bookkeeping Divisions, was the need for the development and establishment of a workable system of recording highway expenditures pertaining to the cost of constructing and operating highway facilities.

The primary purpose of the Control System, therefore, is to provide a practical and permanent system of recording which will permit ease of reference and positive identification of all information and statistical data pertaining to the maintenance and construction of state highways. This system has also made it possible to make an intelligent estimate of investment lost due to the retirement of highways, either through relocation, reconstruction or actual abandonment and through loss by obsolescence. Also, it permits the immediate assemblage of all maintenance and construction costs as well as engineering records and such other data as might be essential in completing any necessary statistical studies.

In the Control Section Numbering System, the term "Control Number" means a definite section of highway with well defined

geographic termini. Control Numbers vary in length, usually from 50 to 100 miles.

The term "Control Section" means a definite portion of a Control Number with well defined geographic termini within the established limits of a Control Number. Control Sections also vary in length, usually from 10 to 15 miles. One or more Control Sections comprise a Control Number. These Control Sections are the basic reporting units for each division of the Highway Department -- planning, programming, design, construction, maintenance, right-of-way and accounting.

The term "Job Number" means the number assigned to each contract or day-labor job under a Control Section. A Job Number may cover either the entire limits or any part of a Control Section. In the event a contract or day-labor job extends into more than one Control Section, a separate Job Number must be assigned under each Control Section. As many Job Numbers may be assigned under a Control Section as there are different or successive contracts or day-labor jobs entered into.

In the establishment of our Control System, the Controls and Sections were set up in numerical sequence from west to east and from north to south. Control Section termini were established at the beginning and ending points of previously designated State and Federal project limits, at county lines, intersecting routes, major stream crossings, city limits, city street intersections, etc. (see Figure 1). It was found

desirable to terminate the Control Sections at the west and south ends of bridges encountered at county lines (see Figure 1).

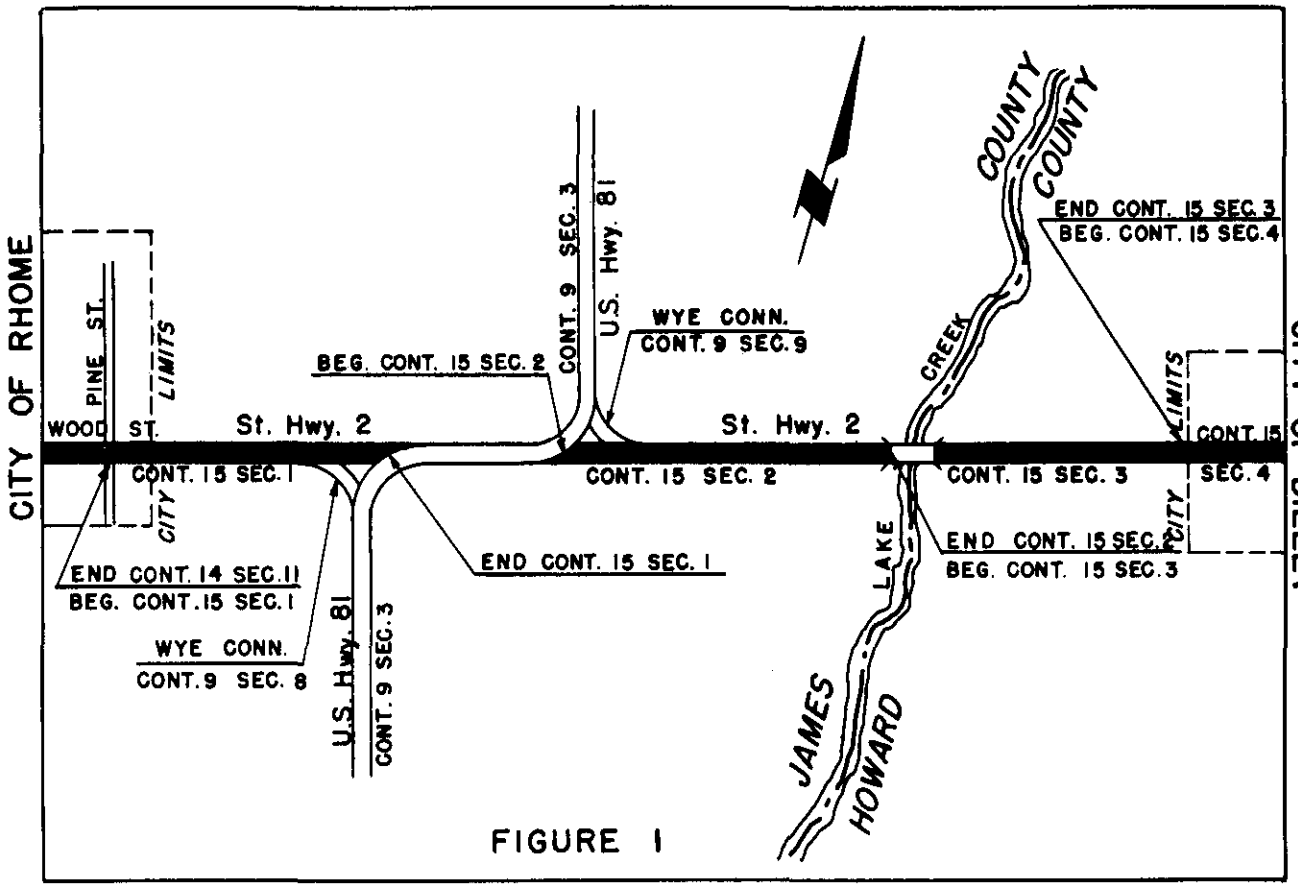


FIGURE 1

The major highways were rated and grouped according to their relative importance to assist in establishing the governing route where one highway traversed another. In such instances, Control Sections were set up in consecutive numerical order on the primary or governing highway, with a gap in the geographical termini description on the secondary highway at points of entry and departure from the primary or governing highway. The beginning point of the gap in the secondary highway was made the ending point of the Control Number or Section on the same highway. Likewise, the ending point of such a gap was made

the beginning point of another Control Number or Section on the same highway. In no case do we have two Control Numbers or Sections covering the same section of highway. This is illustrated in Figure 1.

Separate Control Sections were set up for wye connections for maintenance log purposes only. Wye connections are to be considered a part of the project or Control Section being constructed and a separation of quantities is not required. As an example, in Figure 1, all quantities involved in the wye connections covered by Control 9, Sections 8 and 9, were included with those of Control 9, Section 3, at the time of construction. After the completion of construction, these wye connections were assigned new Section numbers (8 and 9) under Control 9 for logging purposes only.

At the present time, Controls and Sections are added to the system as needed to cover new highway designations as proposed on the various programs of work. In assigning these Control Sections, we realize that it is desirable to have each Control Section set up in numerical order and therefore attempt to anticipate the possible future extensions of these new designations. Due to the numerous short sections of farm to market roads that are designated, it is exceedingly difficult to follow any uniform sequence in the assignment of Control Sections.

To aid in the assignment of Controls and Sections to the proposed designations on future programs of work, especially the Farm to

Market Road Programs, it would be very helpful if each district, at the time of submission of these programs to the Austin office (File D-2), would also submit a district map to the Road Design Division showing, to the best of their knowledge and ability, the probable future extensions to these proposed designations. This would eliminate a lot of guess work in the assignment of Control Sections and would aid in the development of a more uniform sequence of Control numbering.

PROJECTS FINANCED WITH COMBINATION OF FEDERAL AND STATE OR OTHER TYPE FUNDS

With reference to projects financed with Federal-aid Funds, the following definitions should be considered:

"Urban Area" -- an area including, and adjacent to, a municipality or other urban place of five thousand or more, the population of such municipality or urban place to be determined by the latest available Federal Census. This official definition permits the extension of the "Urban Area" to include sections outside the corporate limits, but in practice the city limit line is usually considered the urban area boundary. It is not permissible to expend Federal-Aid Secondary funds within the limits of an "Urban Area."

"Rural Area" -- all areas not included in "Urban Areas."

"Railway-Highway Projects" -- projects which include provision for the elimination of hazards to traffic at railway-highway crossings.

The source of finance, which is determined in the Austin office, governs the prefix designation used with Federal Project Numbers assigned to each project developed with Federal aid.

Projects utilizing Federal-Aid Funds are grouped in the following categories:

FEDERAL-AID PRIMARY FUNDS

These funds may be expended on the approved Federal-Aid Primary Highway System.

The following prefix designations are used for these projects:

F — Highway improvement not on the approved route of the Interstate System

FI — Highway improvement on the approved route of the Interstate System

FG — Railway-highway improvement not on the approved route of the Interstate System

FGI — Railway-highway improvement on the approved route of the Interstate System.

Project numbers are assigned in numerical order as needed, and the parenthesis numbering system is used to denote the sequence of work on these projects.

Examples: F 25 (1), FG 25(2), F 25 (3)

FEDERAL-AID SECONDARY FUNDS

These funds may be expended on the approved Federal-Aid Secondary Highway System. As stated before, it is not permissible to expend these funds within the limits of an "Urban Area."

The following prefix designations are used for these projects:

S Highway improvement on Secondary System

SG Railway-highway improvement on Secondary System

Project numbers are assigned in numerical order as needed, and the parenthesis numbering system is used to denote the sequence of work on these projects.

Examples: S 50 (1), SG 50 (2), S 50 (3), SG 50 (4)

FEDERAL-AID URBAN FUNDS

These funds may be expended on projects in "Urban Areas" and on routes included in the approved Federal-Aid Primary Highway System.

The following prefix designations are used for these projects:

U Highway improvement not on the approved route of the Interstate System

UI Highway improvement on the approved route of the Interstate System

UG Railway-highway improvement not on the approved route of the Interstate System

UGI Railway-highway improvement on the approved route of the Interstate System

Project numbers are assigned in numerical order as needed, and the parenthesis numbering system is used to denote the sequence of work on these projects.

Examples: U 431 (1), UG 431 (2), UI 431 (3), UGI 431 (4)

FEDERAL-AID INTERSTATE FUNDS

These funds may be expended on the approved Interstate Highway System.

The following prefix designations are used for these projects:

I Highway improvement on the approved route of the Interstate System

IG Railway-highway improvement on the approved route of the Interstate System

Project numbers are assigned in numerical order as needed, and the parenthesis numbering system is used to denote the sequence of work on these projects.

Examples: I 12 (1), I 12 (2), IG 12 (3)

TEXAS FOREST HIGHWAY FUNDS

These funds may be expended on any type of road within the boundaries of Texas National Forests provided it is on the approved Texas Forest Highway System. The prefix designation, TFHP, is used on all projects financed with these funds but the parenthesis numbering system is not used. A forest highway project is identified by the forest highway route number. The forest route can be sectionized as sections A, B, C,

etc. for construction convenience. The first unit of work under Section A of the Texas Forest Highway Route Number 25 would be identified as Project TFHP 25 A. The second unit of work under this same section would be identified as TFHP 25 A-1; the third unit would be TFHP 25 A-2, etc.

EMERGENCY RELIEF FUNDS

These funds may be expended on projects located on the approved system of Federal-Aid Primary or Secondary Highways for the repair or reconstruction of damage to roads and bridges due to floods, hurricanes, earthquakes, landslides or other catastrophes only after an emergency has been declared by the Governor of the State, concurred in by the Secretary of Commerce, and a finding made by the Commissioner of Public Roads that conditions justify an allocation of Emergency Relief Funds.

Projects involving the use of these funds may be identified by the prefix "ER" if State or local funds are used for matching, "ER-F" if Federal-Aid Primary Funds are used for matching, "ER-S" if Federal-Aid Secondary Funds are used for matching or "ER-U" if Federal-Aid Urban Funds are used for matching.

Project numbers are assigned in numerical order as needed, and the parenthesis numbering system is used to denote the sequence of work on these projects.

Examples: ER-1, ER-F 2 (1), ER-S 3 (1), ER-S 4 (1)

DEFENSE ACCESS ROAD FUNDS

These funds (100 per cent Federal-Aid) may be expended on access roads to Army, Navy or Air Force installations, to sources of critical and strategic minerals and metals, or on any road certified to the Secretary of Commerce as important to the National Defense by the Secretary of Defense, or such other official as the President may designate.

All project numbers covering access roads are assigned by the Bureau of Public Roads. It must be remembered, however, that access road projects are assigned Control, Section and Job Numbers in the same manner as for all other highway projects.

Projects financed with a combination of the various funds authorized by Federal-Aid Highway Legislation are to be identified by a combination of prefix designations applicable to the funds involved.

Each Federal-Aid Primary, Secondary, Urban or Interstate project that serves an access function, to the extent that at least 25 per cent of the traffic using the facility is generated by defense activities in the vicinity of the project, is to be identified by adding the letter "A" (for Access) as a prefix to the project designation. The project number used will be the one assigned in the regular Federal Aid Series. Examples: AF 271 (4), AS 982 (3), AU 15 (1), AI 432 (7). Projects jointly financed with Access Road Funds and Federal-Aid Funds should carry the double prefix. Example: AD-AF 15 (2). For this class of project, the project number will be the one assigned in the Defense Access Road series.

Projects including the letter "I" in the prefix designation are to be those, and only those, which are clearly intended to be interstate system improvements. Improvements on locations which do not conform to the probable location of the interstate route when built to interstate system standards, or which are intended for use only during the interim period prior to eventual construction of interstate system facilities, are not to be identified in such manner. Improvements not conforming to interstate system standards but which by stage construction are expected to become a part of interstate system facilities are to be identified as interstate system improvements.

PROJECTS FINANCED WITHOUT FEDERAL FUNDS

Projects built without Federal Aid are to be identified by the following prefix designations placed before the Control, Section and Job Number depending upon the type of road, method of construction and type of funds used for financing.

PREFIX	TYPE OF HWY. OR ROAD	CONSTRUCTION METHOD	TYPE OF FINANCING
"C"	Any improvements on the State System of Highways	Contract	100 per cent State Highway Funds
"L"	Any improvements on the State System of Highways determined to be construction	Day-Labor	100 per cent State Highway Funds
"M"	Any improvements on the State System of Highways determined to be maintenance	Day-Labor	100 per cent State Highway Funds

"MC"	Any improvements on the State System of Highways using maintenance funds	Contract	100 per cent State Highway Funds
"R"	Any improvements on Farm to Market Roads	Contract or Day-Labor	Farm to Market Road Funds
"B"	Any improvements on Farm to Market Roads	Day-Labor	House Bill 21 of 50th Legislature
"V"	Any improvements on Farm to Market Roads	Contract or Day-Labor	Combination of State and Voluntary Funds - usually County Funds
"RV"	Any improvements on Farm to Market Roads	Contract or Day-Labor	Combination of Farm to Market Road Funds and Voluntary Funds - usually County Funds
"BV"	Any improvements on Farm to Market Roads	Day-Labor	Combination of Funds of House Bill 21 of 50th Legislature and Voluntary Funds - usually County Funds

ASSIGNMENT OF PROJECT AND CONTROL NUMBERS

The Road Design Division is held responsible for the assignment of all Project and Job Numbers and is required to maintain a complete and up-to-date record of all numbers assigned together with complete information as to the type of improvements proposed or completed under each number assigned.

In order to avoid confusion, it is customary and definitely preferred that Project Parenthesis Numbers and Job Numbers be assigned

after the P. S. &E. are received in the Austin office for review. Quite often, however, Project and Job Numbers are requested in advance of the date on which P. S. &E. are submitted. If such procedure is of any particular advantage, the assignment of these numbers can be made at any time requested provided the proposed procedure for contract letting has been definitely established and information in this regard is submitted with request for Project Parenthesis Number and Job Number assignment. In other words, in order to be able to assign Job Numbers in advance of P. S. &E. submissions, we will need complete information regarding the proposed project such as limits, mileage, type of construction, program involved and tentative or proposed letting date.

Frequently projects are programmed which involve two adjacent counties. In the assignment of Federal Project and Parenthesis Numbers in such instances, it has been customary in the past to assign separate Parenthesis Numbers to the sections in each county. However, if preferred and conditions justify, it is permissible to assign one Parenthesis Number to cover this type of project, but it should be remembered that quantities must be divided into the separate Control, Section and Job Numbers assigned for each county involved.

FIGURING PROJECT LENGTH

In figuring the length of any project, the total length reported should be an end to end distance of the project, excluding lengths of exceptions and incidental facilities.

In the case of divided highways, the Project length may be obtained by averaging the length of the two Roadways or by measuring the length of the median or by measuring the length of one Roadway.

The actual length measured along the centerline of Roadway, of structures of more than 20 feet clear span, should be shown as Bridge length and the length of road approaches should be shown as Roadway length.

On projects where the Roadway underpasses a railroad, city street or county road, the entire project should be shown as Roadway inasmuch as an underpass structure has no length along the centerline of the Roadway.

The total length of the project should be the summation of the total length of Roadway in feet converted into miles (CARRIED TO THE THIRD ACTUAL DECIMAL PLACE) plus the total length of Bridges in feet converted into miles (CARRIED TO THE THIRD ACTUAL DECIMAL PLACE).

EITHER MUNICIPAL OR RURAL CONSTRUCTION OF ROADWAY AND BRIDGES

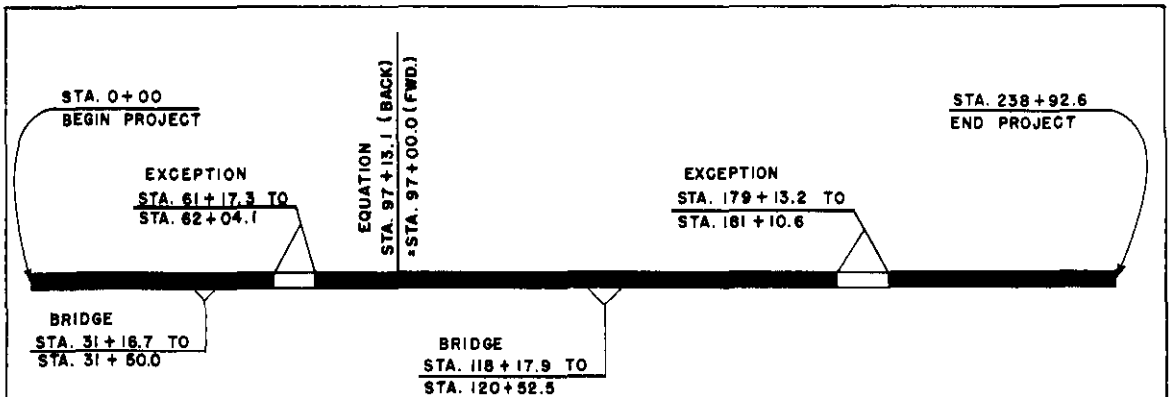


FIGURE 2

EQUATIONS:

97/13.1 = 97/00.0 = /13.1 Ft.

EXCEPTIONS:

61/17.3-62/04.1 = -86.8 Ft.
179/13.2-181/10.6 = -197.4 Ft.

TOTAL EXCEPTIONS: -284.2 Ft.

Figure number of feet in Bridges and Roadway separately.

Calculate mileage of Bridges and Roadway separately to THIRD ACTUAL DECIMAL PLACE. Total for net Project Length.

Net Bridge Length	267.9 Ft.	= 0.050 Mi.
Net Roadway Length	23,353.6 Ft.	= 4.423 Mi.
Net Project Length	23,621.5 Ft.	= 4.473 Mi.

BOTH MUNICIPAL AND RURAL CONSTRUCTION OF ROADWAY AND BRIDGES

If a project consists of both MUNICIPAL and RURAL Sections, the MUNICIPAL Section (Roadway and Bridges figured separately) plus the RURAL Section (Roadway and Bridges figured separately) should be made to equal the total Roadway, Bridge and Project length by altering the THIRD ACTUAL DECIMAL PLACE of the MUNICIPAL and RURAL Roadway and Bridge mileages.

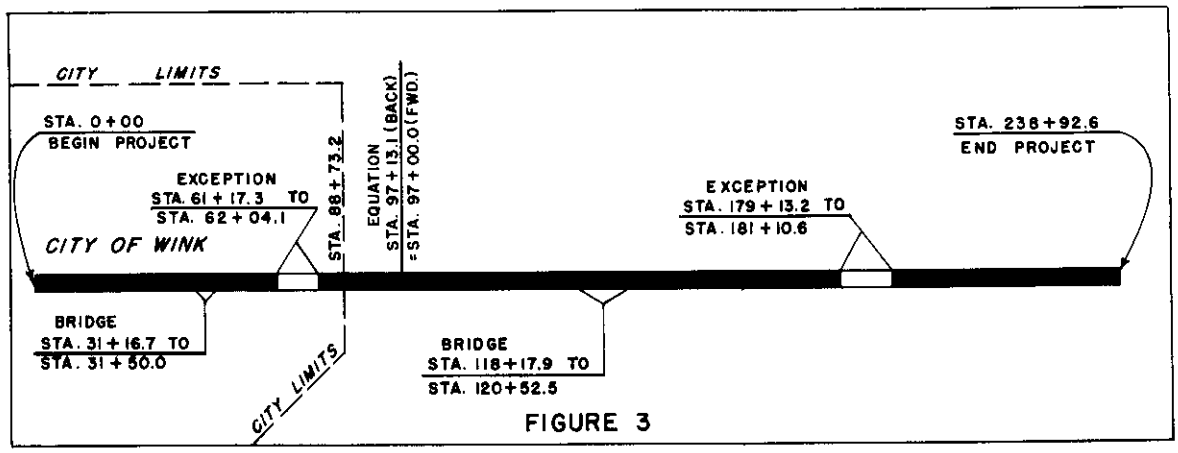


FIGURE 3

EQUATIONS:	EXCEPTIONS:
97/13.1 = 97/00.0 = /13.1 Ft.	61/17.3-62/04.1 = -86.8 Ft.
	179/13.2-181/10.6 = -197.4 Ft.
	TOTAL EXCEPTIONS: -284.2 Ft.

The Project used for an example is identical to that used in Figure 2 with one exception; the Project has been divided into MUNICIPAL and RURAL Sections at Station 88/73.2; the section from Station 0/00 to Station 88/73.2 being MUNICIPAL and the section from Station 88/73.2 to Station 238/92.6 being RURAL.

We found by using Figure 2 that the following net lengths apply:

Net Bridge Length	267.9 Ft. = 0.050 Mi.
Net Roadway Length	23,353.6 Ft. = 4.423 Mi.
Net Project Length	23,621.5 Ft. = 4.473 Mi.

Figure number of feet in MUNICIPAL Bridges and Roadway separately.

Calculate mileage of MUNICIPAL Bridges and Roadway separately to THIRD ACTUAL DECIMAL PLACE.

MUNICIPAL Bridges	33.3 Ft. = 0.006 Mi.
MUNICIPAL Roadway	8,753.1 Ft. = 1.657 Mi.

Figure number of feet in RURAL Bridges and Roadway separately.

Calculate mileage of RURAL Bridges and Roadway separately to THIRD ACTUAL DECIMAL PLACE.

RURAL Bridges	234.6 Ft. = 0.044 Mi.
RURAL Roadway	14,600.5 Ft. = 2.765 Mi.

Total the MUNICIPAL and RURAL Bridge mileage and adjust the THIRD ACTUAL DECIMAL PLACE (if necessary) to arrive at the net Bridge length as calculated to the THIRD ACTUAL DECIMAL PLACE.

Total the MUNICIPAL and RURAL Roadway mileage and adjust the THIRD ACTUAL DECIMAL PLACE (if necessary) to arrive at net Roadway length as calculated to the THIRD ACTUAL DECIMAL PLACE.

Bridges

MUNICIPAL	33.3 Ft. = 0.006 Mi.
RURAL	234.6 Ft. = 0.044 Mi.
NET LENGTH	267.9 Ft. = 0.050 Mi.

Roadway

MUNICIPAL	8,753.1 Ft. = 1.657⅞ Mi.
RURAL	14,600.5 Ft. = 2.765⅞ Mi.
NET LENGTH	23,353.6 Ft. = 4.423 Mi.

Add net Bridge length to net Roadway length to arrive at net Project length.

Net Bridge Length	267.9 Ft. = 0.050 Mi.
Net Roadway Length	23,353.6 Ft. = 4.423 Mi.
Net Project Length	23,621.5 Ft. = 4.473 Mi.

EITHER MUNICIPAL OR RURAL CONSTRUCTION OF BRIDGES AND CULVERTS ONLY - NO ROADWAY INCLUDED

Do not include exceptions at the beginning or end of the Project but begin and end Project at the actual beginning and end of construction.

All Roadway should be shown as exceptions.

Figure number of feet in Bridges and Culverts separately.

Calculate mileage of Bridges and Culverts separately to the THIRD ACTUAL DECIMAL PLACE.

Total for net Project length.

BOTH MUNICIPAL AND RURAL CONSTRUCTION OF BRIDGES AND CULVERTS ONLY - NO ROADWAY INCLUDED

Do not include exceptions at the beginning or end of the Project but begin and end Project at the actual beginning and end of construction.

All Roadway should be shown as exceptions.

Figure number of feet in Bridges and Culverts separately.

Calculate mileage of Bridges and Culverts separately to the THIRD ACTUAL DECIMAL PLACE.

Total for net Project length.

Figure number of feet in MUNICIPAL Bridges and Culverts separately.

Calculate mileage of MUNICIPAL Bridges and Culverts separately to the THIRD ACTUAL DECIMAL PLACE.

Figure number of feet in RURAL Bridges and Culverts separately.

Calculate mileage of RURAL Bridges and Culverts separately to the THIRD ACTUAL DECIMAL PLACE.

Total the MUNICIPAL and RURAL Bridge mileage and adjust the THIRD ACTUAL DECIMAL PLACE (if necessary) to arrive at the net Bridge length as calculated to the THIRD ACTUAL DECIMAL PLACE.

Total the MUNICIPAL and RURAL Culvert mileage and adjust the THIRD ACTUAL DECIMAL PLACE (if necessary) to arrive at the net Culvert length as calculated to the THIRD ACTUAL DECIMAL PLACE.

Add net Bridge length to net Culvert length to arrive at net Project length.

ONE FEDERAL PROJECT EXTENDING INTO MORE THAN ONE CONTROL SECTION

Determine net length of Project by figuring the number of feet included in Project and calculate mileage to THIRD ACTUAL DECIMAL PLACE as previously indicated for any project.

Determine number of feet in each Control, Section and Job and calculate to THIRD ACTUAL DECIMAL PLACE as previously indicated for a single Project. The summation of the total length of all Control, Section and Jobs should be made to equal the Project net length by altering the THIRD ACTUAL DECIMAL PLACE of each Job, if necessary.

STATE PROJECTS EXTENDING INTO MORE THAN ONE CONTROL SECTION

Determine separately the net length in feet of each Control, Section and Job and calculate mileage to THIRD ACTUAL DECIMAL PLACE as previously indicated for any project.

The net Project length should be the summation of the total length of all Jobs without alteration to the THIRD ACTUAL DECIMAL PLACE of each Job.

DIVISION OF QUANTITIES AT INTERSECTIONS

Due to the many different types of highway intersections and interchanges being developed and the various types or combinations of funds employed in financing each, it is impossible to adopt an iron-clad rule or procedure governing the breakdown of quantities according to the Control Sections involved. However, since the entire system of recording all information pertaining to the maintenance and construction of highways is based on the Control Numbering System, and the accuracy of any information or statistical data which the various divisions in the Austin office are required frequently to assemble for various purposes is dependent on the accuracy of the recording system, the importance of reasonable accuracy in the proper division of quantities at intersections or interchanges should not be overlooked.

Each major interchange represents a separate and distinct problem which in most instances requires individual treatment. In such cases, two copies of a sketch covering the proposed intersection or interchange should be submitted to the Road Design Division. One copy of this sketch will be returned to the field with the proper arrangement of Control Sections and division of quantities indicated thereon.

The most common type of simple intersection is similar to that shown in Figure 4, and the proper method of handling this type of intersection is as follows:

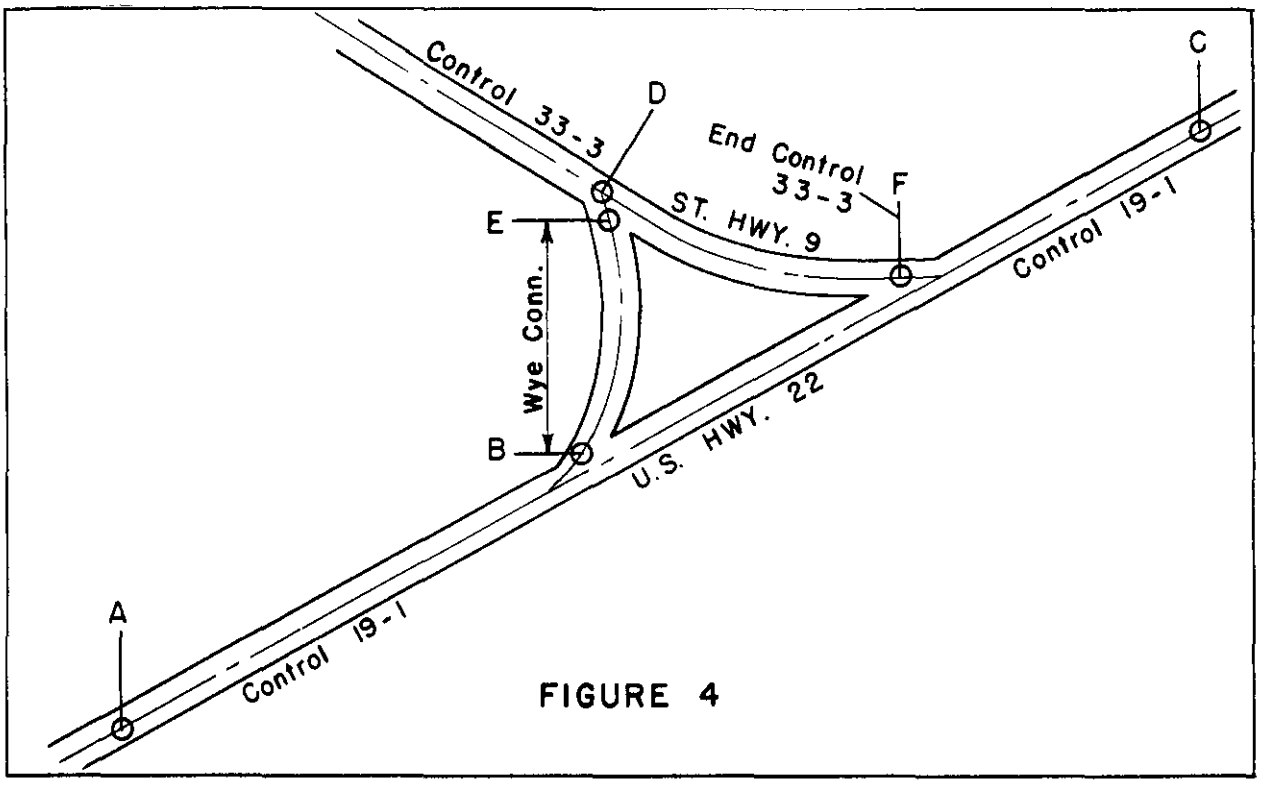


FIGURE 4

In the event a Project is proposed from a point through "A" to or beyond "C" on U.S. Highway 22, Control 19-1 (see sketch above), the length is measured along the centerline through "A" to or beyond "C" from the beginning to end of proposed project and the wye connection between edge of pavements from point "B" to point "E" and that portion of State Highway 9, Control 33-3, from point "D" to edge of pavement at point "F" may be included in the Project as incidental work without length. However, if the distance between points "D" and "F" on Control 33-3 is appreciable and involves considerable construction, the quantities must be broken out on the estimate and quantity sheet under Control 33-3 and the length also shown separately on the title sheet under Control 33-3.

Should the proposed improvements on State Highway 9, Control 33-3, extend beyond point "D" appreciably, the quantities should be broken out and if Federal-Aid is proposed on this connection, it will be necessary that the length and quantities be computed as a separate Federal-Aid Project and P.S.&E. prepared accordingly. In this case, the wye connection between points "B" and "E" may be included in either project without length.

In case of doubt as to whether or not the work involved is of sufficient magnitude to justify or require a separate job number, the Road Design Division should be contacted for information as to the proper procedure.

THE USE OF GEOLOGY BY THE TEXAS HIGHWAY DEPARTMENT

INTRODUCTION

The purpose of the first part of this discussion is to review some of the fundamentals of geology in as interesting manner as possible, with the hope of creating a common interest in the subject. It is usually necessary for the engineer to have a basic interest in geology before he accepts it as a practical aid in solving related engineering problems. The second part of the discussion will cover the program of geology in the Highway Department.

Mr. Seward Horner, Chief Geologist of the Kansas State Highway Commission, on the 75th Anniversary of the Colorado School of Mines, prepared a detailed study of the practical applications being made of geology to highway engineering in the United States. Figure One is the index map prepared by Mr. Horner and Mr. John D. McNeal, Regional Geologist of the Kansas State Highway Commission. This map was prepared from information obtained by a survey made in 1949, and shows the status of highway geology in each of the 48 states. There are 16 states with symbols like Nebraska and Kansas which employ staff highway geologists. The number employed by each state is shown in the circle. A total of 43 geologists were thus employed. Ten states, indicated by symbols such as those for Colorado and Utah, anticipated the addition of staff geologists in the near future. Several states, for ex-

ample, Oklahoma and Illinois, either reported that they did not anticipate the use of staff geologists or did not reply to this question. Twenty-two states have cooperative agreements with other state or federal agencies or use consultants for obtaining needed geologic information. This condition is indicated by an overprint of broken, close-spaced, parallel bars slanting to the left such as has been used for Kansas, Utah, and Illinois.

Briefly some of Mr. Horner's remarks on geology in highway engineering are as follows: "It might seem from the relatively large number of states reporting some use of highway geology and highway geologists that civil engineers and highway geologists have long been members of the 'Society for Mutual Admiration and Appreciation.' Happily the 'Society' is growing, but as late as 1943 several engineers seemed to object to the initiation.

"In that year M. T. Huntting presented an interesting and informative paper titled Geology in Highway Engineering. Written comments on this paper were invited and were subsequently published. Many of the country's outstanding engineers, geologists, and soil mechanists replied. While most of the replies expressed either a strong appreciation of the value of geology or only a desire to prevent over emphasis of the field, a few took sharp exception to the estimate of the geologists' value to the engineering profession. Most of the critical comment was aimed not at the role of the science of geology but at the engineering geologist.

Discounting those criticisms of the profession of engineering geology which were based on errors made by individual geologists, we still find many valid criticisms of the profession.

"Some critical feeling toward geologists on the part of engineers arises from a difference in language and will dissolve under the influence of time, association, and active cooperation between the two professions. There are, however, certain fundamental differences in training and thought which lead to misunderstanding. The engineer, for example, must and should, in keeping with his public trust, worship the sign of the dollar and also those signs and symbols too frequently strange to the geologist but familiar to the mathematician. On the other hand, the geologist in his thirst for knowledge too often ignores the law of diminishing returns and is fond of generalizations rather than mathematical precision.

"A second fault common to geologists is the inability to prepare reports which are of use to the engineer. The very best geologic report may be a very poor engineering-geology report. It is the duty of the highway geologist to furnish his information to the engineer in such a form that its engineering implications are immediately clear. Where the geology of the location suggests a practical engineering solution or prevents an otherwise logical one, he should give such information to the engineer. Common sense and practical experience in engineering are requirements for the highway geologist.

"The engineer, on the other hand, has sometimes been guilty of unduly limiting the geologist in his investigation while still expecting the findings of a detailed study. The size or nature of the project will, of course, place an economic limit on the amount of preliminary investigation. The highway geologist should always be aware that such a limitation exists and plan his work accordingly. Within this limit the choice of the method and procedure of investigation should be left to the geologist."

FUNDAMENTAL GEOLOGY

Historical geology is probably the most interesting branch of the whole science of geology from an academic point of view, but the actual need of this information by a civil engineer is in question. Usually, a general knowledge of the materials forming the crust of the earth and the structural features of this crust is sufficient, but the fundamental facts of stratigraphic geology can be of great practical value to the engineer in many instances.

The history of the earth is revealed in the rocks of the earth's crust. The sedimentary rocks have been laid down one upon the other (generally speaking) and now underlie three quarters of the earth's surface. As this process of sedimentation has continued from early times to the present, there has been a corresponding development of life on the earth. The remains of this plant and animal life have been entombed in the rocks, and they are often the key to their relative ages. From

these fossils it is possible to determine whether the rocks in a given area occupy their normal position or not. As igneous and metamorphic rocks are usually non-fossilliferous, their geologic age is approximated by their relation to rocks of known age.

The most important point is for the civil engineer to be able to recognize where a problem of stratigraphic geology exists, and if he is unable to work it out alone, to call for the aid of a geologist.

The geologic time table was devised from the chronology of earth history, based on the sequence and character of rocks, and is not established in terms of years. It is impossible to determine just how many years it took for certain rock strata to be deposited, but it is evident that it took many thousands or millions of years. Between the times of deposition there were intervals of nondeposition and erosion that probably represent more time than do the periods of desposition. R. C. Moore draws the comparison of these times of accumulation of sediment to chapters of a book, and the breaks due to nondeposition as the divisions between the chapters. Smaller parts of the geologic section he compared to paragraphs, and the few especially important lines of division in the rock succession which denote major partitions of geologic time, suggest separate volumes. Each of these divisions and subdivisions are given names that make up the geologic time table. Figure Two is a generalized geologic time table.

It is true that each of the units in the table represent a percent of the total age of the earth, and by studying the relative lengths of the different eras and periods, these percentages have been worked out by various geologists. To arrive at the total age of the earth, scientists have used the concentration of the salt in the seas, the rate of wearing away of the existing land, the deposition of limestone, and many others. Physicists have made the most reliable estimate in recent years based on radioactive minerals. The age of samples of radioactive minerals from some of the oldest rocks known have been determined on the length of time required to produce stated amounts of elements caused by disintegration of complex elements like thorium and uranium. This method gives the earth an age of one billion, eight hundred and fifty million years. Future discoveries will probably change this estimate of the age of the earth. If it is ever changed, it will be increased and never decreased, of this there is little doubt. It is very important to realize the vastness and extent of geologic time.

Mr. Chester McDowell, Senior Soils Engineer, Texas Highway Department, presented a discussion at the 21st Annual Texas Highway Short Course on the use of geologic maps and symbols. This is a discussion by an Engineer of the Texas Highway Department on one of the phases of geology most confusing to engineers making practical use of geologic maps. Figure Three is Mr. McDowell's chart showing the relation of geological map legends to formations, and the following is part

of his discussion of the subject: "Unless the beginner is well acquainted with geology, he will find the standard symbols or the legend used on most geology maps cumbersome. For example, such a beginner, after locating a certain symbol on the map, immediately finds himself hunting desperately among over one hundred symbols to find the geological name of the material he is interested in. After a few experiences of this kind one soon realizes that a sound understanding of the basis for the legend is desirable. The symbol system used by the Geologist is a rather definite system and no changes are suggested. It is proposed to promote a better understanding of the map legend by tieing in the essential symbols most commonly used with their origin and meaning as is shown in the attached chart (Figure Three). The left hand column of the chart shows the essential symbols from which most all of the one hundred symbols originated. These letters are arranged in the same order from top to bottom as is used in the map legend. A close observation of the chart reveals that these letters identify certain geological periods or epochs; such as, Q for Quaternary, E for Eocene, K for Cretaceous, etc., and that these formations are arranged in order of their ages. The most recent formations (Quaternary) being placed at the at the top of the chart or map legend and each older formation at lower positions on the chart or map legend. In general this is a natural arrangement and is generally consistent with existing formations except where uplifts, intrusions, etc., have occurred. Other columns on the

chart show the principal ages as related to the various formations and some remarks relative to the high points of our own State's complicated geological history." If the units are further divided and mapped as groups or formations, the symbols are carried as lower case letters. For example: The Taylor formation is shown on the Geologic Map of Texas with the symbol Kta; the K means it was deposited during the Cretaceous period, and the ta indicates it is the Taylor formation.

It is necessary for geologists to deal in both abstract and concrete terms. The classification, by geologists, of most natural objects such as rocks, minerals, and organisms is governed by definite rules. The classification of the inorganic world has no general scheme comparable to a binomial system. For example, the nomenclature of igneous rocks consists of a mass of unrelated terms derived from various languages and taken piecemeal from various schemes that have been advanced and have enjoyed more or less popularity in the past. Systems which are supposed to be of universal application have failed because of lack of authority to bring unity. The extensive terminologies of paleontology, stratigraphy, and minerals often with duplication and without system, is probably the greatest problem in presenting geology as a practical working tool for the engineer. On the other hand, engineers have terminologies equally foreign to the geologist. Words which originally served in a general or popular manner have come to have more restricted and sometimes divergent meanings in the different departments of science,

engineering, and industry. Such words as stone, rock, soil, and mineral carry somewhat different connotations when used in the various fields which have to do with the earth. If each group remains tolerant and understanding of the other, time and association will be the answer to this problem.

For the engineer who needs a quick reference on geologic terms while reading or studying geologic literature, the Dictionary of Geologic Terms, by C. M. Rice, published in 1949 is recommended. There is also an appendix of geological terms in Mr. D. G. Runner's publication, Geology for Civil Engineers. These books will be further discussed in the section on literature which is included in this paper.

To make practical application of geology in highway engineering, it is not necessary for the engineer to know all the various types and varieties into which rocks have been subdivided. He is already familiar with most of the names of the common rocks with which he will be confronted, and it will be easy for him to place them in the three general classifications used by the geologist. The three major groups are: (1) igneous, (2) sedimentary, and (3) metamorphic. The igneous rocks are those that have been derived from molten magma that is thought to have come from the core of the earth. If this molten material reaches the surface through a fissure or volcano it cools rapidly forming a fine-grained rock such as basalt. If it is contained in the subsurface layers and cools slowly it forms a coarse-grained type of rock such as granite.

Sedimentary rocks were formed, as the name implies, by the deposition of the products of rock and soil decomposition through the agency of water, wind, or glaciers. Sandstones, limestones, shales, and conglomerates are common examples of sedimentary rocks.

Metamorphic rocks are the product obtained from the alteration of sedimentary or igneous or other metamorphic rocks by processes usually brought about by movements in the earth's crust which can bring great pressure and heat to bear, or by sudden outflows of hot magma from the interior, that can change the complete mineralogical, chemical and structural properties of the rock. Schist, slate and marble are examples of metamorphic rocks.

Geologic structures are surely of interest and importance to the engineer, but this subject is too broad to be covered in this paper. Some of the text books included in the section on literature are recommended for reference on this phase of geology.

This section on fundamental geology has covered only the brief essentials requisite to the use of elementary geology and its principles by civil engineers. In the next section we will examine more closely some of the applications being made of geology by the Texas Highway Department.

APPLIED GEOLOGY IN THE TEXAS HIGHWAY DEPARTMENT

At the present time the Road Design Division has two graduate geologists employed to assist the engineers in the field in any phase of

highway engineering to which geology is applicable. This section was organized largely as a result of field surveys made some six or seven years ago by members of the Road Design and Bridge Divisions. These surveys indicated a rather consistent relation between pavement behavior and geologic units in certain parts of the State, and the need for correlation of core hole logs with subsurface conditions in certain instances. It was also decided that knowledge of geology, whether acquired through experience or through formal education, would be very helpful in locating flexible base materials.

The Road Design Division placed the geology staff under the supervision of the Senior Research Engineer to assist him in research projects, particularly those related to geology. The geologists were made available for lectures in elementary and applied geology, and began preparing generalized district geologic reports and maps. They were also called upon to assist in the investigation of groundwater problems, correlation of surface geology along proposed routes, and correlation of subsurface geology at foundation drilling sites. It was the application of geology to the locating of flexible base materials that proved to be of the greatest service to the field. Consequently, more and more time has been allocated to this phase of the program and a generalized procedure has been established for locating base materials.

The procedure for a typical base material search participated in by The Road Design Division, as outlined in a paper read to the Twenty-

Fifty Annual Short Course at A & M College in 1951, is comprised of six phases. These phases are: (1) a request from the field for assistance, (2) preliminary preparation, (3) reconnaissance field investigation, (4) detailed office study, (5) detailed field investigation, and (6) a report on the results of the first five phases.

The point should be stressed here that geologists employed by the Road Design Division are there to assist engineers in the field when and where they may be able to do so. However, as a rule the Design Division does not participate without a specific request from the field. Requests are received through the D-8 field design engineers and from field personnel during visits to the Austin office, but the surest and preferred method is a written request.

For a base material survey, all information that might be of value in the preliminary preparation for the investigation should be included in the request; such as the location of the job, type and quantity of material needed, and the time available for locating sites.

From the information received in the request, the geologist begins his preliminary preparation. The control area for which preparation is made is determined by the project type, project length, and maximum haul distance allowable. The project type is always the major factor in all determinations. This control area may fall in a section of the State with which the geologist is unfamiliar. He must acquaint himself as much as possible with the area by a close study of applicable literature,

and aerial photographs when available. For this purpose the Road Design Division maintains a library containing all available bulletins published by the University of Texas Bureau of Economic Geology and many other pertinent publications. Literature on the area or county under study occasionally is not available, and regional or neighboring county literature must be consulted for information on the geologic units which are determined as probable material sources, and projections made into the area under consideration.

The preparation of a base map or work map is one of the first steps in the preliminary preparation. The control area is plotted on a planning survey county map (scale: 1" = 2 miles), and the geology contained within this area is transposed from the United States Geological Survey's Geologic Map of Texas to the work map. This geology is mapped in broad units without much detail, and some accuracy is lost in the transposition due to the fact that the two base maps are not congruent, but it serves well as a work map with which the geologist can begin his reconnaissance. Often these maps are prepared for engineers to use as reconnaissance maps where there is not a need for a geologist to make a detailed material survey.

When the geologist has completed this study he has a general working knowledge of the areal geology and he is ready to make a reconnaissance of the control area in the field.

It is the policy of the Road Design staff geologist to contact the office of the resident engineer through proper channels, and make arrangements to meet some member of the personnel responsible for locating material in the project area, to discuss all pertinent information such as known past and proposed sources, prospective haul roads, topography, geologic outcrops, and to visit as many of these points as is feasible. In most instances, the project for which the investigation is being made is inspected with the representative from the field. The geologist plots this information on his work map and checks his notes to be sure the determinations he has made in his preliminary investigations are still logical.

The next step in the reconnaissance is to begin a study of the geology of the area, and to check the accuracy of the work map. If stratigraphic sections in the area have already been worked and described in the literature, the geologist can get a quick and accurate picture of that part of the geology represented by visiting the locations of these sections. Often they will prove to be the key to the whole problem. It will happen just as often that the geologist will have to begin his reconnaissance by using regional information because of the lack of local data. It is possible he may begin in a neighboring county in which the geologic units are better exposed or have been previously described and measured. This regional information can be extrapolated and applied to the desired area.

It is important that the engineer understand the necessity of using the regional approach occasionally. To illustrate this necessity, and the misconception which it often causes among engineers throughout the nation, the following quotation is used from a paper entitled The Background of Engineering Geology, presented by Mr. C. E. Erdmann to the Seminar on Engineering Geology held by the U. S. Geological Survey, Denver, Colorado, in 1946: "Frequently the construction area may be so restricted that it cannot be said to have truly geologic dimensions. Hence, the methods peculiar to the geologist cannot be employed unless he works beyond its limits. Reference to previous work in the region often furnishes the necessary information. Sometimes it is necessary to seek the key to certain geologic phenomena miles from the locality where the knowledge gained is to be applied. To say the least, this may be disconcerting to an engineer whose chief interest in this world may be compassed by a few hundred or thousands of square yards. When such excursions are necessary, the reasons therefor should be explained fully so that there need be no apprehension that the journey is for purely academic reasons. If possible, take the engineer along."

By the time the geologist has completed his reconnaissance phase, he will have several things well in mind. First, he will understand the problems more thoroughly; second, he will have the geologic section and stratigraphy worked out in general with any topographic relationships that are of value, especially in the study of aerial photographs; third,

his work map will be corrected to some degree and all pertinent information shown on it.

The fourth phase of the survey is carried on in the office. The data that has been collected in the preliminary investigation and on the reconnaissance is given a close study. Information on the work map is correlated with aerial photographs. The Austin office of the Planning Survey has on file aerial photos of many counties. The Public Marketing Administration field offices have been very generous about lending their prints in some counties where photographs were not available within the Department. Stereoscopic viewing of the area is desirable, not only because it gives the great advantage of the third dimension, but also because some features that are not visible on one photo, because of the angle or effect of lighting, become visible on the adjoining picture, and thus when viewed stereoptically, appear on the combined image.

Mapping geology directly on the photos is the desired method, but due to the fact most of the photographs are borrowed, overlay sheets are used. If a considerable number of photos are to be used, a photo index map is made for quick reference and handling of the photographs in the field.

Another step in the office study is to make a second and more detailed search of the literature, with emphasis on the proposed geologic units. A more comprehensive knowledge can be obtained from this type of study after the units have been examined in the field. The geology

libraries of the University of Texas, State Board of Water Engineers, Railroad Commission, and U. S. Geological Survey (Ground Water Division) are available for this use. Geologists with these several organizations who may be specialists in the region under study are consulted.

The geologist is now ready to make his detailed field investigations. Often he will have specific locations that he has found on the aerial photographs or in the literature which prove to be potential material sites on first examination in the field, and just as often he will have to walk out miles of contacts and trace the desired unit through the entire area before he is able to find anything worth exploring. Of course, there will be times where there is no material there, but at least he is sure of the fact if he has made a detailed survey, and this is often information the engineer needs in order to make a decision as to whether he should change his design, go to a more expensive material, or use a less desirable material.

All potential material sites are plotted on the work map, and a large scale sketch map of each site is made. Detailed notes are taken to be used in later evaluation of the various possible sites. The geologist is limited here to a study of the surface indications, and it is often difficult or impossible to determine the subsurface condition of the strata in question. The use of a core drill is especially valuable at this point for more accurate quantity and quality estimates.

The Road Design Division became cognizant of the value of a drill about two years ago and in cooperation with the Equipment Division an auger type drill was purchased for use in exploring base material sources. This drill is operated through the Design Division on the same basis the larger rigs are operated through the Bridge Division, except at less than half the price to the field. It is available to all Districts in the Department, and is often used by Districts that have auger drills of their own if the one they have is being used, or some of the special tools on the so called "Austin rig" are needed for a specific job. Ordinarily this rig uses an 18" auger bit in materials that can be drilled with an auger, but a rock bit has been made in the Equipment Division shops that will drill medium-hard to hard rock. This tool is especially good to cut caliche caps or drill layers of limestone and sandstone. If a smaller bit is used the core is broken or pulverized to such a degree that it is very difficult to tell exactly what type of rock is being drilled. If circulating water is used all loose material such as sand and clay seams are washed out and the logs are not accurate. By drilling at least one large 18" hole at each proposed location it is possible to keep a close control on the core and figure the thickness of each layer to the inch. All the other exploration holes can be drilled with a six or eight inch bit and the cores correlated with the large core to give a much more accurate picture of the subsurface. If necessary, it is possible to go down into the 18" holes to examine the strata.

The geologist is interested in drilling only a few holes to make a rough estimate of the quantity of material available. After each site has been evaluated, it is usual to go to these sites with the resident engineer or his representative and make final inspections in light of the residency's needs and opinions. If the engineer wishes to make more exact estimates of the quantity of material in certain locations, this is done with the drill under the supervision of personnel from the engineer's office.

Because the proposed sites are visited with the engineer and most of the information the geologist has gathered is discussed with him, it may seem that a written report is not necessary, but actually it is very important. Too often in the past a great wealth of information on the possible location of base materials in an area is gained by some member of the Department, usually worked out on time paid for by the Department, and is lost when this person leaves the Department or is transferred, because it is never put in any form suitable for filing for future reference. Another importance of the report is to make available to the engineer all the information the geologist has gained on his problem in a complete and usable form. Usually a short geologic history of the area is included, but it is kept as free as possible of technical geologic terms and unnecessary academic deviations. A description of each site location and approximate haul distance from the center of the project is given in the text as well as shown on the map. Quantity and quality

estimates of usable material and estimates of stripping are made if there is enough information available to form a basis for these estimates. All drill logs and laboratory reports used in these estimates are furnished as part of the geologic report. Some speculation as to possible quarrying methods and the effect of excavation upon nearby drainage systems may be stated for the engineer's consideration.

Possibly the most important part of this report is the map or maps. If the engineer has not been previously supplied with an areal geologic map of his area, a copy of a map showing only the geology is made a part of the report. A large scale map showing the outcrop pattern of the source unit, the site location, and pertinent culture, is traced from aerial photographs of the area. All information from the work map is placed in final form on the report map. Several areas which have been worked separately but are relative may be covered in the same report, but usually a separate map is made for each. These maps might be termed engineering geologic maps.

In this case, the areal geologic map is made from information published by geologists who have mapped the area along strict geologic terms and units. The engineering geologic map is prepared by the staff of the Highway Department and includes only the geology that is pertinent to the problem. Mr. J. Fred Smith, Jr., geologist for the United States Geological Survey, has proposed three procedures that may be followed to produce an engineering map in the field from an areal geologic map:

*"1. Use the areal geologic map with text pointing out the engineering properties of the units. This engineering information may be added to the straight geologic text, may be entirely separate from the geologic text, or may be included as an additional or expanded map explanation. This is possible where the geologic units do not have distinct enough variations of engineering properties within themselves to warrant further division.

"2. Subdivide formations or geologic units into units with similar engineering properties. A strictly lithologic break is not adequate, because the engineering properties may differ within rocks of one lithologic type.

"3. Both subdivide and combine geologic units used on the areal geologic map. All sandstones, shales, or limestones, for instances, could be combined regardless of their geologic relations if their engineering properties are the same. Gravels on several terraces could be combined or mapped separately depending upon their similarities."

"The best approach seems to be one of preparing a map to fit the needs of the area or of the specific problem rather than one of following a set of predetermined regulations. One problem which is not considered on many geologic maps is that of overburden, a factor which is extremely important to engineering geologic maps and data in many areas.....Much information on overburden probably can be obtained

*(Paper presented at Seminar on Engineering Geology November 12, 1946, at the U. S. Geological Survey, Denver, Colorado.)

best by the soils scientists. The geologist can gain information on thickness of overburden, can observe the material and its character under various weather conditions, can observe its effects on roads or other structures,.....but he is obviously limited in the amount of soils engineering data he can obtain."

The submission of the report to the engineer usually ends the participation of the Road Design Division in this particular problem, but this procedure is meant to be flexible in all of its phases. The request is acceptable in almost any form from any authorized person, the written form is only desirable. The phase on preliminary preparation can almost be eliminated in problems where the geologist is already familiar with the area and the files can supply him with suitable work maps, or it may prove the most time consuming of all the phases in other instances. The reconnaissance field investigation is probably the one phase that cannot be omitted. In some areas it has been possible to find a suitable answer to a problem while on the reconnaissance, and a report made without further study. It should be understood that the detailed office study and detailed field investigation are necessary for a comprehensive report, but the engineer will settle for less on occasions because of practical reasons.

In all the applications of geology in the Texas Highway Department, it is the practical and common sense point of view that is stressed. Rigid rules and procedures cannot be laid down arbitrarily. There is a

picture of a bearded engineer by the name of Davis, which hangs in the mess hall of Camp Davis, University of Michigan Field Camp for Geology and Engineering, Wyoming. Under this picture is the quotation, "Young man, when theory and practice conflict, use horse sense."*

RECOMMENDED GEOLOGIC LITERATURE FOR ENGINEERS IN THE TEXAS HIGHWAY DEPARTMENT

As a recommendation to engineers of the Texas Highway Department who might wish to buy or otherwise obtain some reference books on the subject being discussed in this paper, the following books are suggested. A short comment on each publication might be of some help in selecting those of the most interest to you.

"Geology For Civil Engineers, As Related To Highway Engineering," By Mr. D. G. Runner, published by the Gillette Publishing Company, 22 West Maple Street, Chicago 10, Ill., is an elaboration of a series of articles in Roads and Streets. Mr. Runner was Assistant Materials Engineer of the Public Roads Administration at the time he authored this book. He as an engineer in the field of highway engineering, presents his information from the point of view that makes this book the recommended "handbook" for engineers of this Department interested in geology. The approximate price of this book is $3.00.

*(Problems in Engineering Geological Mapping and the Castle Rock Example, Paper presented at Seminar on Engineering Geology, November 12, 1946 at the U. S. Geological Survey, Denver, Colorado.)

"Geology and Engineering," by Robert F. Legget, published by McGraw-Hill Book Inc., New York, is a text used by the University of Texas in a course of geology for engineers. The author of this book is an engineer with an excellent background in geology, and he presents his work from the viewpoint of the engineer. Suggestions for additional reading are included at the end of each chapter. The approximate price of a new copy of this book is $5.00.

"Elements Of Engineering Geology," by H. Ries and Thomas L. Watson, published by John Wiley & Sons, Inc., New York, is also used as a text by the University of Texas and includes bibliographies with each chapter. Both authors of this book are geologists and present a great deal of basic geology in each chapter before relating it to engineering. The approximate price of this book is $5.00.

"Historical Geology," by Raymond C. Moore, published by McGraw-Hill, Inc. New York, begins with the various hypotheses of the origin of the earth and discusses each cycle of development to our present time. This is not a general text of geology, but it deals with the development of the earth by which all basic geology came about. A bibliography is included at the back of this book. The approximate price is $4.50.

"The Geology of Texas" Volume I, by Sellards, Adkins, and Plummer, published by the Bureau of Economic Geology, Austin, Texas, is the most complete work of Texas stratigraphy in print today. It is so

written that it can be understood with only a minimum of geologic background. An excellent geologic map is included in a pocket under the back cover. The price is $4.00 per copy.

"The Geology Of Texas" Volume II, by Sellards and Baker, published by the Bureau of Economic Geology, Austin, Texas is no longer in print, but it is an excellent reference for the structural and economic geology of the State.

Publications of the Bureau of Economic Geology of the University of Texas are probably the greatest source of basic and detailed information available on the geology of Texas. According to a NEWS LETTER from the Bureau dated May, 1952, the following types of publications are being issued:

The University of Texas Publications, which are numbered bulletins in the University series and in the Bureau are restricted generally to larger reports. The Road Design Division has most of these publications in cloth bound volumes that usually contain all the bulletins of the year, except for some that are too large to be contained in one volume. The paper bound copies of each bulletin are separate. The nominal cost of these publications covers only the cost of printing and binding.

Report of Investigations is a numbered series of reports reserved for shorter manuscripts and provides a comparatively quick means of publication. Some are given initial publication in journals and reissued as Bureau publications.

Quadrangle maps are a new type of publication modeled after the United States Geological Survey publication of the same title. This publication consists of a geologic map faced by a map-size page of text. Fourteen of these publications by V. E. Barnes covering quadrangles in the southern part of Llano uplift have been issued recently.

Separate maps that are available without text.

Open-file maps and manuscripts are those manuscripts and manuscript maps considered to be of current interest which are made available for examination at the Bureau pending the time they can be published. Generally some kind of copy of the maps can be supplied if desired.

A catalogue of all the publications of the Bureau is available without charge. This catalogue also contains an index of publications by counties.

The Road Design Division is in the process of collecting all pertinent data for a reference file on the geology of each county. Most of this information can be obtained in duplicate or reproduced for use in the field when it is desired.

Other excellent sources of information are the publications of the American Association of Petroleum Geologists, and the United States Geological Survey. Many of these publications are out of print and are available only in large libraries, and only selected articles in many pages of publication pertain to Texas. An Index Volume of the American Association of Petroleum Geologists publications and a catalogue of the

United States Geological Survey's publications are available in the Road Design Library. The libraries of the Geology Department and the Bureau of Economic Geology of the University of Texas have complete sets of these volumes, but they are not on loan for use outside the library.

The geologists of the Road Design Division are always glad to help any member of the Department obtain publications for which they have a need.

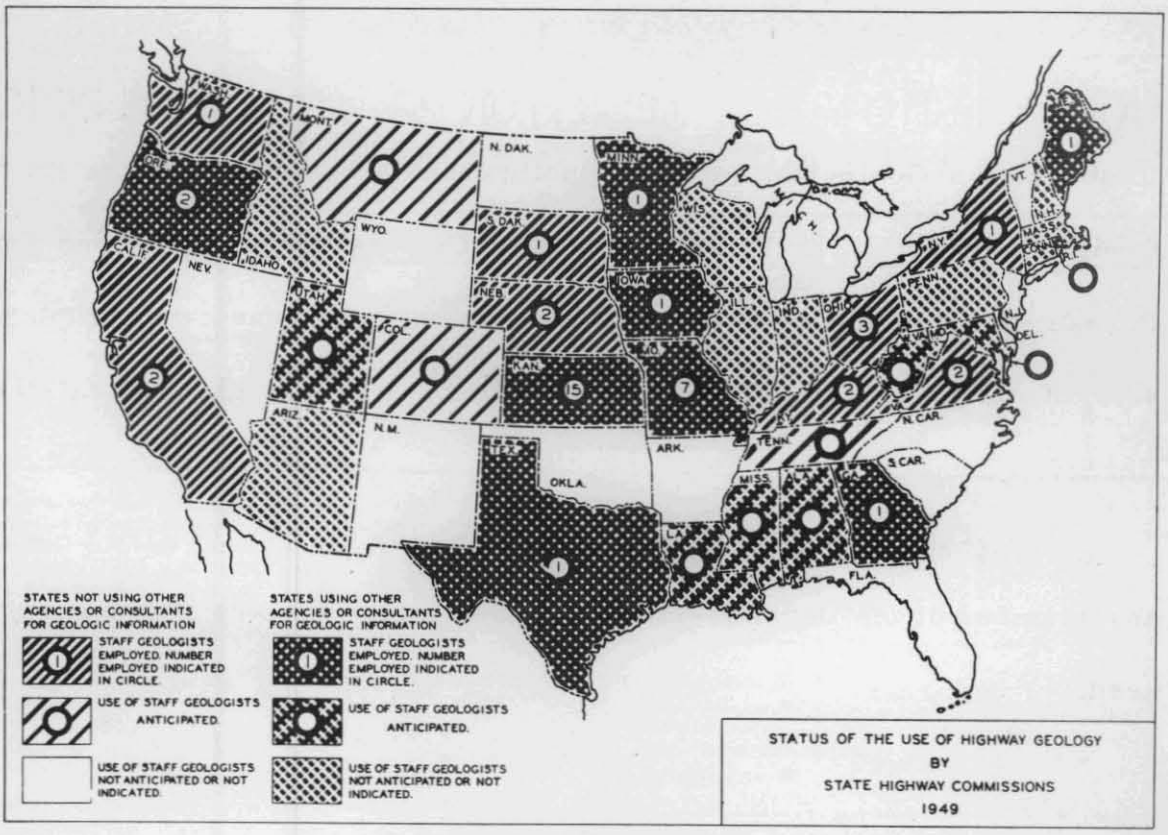


FIGURE 1. Index map of the United States showing the use of highway geology by states.

GENERALIZED GEOLOGIC TIME TABLE

ERA	PERIOD	EPOCH
Cenozoic	Quaternary	Recent Pleistocene (Glacial)
	Tertiary	Pliocene Miocene Oligocene Eocene
Mesozoic	Cretaceous Jurassic Triassic	
Paleozoic	Carboniferous	Permian Pennsylvanian Mississippian
	Devonian Silurian Ordovician Cambrian	
Proterozoic	Algonkian	
Archeozoic	Archean	

Figure 2

CHART SHOWING RELATION of GEOLOGICAL MAP LEGENDS to FORMATIONS

MAP LEGEND	ERAS	PERIODS	EPOCHS	AGES	REMARKS on TEXAS GEOLOGY
Q	CENOZOIC	QUATERNARY	RECENT PLEISTOCENE	AGE of MAN	Formations deposited in last 50 Million years, after drainage reversed and ran from West to East, helping to form the present topography with outcroppings in Eastern half of Texas.
P M E	CENOZOIC	TERTIARY	PLIOCENE MIOCENE OLIGOCENE EOCENE	AGE of MAMMALS	
K	MESOZOIC	CRETACEOUS	UPPER CRETACEOUS LOWER CRETACEOUS	AGE of REPTILES	Some 130 million years ago, Texas was completely submerged by the Pacific Ocean. Then approximately 100 million years ago, Texas reappeared as a peninsula jutting out from Oklahoma.
J	MESOZOIC	JURASSIC	ALANTOSAURUS BEDS		
T	MESOZOIC	TRIASSIC	CONNECTICUT RIVER BEDS		
C	PALEOZOIC	PERMIAN	UPPER LOWER	AGE of AMPHIBIANS or PLANTS of COAL PERIOD	Carboniferous Limestone formations outcropping in North and West portions of Central Texas were deposited in the Texas Sea approximately 250 million years ago. Sea was bounded by mountain ranges extending from Mexico and passing near San Antonio, Austin, Dallas and Westward across the Panhandle. Vegetation sparse, and Eastern part of state drained from East to West.
	PALEOZOIC	CARBONIFEROUS: PENNSYLVANIAN	UPPER LOWER		
	PALEOZOIC	CARBONIFEROUS: MISSISSIPPIAN	UPPER MIDDLE LOWER		
D	PALEOZOIC	DEVONIAN	CATSKILL HAMILTON CORNIFEROUS ORISKANY	AGE of FISHES	
S	PALEOZOIC	SILURIAN	HELDERBERG ONANDAGA NIAGARA	AGE of INVERTEBRATES	
O	PALEOZOIC	ORDOVICIAN	TRENTON CANADIAN		
€	PALEOZOIC	CAMBRIAN	POTSDAM ACADIAN GEORGIAN		
PC	AZOIC	PRE-CAMBRIAN	ARCHAEAN	NO DISTINCT ORGANIC REMAINS	Granite, Shists, etc. Outcropping in land areas due to uplift.

TEXAS HIGHWAY DEPT.
DIV. of MATERIALS & TESTS
February, 1947 C. McD.

Figure 3

RIGHT-OF-WAY PROCEDURES
AND THE ACQUISITION OF MATERIAL SOURCES

POLICIES

In general, the policies of the Department concerning right-of-way are of long standing and we do not have current circulars or Commission orders setting forth the specific policies.

All highway right-of-ways are furnished without cost to the State, free of obstructions and encroachments, by the Counties and Cities within their respective jurisdictions. This is a policy which has been in effect since inception of the Highway Department. All rural right-of-way must be fully fenced, the only exception being on low traffic Farm to Market Roads and providing that the County will pay the cost of necessary cattle guards. Exceptions of this type are handled by the District Engineer on the basis of each project's individual merits. No cattle guards are placed on State Highways.

Before right-of-way deed descriptions are written there should be agreement with the Austin Office as to the design geometrics of the road. This is particularly true at highway intersections as there are numerous cases in which it has been necessary to cramp in an intersection design because of limited right-of-way, or there has been the necessity to go through the embarrassing process of asking the County for additional right-of-way.

Deeds are not to be released for the acquisition of right-of-way unless a project is programmed or there is a Commission Order authorizing the release of deeds. If a project does not qualify under one of these two categories and it is desired to release deeds to the County, approval of such action should be obtained from the Austin Office.

RIGHT-OF-WAY INSTRUMENTS

Preparation:

The necessary instruments to be used by the Counties and Cities in securing right-of-ways are prepared by the Highway Department, and careful attention should be given to the preparation of field notes placed in these instruments.

Before going into details concerning the type of instruments used in right-of-way acquisition, we would like to impress upon you the importance of securing good ownership to the land which we will occupy for right-of-way purposes. The location and the right-of-way are the only two permanent features in a highway facility. The road we build can be worn out and rebuilt any number of times but the location and the right-of-way remains. We exercise some of our most careful engineering judgment in determining the location of the road but this same care is not always carried to the stage of acquiring title to the right-of-way. It is realized that the supervising engineer should not perform the title research work and prepare the deeds and we agree that this work should

be assigned to some assistant, but we do think that someone of responsibility should be in charge and should always check and review the instruments for accuracy.

Errors may not show up for years but when they do the situation sometimes may be critical to the Department but most often is of distress to the property owner. Our error may cloud ownership to his remaining land and during the time it requires us to correct the error, there is the delay and even the possibility of the loss of the sale which brought to light the fact that the error exists. The Field Engineer probably does not realize the number of erroneous deeds which are brought to our attention and which must be submitted to the State Highway Engineer and Commission for consideration and approval before action of the Governor can be requested. In the last few months, approximately one-third of the proposed reconveyances we have been requested to prepare have been for the purpose of clearing land titles which were clouded as the result of the use of incorrect field notes in the original deeds and easements conveying right-of-way to the State some few years ago.

An error though of apparent minor nature can result in serious and confusing conditions. Examples brought to our attention are:

(1) A man desired to buy a tract of land through the Veterans' Land Board. In the title search it was found that in securing right-of-way through the tract there was an error in the first call of a curve to the right instead of to the left. This clouded title to the entire tract of

land and the Veterans' Land Board will not approve the loan until the State clears the erroneous deed and secures execution of corrected deed.

(2) The State's ownership to a tract of land was questioned. Upon investigation, the deed, though recorded, had never been signed by the owners.

(3) During the negotiations for the sale of a tract of land, the title search revealed that a borrow easement had been granted the State by the previous property owner to remain in effect until completion of the project to be constructed. The standard clause in our easement form further provided the State or its representatives would have the right at all times to use said land for making improvements and repairs to the highway. The State was called on to quitclaim its interests before the sale could be made.

(4) A location was made into a city and the right-of-way acquired. Later a minor shift in the alignment was made to improve a curve but the right-of-way was not re-negotiated. We now find that we own land on which private improvements are located on one side of the road and the property owners own land on which our highway is built.

(5) The tract of right-of-way was properly described but was referenced to the wrong section of land. The error was discovered when the property owner attempted to lease his mineral rights. The Oil Company refused to negotiate until this error had been corrected.

These are only samples for your consideration. There are many other kinds of errors and they all affect the property owner at the one point in which his greatest interest centers, that is, ownership of his own property. This creates very poor public relations for the Highway Department.

Deed vs Easement:

Both our deed and easement forms are used in obtaining right-of-way, but deeds are preferred since they convey title. Easements grant only the right to use land without conveying title, and some difficulty has been encountered with property owners from whom we have obtained easements. Some of them have taken the attitude that since they still have title to the land across which they have granted an easement, they may continue to use parts of our right-of-way so long as the roadway proper is not interferred with. If an owner will execute an easement, but won't execute a deed, we should not resort to condemnation just because we prefer the deed. Courts have held that in condemnation proceedings, only an easement is required and that such easement is all that is obtained.

Lien Releases:

Releases should be secured from every person, firm or corporation holding a lien on a tract of land out of which a right-of-way is secured for any road on the State Designated System. These lien releases

are necessary if clear title to our right-of-ways is to be acquired by the various Counties and Cities. This responsibility is assumed by these agencies before the acquisition of right-of-way begins.

Waivers of Mineral Rights for Highway Purposes:

Waivers of mineral rights for highway purposes should be secured from holders of oil and gas leases at the time right-of-way is acquired. If the mineral rights are held by an individual other than the owner of the land, his waiver is to be obtained by our separate standard form which has been prepared to cover this condition. If the land owner also holds the minerals, our standard deed form includes the waiver of mineral rights.

These waivers of the right of ingress and egress to our right-of-way for the purpose of mining, drilling, exploring or developing minerals so long as said right-of-way is used for road purposes are secured to insure the free and uninterrupted use of the surface of the land by the State for highway purposes. While it is recognized that it is somewhat time consuming and troublesome for a County to secure these waivers, yet it is also recognized that the owner of a prior mineral lease has a vested right to his interest the same as the property owner has to his land and therefore it would appear that each of them should be traded with.

Recently, in the acquisition of right-of-way for one of our highways, such a waiver was not secured from an owner of an oil and gas lease,

probably due to the fact that the existence of the lease was overlooked at the time the land was acquired. Oil in the area was proven. The owner of the mineral lease was not aware of the situation until the highway was under construction. We are now faced with the possibility of injunction stopping construction of the road unless a satisfactory settlement is made with the lease holder.

Recheck of Conveyances:

After right-of-way has been acquired by a County, all conveyances should be reviewed again, before having them recorded, to see that no alterations have been made or clauses inserted which might be objectionable to the State. Any conveyances found to contain any clauses or alterations that might affect title or wherein the State is required to do certain things which are, in fact, obligations of the county, or wherein the grantors reserve any rights that leave the State without full authority over the land conveyed to it, should be rejected or should be cleared with the Austin Office as to acceptability before having the instruments recorded.

Submission to Austin Office:

After all right-of-way conveyances for a project are found to be in order and have been recorded, and the right-of-way map tracing has been completed, they should be submitted to this office by the District as soon as it is conveniently possible to do so, either before or after the project is let.

Handling by Austin Office:

The right-of-way section of the Road Design Division does not have the personnel to make a thorough check of all right-of-way conveyances submitted to the Austin Office, and no attempt is made to do so, as this is the responsibility of the Districts. The instruments are given only a general review and any discrepancies noted are called to the attention of the District when receipt of the instruments is acknowledged. In the case of objectionable clauses, little can be done other than to attempt to prevent the insertion of such in future right-of-way conveyances.

If not already shown, job and project numbers are placed in the spaces provided for such information on the outside of the conveyances. This information, if known, is generally indicated on the conveyances along with the County, Highway Number, and Project Limits before the conveyances are submitted to this office.

The right-of-way map is reviewed to see that all conveyances are indicated thereon. The information shown on the map should include the name of the grantor, the type of instrument, location of tract as to chaining stations or to block and lot number if in a city or town, recording information, and acreage of the tract of right-of-way involved. The right-of-way map is to correctly reflect the land conveyed by the field notes in the conveyances. The map is checked in this respect before being submitted to this office.

The number of prints of the right-of-way map, as might have been requested, are furnished the District, and the map tracing is then placed in the permanent right-of-way files. All right-of-way conveyances are sent to the State Comptroller to be filed in his office as required by law.

ACQUISITION OF R/W FROM VARIOUS STATE AGENCIES

Frequently it is necessary to secure right-of-way from lands controlled by any one of the various State Departments and Agencies. Even though title lies with the State it should be understood that this does not relieve the County or City of its obligation to secure clear title and to assume the responsibility for any consideration which might be required. There is quite a difference in the method of operation and the authority of the various State Agencies in furnishing right-of-way from lands under their supervision. The Road Design Division will be glad to assist in these negotiations and in the case of the University of Texas lands, we have been requested to handle the negotiations. Requirements and authority of various State Agencies are discussed as follows:

Board of Regents of University of Texas:

From time to time it is necessary to secure easements from the Board of Regents of the University of Texas covering right-of-way, drainage and material sources out of University lands. Representatives of the Board of Regents have requested the Road Design Division to handle the formal submission of all requests for these easements in order

that the Board might deal with the same representative of the Highway Department in all transactions. Three copies of field notes and three prints of the right-of-way map describing and showing the location of right-of-way, material sources and channel easements should be submitted to this Division at least sixty to ninety days before any work is contemplated on the project involved. This office will forward this information along with a letter to the Board of Regents, requesting their consideration in granting such easements as are needed by the Highway Commission. After approval is authorized by the Board, easements are executed and transmitted to this office where they are forwarded to the District involved.

Sometimes the easements contain certain provisions relative to fencing, water supply, stockpasses, etc. Carrying out the requirements of such provisions is the responsibility of the County in furnishing the necessary right-of-way free of cost to the State, except in the case of material sources, where the cost is borne by the State. In the latter instance, necessary work may be accomplished with our own forces or as a part of the Contract.

When such easements from the University are found to be in order by the District, and a County has agreed to fulfill any provisions which might be its responsibility, the instrument should then be recorded and submitted to this office for permanent filing along with the submission of other conveyances for the project involved.

State Parks Board:

The State Parks Board has the authority to grant right-of-way easements across lands under its control. Acquisition of right-of-way from this Board may be handled by the County in the same manner as the acquisition of other right-of-way, or the Road Design Division will handle the submission of the request if desired. Two copies of field notes and two prints of the right-of-way map should be included with a request for an easement from the Parks Board.

Board for Texas State Hospitals & Special Schools:

Requests for right-of-way easements across State Hospital and Special School lands are submitted to the Board for Texas State Hospitals and Special Schools. An act of the Legislature is required before this Board can legally grant such an easement. Pending legislative action, the Board may grant the Highway Commission a permit or right-of-entry to proceed with the construction of a proposed project. The District may call on the Road Design Division to handle the submission of such requests, which should include two copies of field notes and two prints of the right-of-way map.

In the past, easements of this type have been granted by the Hospital Board without cost, however, they want assurance that neither the particular hospital or school involved nor the Board will have to bear any expense arising from the construction of our project. Certain provisions relative to fencing and the alteration of existing facilities re-

quired as a result of the proposed highway construction, are usually incorporated in these easements. The fulfillment of these requirements usually is the County's responsibility.

With regard to legislative authorization of an easement from this Board or from any other State Agency where the law requires legislative action, the proper County authorities should contact their Representative and have him initiate the legislation at the next Regular Session of the Legislature. A copy of sample legislation which may be used as a guide is attached to this paper. (See Attachment No. 1)

Where Approval of Veterans' Land Board is Required:

The State cannot acquire title to right-of-way out of land which a Veteran is buying from the Veterans' Land Board. Under the laws governing the operation of this Board, title to such land cannot be given to the Veteran until it is paid for, therefore he cannot execute a deed conveying title to any part of his land for any purpose. Such right-of-way may be obtained by easement through the use of our standard form with the addition of a clause wherein approval is given by the Veterans' Land Board. The clause to be used is included in Road Design Information Circular No. 2-52 (See Attachment No. 2) which outlines the procedure to be followed in cases of this kind.

School Land Controlled by The General Land Office:

Right-of-way across school lands under the control of the General Land Office cannot be acquired by negotiation, since the Land Office can

only dispose of land by sale to the highest bidder. The method of acquiring such right-of-way, at the suggestion of the Land Office, has been to have the County condemn in the same manner as for any other property, and the Land Office will not contest. In filing the condemnation proceedings, the defendant will be "Permanent Free School Fund of Texas." A copy of our Form 449 shall be served upon "Permanent Free School Fund of Texas, by serving Hon._____, Commissioner of the General Land Office of Texas, Austin, Texas." In order to conform to descriptions used in records of the Land Office, the field notes included in the condemnation papers should give a complete metes and bounds description in varas.

PLANS FOR ASSURING FULL WIDTH RIGHT-OF-WAYS FOR FUTURE DEVELOPMENT

We are faced with two general types of problems when determining the width of right-of-way to be acquired. First, we have the highway on which traffic requirements require immediate construction of the ultimate facility whether it be 2-lanes, 4-lanes or of Freeway design. We acquire the full right-of-way width and the overall highway is constructed. Second, we have the road on which two lanes will serve adequately for a few years to come but on which we can foresee the need for four lanes, or four lanes may be needed now and we may anticipate the need for future frontage roads. Unless all required right-of-way is secured now, property development may prohibit the extra lanes in the future. At

the same time we are reluctant to acquire the full width now, with the excess land to lay idle and an extra expense to mow. The following two plans have been developed to assure the full width needed and avoid the maintenance expense and the economic loss of idle land.

Agreement for Continued Use of Right-of-Way by Grantor:

In 1951, the Texas Legislature passed H.B. No. 629, copy of which is attached to this paper (See Attachment No. 3). This law provides that in order to facilitate the acquisition of sufficient right-of-way for future development of designated highways, the State may enter into written agreements with abutting land owners permitting such owners to use and cultivate such portions of the right-of-way as may not be required for immediate use by the State. A standard form for this type of agreement has not been drawn up, however a sample agreement (See Attachment No. 4) has been prepared which may be used as a guide. This sample form covers only the general elements of the agreement and it is understood that additional paragraphs may be required to cover special conditions. These agreements are new to the Highway Department and there is of course much to be learned through experience as to the various problems which will be encountered through their use.

Agreement for Reservation of Right-of-Way:

Road Design Circular Nos. 5-47 and 10-47 discuss the use of a right-of-way reservation plan. The plan calls for the execution of an agreement with property owners to restrict developments on their pro-

perty adjacent to highway right-of-way which may be required for expansion of the highway in the future. In instances where the future need for an enlarged facility can be foreseen, but the actual expansion is so far in the future, it is difficult to secure any action on the part of a County in using its funds for the acquisition of wider right-of-way widths than are required for immediate use. The reservation agreement plan permits the County to conserve its funds by eliminating expensive building, public utility and other rearrangement costs, pending the availability of funds for the construction of the proposed improvement by the State.

The plan briefly is to secure by deed or easement only the right-of-way required for immediate use, but in addition to execute agreements with the property owners to restrict developments on all marginal property that apparently may be required in the future. This plan may be used for reserving right-of-way along both proposed and existing highways.

Attached to this paper are copies of Road Design Circular Nos. 5-47 (See Attachment No. 5) and 10-47 (See Attachment No. 6), and a suggested County resolution form (See Attachment No. 7) covering reservation of right-of-way. Both the County resolution form, and the "Highway Reservation Agreement" form attached to Circular No. 5-47 are to be considered only as general guides subject to revisions necessary to fit local conditions. Application of the right-of-way reservation plan is now being tried out in one or two Districts.

ACQUISITION OF LOCAL ROAD BUILDING MATERIAL SOURCES

The majority of our local material pits are secured through the use of our standard option agreement form. Both borrow and base materials from sources not contiguous to the highway right-of-way are to be secured by this method for all construction work, the only exception being in areas where there is a critical shortage of the needed material. In order to conserve remaining materials in such areas, the State Highway Commission, by Minute No. 26432, authorized the State Highway Engineer to obtain, in the most convenient and economical manner, local material deposits whenever engineering investigations indicate that to do so will be to the best interests of the State.

This action was taken because of difficulties that had been experienced in retaining rights to material under the regular option form, particularly long term options in areas of the State where there is a premium on good road building materials. In order to overcome these difficulties and to better protect the interests of the Department, Form 271, "Easement for Purpose of Producing and Hauling Materials" was prepared for use in such areas. The easement is taken in the name of the State. Negotiations are handled directly by the State and payment made by the State to the property owner.

This procedure has the advantage of permitting immediate full payment to the owner, which together with recording of the easement effects a binding legal document. A modification of the easement form

has been used in some instances where immediate or foreseeable needs have not been enough to justify a lump sum payment sufficient for the full amount of material available in the source or where there has been doubt as to the quantity of suitable material available. With this modification, the quantity covered by the lump sum payment is limited to a stated yardage and additional material is to be paid for at a stated price per cubic yard. The initial payment, however, is of sufficient sum to establish the State's sole rights to the material and permits recording of the easement as a legal binding instrument. Attachment No. 8 illustrates the use of this modification in our standard "Easement for Purpose of Producing and Hauling Materials." Where full payment is made, the form should be used without any alterations.

The procedure to be followed in acquiring material sources and in the preparation of the necessary forms is outlined in Administrative Circulars 31-49 (See Attachment No. 9) and 39-50 (See Attachment No. 10). The procedure should be carefully studied before this method of material acquisition is put into practice. If the various steps are closely followed as outlined, it will greatly facilitate the further handling of the transaction by the proper Austin Office Divisions, and prompt payment for the right to remove material can be assured. One point should be mentioned which is not covered in the procedure attached to Circular 31-49. Since easements of this type are placed on record, the considerations shown therein should be the exact amounts paid out by the State.

SAMPLE LEGISLATION

(May be used as a guide for obtaining authorization of a right-of-way easement from Board for Texas State Hospitals & Special Schools)

WHEREAS, the State Highway Commission of Texas is desirous of constructing, reconstructing, or widening _____ Highway No. _____ in _____ County, Texas; said highway extending along or across certain State property known as _____ Hospital or School; and

WHEREAS, it is necessary to acquire a right-of-way easement across a tract or parcel of said State owned land, said tract or parcel of land being more particularly described as follows, to wit:

(Insert metes and bounds description)

RESOLVED by the House of Representatives, the Senate concurring, That the Board for Texas State Hospitals and Special Schools be, and it is hereby, authorized and directed, in consideration of the benefits accruing to the State from the construction or reconstruction and maintenance of _____ Highway No. _____, to execute and deliver to the Texas State Highway Commission a proper instrument conveying to the Texas State Highway Commission an easement to the above described tract of land for use for highway purposes, the form of said conveyance to be approved by the Attorney General, and the Executive Director of the Board for Texas State Hospitals and Special Schools is hereby authorized, for and on behalf of said Board for Texas State Hospitals and Special Schools, to execute, acknowledge and deliver to the Texas State Highway Commission such conveyance.

Attachment No. 1

TEXAS HIGHWAY DEPARTMENT

Austin 14, Texas

May 12, 1952

IN REPLY REFER TO
FILE NO. D-8

ROAD DESIGN INFORMATION CIRCULAR NO. 2-52

SUBJECT: Right-of-way

TO: All District Engineers and Engineer Managers

Gentlemen:

We have received a number of inquiries concerning the acquisition of right-of-way across land which a Veteran is buying from the Veterans' Land Board. A satisfactory procedure has been worked out with this Board for the acquisition of such right-of-way.

Under the laws governing the operation of the Veterans' Land Board, title to land being purchased by a Veteran cannot be given to him until the land is paid for, therefore he cannot execute a deed conveying title to any part of his land for any purpose. He is allowed, however, to execute an easement for right-of-way for road purposes.

Our regular easement form may be used with the addition of the following clause:

> "The land herein described is under Contract of Sale and Purchase to grantor herein, who will receive a deed to said land from the Veterans' Land Board when all the terms of said Contract have been complied with. Grantor executes this instrument with the approval of the Veterans' Land Board, in accordance with the regulations of said Board, which approval is signified by the signature hereon of its Chairman."

After the easement has been signed by the Veteran, it should be submitted to the Veterans' Land Board, General Land Office, Austin, Texas, for approval, and we have been assured there will be no difficulty in obtaining same, as the Board will approve the instrument as a matter of form in compliance with the law.

The proper County authorities should be informed that if there is a consideration involved in obtaining an easement of this type, the money should be paid to the Veterans' Land Board who will apply it as payment on the Veteran's land and furnish him with a receipt for same.

We are furnishing sufficient copies of this letter for distribution to the Counties if you so desire.

Yours very truly

D. C. Greer
State Highway Engineer

By: J. C. Dingwall

J. C. Dingwall
Engineer Road Design

Attachment No. 2

H. B. No. 629

AN ACT

to authorize the Texas Highway Department to enter into written agreements with owners of lands adjoining or abutting lands obtained by the State for the construction or improvement of highways, which would authorize such abutting or adjoining owners to use and cultivate portions of the right of way as may not be required by the Department for immediate use; specifying the contents of such agreement and prescribing the manner of execution; providing that such agreement shall not impair or relinquish the State's right to use such land for right-of-way purposes when required, nor be construed as abandonment; and declaring an emergency.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

Section 1. The Texas Highway Department may enter into written agreements with owners of the lands abutting or adjoining the lands acquired by the Department for right of way for any highway, farm-to-market road, or other roadway in the State Highway System, under the terms of which such owners of abutting or adjoining lands may be authorized to use and cultivate such portions of the right of way as may not be required for immediate use of the Department. The agreements may contain provisions regarding the use, cultivation, construction of improvements, the placement of fences and such other matters as may be mutually agreed to by the Department and the respective owners of the abutting or adjoining lands. Such agreements shall be executed by the owners of the adjoining or abutting lands and the State Highway Engineer or his authorized representative; provided, however, that the Department, by such agreements, may not impair or relinquish the State's right to use such land for right-of-way purposes when it is required for the construction or reconstruction of the road for which it was acquired, nor shall use by adjoining or abutting land owners under such agreement ever be construed as abandonment by the Department of such lands acquired for right-of-way purposes.

Sec. 2. The fact that right of way is sometimes acquired or should be acquired in advance of the time the Department is prepared to commence the construction or reconstruction of a highway or other roadway, thus removing such lands from cultivation and other uses unnecessarily, and the fact that the State is saved the expense of mowing presently unused right of way and other maintenance expense, and the further fact that by the passage of this Act

Attachment No. 3

the Department can obtain sufficient right of way for future development at the time of designation without prohibitive cost and without later burdening the counties and cities with the expense of buying right of way for widening existing highways and paying for permanent improvements made thereon after the original designation was made, create an emergency and an imperative public necessity that the Constitutional Rule requiring bills to be read on three several days in each House be suspended, and said Rule is hereby suspended, and that this Act shall take effect and be in force from and after its passage, and it is so enacted.

Ben Ramsey /s/
President of the Senate

Ruben E. Senterfitt /s/
Speaker of the House

I hereby certify that H. B. No. 629 was passed by the House on April 25, 1951, by the following vote: Yeas 129, Nays 0.

Clarence Jones /s/
Chief Clerk of the House

I hereby certify that H. B. No. 629 was passed by the Senate on May 30, 1951, by the following vote: Yeas 30, Nays 0.

Loyce M. Bell /s/
Secretary of the Senate

APPROVED: June 15, 1951
Date

Allan Shivers /s/
Governor

FILED IN THE OFFICE OF THE
SECRETARY OF STATE

THIS 21 DAY OF June 19 51
AT 10 O'CLOCK AND - MINUTES A.M.

Jack Ross /s/
Assistant Secretary of State

THIS AGREEMENT made this _____ day of _____, 19 ____, by and between the State of Texas, acting by and through the State Highway Department, hereinafter referred to as the "State", party of the First Part, and _____, of _____County, Texas, party of the Second Part.

WITNESSETH

WHEREAS, the State intends to construct Highway No. _____ along and across certain lands belonging to the said _____ and lying in the _____ Survey (s), _____County, Texas, and

WHEREAS, the said _____ has conveyed certain tracts, out of the above land, to be hereafter used for right-of-way in constructing the said Highway No. _____, and

WHEREAS, the said _____ desires to use those certain tracts of land, as conveyed to the State, for the purposes of grazing or cultivation until such time as the conveyed land is needed for highway purposes.

AGREEMENT

NOW THEREFORE, in consideration of these premises and of the mutual convenants and agreements of the parties hereto, to be by them respectively kept and performed as hereinafter set forth, it is agreed as follows:

1. The State hereby grants permission for the said _____ _____ to use the aforesaid right-of-way tract(s), as conveyed to the State, for the purposes of grazing or cultivation until the conveyed land is needed for highway purposes, said land being the right-of-way tract(s) for Highway No. _____ lying between Engineer's Chaining Stations _____ and _____, and being adjacent to land owned by _____.

2. At such time as it has been determined by the State that all or any part of the conveyed land is needed for highway purposes, the State shall give the aforesaid _____ written notice, and ninety (90) days after date of such notice this agreement shall terminate, and by the date of the termination of this agreement the said _____ will vacate the land conveyed to the State for highway purposes.

3. This agreement shall terminate immediately, and by its own terms, without the necessity of re-entry or any action by the State if _____ _____ sells or otherwise disposes of (his, her, their) property adjoining said tract of land covered by this agreement.

4. The said _____ hereby agrees not to erect any permanent improvements on the conveyed tract of land and any temporary improvements placed thereon will be removed by (him, her, them, it) within ninety (90) days after date of above notice in writing from the State.

5. It is understood that this agreement does not in any way impair or relinquish the State's right to use the said conveyed tract of land for highway right-of-way purposes when and as may be determined by the State, and it is further understood that this agreement shall not be construed as an abandonment of said right-of-way tract by the State.

IN TESTIMONY WHEREOF, witness our hands this _____ day of _____, 19 ____.

STATE OF TEXAS

APPROVAL RECOMMENDED:

_____
District Engineer, District ____

_____
Engineer Road Design

_____
Party of the Second Part

Certified as being executed for the purpose and effect of activating and/or carrying out the orders, established policies, or work programs heretofore approved and authorized by the State Highway Commission:

By:

_____
Chief Engineer of Planning

THE STATE OF TEXAS,

COUNTY OF _____.

Before me, the undersigned, a Notary Public in and for said County and State, on this day personally appeared _____, known to me to be the person whose name is 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 _____ day of _____, 19 _____.

_____
Notary Public, _____County, Texas.

THE STATE OF TEXAS,

COUNTY OF TRAVIS.

Before me, the undersigned, a Notary Public in and for said County and State, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, and in the capacity therein stated.

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

_____
Notary Public, Travis County, Texas.

TEXAS HIGHWAY DEPARTMENT

Austin 26, Texas
April 28, 1947

IN REPLY REFER TO
FILE NO. D-8

Road Design Circular No. 5-47

Subject: Right-of-Way Reservation

TO: ALL DISTRICT ENGINEERS:

Gentlemen:

At the last District Engineer's meeting, we mentioned a plan being used by the Ohio State Highway Department to restrict developments adjacent to highways and permit future expansion at a minimum right-of-way cost. We believe this plan can be used to advantage in Texas, and we wish to give you further details at this time.

Right-of-way acquisition may be considered to fall into three classifications. First is the case where the initial improvement constitutes the full width facility and all necessary right-of-way is to be acquired and fully utilized at once. This would cover a simple rural highway, an interstate expressway complete with divided lanes and service roads, or any class of highway for which traffic potentiality is within the scope of the facility to be currently constructed.

The second class covers the highways on which stage construction is planned, but the complete facility is to be accomplished soon enough to warrant securing all right-of-way prior to the first stage of work. This right-of-way is secured by deed or easement in the usual manner, but property owners may be given permission by letter to use for a given period of time the right-of-way not needed for the current construction. This plan has a number of advantages. By permitting the property owners to use the right-of-way not needed at present, the state will save in maintenance cost, and the property owner is allowed to realize an income by continued use of the land. If this permission is handled as a right-of-way consideration, the County's action in securing the right-of-way may be facilitated and possibly a more reasonable price obtained.

An urban example of this plan is relocated U.S. 59 through Lufkin. For years the State met with opposition in Lufkin because the required right-of-way width cut a considerable slice out of front yards in the residential area. Finally the full right-of-way necessary to care for future expansion was obtained by permitting the property owners to use for a 10 year period the right-of-way not needed for the immediate construction. This gives the owners time to adjust their property to the future width and to retire investments in existing improvements.

The third classification covers the most acute right-of-way problems. We refer to both proposed and existing highways which may be adequate to serve traffic for the immediate future, but for which we can foresee a possible future need for widening throughout, for grade separations, expanded interchange facilities, limited access, etc. The problem hinges on the fact that while we can foresee these needs, the actual expansion is so far in the future it is almost impossible to secure any action on the counties' part in acquiring extra right-of-way widths at this time. When counties vote bond issues and expend large sums for right-of-way, they naturally expect some early realization on their investment. There are many cases where we need extra right-of-way, not for immediate expansion, but to protect the existing road and secure its future for expansion as traffic volume demands.

We all know of too many roads where in the past we have watched strip development slowly creep forward, eliminating any possibility of future highway expansion. Traffic congestion may be the direct result of the strip development itself. When the problem finally becomes insufferable and some action must be taken, property values prohibit widening the right-of-way. We then must relocate, the county must expend large sums for right-of-way, and business establishments along the old road dependent on highway trade are left without a source of income. Nearly every day there are inquiries from property owners, prospective buyers and local officials, all asking for some assurance that a section of road will remain as located. We can never give this assurance, even when the road is correctly located, until we have a commitment ourselves that all needed right-of-way will be available.

The Ohio plan promises to be a step forward in solving problems of this third classification. The plan briefly is to secure by deed or easement only the right-of-way required for immediate use, but in addition to execute agreements with the property owner to restrict developments on all marginal property that apparently may be required in the future. This in affect is little more than zoning or the establishment of building lines as practiced by municipalities. In Texas, as in most states, the zoning authority does not extend to counties and we can proceed only on the agreement basis.

Under this agreement the state acquires specified rights, but the land remains in the ownership of the individual. In other words, there is no initial outlay of large sums of money by the counties for what may appear to them to be unnecessarily wide right-of-way. There is no implied commitment by the State for additional future construction; in fact, the agreement form is worded to permit the state, but not the property owner, to terminate the agreement if it appears that widened right-of-way will not be required. Ohio has found that property owners prefer this form of agreement over the immediate relinquishment of the property. Owners consider the fact that they receive pay under the agreement but the property remains theirs. Also, all rights will revert to them if the State terminates the agreement. If the State uses it for right-of-way, they will receive full value for the land, and in the meantime they are still able to sell land behind the reserved marginal area for suburban or rural strip development. In return, a guaranteed future right-of-way width is

secured at a minimum initial and ultimate expenditure. In Ohio these agreements have been executed at a cost from $3.00 to $5.00 per acre, which will average from $50.00 to $100.00 per mile of highway depending on the width of area protected. This is no more than the cost per pole of a power line easement, or about twice the cost of a highway center stripe. All progressive counties should readily see the ultimate savings to themselves and everyone else concerned that will be brought about by this initial small investment.

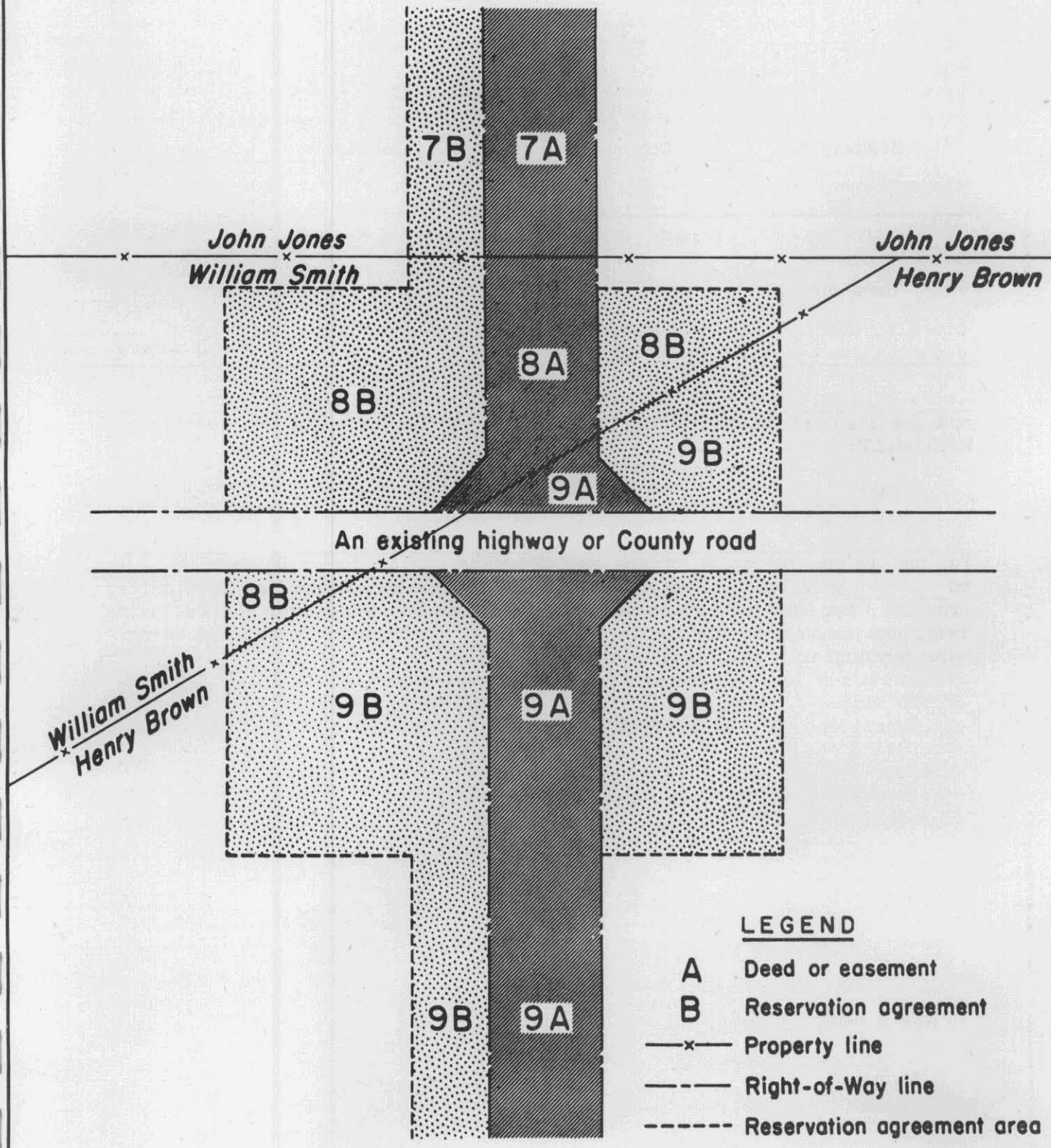
The agreement will prevent the erection of buildings, permanent planting, and public utilities that would increase the cost of acquirement in the future, but the property owner is permitted use of the land for all normal purposes, such as ranching and farming, not inconsistent with its future use for highway right-of-way. This plan does not freeze the value of the land. If years after the agreement is executed it should be decided to obtain title to the right-of-way, the owner will receive full compensation based on the value of the land at that time. The land may have changed from farm land to potential residential property, and the owner will be reimbursed accordingly, but the county is able to secure the land as undeveloped property and avoid the prohibitive costs of moving buildings, etc. Also, if the land is used for farming, the usual consideration to crop loss will be given at the time the deed is executed.

Attached is an illustrating diagram and a sample copy of the agreement form. The usual right-of-way deed or easement will be executed for tracts 7A, 8A and 9A, as shown on the diagram. The reservation agreement will be executed for tracts 7B, 8B and 9B. These latter tracts are to cover the maximum area that will be required. Future design will fix the exact requirements, and restrictions on any excess property will be removed by cancellation of the agreement. The agreement will prevent the owner from conveying any lesser interest in the reserved area without prior approval of the State. The reservation runs with the land and will be recorded in the County records and binding upon any new purchaser of the property.

We would like to have your reaction to this plan and a discussion of its possible application on an experimental basis to one or more highways in your District.

Yours very truly

D. C. Greer
State Highway Engineer



RIGHT-OF-WAY RESERVATION PLAN

HIGHWAY RESERVATION AGREEMENT

Highway No._____, Control_____Section_____,

_____County, Texas.

These articles of agreement entered into on this_____day of

_____, 194___, by_____

_____

and the State of Texas, acting by and through its State Highway Commission, WITNESSETH:

That_____

_____,

for and in consideration of the sum of_____Dollars,($_____), to_____paid by the State of Texas do____hereby reserve, as hereinafter provided, for the future use of the State Highway Commission, the following described lands, situate in_____County, Texas, and being more particularly described as follows:

PARCEL NO._____

as shown by maps on file in the office of the Texas Highway Department, Austin, Texas.

1. It is the intent of this highway reservation agreement to permit the State to conserve its funds by eliminating expensive building, public utility, and other rearrangement costs, pending the availability of funds for the construction of the proposed improvement, and to permit the owner, in the meantime, to utilize the land, hereinbefore described, in all normal ways not inconsistent with the purposes and terms of this agreement.

2. The owner agrees that within the limits of said Parcel No._____, he will not construct or permit to be constructed any building or structure which can not be removed within 10 days, without cost to the State, upon order of the State Highway Engineer, and further that, he will not undertake, or permit to be undertaken, any planting of a permanent nature, such as orchards or other growths, which will interfere with the ultimate use of said parcel for highway purposes.

3. The owner agrees that he will neither lease nor convey an easement, in any way affecting said Parcel No._____, without first securing the written approval of the State Highway Engineer, and further that should he dispose of said Parcel No._____, or any lesser interest therein, such disposal shall be subject to the terms of this agreement.

4. The State agrees that the owner shall have the full right to use or cultivate said Parcel No._____in any manner not inconsistent with the terms and purposes of this highway reservation agreement.

5. The State agrees to negotiate with said owner for a title to Parcel No._____at the time the State finds it necessary to make use of said parcel in the completion of the ultimate proposed highway improvement.

6. The State Highway Engineer shall have the right to cancel this highway reservation agreement in the event that the project is relocated or idefinitely deferred, or if subsequent changes in alignment or grade line require modification of the description of said Parcel No._____herein.

7. The State agrees to furnish the owner with a copy of this agreement, receipt of which is hereby acknowledged.

Signed, this_____day of_____,
194____, in the presence of:

Attest:

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.

WIFE'S SEPARATE ACKNOWLEDGMENT

THE STATE OF TEXAS)
))
County of_____)

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

wife of,_____,

known to me (or proved to me on the oath of_____, a credible witness) to be the person whose name is subscribed to the foregoing instrument, and having been examined by me privily and apart from her husband, and having the same fully explained to her, she the said_____, acknowledged such instrument to be her act and deed, and declared that she had willingly signed the same for the purposes and consideration therein expressed, and that she did not wish to retract it.

Given under my hand and seal of office, this the____day of_____, 19___.

_____

Notary Public in and for_____County, Texas.

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.

4-47-1063
D-8

TEXAS HIGHWAY DEPARTMENT

Austin 26, Texas
July 12, 1947

IN REPLY REFER TO
FILE NO. D-8

ROAD DESIGN CIRCULAR NO. 10-47

SUBJECT: Right-Of-Way Reservation Agreement

TO: ALL DISTRICT ENGINEERS

We have received a very good reaction concerning the Ohio right-of-way reservation plan (Road Design Circular 5-47, dated April 28, 1947). Letters have been received from a number of districts, and some include expressions from resident engineers and from county and city right-of-way agencies. Apparently, the plan is considered fundamentally sound, as the questions raised concern the mechanics of its operation and do not imply doubt as to the merit of its use.

Last year Mr. J. L. Dickson, while serving on a committee of the Highway Research Board, first learned of this plan and secured from Ohio an explanation of its use in that State. Since then the Public Roads Administration has given the subject national publicity in their booklet "Public Control of Highway Access and Roadside Development." Also, the AASHO Right-Of-Way Committee at their recent meeting in Chicago discussed its use in those States not having adequate zoning and controlled access legislation.

Because of existing differences in state laws and procedures, it is impossible for all states to adopt in full the procedure of any one state. Revisions must be made to comply with local laws and procedure. Since the State of Ohio purchases their right-of-way using State and Federal funds without city and county participation, their mechanics differ widely from ours, and it is our problem to adapt the basic plan to our own practice.

To initiate the reservation agreement in Texas we believe flexibility to be of paramount importance. Rather than set up arbitrary rules at this time, we suggest that the districts proceed according to their best judgement, and from the experiences obtained, the most practical method can be determined.

The reactions already received from the individual districts and the questions they have raised will, we believe, be interesting to all of you. We have therefore prepared the attached transcript to give excerpts from each letter and to give a general comment on the questions raised. It will be appreciated if you will keep us in touch with developments in those cases where use of the right-of-way reservation is undertaken.

Yours very truly,

D. C. Greer
State Highway Engineer

7-47-1756
D-8
Attachment No. 6

ORDER OF COMMISSIONERS' COURT
AGREEING TO FURNISH RIGHT-OF-WAY

THE STATE OF TEXAS §
§
COUNTY OF _____ §

WHEREAS, it has come to the attention of the Commissioners' Court of _____ County, Texas, in _____ session on this, the _____ day of _____ 19 ____, that the Texas Highway Department proposes the improvement of _____ Highway _____ from _____ _____, such improvement to consist initially of a two lane paved facility, with additional pavement lanes to be provided as required by traffic and permitted by available funds: provided that _____ County will acquire a minimum _____ right-of-way considered necessary for the ultimate facility; and

WHEREAS, the two lane facility, which is currently considered for construction, can be accomplished within the existing right-of-way width, but it is essential that before undertaking this increment of work a determination be made that the full right-of-way width required for the ultimate facility will be made available; and

WHEREAS, this section of highway traverses a rapidly developing irrigated farming district, and in the interests of promoting orderly development of the adjacent property, it is essential to determine now the additional right-of-way width required and by negotiation with the property owners to arrive at a mutual understanding and to take such action as is required to reserve such additional widths for future highway purposes:

NOW, THEREFORE, IT IS HEREBY ORDERED that _____County, acting herein by and through its Commissioners' Court, agrees to and obligates itself to furnish at its own expense a fully fenced right-of-way free of obstructions and a minimum _____ in width, on the section of _____Highway _____ from _____, the additional width over and above that not now contained in the present highway right-of-way to be reserved at this time by negotiation with the property owners.

It is further ordered that at such time as the reserved right-of-way is required for highway purposes, _____ County, at the request of the Texas Highway Department, will complete negotiations necessary to accomplish the objectives of the reservation agreements and will secure clear title to the reserved right-of-way as necessary to permit use of the property for highway purposes.

Attachment No. 7

_____
COUNTY JUDGE

_____ _____
Commissioner, Precinct No. 1 Commissioner, Precinct No. 3

_____ _____
Commissioner, Precinct No. 2 Commissioner, Precinct No. 4

THE STATE OF TEXAS §
§
COUNTY OF _____ §

I hereby certify that the foregoing is a true and correct copy of order passes by the Commissioners' Court of _____ County, Texas, on _____, 19 ___.

Clerk of County Court
_____ County, Texas

(Seal)

EASEMENT FOR PURPOSE OF PRODUCING AND HAULING MATERIALS

STATE OF TEXAS }
County of _____ } KNOW ALL MEN BY THESE PRESENTS:

THAT _____

_____

_____

_____

of _____, in consideration of the sum of

_____ and other good and valuable consideration in hand paid by the State of Texas, acting through the State Highway Commission, receipt of which is hereby acknowledged, do by these presents grant, bargain, sell and convey unto the State of Texas, the free and uninterrupted use, liberty and privilege of the passage in, along, upon and across the following

lands in _____ County, Texas, owned by _____, and being subject to:

(Important Note: If no liens, easements or leases exist, insert the word, "None.")

Lien(s) held by _____,
(Name) (Address)

easement(s) held by _____,
(Name) (Address)

lease(s) held by _____,
(Name) (Address)

and being particularly described as follows, to-wit:

(Insert metes and bounds description)

The consideration paid the grantor herein is based upon the estimated amount of useable material at the rate of _____cents ($_____) per cubic yard as determined from investigations made by representatives of the State Highway Commission. It is understood and agreed that if the actual amount of material removed by the State exceeds the estimate of _____ cubic yards, then the grantor shall be paid additional compensation at the rate of _____ cents ($_____) per cubic yard for all material removed over and above the estimated amount of _____ cubic yards.

For the purpose of removing and processing materials therefrom either upon or under the surface, with the right and privilege at all times of the State, its agents, employees, workmen, contractors, and representatives having ingress to and egress from, along, upon and across said premises and adjoining property of the grantor. It is specifically understood that the State and its assigns shall be vested with the title to and the right to take and use, ~~without additional compensation,~~ any stone, earth, gravel, caliche, iron ore gravel, or any materials or minerals upon, in and under said land, except oil, gas and sulphur, for the construction and maintenance of the Highway System of Texas.

It is understood that all fences, gates and other existing improvements on the herein described lands, after removal of all material desired by the State, its agents or contractors, as disturbed by the removal of said materials, shall be placed in a condition comparable in repair to their former state by the State, its agents or contractors. All equipment placed on said lands by the State, its agents or contractors, to assist in the removal of said material, shall remain the property of the State, its agents or contractors, and shall be removed on or prior to the expiration date of this easement as herein specified.

It is further understood that should the Grantor herein at any time consider the maintenance of watchmen or the erection of additional fences, cattleguards, etc., necessary to safeguard his-their lands, improvements, livestock, etc., against possible damage during quarry operations and removal of said materials, all arrangements and cost incident thereto shall be the entire responsibility of the grantor herein. Any such safeguards required by the State, its agents or contractors, shall be the entire responsibility of the State, its agents or contractors. The grantor shall permit the State to erect a sign on the herein described property giving notice of the State's ownership of the materials therein.

The grantor agrees to indemnify and save harmless the State of Texas, its agents or contractors, from any and all damage, or loss, that may develop from the grantor's non-ownership of the land, or existing mortgages, liens or easements on the land herein described.

This easement shall expire _____ year(s) from the date of execution unless the State, its agents or contractor, is actually engaged in removing materials, in which event it shall remain in effect until all such material desired by the State has been removed and the conditions hereinbefore stated have been fulfilled.

TO HAVE AND TO HOLD unto the said State of Texas as aforesaid for the purposes aforesaid the premises above described.

Witness _____ hand _____, this the _____ day of _____, A. D. 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.

WIFE'S SEPARATE ACKNOWLEDGMENT

THE STATE OF TEXAS,
County of _____

Before me, _____, a notary public in and for said County and State, on this day personally appeared _____, wife of _____, known to me (or proved to me on the oath of _____, a credible witness) to be the person whose name is subscribed to the foregoing instrument, and having been examined by me privily and apart from her husband, and having the same fully explained to her, she the said _____, acknowledged such instrument to be her act and deed, and declared that she had willingly signed the same for the purposes and consideration therein expressed, and that she did not wish to retract it.

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

_____

Notary Public in and for _____ County, Texas.

Tract No. _____
County _____
Highway No. _____
Control _____ Sec. _____ Job _____
Federal No. _____
Between _____
and _____

EASEMENT FOR PURPOSE OF PRODUCING & HAULING MATERIALS

BY _____

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.

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.

TEXAS HIGHWAY DEPARTMENT

Austin 26, Texas
May 5, 1949

IN REPLY REFER TO
FILE NO.

ADMINISTRATIVE CIRCULAR NO. 31-49

TO: ALL DISTRICT ENGINEERS

SUBJECT: ACQUISITION OF LOCAL ROAD BUILDING MATERIAL SOURCES

Gentlemen:

During the early 1930's the Department adopted the procedure of securing local material pits by agreement with the property owner. This agreement has been in use up to the present time and has been effective in most instances. In recent years, however, a scarcity of materials has developed in certain areas, and in these areas the available sources are being exhausted on other work before we can proceed with our highway improvements. We may have agreements signed by the owner covering these pits, but the agreement in effect only fixes the purchase price and does not bind either the Department to use the materials or the property owner to reserve them for our future use. We therefore have no effective recourse when the property owner permits other agencies to use the material.

In order to better protect the Department's interests, the Highway Commission by Minute 26432, copy of which is attached, has granted authority whereby we may secure local material deposits by obtaining an easement in the name of the State, the cost of the easement to be borne by the State. It is not intended that this practice supplant our present procedure. Its use is to be confined to the materials that are scarce or in areas where a genuine shortage exists or is anticipated. As set forth in the Commission order, this procedure is effective for the entire highway system as well as for farm-to-market projects. Also, it is intended that materials obtained under this arrangement are to be available for the use of the Highway Department wherever needed, and not confined necessarily to the District in which the material pit is located.

Negotiations will be handled directly by the State and payment will be made by the State to the property owner. In arriving at the lump sum or acreage consideration to be paid for the material pit easement, thorough investigations should be made to determine the quality and quantity of usable material that is available. Care must be taken that we do not pay an excessive cost. For borrow sources, the price paid should not exceed the normal land value. Sufficient details should be submitted to the Austin office to permit concurrence in the purchase by the appropriate Division, either the Bridge, Road Design, Land Service, or Maintenance Division, according to the type of project involved.

Attachment No. 9
5-49-999

The acquisition of borrow sources and local material pits will be parallel in respect to the type of instrument used. We have experienced considerable difficulty in the use of a "Warranty Deed" and "Warranty Deed For a Term of Years" in acquiring borrow sources. Copies of these forms were made a part of Administrative Circular 39-46. Their use in securing borrow sources will be discontinued, and the form of easement attached hereto is to be used for both borrow sources and local material pits. The State does not desire to hold title to exhausted pits located throughout the State. In the occasional case where a permanent right to remove materials is desired, the easement form should be used, modified to eliminate the expiration date. Of course, if the property owner will not negotiate an easement but will sell the land, and if purchase of the property is to the best interests of the State, the land may be purchased by Warranty Deed in the same manner as for a warehouse site. In these cases, substantiating facts must be submitted to the Austin office for approval, the deed is to be accompanied by a certificate of title or a title abstract, and approval must be secured from the Attorney General before payment can be made.

On the attached summary sheet, we have attempted to outline the complete procedure for acquiring borrow and local material pits, the method of payment, and the accounting procedure for charging to stock and clearing to construction projects or maintenance operations. Any suggestions or comments will be appreciated.

Sincerely yours,

D. C. Greer
State Highway Engineer

5-49-999

C
O
P
Y

MINUTE ORDER

_____County

District No._____

Whereas, the expanded program of Secondary or Farm to Market roads indicates the improvement of a substantial mileage of these roads, and

Whereas, the mileage needed as compared with the probable available funds for that purpose dictates that the construction and maintenance costs of these roads be held to a minimum, and

Whereas, maximum utility of local roadbuilding materials is essential to low-cost development of these roads, and

Whereas, a local supply of suitable roadbuilding materials assures competitive bidding and a resultant minimum construction cost, and

Whereas, in certain areas of the State local deposits of roadbuilding materials are rapidly being exhausted and remaining deposits are being exploited to the extent that the development of low-cost Farm-to-Market roads is seriously jeopardized,

Therefore, in order to conserve remaining materials, and thereby assure continued low-cost Farm-to-Market road and highway development, the State Highway Engineer is authorized to obtain, in the most convenient and economical manner, local material deposits whenever engineering investigations indicate that to do so will be to the best interest of the State.

Minute Number 26432

Date Passed March 29, 1949

5-49-999

PROCEDURE FOR ACQUIRING BORROW & MATERIAL SOURCES AT STATE'S EXPENSE

1. Title

Experience in the handling of our local material option agreements has shown that in some cases sufficient investigations were not made to determine rightful ownership of the property. Under this proposed easement procedure, utmost care must be taken to see that the easement is signed and payment made to the correct owner or owners. If ownership is considered doubtful, an abstract of title should be secured and forwarded to the Road Design Division for transmittal to the Attorney General for an opinion.

2. Price

Sufficient borings, investigations and laboratory tests should be made to establish quantity and quality of materials, and a determination made as to their future use by the Department. The District Engineer should be sure that at the price paid, the Department will realize good value.

3. Procedure

The easement must be signed before a notary public by the owner of the land and (if married) his wife. The same care must be given in writing the metes and bounds description as would be required if the State was securing title to the property by warranty deed. The easement form has been prepared to show an expiration date. In the few cases where the State desires the permanent right to remove materials, the form may be retyped to omit the expiration date references. The wording of the easement should not be changed unless absolutely necessary. If modifications or additional paragraphs are unavoidable in certain instances, they should be submitted for approval before negotiations are completed. The attached is a mimeographed sample of the form. Printed copies are being prepared and will be furnished upon request.

Form 132, Monthly Statement, in quadruplicate, properly prepared, signed by the land owner, acknowledged before a notary public, and signed as to receipt of goods by the Resident Engineer, is to be sent to the District office together with the easement. The wording on Form 132 is to be in accordance with the sample shown below:

"Right to remove road building material from 6 acres of land in Saxet County, Texas from May 1, 1949 to May 1, 1960; same being 3 acres of the John Doe Farm, Survey No. 1, and 3 acres in Survey No. 2, Block "C", GH&SARR Co."

The district office is to prepare a Special Material and Supply Pay Roll and charge the easement cost to a district stock account. This pay roll, together with the easement, is to be sent to either the Maintenance Division or one of the Design Divisions, depending on the proposed use of the materials. The letter of transmittal

should include sufficient information (see item 2 above) to enable the interested Austin office division to concur in the purchase. This Division will then transmit the District's letter, the easement, and the M&S Pay Roll to File D-8, Right of Way Section, where the easement will be indexed and handled for filing with the Comptroller. File D-8 will transmit the pay roll to File D-11, Accounting Division, for payment. The easement will be returned to the District to be recorded in the office of the County Clerk in the County where the land is located. The recorded instrument is to be returned to the Right of Way Section, File D-8, for permanent filing.

The stock card is to show full and complete description of the property, period covered by easement, name of land owner, and date recorded by the county clerk. The cost of the easement will be carried in the stock account until charged out by the District to the proper maintenance accounts or construction projects as they develop.

4. Construction Project Plans and Estimates

An item must be shown in the estimate for materials to be furnished by the State so that funds will be made available to pay the charge. The material should be listed on a cubic yard basis at a lump sum cost determined by the purchase price of the material pit in ratio to the amount of available material being used on the specific project. If a Federal Project, this should be shown as a non-participating item. It is not contemplated for the present to request Federal aid, but in the future it may be desired to modify this policy.

The material should not be shown as a separate item on the Estimate Summary of the plans. By asterisk reference to the appropriate item, a note should be placed on this sheet explaining that the material source will be available to the contractor free of royalty. Special provision "Local Material Sources" should be prepared in the usual manner outlining the special conditions governing the operation of the pit as required by the terms of the easement.

TEXAS HIGHWAY DEPARTMENT

Austin 26, Texas
June 1, 1950

ADMINISTRATIVE CIRCULAR NO. 39-50

IN REPLY REFER TO FILE NO.

TO: DISTRICT ENGINEERS AND ENGINEER-MANAGERS

SUBJECT: Acquisition of Local Material Sources

Gentlemen:

We have been advised that there is some confusion concerning the forms to be used in securing local materials sources.

There are three forms approved for this purpose. The first, a brief mimeographed form (stencil 7-34-568) is used generally by Section Foremen in securing options from land owners where relatively small quantities are needed for maintenance work.

The second, "Agreement for Purchase of Road Material" (M-7-49-1785) is our standard option agreement form. Both borrow and base materials from sources not contiguous to the highway right of way are to be secured by this method for all construction work, the only exception being in areas where there is a critical shortage of the needed material.

The third form, "Easement for Purpose of Producing and Hauling Materials" (form 271) is approved for use only in the critical areas. As examples are the sections in East Texas where iron ore deposits are nearly depleted, and a portion of the southeastern coastal industrial area where satisfactory fill material is difficult to obtain. Competition from commercial and other agencies requires this easement form to hold prospective material sources. This procedure has the advantage of permitting immediate full payment to the owner, which together with recording of the easement effects a binding legal document. Its disadvantages, however, preclude its use on a Statewide basis. Instructions concerning this easement are contained in Administrative Circular No. 31-49.

If there are further questions, please direct your inquiry to the Road Design Division.

Sincerely yours,

D. C. Greer
State Highway Engineer

5-50-1517

Attachment No. 10

THE MUNICIPAL CONSTRUCTION AGREEMENT

The Texas Highway Department has the legal authority needed for constructing and maintaining the designated highway system, but when entering an incorporated city we are faced with the fact that the highway route becomes a city street, and city streets are the responsibility of the municipal government. Cities have exclusive control of streets and are responsible for their construction, maintenance, policing, and for other regulations which affect the health and safety of the people. While the State has the legal right to spend its funds within cities, the Highways Department's authority to enter the city and after entering is limited to whatever authority is granted by the city.

The State naturally would not wish to expend millions of dollars within towns without at least retaining a partnership right in the investment, including the authority to assure perpetuation of the facility and to safeguard its proper use as a route for expedient traffic movement. The ability to obtain these rights was made possible by an Act of Legislature. This empowered the cities and the Highway Department to enter into contracts in which agreements would be reached as to joint responsibilities for streets traversed by highway designations. The form of contract was prepared by the State with the assistance of city attorneys, and the standard municipal construction agreement is the result. The cities have been most willing to execute these agreements

and to accept the requirements we have considered necessary in order to protect the State against damage suits and to maintain our desired partnership in the administration and operation of the project. This agreement is the legal protection which has made possible the success of the State's participation in municipal highway construction. From this it can be seen that regardless of how minor or short a municipal construction project might be, the construction agreement is an essential requirement vital to the interests of the State.

Before discussing the mechanics for handling this agreement, it should be pointed out that there are other kinds of municipal agreements required of a city. These cover special conditions such as installation of traffic signals, grade separation structures, or even financial participation by the city in our project cost. If such special agreements are required, you will receive notification from the Austin office, and in most cases the Austin office will prepare the appropriate forms and will forward for the District's handling. We will not confuse you by further discussion of these additional agreements at this time. The standard municipal construction agreement, however, is the basic agreement required for all Farm to Market and highway road and bridge projects located either partly or wholely within a city, and the District is responsible for its preparation and its approval by the cities.

You have been furnished with two sample forms, one of which is headed "Municipal Construction Agreement (Combination Construction,

Reconstruction and Maintenance)." The other is the supporting "Municipal Ordinance" form. The agreement is prepared for the Mayor's signature as the official representative of the city, and the ordinance is required for the City Council to authorize this action. The Mayor's signature on the agreement is meaningless without the supporting ordinance.

Only one ordinance and agreement, prepared in duplicate, need be executed for any one contract, regardless of the number of highways or Federal or State project numbers involved. One copy of the ordinance and agreement will be for the city's files and one for the Austin office. Extra copies may be prepared as desired for the District's files. Please note that section 6 of the ordinance requires the attachment of a copy of the agreement to the ordinance to set forth the kind and extent of the agreement which the Mayor is being authorized to sign. You therefore will prepare two ordinance copies supported by attached agreement forms, which will be entirely separate from the two agreement copies which will be signed by the city and the state.

The city should execute the ordinance and agreement far enough in advance to permit transmittal of the signed copies to Austin as a part of the P.S.&E. submission. If not submitted with the plans and if the letter of transmittal does not include a note explaining the delay, it will appear the need for the agreement may have been overlooked, and the Austin office will make inquiry of the District. Under this system, if the agree-

ment has been overlooked, there is time left usually to secure the city's action without requiring a delay in letting the contract.

After the State has signed the agreement, the last step remaining is attachment of the plans which also must bear the City's approval by the signature of the Mayor. The approved procedure is for the Mayor to sign the title sheet tracing before submission of the plans to Austin, then after formal approvals are received from the State and the Bureau of Public Roads (if a Federal project), copies of the plans are attached to both copies of the agreement and the City's copy returned for their files. A common fault is failure to secure the Mayor's signature on the plans tracings. In such cases it becomes necessary for the Austin office to return photostat copies for signature, thereby adding one additional step in the handling of the agreement.

Only a few common errors are made in the preparation and submission of the agreement. One already mentioned is failure to secure the City's signature on the title sheet tracing. Be sure the signature is in ink heavy enough to blueprint and photostat. Another is the failure to add a parallel parking clause when the project proposes a curb and gutter street section. This clause should be added to the bottom of page 3 of the agreement in accordance with Administrative Circular 83-50, copy of which you have for reference.

The third and most important error, which occurs in too many instances, is failure to obtain the agreement either through oversight or

a misunderstanding as to whether the agreement is needed. Remember this:

> If the work is construction in character, regardless if done by contract or State forces, the agreement is required. If the work is of maintenance nature only, the agreement is not needed even if a contract project. By maintenance we mean seal coats, surface courses, levelling up, or any general revamping work which does not change the drainage or the geometrics of the road. If there is any change in drainage, or any widening or other work which changes the design, the agreement is a requirement. There is only one exception to this. We have to get the agreement for all Federal Aid projects, regardless of the type of work. Finally, it should be remembered that the agreement must be secured for each unit of construction work even though an agreement was obtained for previous construction on the same section not over a year ago. Each agreement is effective only to the extent of the construction covered by the plans attached thereto.

There is one other agreement form which has been developed for Freeway and other major street projects. This replaces the standard form for such projects. A sample of this form together with Road Design Circular 6-50 have been furnished for your reference. You will

note that this is a suggested form, including alternate paragraphs and suggestions, and is to be used by the Districts only as a guide in preparing specific agreements. Too many unusual conditions are encountered on a Freeway job to permit use of the simple standard form or to permit adoption of any fixed standard form.

The Freeway agreement form has one particular advantage over the standard form. An elementary sketch is the only illustrative attachment and the construction plans are not made a part of the agreement. This eliminates the need for a new agreement every time a contract is awarded, and the original agreement is effective for the life of the Freeway. Incidentally, the Lubbock District has adapted this Freeway form to the ordinary project and no longer uses the standard form. We hope to do this on a statewide basis in the not too distance future.

Reference has been made to the parallel parking clauses where city work involves a curb and gutter section, which brings up the question of Department policy on the construction of curb and gutter. It is the general policy of the Department to require the cities to bear the cost of construction of curb and gutter and you will find nearly all Commission Minutes on Municipal projects carrying such provisions, also the same for sidewalks, driveways, and storm sewers where these items are involved. Any variations from this practice are due to unusual conditions that require special and individual consideration and these are certainly the exception rather than the rule.

The problem of drainage is always present in towns and cities and the question of the Department's responsibility regarding construction of storm sewers is often brought up. The policy on this is that the State will place the sewer lines for all existing cross drainage, but the City must assume responsibility for parallel drainage regardless of whether or not such lines are built within the right of way of the project.

MUNICIPAL ORDINANCE
(Construction, Reconstruction and Maintenance)

AN ORDINANCE PROVIDING FOR THE____CONSTRUCTION AND MAINTENANCE OF THE PORTION OF_____HIGHWAY NO._____IN THE CITY OF_____

_____

HEREINABOVE REFERRED TO AS "THE STREET PROJECT" AND AUTHORIZING THE MAYOR OF THE CITY TO EXECUTE AND THE CITY SECRETARY TO AFFIX THE CORPORATE SEAL AND ATTEST THE SAME, A CERTAIN CONTRACT BETWEEN THE CITY AND THE STATE OF TEXAS PROVIDING FOR THE INSTALLATION,_____CONSTRUCTION, MAINTENANCE, EXISTENCE AND USE OF THE SAID STREET PROJECT: FOR THE INDEMNIFICATION OF THE STATE OF TEXAS, BY THE CITY AGAINST ALL DAMAGES TO ADJOINING, ABUTTING AND OTHER PROPERTY, AND FOR EXPENSES IN CONNECTION WITH ANY CLAIM OR SUIT THEREOF: AND DECLARING AN EMERGENCY AND PROVIDING THAT THIS ORDINANCE SHALL BE EFFECTIVE FROM AND AFTER ITS PASSAGE.

WHEREAS, the public convenience, safety and necessity of the city, and the people of the city require that the portion of_____

_____

be_____constructed. Since the existing street constitutes a danger and serious inconvenience to the public, it is urgently required to be remedied; and

WHEREAS, the city has requested the State of Texas to contribute financially in the street project; and

WHEREAS, the State of Texas has made it known to the city that it will assist the city in the street project by furnishing the necessary funds for actual construction, reconstruction and maintenance; and by supervising construction, providing the city approves the plans, grades and alignment for said project; and

WHEREAS, the city, in consideration of the providing of said project, agrees to indemnify the State of Texas against all damages or claims for damage to adjoining, abutting or other property for which the State is liable, arising out of, incident to, and in any way connected with the installation, the____construction, the existence, the use and maintenance of the street project or the passage and enforcement of this ordinance.

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL:

SECTION 1. That since the public convenience, safety and necessity of the city and the people of the city require it, said street shall be____constructed.

SECTION 2. That the State of Texas be and is hereby authorized to enter upon____construct and maintain the street project at the location and in the manner shown on the plans, attached hereto and marked "Exhibit A" and made a part hereof in all respects.

SECTION 3. That nothing in this ordinance shall be construed to obligate the State of Texas to pay any direct, incidental, or consequental damages to adjoining, abutting or other property in enforcement of this ordinance or by reason of the installation,_____construction, existence, use and maintenance of the street project authorized herein.

SECTION 4. For and in consideration of the mutual covenants herein contained, the city does hereby agree to indemnify the State of Texas against all damages and claims for damages to adjoining, abutting, or other property for which the State of Texas is liable, arising out of, incident to, or in any way connected with the installation, the construction, existence, use and maintenance of said street project and does hereby agree to indemnify the State of Texas against all court costs, attorneys' fees and all expenses in connection with suits for such damages, and shall, if requested to do so in writing, assist or relieve the State of Texas from defending any such suits brought against it.

SECTION 5. Nothing contained herein shall ever be construed to place upon the State of Texas any manner of liability for injury to or death of persons or for damages to, or loss of property arising out of or in any manner connected with the maintenance or use of the street project and the city will save the State of Texas harmless from any damages arising out of said maintenance and/or use of said street project.

SECTION 6. The Mayor of the city be and is hereby authorized to execute for and on behalf of the city an agreement and contract with the State of Texas in accordance with and for the purpose of carrying out the terms and provisions of this ordinance, in the form attached hereto and marked "Exhibit B". The City Secretary is hereby directed to attest the agreement and contract and to affix the proper seal of the city hereto.

SECTION 7. The Mayor of the city, having requested in writing that this ordinance take effect forthwith and there being in fact an emergency and imperative necessity that the work herein provided for be begun and carried out promptly and with expedition and that the contract aforesaid shall be immediately made, executed and delivered to the end that such work herein provided for may be begun and carried out promptly and with expedition. The reading of the ordinance on three several days is hereby dispensed with and the same shall be in full force and effect from and after its passage.

STATE OF TEXAS)
)
COUNTY OF_____)

I,_____, the duly appointed, qualified and acting city secretary of the City of_____, Texas, hereby certify that the foregoing pages constitute a true and correct copy of an ordinance duly passed by the City Council at a meeting held on _____, A.D., 19_____, at _____o'clock___M.

To certify which, witness my hand and seal of the City of_____ Texas, this due_____day of_____, 19____, at _____Texas.

_____
City Secretary of the City of

_____Texas

Ordinance (Highway Projects)
10-43-1083

MUNICIPAL CONSTRUCTION AGREEMENT
(Combination Construction, Reconstruction and Maintenance)

STATE OF TEXAS §
§
COUNTY OF TRAVIS §

This agreement made this ____ day of _____, 19___, by and between The State of Texas, hereinafter referred to as the "State", party of the first part, and the City of _____, _____ County, Texas, acting by and through its duly authorized officers under an ordinance passed the _____ day of _____, 19___, hereinafter called the "City", party of the second part.

W I T N E S S E T H

Whereas, the City has requested the State to contribute financial aid in the improvement and/or maintenance on _____ _____ Street from _____ _____ to _____ within such City and has by proper ordinance authorized the State to enter upon and improve and/or maintain or assist the City in the improvement and/or maintenance of said project; and

Whereas, the State Highway Commission under date of _____ approved a _____ program of work which includes the project described above, and

Whereas, the State Highway Engineer, acting for and in behalf of the State Highway Commission in activating such program, has made it known to the City that the State will assist the City in the improvement and/or maintenance of said street project by furnishing the funds necessary to construct, reconstruct or otherwise place said street in a condition to properly serve motor vehicle traffic thereon by preparing plans for said improvement and supervising the construction, reconstruction or betterment work as provided in said plans or may be provided in said plans conditioned that the City, as contemplated by Senate Bill 415, Acts 46th Legislature, Regular Session, will enter into an agreement with the State for the purpose of determining the liabilities and responsibilities of the parties with reference thereto, determining and providing adequate and appropriate means for the regulation of traffic, policing and maintenance of the project upon completion, and, provided further, that the City approves the plans, specifications, alignments and grades of the project, and, provided further, that the City will indemnify the State against all damages to adjoining, abutting or other property occasioned by or resulting from the installation, construction, existence, use or maintenance of said street project and the passage and enforcement of the ordinance herein referred to.

M-9-45-937
D-8

Now therefore, in consideration of the premises and of the mutual covenants and agreements of the parties hereto to be by them respectively kept and performed as hereinafter set forth, it is agreed as follows:

The State as its contribution to the improvement of said street project will prepare or provide for the plans and specifications, advertise for bids, and let the construction contract, or otherwise provide for the construction, and will supervise the construction, reconstruction or betterment work as required by said plans, and will pay the cost of those items indicated on the plans as to be paid for by the State.

As long as the city street is a designated highway, the State will maintain said street project except those portions as may be made the City's obligation as mutually agreed to by the parties hereto.

The State will maintain said street project or such portions thereof or extensions thereto as may be indicated on said plans for State maintenance, and such other portions as may be mutually agreed to by the parties hereto.

The City, in consideration of the mutual covenants herein contained, does hereby agree to and does hereby authorize the State to improve or assist in the improvement of said street project at the location, to the grades and in the manner shown on the plans, which plans when approved by both parties hereto will be attached hereto, marked "Exhibit A" and become a part hereof in all respects.

The City will provide for said street project a right-of-way free of all obstructions and of a width sufficient to properly provide for the improvements shown on the plans, without cost to the State and will not, in the future, permit encroachments on said right-of-way.

The City will provide at its own expense for the installation, raising, lowering, removal or other necessary adjustment of any and all utilities or services, whether publicly or privately owned, as may be necessary to permit proper improvement, maintenance and use of said street project, and, failure of the City to promptly carry out this provision upon the written request of the engineer shall, if such delay results in additional expense to the State, be the direct charge and obligation of the City.

The City agrees to pay to the State promptly the cost of making repairs to the subgrade or surfacing made necessary by reason of the installation, repair, removal, or adjustment or any such publicly or privately owned utilities or services, which may occur after the completion of the street project.

The City agrees that it will refrain from passing an ordinance fixing a speed limit on the above mentioned street project of under twenty (20) miles per hour nor will it allow the erection of signs, semaphores and/or signals that will give preference to local routes which intersect with the said street project, nor that will slow up, hinder or delay traffic on said above mentioned street project.

The City will at its own expense maintain all streets lights, traffic lights and signal devices on said project, and sweep, flush and otherwise keep said street project in a clean and sanitary condition.

The City agrees to execute all work, either construction or maintenance, at its own cost and expense, shown on the plans, which is or may be indicated on such plans as the responsibility of the City.

The City agrees to indemnify the State against any and all damages and claims for damage to adjoining, abutting or other property for which the State is or may be liable arising out of, incident to or in any way connected with the installation, the construction, the existence, the use and/or maintenance of such street project and does hereby agree to indemnify the State against any and all court costs, attorneys' fees and all expenses in connection with suits for such damage and shall, if requested to do so in writing, assist or relieve the State from defending any such suits brought against it.

Nothing herein contained shall be construed to place upon the State any manner of liability for injury to or death of persons or for damage to or loss of property arising out of or in any manner connected with the maintenance or use of the street project and the City will save the State harmless from any damages arising from said maintenance and/or use of said street project.

It is understood and agreed between the parties hereto that the City by virtue of the provisions of its charter and the laws of the State of Texas has exclusive control of and jurisdiction over all streets and public ways within the incorporated limits of such city and that the City has requested and consented to the construction of the above street project hereinabove named and the State in the construction of the above street project does so at the special instance and request of the City. The location, grades and manner of construction shown on the plans attached hereto and marked "Exhibit A" are made a part hereof. In case of conflict between this agreement and said plans, the plans shall govern.

Nothing in this agreement shall be construed to place any liability on the City for personal injury arising out of the construction of such street project.

It is understood and agreed between the parties hereto that all obligation of the State, created herein, to maintain the herein above described street project shall end and terminate if and when the State shall abandon, cancel or relocate such designation.

It is further understood and agreed between the parties hereto that the improvement and/or maintenance of the above project by the State is for the sole purpose of providing the travelling public a more adequate travel facility and shall never be the basis of any claim for State assumption, or participation in the payment, of any of the obligations of the City incurred in the improvement, past or present, of any street project.

IN WITNESS WHEREOF, the parties have hereunto affixed their signatures, the City of _____ on the _____ day of _____, 19__ and the Highway Department on the _____ day of _____, 19__.

ATTEST:

_____

CITY OF _____

BY _____

_____
(Title of Signing Official)

THE STATE OF TEXAS

Certified as being executed for the purpose and effect of activating and/or carrying out the orders, established policies, or work programs heretofore approved and authorized by the State Highway Commission:

BY _____
Chief Engineer of Planning

APPROVAL RECOMMENDED:

_____
District Engineer

_____
Engineer Road Design

_____
Engineer, Land Service Roads

M-9-45-937
D-8

TEXAS HIGHWAY DEPARTMENT

Austin 14, Texas
December 5, 1950

IN REPLY REFER TO
FILE NO. D-8

ADMINISTRATIVE CIRCULAR 83-50

TO: ALL DISTRICT ENGINEERS, EXPRESSWAY MANAGERS & DIVISION HEADS

SUBJECT: Parking Ordinances

Gentlemen:

Administrative Circular 27-49 outlined the procedure for including in the municipal construction agreement a commitment by the City to regulate parking in keeping with the project design.

You will note from the attached copy of letter from the Bureau of Public Roads that this commitment on the Cities' part becomes prerequisite to the Bureau's approval of any Federal-aid project. You also will note that angle parking is to be prohibited regardless of the street or parking lane width.

For all Federal or State projects where a City street section design is proposed, the municipal construction agreement shall include a paragraph similar to the following.

> "The City agrees that prior to completion of the proposed construction an ordinance will be passed restricting parking to parallel parking only (parallel parking on one side of the street only, prohibiting parking, etc. or whatever may be in accordance with the project design)."

As stated in Administrative Circular 27-49, the subsequent request for the ordinance should initiate with the District Office, and an executed or certified copy be furnished for the Main Office files. The form of the ordinance may be in accordance with the City's established practices.

Sincerely

D. C. Greer
State Highway Engineer

la

12-50-3217
D-8

DEPARTMENT OF COMMERCE

BUREAU OF PUBLIC ROADS

Austin, Texas
November 28, 1950

Urban General

Mr. D. C. Greer
State Highway Engineer
Austin, Texas

Dear Sir:

In a few instances Federal-aid projects extending into or through towns have had pavement widths provided which result in the local authorities making provision for angle parking of vehicles on the street.

It is believed that angle parking interferes with the safe and efficient utilization of the street by moving traffic. Accepting this premise, Section 12 of the Federal-aid Highway Act of 1944 is pertinent. It is quoted as follows:

"On any highway or street hereafter constructed with Federal-aid in any State, the location, form, and character of informational regulatory, and warning signs, curb and pavement or other markings, and traffic signals installed or placed by any public authority, or other agencies shall be subject to the approval of the State Highway Department with the concurrence of the Public Roads Administration, and the Commissioner of Public Roads is hereby directed to concur only in such installations as will promote the safe and efficient utilization of the highways."

There is no objection to parallel parking lanes of liberal width, but it is believed that pavement widths should consist of a combination of travel lanes and parallel curb parking lanes when parking is to be permitted at all.

To this end it is requested that future Municipal Agreements make specific provision for parallel parking and prohibit angle parking when curb parking is contemplated.

C
O
P
Y

Very truly yours

J. M. Page /s/

J. M. Page
District Engineer

12-50-3217
D-8

COMMISSION

E. H. THORNTON, JR., CHAIRMAN
FRED A. WEMPLE
ROBT. J. POTTS

TEXAS HIGHWAY DEPARTMENT

Austin 14, Texas
October 11, 1950

STATE HIGHWAY ENGINEER
D. C. GREER

IN REPLY REFER TO
FILE NO. D-8

ROAD DESIGN CIRCULAR NO. 6-50

TO: ALL DISTRICT ENGINEERS AND ENGINEER-MANAGERS

SUBJECT: Special Municipal Construction Agreements.

Gentlemen:

By Road Design Circular No. 5-50, we transmitted for your study a sample municipal construction and maintenance agreement proposed for Freeway and major street projects.

Comments from the field have developed some desirable modifications in both the ordinance and agreement, and revised copies including these changes are attached for your files. Please mark void the copies accompanying Road Design circular No. 5-50.

We reiterate that this is to be used as a guide in preparing special agreements for the larger city projects, and is not to replace the standard form now in use for the normal project.

Sincerely yours,

D. C. Greer
State Highway Engineer

Note: Red denotes inserts to be used if project is to be designated as "Freeway".

MUNICIPAL ORDINANCE
(Construction and Maintenance)

AN ORDINANCE PROVIDING FOR THE CONSTRUCTION AND MAINTENANCE OF THE PORTION OF HIGHWAY NO._____ (_____STREET) IN THE CITY OF_____,

BETWEEN THE FOLLOWING LIMITS, TO-WIT:_____
AS A FREEWAY AND AS A STREET, HEREINAFTER REFERRED TO AS "THE PROJECT" AND AUTHORIZING THE MAYOR OF THE CITY TO EXECUTE AND THE CITY SECRETARY TO AFFIX THE CORPORATE SEAL AND ATTEST THE SAME, A CERTAIN CONTRACT BETWEEN THE CITY AND THE STATE OF TEXAS PROVIDING FOR THE CONSTRUCTION, MAINTENANCE, EXISTENCE AND USE OF SAID PROJECT AS A FREEWAY AND AS A STREET, AND DETERMINING THE LIABILITIES AND RESPONSIBILITIES OF THE CITY AND THE STATE OF TEXAS WITH REFERENCE THERETO; AND DECLARING AN EMERGENCY AND PROVIDING THAT THIS ORDINANCE SHALL BE EFFECTIVE FROM AND AFTER ITS PASSAGE.

WHEREAS, the public convenience, safety and necessity of the City, and the people of the City, require that the portion of Highway No._____from _____

_____to_____
be constructed, since the existing condition constitutes a serious inconvenience to the public, which it is urgently required to be remedied; and

WHEREAS, the City has requested the State of Texas to contribute financially in the project; and

WHEREAS, the State of Texas has made it known to the City that the State will assist the City in the improvement and maintenance of said project as a street and as a Freeway, providing the City approves the plans for said project.

NOW THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL:

SECTION 1. That since the public convenience, safety and necessity of the City and the people of the City require it, said project shall be constructed as a street and and as a Freeway as defined by House Bill No. 771, Acts 51st Legislature, Regular Session.

SECTION 2. That the State of Texas be and is hereby authorized to enter upon, construct and maintain the project at the location and in the manner shown on the plan attached hereto, marked "Exhibit A," and made a part hereof in all respects.

SECTION 3. The Mayor of the City be and is hereby authorized to execute for and on behalf of the City an agreement and contract with the State of Texas in accordance with and for the purpose of carrying out the terms and provisions of this ordinance, in the form attached hereto and marked "Exhibit B." The Mayor of the City is further authorized to approve and sign the detailed plans for construction of the project or any section thereof when and as such plans are completed and prior to award of construction contract by the State. The City Secretary is hereby directed to attest the agreement and contract and to affix the proper seal of the City hereto.

SECTION 4. The fact that there is an imperative necessity that the work provided for in said contract be begun and carried out promptly, and that such contract should accordingly be forthwith executed, creates a public emergency requiring that this ordinance be passed finally on the date of its introduction, and the Mayor having in writing declared the existence of such emergency and requested such passage, this ordinance shall be passed finally on the date of its introduction, this_____, A.D. _____, and shall take effect immediately upon its passage and approval by the Mayor.

STATE OF TEXAS

COUNTY OF_____

I,_____, the duly appointed, qualified and acting city secretary of the City of_____, Texas, hereby certify that the foregoing pages constitute a true and correct copy of an ordinance duly passed by the City Council at a meeting held on_____, A.D., 19___, at _____o'clock_____M.

To certify which, witness my hand and seal of the City of_____ TEXAS, this due_____day of_____, 19_____, at _____; Texas.

_____
City Sectetary of the City of

_____Texas

MUNICIPAL CONSTRUCTION AND MAINTENANCE AGREEMENT

Note: Red denotes inserts to be used if project is to be designated as "Freeway".

STATE OF TEXAS }
}
COUNTY OF TRAVIS }

This agreement made this_____day of_____, 19____, by and between The State of Texas, hereinafter referred to as the "State", party of the first part, and the City of_____,_____County, Texas, acting by and through its duly authorized officers under an ordinance passed the_____day of _____, 19____, hereinafter called the "City", party of the second part.

W I T N E S S E T H

WHEREAS, the City has requested the State to contribute financial aid in the improvement and maintenance of _____ Street within such City, from _____ to _____; the route of Highway No._____ and hereinafter called the "Project", and has by proper ordinance authorized the State to enter upon and improve and maintain or assist the City in the improvement and maintenance of said project as a street and as a Freeway; and

WHEREAS, the State Highway Engineer, acting for and in behalf of the State Highway Commission, has made it known to the City that the State will assist the City in the improvement and maintenance of said project, conditioned that the City, as contemplated by Senate Bill 415, Acts 46th Legislature, Regular Session, will enter into agreements with the State for the purpose of determining the liabilities and responsibilities of the parties with reference thereto.

A G R E E M E N T

NOW THEREFORE, in consideration of the premises and of the mutual covenants and agreements of the parties hereto to be by them respectively kept and performed as hereinafter set forth, it is agreed as follows:

Definitions

It is understood that this project shall be constructed as a street to consist of a "Freeway" as defined by House Bill No. 771, Acts 51st Legislature, Regular Session supplemented by "Frontage Streets" as mutually agreed to by the City and the State. The term "Project" as used in this agreement and hereinabove described as to termini, shall

include grading, pavement, curbs and gutters, sidewalks, bridges, grade separation structures, culverts, storm sewers, outfall channels as well as other usual appurtenances common to a normal street project. The term "Freeway" denotes that portion of the project consisting of the inner pavement lanes designed to serve through traffic. The term "Frontage Streets" denotes the outer streets, auxiliary to the Freeway, designed to serve abutting property and adjacent areas.

Project Authorization

It is understood and agreed between the parties hereto that the City by virtue of the provisions of its charter and the laws of the State of Texas has exclusive control of and jurisdiction over all streets and public ways within the incorporated limits of such City, and that the City has requested and consented to the construction and maintenance of the project and the State in the construction and maintenance of such project does so at the special instance and request of the City. The City, in consideration of the mutual covenants herein contained, does hereby agree to and does hereby authorize the State to improve or assist in the improvement of said project at the location and in the manner shown on the plan approved by both parties and attached hereto, marked "Exhibit A", and made a part hereof in all respects.

Right of Way

The City will provide without cost to the State a right of way for the project free of all obstructions and encroachments, and of a width sufficient to provide properly for the improvements shown on the plans, and will not in the future permit encroachments on said right of way.

Existing Utilities

The City will provide for the installation, removal or other necessary adjustment of any and all utilities and services, whether publicly or privately owned, as may be necessary to permit the proper improvement, maintenance and use of said project. Existing utilities shall be adjusted in respect to location and type of installation in accordance with requirements of the State. If, upon receipt of written request by the State, the City does not promptly carry out this provision, and if such delay results in additional expense to the State, such expense will be the direct charge and obligation of the City.

Engineering Services

The State will prepare or provide for the construction plans, advertise for bids, and let the construction contract, or otherwise provide for the construction and will supervise the construction, reconstruction or betterment work as required by said plans. As the project is developed to the construction stage, either as a unit or in increments, the State will secure the City's approval of the construction plans for each increment or the unit prior to award of contract.

Division of Construction Responsibilities

(Note: This sample agreement does not attempt to define construction responsibilities due to variable conditions that can be encountered.)

The City and the State will provide for the items of construction for which each assumes financial responsibility.

If desired by the City and approved by the State, the City may prepare plans and undertake its items of construction responsibility. In such event the sequence of construction will be determined by the State, and the design and construction of the City's portion of the project will be subject to inspection and the approval of the State.

If desired by the City and approved by the State, any part or all of the items of construction which are the City's responsibility may be included in the plans and made a part of the construction work to be undertaken by the State. If construction is undertaken in this manner, the details of cost participation and method of payment will be covered by a separate agreement to be executed between the City and the State prior to the inclusion of such work in the plans. The State will prepare the plans, let the contract, supervise the construction, and the City will pay to the State the actual cost of the items which are the City's responsibility.

Traffic Control Devices

The City agrees that traffic control devices, such as stop and slow signs, traffic signal lights, parking meters and other types of devices for traffic control, in respect to type of device, points of installation, and necessity will be fixed by agreement with the State as represented by the State Highway Engineer after traffic and engineering surveys have been made. The City agrees that it will not install or maintain or permit the installation or maintenance of any type of traffic control device which will affect or influence the utility of the project without having obtained in writing the prior approval of the State. Traffic control devices installed prior to the date of this agreement and which will affect or influence the utility of the project are hereby made subject to the terms of this agreement, and the City agrees to the removal of such devices unless their continued use in place is approved in writing by the State. It is understood that future traffic signal lights installed as a joint project by the City and State will be the subject of a separate agreement outlining the responsibilities for installation and maintenance.

Pavement Striping

The State agrees to construct and maintain all longitudinal center line and non-passing barrier stripes. The City agrees to construct and maintain any additional traffic striping it may desire subject to the approval of the State.

Street Lighting System

The City agrees to install and maintain any street lighting system desired by the City and to pay for all electric energy as may be required for its operation. The street lighting system installation will be subject to the approval of the State.

(For Freeways and Arterial Street Projects, the policy of the Department permits State participation in the street lighting system. If the Freeway or Arterial Street project for which this agreement is being written has developed to the point that there is a mutual understanding concerning the street lighting system, this paragraph may be written in accordance with the policy and fit the project conditions. If the project has not developed to this point, use the following only.) This being a Freeway (or Arterial Street) project, it is understood that the joint responsibilities of the City and State for a street lighting system will be determined by separate agreement.

Future Utilities

(Hereunder are written alternate and suggested paragraphs which may be used separately, combined or revised to fit project.)

The City agrees to pay to the State promptly the cost of making repairs to the subgrade or surfacing made necessary by reason of the installation, repair, removal, or adjustment of any publicly or privately owned utilities or services, which may occur after the completion of the project.

The City will secure or cause to be secured a permit from the State before any utility installation, repair, removal or adjustment is undertaken, crossing over or under the project or entering the project right of way. 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, the City, without the necessity of a permit from the State, may at its own responsibility and risk make necessary emergency utility repairs, notifying the State of this action as soon as is practicable.

The City agrees that it will not cut nor permit a third party to cut the pavement for the placement of any pipe or conduit for any utility to be placed transverse to the project.

The City agrees (to prohibit any overhead power lines across the project, or:) to hold to a minimum overhead power lines across the project. When such power lines are considered necessary, the line and structure construction of crossings shall conform to the highest grade as defined by the latest published edition of the National Electrical Safety Code published by the National Bureau of Standards.

Traffic Regulations and Safety Provisions

The City agrees to pass and enforce an ordinance restricting parking to parallel parking only (parking requirement to be modified to fit project conditions). The City agrees that other traffic regulations will be established and speed limits fixed by agreement with the State as represented by the State Highway Engineer after traffic and engineering surveys have been conducted.

The City agrees to prohibit the planting of trees or shrubbery or the creation or construction of any other obstruction within the right of way without prior agreement with the State, which would impair sight distance to the extent of creating an unsafe or hazardous condition to traffic movement.

The City agrees to prohibit the movement of loads over the project and other State maintained streets which exceed the legal limits for designated State highways for either weight, length, height or width except those having proper permits from the State for such movements.

The State will be responsible for the erection and maintenance of informational signs on the project for direction of traffic, such signs to be of design and location to conform to standard practices of the State.

Division of Maintenance Responsibilities

(Note: Varying conditions in respect to both project location and design make it impracticable to outline standard clauses covering maintenance responsibilities. The District Engineer should detail maintenance responsibilities to fit the particular project, using the following general clauses as a supplement.)

This general maintenance provision is supplemented, or in case of conflict is superseded in respect to the point in conflict only, by the specific maintenance responsibilities as delineated in other provisions of this agreement.

The City (State) will at its own expense sweep and otherwise keep the project in a clean condition.

Maintenance work by the State shall be performed only as long as the Project is the route of a State highway, and it is understood and agreed between the Parties hereto that all obligations of the State and the City as created herein shall terminate if and when the project is no longer the route of a State highway.

Future Street Crossings

It is understood and agreed between the parties hereto that the City will refrain on its part and will prohibit any other third party from carrying any present or future street across or into the Freeway at grade except as may be shown on the sketch attached hereto and marked "Exhibit A". This provision shall not prevent the City from constructing such underpasses or overpasses in the future as may be necessary to relieve traffic when plans and specifications have been approved by the State.

Indemnification

The City agrees to indemnify the State against any and all damages and claims for damages to adjoining, abutting or other property for which the State is or may be liable arising out of, incident to or in any way connected with the installation, the construction, the existence, the use and/or maintenance of such project and does hereby agree to indemnify the State against any and all court costs, attorneys' fees and all expenses in connection with suits for such damage and shall, if requested to do so in writing, assist or relieve the State from defending any such suits brought against it.

Nothing in this agreement shall be construed to place any liability on the City for personal injuries arising out of the construction of such project.

Nothing herein contained shall be construed to place upon the State any manner of liability for injury to or death of persons or for damage to or loss of property arising out of or in any manner connected with the maintenance or use of the project, and the City will save the State harmless from any damages arising from said maintenance and/or use of said project.

It is further understood and agreed between the parties hereto that the improvement and/or maintenance of the project by the State is for the sole purpose of providing the travelling public a more adequate travel facility and shall never be the basis of any claim for State assumption, or participation in the payment, of any of the obligations of the City incurred in the improvement, past or present, of any street project.

IN WITNESS WHEREOF, the parties have hereunto affixed their signatures, the City of _____ on the _____ day of _____, 19___, and the State on the _____ day of _____, 19___.

ATTEST:

_____

CITY OF _____

BY _____

Title _____

THE STATE OF TEXAS

Certified as being executed for the purpose and effect of activating and/or carrying out the orders, established policies, or work programs heretofore approved and authorized by the State Highway Commission:

BY _____
State Highway Engineer

RECOMMENDED FOR APPROVAL:

_____
District Engineer

_____
Engineer Road Design

OR

_____
Engineer Manager

_____
Chief Engineer of Planning

TEXAS STATE HIGHWAY DEPARTMENT

LAYOUT MAP

SHOWING

EXHIBIT A

DENSON DRIVE PROJECT

U.S. HIGHWAY NO. 69

FROM MASON STREET TO JACKSON STREET

CITY OF TEXHAVEN

JULY 1949

SAMPLE SKETCH FOR NORMAL STREET PROJECT

APPROVED:

_____

DISTRICT ENGINEER

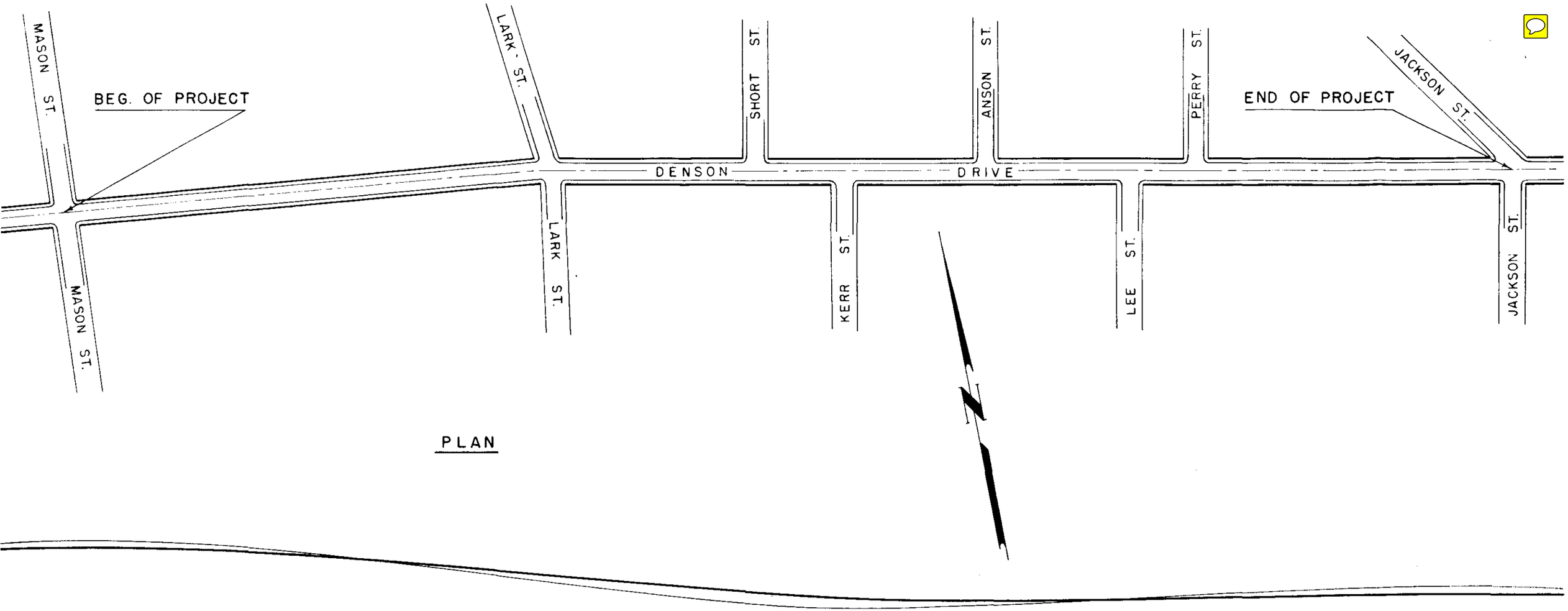
_____

MAYOR, CITY OF TEXHAVEN

LEGEND

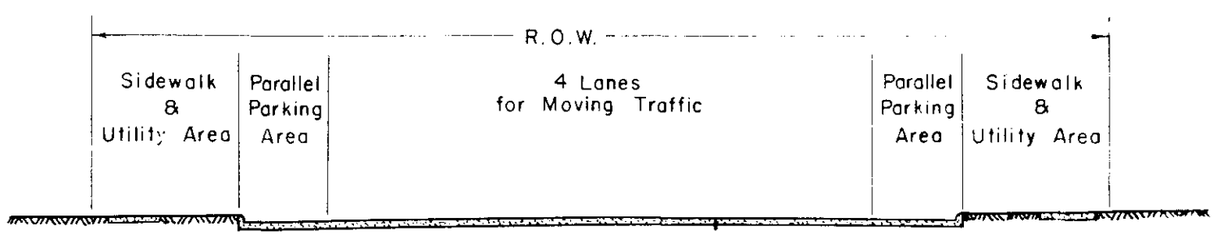
Original Ground Line at ℄ R.O.W.

——— Finished Grade at ℄ R.O.W.



PLAN

PROFILE



TYPICAL SECTION

TEXAS STATE HIGHWAY DEPARTMENT

LAYOUT MAP

SHOWING

EXHIBIT A

FAIRVIEW DRIVE PROJECT
U.S. HIGHWAY NO. 83
FROM E. 5 STREET TO E. 13 STREET

CITY OF TEXHAVEN
JULY 1949

SAMPLE SKETCH FOR FREEWAY PROJECT

APPROVED:

DISTRICT ENGINEER

MAYOR, CITY OF TEXHAVEN

LEGEND

——— Original Ground Line at ℄ R.O.W.

——— Finished Grade on Freeway

— — — Finished Grade on Rt. Frontage St.

- - - - - - - - Finished Grade on Lt. Frontage St.

BEG. OF PROJECT

END OF PROJECT

E. 7 ST.

FISK STREET

KENT STREET

WELLINGTON STREET

LEE STREET

NOBLE STREET

E. 12 ST.

E. 5 ST.

E. 6 ST.

E. 7 ST.

E. 8 ST.

E. 9 ST.

E. 10 ST.

E. 11 ST.

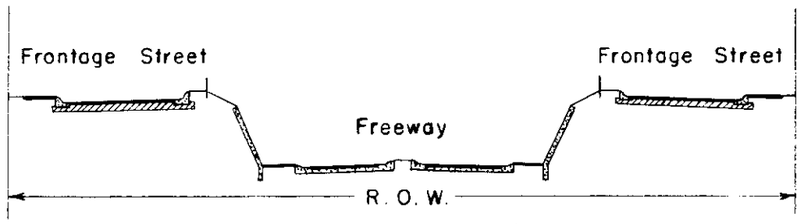
E. 12 ST.

E. 13 ST.

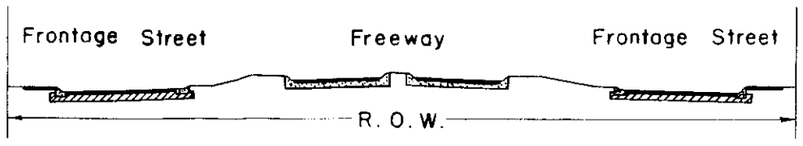
MARKET STREET

PLAN

PROFILE



TYPICAL SECTION
AT GRADE SEPARATION



NORMAL TYPICAL SECTION