PLANNING AND RESEARCH DIVISION

MANUAL OF PROCEDURES

FOR

RESEARCH STUDIES

Research Conducted for
TEXAS HIGHWAY DEPARTMENT
in cooperation with
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

November 1973

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PROCEDURES FOR HIGHWAY RESEARCH STUDIES

I. INTRODUCTION

The Texas Highway Department and various research agencies have been and will be conducting a cooperative program of highway research and development on a cost-reimbursable contract basis. The authority for research with outside agencies is based on state legislation and joint cooperative research agreements.

The Federal Highway Administration Research and Development Manual, Volume 1, Chapter III dated April 17, 1972 is the Departmental guide for the conduct of the cooperative research effort and pertinent portions are included herein. The purpose of this Departmental manual is to outline administrative procedures for highway research in logical sequence so that this work can be more efficiently handled between the agencies concerned. This manual shall be for the administrative conduct of highway research studies and is a guide to fullfilling the Cooperative Research Agreement.

The manual shall be revised and/or updated from time to time as necessary.

II. TERMS AND DEFINITIONS

A. Department. The Texas Highway Department.

B. Research and Development Committee. The Committee appointed by the State Highway Engineer to recommend policy and direction of the Cooperative Research Program of the State.

C. Engineer-Director, Planning & Research Division. The Engineer appointed by the State Highway Engineer to administer the Cooperative Research Program of the State.

D. Engineer of Research. The individual who carries out the directives of the Engineer-Director, Planning & Research Division. He is a staff member of D-10 and serves as the Secretary to the Research and Development Committee.

E. Area Advisory Committee. The Advisory Committee for matters pertaining to the specific Cooperative Highway Research studies assigned in a program area. The Committee is composed of representatives from throughout the Department with expertise in the appropriate research program area.

F. Area Advisory Council. A Council composed of the Chairmen of the Area Advisory Committees which functions to advise the Research & Development Committee as to research priorties and provides suggestions on guidance of on-going research studies.

G. Area Coordinator. The Secretary to the Area Chairman who also coordinates area activities.

H. Research Agency. Any agency which has entered into a signed agreement with the Department to do planning, research, development, or demonstration studies.

I. Study Supervisor. The principal investigator in charge of a study.

J. Study Contact Individual. The Department liaison individual between the Study Supervisor, the Area Coordinator, and Engineer of Research.

K. Cooperative Research Agreement. The basic contract under which studies are conducted on a cooperative basis between the Department and the Research Agency.

L. Cooperative Highway Research Program Agreement. A contract agreement between the Research Agency and the Department activating the approved studies under the terms of the Cooperative Research Agreement.

M. Departmental Research Program. A program consisting of individual studies performed within the Department and activated by the approval of the State Highway Engineer on a fiscal year basis.

N. Research Study. An individual investigation having the limited aim of confirming a specific theory, supplying the design or data needed to complete a task, or reaching a study objective.

O. Demonstration Study. A study designed to apply research study results on an actual demonstration basis to show their value and applicability to familiarize field personnel concerned. (Demonstration study administration procedures will be the same as for research studies.)

P. Study Proposal/Renewal. A document submitted by the Research Agency or by the Department requesting initiation or continuation of a study. The document outlines the problem statement, objectives, work plan, budget, duration of the study, and other pertinent data.

Q. Study Agreement. The executed Study Proposal/Renewal (upon execution by the Research Agency and the Department) for each individual study under the Cooperative Research Agreement. The Study Agreement shall become a part of the Cooperative Research Agreement.

R. Work Plan. The section of the Study Proposal/Renewal which contains the detailed description of methods and/or procedures which will be used to conduct the study.

S. Study Budget. The total money required for the accomplishment of a specific study for a specified period of time.

T. Direct Cost. Expenses which include but are not limited to salaries, wages, travel, supplies, services, reproduction, equipment, and equipment rental.

U. Indirect Cost. Cost covering clerical, accounting, bookkeeping, ordering and other similar services rendered to the study for which no change is made elsewhere in the agreement. The charges cannot be in excess of 10% of all reimbursable expenses incurred, and are not applicable for the services of consulting personnel.

V. Research Fund Authorization (RFA). A document authorizing the expenditure of monies for a specific period of time to accomplish the objectives of a specified approved study.

W. Equipment. For the purpose of classification and acquisition, equipment is defined under the following headings:

1. Agency Owned Equipment. The instruments, machines, and apparatus which have been acquired and are used in the regular administrative functions of teaching, research, and scientific studies by the Research Agency.

2. Expendable Equipment. Equipment purchased for the accomplishment of a specific study which will be fully used or expended on the work and will have no residual value on completion of the study.

3. Non-Expendable Equipment. Equipment purchased and owned by the Texas Highway Department specifically required for the execution of a study or studies. The equipment retains value after each specific study assignment.

V. Fiscal Year. A twelve month period beginning September 1 and ending August 31.

W. Records. The official papers or evidence that describe the study findings, data taken, work time spent, monies expended, etc.

III. ORGANIZATION AND RESPONSIBILITIES

This chapter explains the organization and responsibilities of the various committees and individuals that are required to administer and operate the Cooperative Highway Research Program. The responsibilities of each individual or committee within the organization are spelled out with the understanding that additional duties may be assigned when necessary by the Engineer-Director, Planning & Research Division. (See Figures 1 & 2)

A. Research and Development Committee

1. The members of the Research and Development Committee are appointed by the State Highway Engineer.

2. Responsibilities

   a. To provide policy and direction to the Department Research Program.

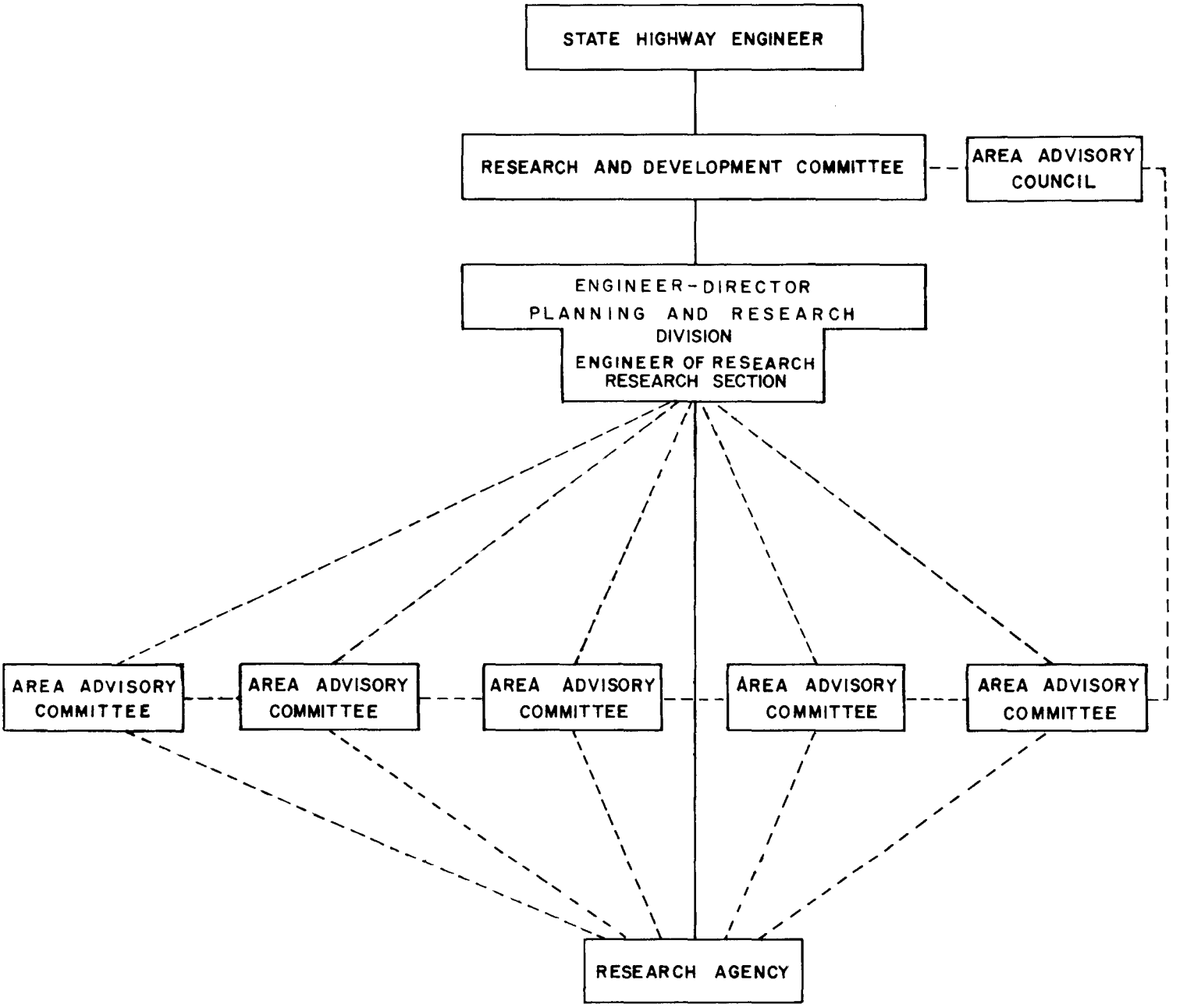
   b. To recommend the final Research & Development Program on an annual basis for approval by the State Highway Engineer each fiscal year, taking into consideration recommendations received from the Area Advisory Council.

B. Engineer-Director, Planning & Research Division

1. The Engineer appointed by the State Highway Engineer to direct the Cooperative Research Program of the Department. He will function as a member of the Research & Development Committee.

2. Responsibilities

   a. To conduct the research, funding, reporting and development of the recommended annual Research Program for the approval of the Research & Development Committee.

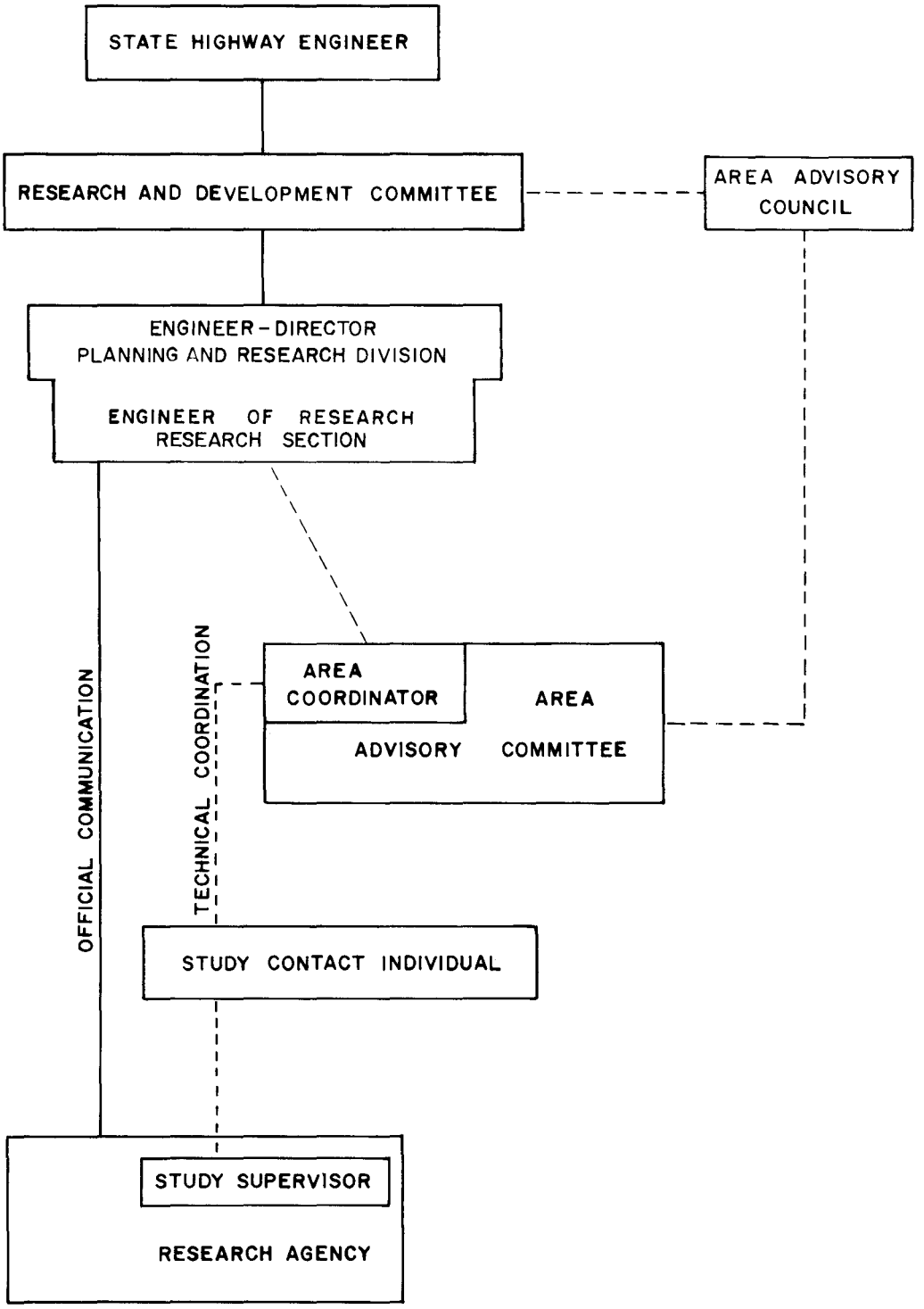


ORGANIZATION AND FLOW CHART

FOR

COOPERATIVE RESEARCH PROGRAM

Figure No. 1



ORGANIZATION AND COMMUNICATION
FLOW CHART FOR RESEARCH PERSONNEL

Figure No. 2

b. To secure and disseminate information, monitor all research activities and promote implementation of research results to the optinum extent.

C. Engineer of Research

1. The Engineer of Research functions as secretary of the Research and Development Committee and Ex-Officio member of each Area Advisory Committee. He is responsible to the Engineer-Director, Planning and Research Division for over-all supervision and management of the Research Section.

2. Responsibilities

a. To carry out such functions as directed by the Engineer-Director, Planning and Research Division.

b. To correlate the established Research and Development Program with the Federal Highway Administration, other agencies, and the Department.

c. To recommend studies, equipment for purchase, Advisory Committee members, study contact individuals, and other functions as designated by the Engineer-Director, Planning and Research Division.

d. To review, approve and distribute study reports.

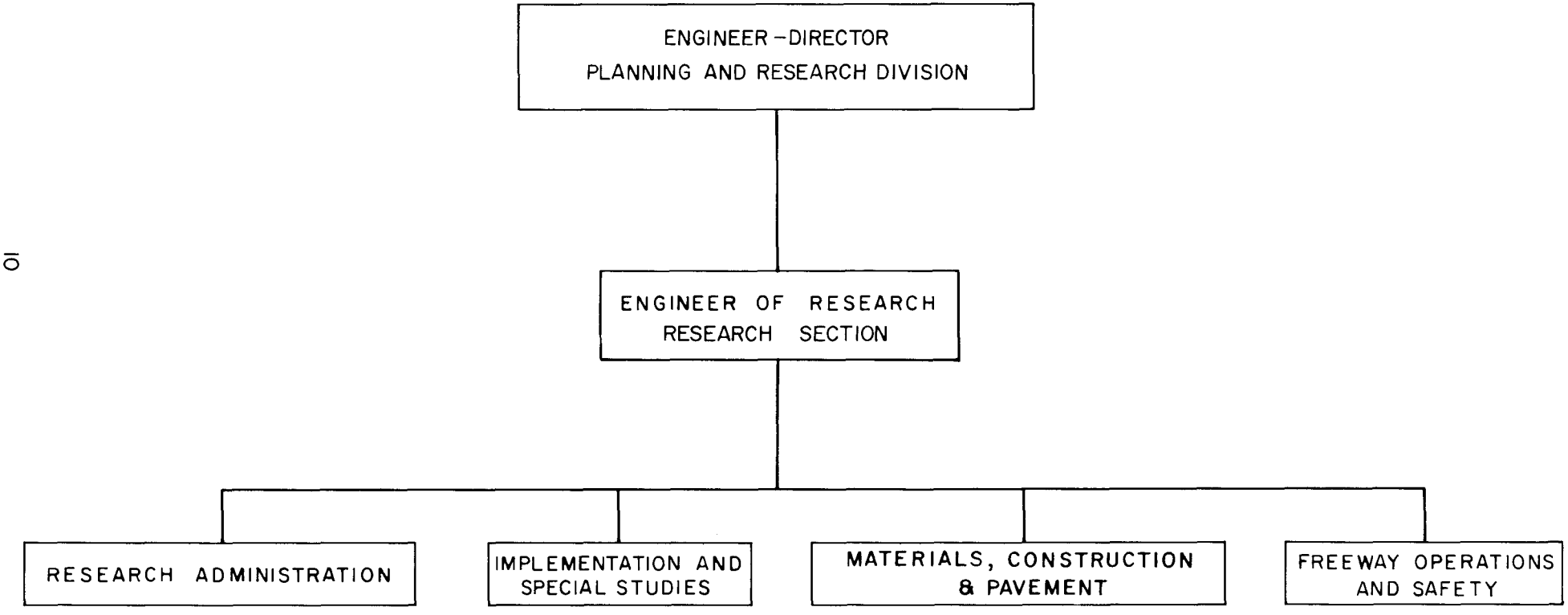
e. To recommend implementation of research study results.

f. To recommend demonstration studies.

g. In conjunction with the Committee Chairman and Area Coordinator, to call meetings of the Area Advisory Committee when the need arises.

h. To direct the administration and operation of the Research Section (See Figure 3)

ORGANIZATION CHART
D-10 RESEARCH



RESEARCH SECTION

Figure No. 3

C. Area Advisory Committee

1. Organization

The Area Advisory Committee is composed of Texas Highway Department personnel and consists of a chairman, elected by it's members, an area coordinator, and members. The number of members will vary in accordance with the needs of the study area concerned and will be selected from those Districts and Divisions with expertise in the appropriate Research Program area. The Area Coordinator will act as the secretary of the Committee. (See Figure 4)

2. Responsibilities of Area Advisory Committee

a. To function as an advisory committee for the studies assigned in the general area.

b. To anticipate and recommend research needs in the assigned area of responsibility.

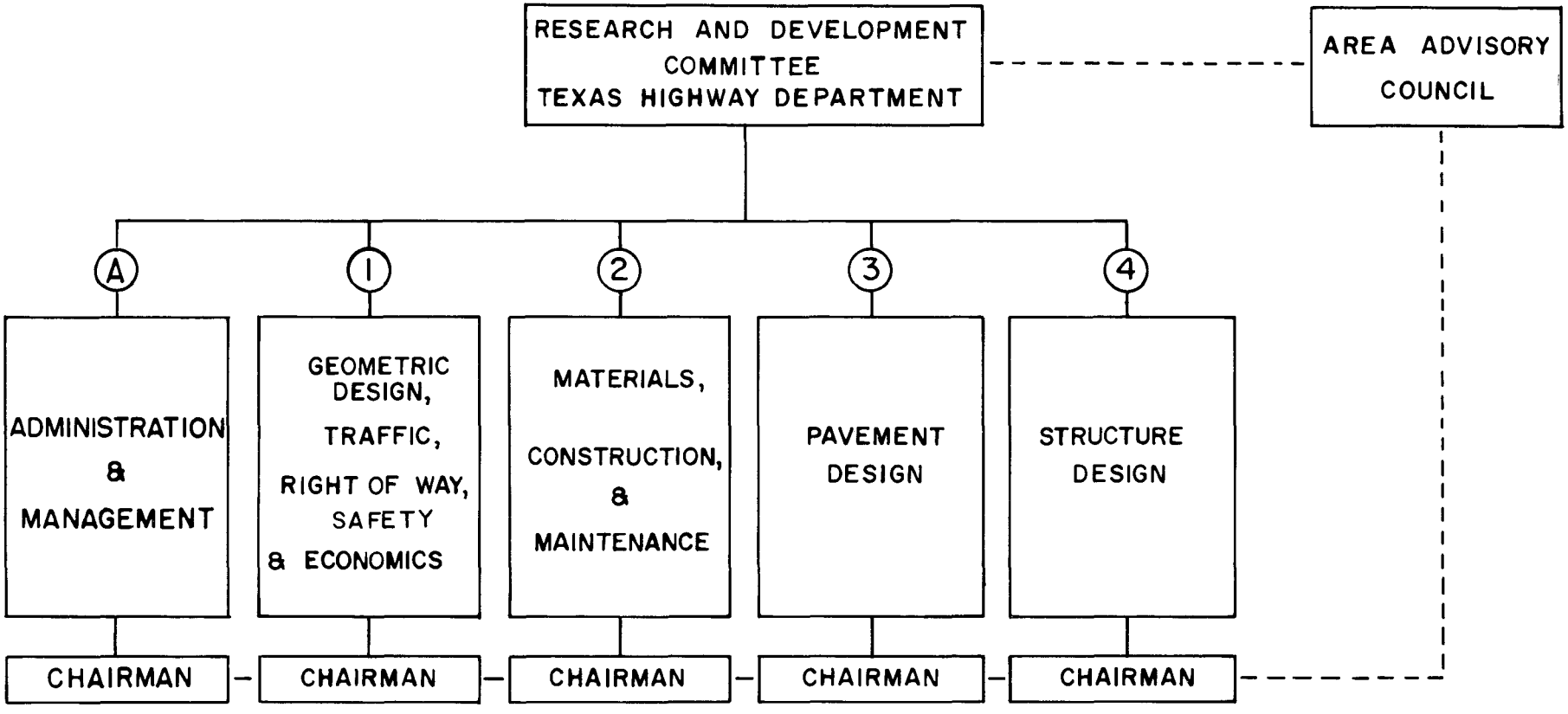
c. To assist in the dissemination and application of study recommendations, preferably in the form of a committee report, and to implement research findings and conduct demonstration studies.

D. Area Advisory Council

1. The Area Advisory Council is composed of the Chairmen of each of the Area Advisory Committees.

2. Responsibilities

To function in an advisory capacity to the Research & Development Committee in recommending research program



AREAS OF RESEARCH

FIGURE NO. 4

priorities, providing suggestions for guidance of on-going research studies, and encouraging implementation of research results in all areas. (See Figure 4)

E. Area Coordinator

1. The Area Coordinator is a member of the Area Advisory Committee.

2. Responsibilities

a. To perform the duties of the secretary of the Area Advisory Committee.

b. To express the wishes of the Area Advisory Committee in regard to area studies as appropriate within the scope of the committee.

c. To handle routine matters connected with the area of research assigned. This includes, but is not limited to, the review of the study reports, study proposals and study renewals.

d. To recommend appropriate application of area research results to Departmental specifications, standards, techniques, etc.

e. To coordinate appropriate matters with the area committee members, contact individuals, study supervisors, and the Engineer of Research.

f. In conjunction with the committee chairman, he will call meetings of the Area Advisory Committee when the need arises.

F. Study Contact Individual

1. The study contact individual is a Departmental individual appointed by a sponsoring Division.

2. Responsibilities

a. To function as a liaison individual between the study supervisor, the area research corrdinator and the Engineer of Research on matters related to his assigned study.

b. To maintain surveillance of the assigned study, noting its progress and direction, cognizant of its objectives as outlined in the study agreement.

c. To render a quarterly report on October 15, January 15, April 15 and July 15 on his assigned studies. (See Exhibit 1)

d. To recommend appropriate application of research study results to Departmental specifications, standards, techniques, etc.

G. Study Supervisor

1. The Study Supervisor will be responsible for the conduct of the study under the direction of the agency or division. The individual selected will be indicated on the Study Agreement.

2. Responsibilities

a. To conduct the study in accordance with the approved study agreement.

b. To direct the personnel working on the study and to execute the work in accordance with the approved plan of research.

c. To maintain a close liaison with the study contact individual.

d. To document the study and render required reports.

e. To assist as required in the implementation and demonstration of study results.

f. To render a quarterly report on research progress.

IV. STUDY PROPOSAL/RENEWAL STATEMENTS

A. General

Study proposals are to be submitted by the research agency and the Department to the Enginner-Director, Planning and Research Division, any time during the year (as the need arises.) An example form is shown in Exhibit No. 2 on page 47 which will generally meet the Department's requirement. Most of the required information is self explanatory; however, comments in this manual on selected sections of the proposal/renewal are made for clarification and guidance. It should be remembered that certain study proposal/renewals may require information for evaluation purposes which has not been anticipated and included in the example form.

B. Research Study Types

Studies are classified as Type A or Type B, depending upon the study objective, duration and total cost. (See Exhibit No. 2, page 47)

C. Budget Estimate for the Initial Fiscal Year

The budget estimate should include, but is not necessarily limited to, salaries, wages, reproduction, expendable supplies, travel, telephone, and equipment costs.

Careful consideration should be given in making the individual item cost estimates in order that the total estimates will be as accurate as possible. This procedure will make it possible for money available to be programmed to the best advantage in establishing an overall research program.

D. Cost Estimate for Succeeding Years

The requirements for cost estimates after the first fiscal year to completion are very important and should be determined as accurately as possible. The estimated cost to complete the study

and the number of years to completion should be indicated in the proposal/renewal.

E. Work Plan.

The Work Plan should be outlined in considerable detail as a guide to the study supervisor during the course of the study. Not only will this Work Plan be of value to the study supervisor, but to all connected with the program. It should fully describe the plan or approach that the supervisor intends to use and specify how the study will be structured and performed, showing how and when each element of the objective will be accomplished. The elements of the activity required to accomplish the objectives, with estimated timing, should be summarized on a chart as shown in Exhibit 2, page 53.

F. Researchers' Experience Sheet

Each study proposal, (and study renewal where there is a change in Study Supervisor), must be accompanied by a Researcher's Experience Sheet. Experience Sheets will show the principal researcher's experience, capability, and past performance on related research. They should be relatively brief, concise, and relevant to the study concerned. (See Exhibit 3, page 54)

V. FORMING THE RESEARCH PROGRAM

A. General

1. The proposed study, when submitted to the Engineer-Director, Planning and Research Division, may be accepted, rejected, or accepted but deferred until funds become available. A study proposal may be submitted at any time; however, the following procedure should be adhered to for the usual fiscal year program development.

B. Initiation Steps

1. Twelve copies of proposals/renewals (unsigned) are to be submitted to the Engineer-Director, Planning and Research Division on or before April 1 for review and recommendation.
2. The Engineer of Research will review and correlate as necessary to consummate a recommendation to the Research and Development Committee.
3. The twelve copies of research proposals/renewals are distributed by the Engineer of Research as follows:

7 copies	Research & Development Committee
1 copy	Sponsoring Division,
1 copy	Area Coordinator
4 copies	Federal Highway Administration

4. The Engineer of Research will submit recommendations to the Research and Development Committee on each proposal/renewal with supporting data from the Area Advisory Committee and interested Divisions.
5. The Research and Development Committee, with the recommendations of the Area Advisory Council, will evaluate and recommend a Research and Development Program commensurate with Departmental needs and available funds.

6. After the Research and Development Committee approves the study proposals/renewals, preliminary copies will be submitted to the Federal Highway Administration for review and approval.
7. After the studies are approved by the Federal Highway Administration, a recommended fiscal year program is formulated by the Research and Development Committee.
8. The Engineer-Director, Planning and Research Division, will notify the appropriate Departmental employees and agencies of studies approved for the fiscal year, and will request four signed copies of the Study Proposal/Renewal Agreements and four signed copies of the Cooperative Research Program Agreement. (See Exhibit 4, Page 55)
9. The recommended Cooperative Research Program is submitted to the State Highway Engineer for approval.
10. The Engineer-Director, Planning and Research Division, will distribute original, signed copies of the fully executed study agreements and Cooperative Research Program Agreements as follows:

a.	2 copies	Research Agency
b.	1 copy	File D-3
c.	1 copy	File D-10
d.	1 xerox copy	Division concerned

11. The Department will submit the Cooperative Research Program to the Federal Highway Administration for approval on August 1, or as soon thereafter as possible.
12. Upon notification by the Engineer-Director, Planning and Research Division, D-3 will issue a Research Fund Authorization (RFA) on each study approved, thereby authorizing work to begin for the new fiscal year.

An RFA must be requested by the agency for each new study agreement requiring expenditures for services or equipment by the Department. This also holds true for Departmental studies where services will be required by another Division/District of the Department other than the one to which the project supervisor is assigned. RFA requests should be submitted to D-10 for correlation with affected organizations as soon as it is determined that services are required. The Engineer of Research will forward the request to D-3 for action.

Upon approval, D-3 will issue the requested RFA's and notify all appropriate organizations accordingly. No charge will be accepted on any study unless authorized by an RFA. RFA's automatically terminate at the end of the fiscal year.

VI. EQUIPMENT, MATERIAL AND SUPPLIES

Supplemental to the definitions for classes of equipment given in Chapter II, the following methods and procedures for equipment acquisition, approval for purchase, reimbursement, and final disposition are given:

A. Agency-Owned Equipment. This equipment shall be available for the work of the study without rent or depreciation charges.

B. Expendable Equipment, Materials and Supplies. The estimated cost of this equipment shall be included in the budget as a separate category under "Expendable Supplies - Miscellaneous Items," but each individual item does not have to be listed unless the unit cost exceeds $500. D-3 will be the Division responsible for determining the specific items of equipment, materials and supplies eligible for reimbursement under this category. Upon acceptance of the final report, such items shall be disposed of by the research agency and credit given to the study, if appropriate.

C. Non-Expendable and/or Special Equipment. The acquisition of equipment of this class for a research study may be handled in either of the following ways:

1. The items may be rented by the research agency from the supplier and charged to the study upon written approval of the rental rate by the Department. This procedure should be used only if the items are not available for use from within the Cooperative Research Program.

2. Equipment and instrumentation should be purchased by the Department in accordance with the Cooperative Research Agreements. The following steps should be used in purchasing equipment:

   a. All requests will be submitted to the Engineer-Director, Planning and Research Division for correlation.

   b. If the requested items are not specifically itemized in the proposal, an explanation and justification as to the need must accompany the request. (If the total cost is more than $500.00 the purchase must be reported in the next quarterly report)

   c. Request should be made at least ninety (90) days prior to researcher's actual need for the equipment.

   d. Upon receipt, if the equipment is found operationally satisfactory, the researcher must acknowledge receipt in writing to the Engineer-Director, Planning and Research Division. This letter should contain all information which identifies the equipment:

      (1) Equipment description - this includes the brand or trade name and model number

      (2) Serial number - if no serial number is available then a THD tag number should be requested.

      (3) Location of the equipment

      (4) Date purchased

(5) Cost

(6) If the item is constructed, major component parts should be listed

3. If included in the approved budget, research and development equipment, devices, or systems may be built by the research agency. (Modification costs required to alter or change available equipment to perform a research function are also included in this category.) Component parts and materials may be purchased either by the research agency or the Department, with costs reimbursable when work order identity and property supported vouchers are submitted. Component parts costing more than $500.00, not itemized in the proposal, will require specific approval from the Department. Requisitions for component parts to be purchased by the Department will be handled as indicated in Item C, 2d, (1) through (6) above.

Under the above procedures, actual maintenance and repair costs may be charged to the study.

All equipment purchased or constructed belongs to the Department and is to be identified accordingly. File D-4 is the Division responsible for maintaining the equipment inventory. Disposition of equipment will be handled through the Engineer-Director, Planning and Research Division in coordination with File D-4. Expendable equipment, materials and supplies shall be disposed of by the research agency and credit given to the study as appropriate. The Engineer of Research should be kept informed of the permanent location of research equipment.

It is the responsibility of the research agency (in the case of a Departmental study, the study supervisor), to insure the safekeeping and proper use of research equipment.

VII REPORTS

A. Purpose of Reports

Reporting procedures are designed to:

1. Assure establishment and maintenance of an adequately documented official record of all research and development studies;
2. Insure that work progress on a study is proceeding in accordance with the terms of a contract or agreement;
3. Provide for early disclosure of significant scientific and technical breakthroughs or the solution of problems;
4. Provide for final documentation and dissemination of technical findings; and,
5. Promote the implementation of study results.

B. Types of Reports

1. Interim and Final Reports

a. Submission and Publication Requirements

(1) Interim Reports - Interim Reports are to be submitted when major phases of a study are completed as stipulated in the approved work plan, or when significant scientific breakthroughs are realized.

All published reports will be provided to the Department as soon as possible after approval and in no case later than 90 days after acceptance. If the 90 day deadline cannot be met, the Department should be notified as soon as possible of the approximate date the report will be published.

(2) Final Reports

Final reports are required upon completion of all research studies. They shall completely document all data gathered, analyses performed, and the results achieved. For studies where a number of interim reports have been published, the Final Report may be a summary of all prior work provided adequate detailed documentation of the work completed has been published previously. All terminated study reports shall be submitted for review and approval as soon as practical, but in no case later than 90 days after termination of the study. If the 90 day deadline cannot be met, the Department shall be notified with a written justification.

b. Uniform Provisions for Iterim and Final Reports

(1) The report will include one completed Report Standard Title Page. This page will be the first right-hand page following the cover. (See Exhibit 6, pages 59 & 60)

(2) A summary (preferably one page) will be included in the report, consisting of a clear, concise, popular statement or any significant developments, discoveries, breakthroughs, or other events, together with their meaning, potential application, and subsequent benefit to the Department. This summary should be prepared in popular language (devoid of complicated scientific terminology)

so that persons in other disciplines may achieve an understanding of the research presented.

(3) Each report should contain a summary statement on research implementation. This statement should point out practical applications of research findings, recommend procedures for implementation of expected benefits and/or recommend additional work needed to achieve implementation. The statement should be prepared cooperatively by the researcher and appropriate state personnel in the area of concern.

(a.) The implementation statement should answer such inquiries as:

1. Do the findings warrant

   the application of new procedures?

   the issuance of new specifications, standards, or designs?

   the use of new materials?

   the development of new equipment?

2. Do the findings indicate

   the rejection of proposed new procedures?

   a determination that no problem existed?

   an implementation for other positive benefits?

   a justification of other research needed?

(b.) The report should indicate the proposed means and mechanisms for translating the research product into applicable form for use by operating personnel.

(c.) The potential benefits to be derived from implementing the research findings should be in terms of savings

in time, money and lives, increased safety, better service, improved esthetics, enhanced capability of solving transportation problems that may accrue in the highway engineering profession, and other user and nonuser benefits. Where dollars are involved, an effort should be made to estimate the first year savings and the expected subsequent average annual savings anticipated from application of the research results.

(d.) If the findings were positive, but not suitable for immediate application, the report should indicate the extent of additional work needed to produce results suitable for implementation; e.g., additional research, development or field testing.

(4) A credit reference to the FHWA, such as the following, will be given:

"Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration".

(5) A disclaimer statement similar to the following will be included:

"The contents of this report reflect the views of the author(s) who is (are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification, or regulation."

(6) After a report has been accepted and published, the material contained therein is to be regarded as information in the public domain, and its further use (both oral and written) does not require approval.

(7) Unless otherwise instructed, ten (10) draft copies of the report should be submitted to the Department for approval. The draft copies of the report will be distributed by the Engineer-Director, Planning and Research Division, as follows:

5 draft copies of a Final Report to FHWA.

4 draft copies of an Interim Report to FHWA.

1 copy to File D-10

1 copy to the Area Coordinator

1 copy to each Division concerned (Attn: Contact Individual or Assistant)

(8) The published version of a report shall not be copyrighted or contain other restrictions which prohibit distribution and reproduction of the report by the Federal Government and the Department.

(9) Research reports should be written in language which can be readily understood by those who will apply the study findings. For example, if additional research is needed, the language should be such that the researchers who will continue the work can readily

assimilate and use the findings of the work completed. If the results are suitable for immediate implementation, the report should be prepared in language that can be easily followed by the practicing engineers.

2. Summary Reports

A summary report will be prepared to accompany each final and interim draft report for approval. This report is a highly condensed version of an interim or final report and is oriented to the highway administrator responsible for setting policies, procedures, and engineering practices. The report should present the study's technical aspects, conclusions, and recommendations clearly and concisely so that the significance of the completed work can be quickly assimilated and can provide a basis for management decision. Concepts should be presented in plain language with study details omitted or briefly summarized. The provisions of paragraphs B1 b(4) (5) (6) (7) (8) (9) (Page 27) apply to summary reports. The following format may be used:

a. Introduction - A brief statement of the problem and study objectives.

b. Conclusions and Recommendations - A clear statement of study findings and their meaning to the highway administrators.

c. Implementation Guidelines - A practical statement of the innovations in policies, procedures, and engi-

neering practices which will implement the findings, and the expected benefits of such innovations.

e. Demonstration Proposals - Objectives for experimentation or demonstration which may be undertaken before the innovations are adopted as standard practice.

f. References - Other study reports.

3. Film Reports

Where motion pictures, film clips, or sets of slides are produced in connection with a study, a minimum of one reproducible copy of the film or slide documentation is required for the Department. Additional copies may be requested on an individual basis. The master copy of any film produced should be available for subsequent use as necessary. The provisions of paragraphs B1 b (4) (5) (6) (8) (Page 27) apply to film reports.

Motion pictures which cost more than $500 to produce and are not specified in the approved proposal/renewal for the study require the prior approval of the Department.

4. Papers or Articles Presented or Published

a. Papers (articles and bulletins) which contain significant technical findings previously undisclosed from a study shall not be presented publicly or published without prior approval by the Department.

b. Submission of technical papers to professional or technical organizations such as the Highway Research Board should be concurrent with submission through

normal channels to the Department. This will allow sufficient time to satisfy the requirement for prior Department review and approval.

c. All papers should contain the credit reference and disclaimer statement specified in paragraphs B1b (4) and (5).

d. In unusual cases when the scheduled time for the preparation of a paper containing previously undisclosed findings does not permit time for formal review and acceptance, an abstract and notification of intent to present the paper should be submitted through normal channels for concurrence. To protect the interests of the sponsoring agencies, such presentations should contain (1) a statement that the sponsoring agencies have not reviewed the paper, (2) the disclaimer statement, and (3) the credit reference specified in paragraph B1b (4). Draft copies of these papers should be submitted to the Department for review and acceptance as soon as completed.

e. Papers containing subject matter and technical findings substantially similar to that covered in a report which has been previously approved for publication do not require any further Departmental review but should include the disclaimer statement and credit reference specified in paragraph B1b.

5. Quarterly Progress Reports

For all studies in the research program, quarterly progress reports shall be submitted for each calender quarter. The first report is due at the end of the first calender quarter in which a study has been in an approved status for over 60 days, and as shortly after Dec. 1, March 1, June 1 and Sept. 1 as possible, but no later than the 10th of the month. Ten (10) copies of the progress reports are required and the Engineer-Director, Planning and Research Division will make distribution as follows:

a. 4 copies to FHWA

b. 1 copy to the Area Coordinator

c. 1 copy to each Division concerned (Attention - Contact Individual or Asst. Contact Individual)

d. 2 copies D-10 File

The reports shall contain sufficient information to enable technical coordinators to evaluate the progress and possible future course of a study. The following should be included in each report: (See Exhibit 5, Page 58)

a. Heading - pertinent data to identify the study.

b. Progress - summarization of work accomplished; specifically, items completed during the quarter ahead of schedule and those tasks

behind schedule should be enumerated. An estimate of the percentage of the total work accomplished through the quarter should be given.

c. Finances - figures should be given showing the total estimated cost of the study, total amount of money spent to that date, estimated budget for the current work program, and expenditures under the current work program to date. Large studies involving a team effort of several disciplines may require periodic conferences in addition to quarterly reports. A complete record of such meetings shall be made and a copy furnished to the Department.

d. Interim or Final Reports - an estimate should be given as to when the Department can expect submittal of the next research report.

e. Other Pertinent Information

(1) Problems - technical problems, including comments or requests for assistance, should be enumerated. Also, a change in principal investigator or indications of insufficient funds should be reported.

(2) Research Implementation - a brief description of the potential application of significant technical information developed during the quarter should be given, as well as a

description of steps being planned to implement these findings.

(3) Planned Work - a description of work planned for the next quarter will be given.

(4) Work Plan Modification - any planned modification to the work plan will be mentioned in detail, as well as information as to when the Department can expect formal submittal of the proposed revision.

VIII

GUIDELINES FOR ASSESSING AND IMPLEMENTING RESEARCH RESULTS

A. General

The research performed was designed to meet the needs of the Department and therefore the findings of each study must be carefully assessed for use. Unless this essential step is carried out, the value of the research cannot be realized.

B. Assessing Research Results.

In the evaluation of study results certain considerations are essential. The following points are presented as an aid and should not be considered as conclusive:

1. Do the study results have potential application?
2. Are the results practical for application to the highway system?
3. Where in the highway system can the results be applied?
4. Will the use of the results enhance the state-of-the-art?
5. What will be the economic result if the findings are applied to the highway system?
6. Should a demonstration of the results be made to the interested Divisions or Districts?

C. Implementing Research Results.

In order for the results of the study to be of value they must be appropriately implemented for use in the highway system. This may be accomplished by use of the following suggested procedures:

1. Apprise responsible individuals of the significance of the findings. (The value of personal contact cannot be overemphasized.)

2. Conduct demonstrations for organizations as appropriate.
3. Recommend that the results be integrated into the highway system by their inclusion into specifications, standards, procedures, methods or techniques.

IX GENERAL ADMINISTRATION, OPERATING PROCEDURES AND SERVICES

A. General

Smooth operation of the Cooperative Research Program depends to a limited extent upon written rules, procedures and regulations. Its success hinges to a far greater degree upon dedicated individuals doing what is required to make each task succeed. However, with dedicated capable individuals and a few standard procedures and guidelines, recurring tasks can be accomplished with minimum effort. This chapter covers a few things that will be helpful to persons just entering the Cooperative Research effort as well as experienced researchers.

B. Notification Regarding Special Tests

In many studies special tests are required which have a unique significance to concerned persons. It is obvious that their witnessing of the test may prove to be of considerable benefit. In such cases, arrangements should be made for appropriate personnel to be present during the testing. The essential information should be telephoned to the Engineer of Research. In turn, the appropriate people will be notified both in the Department and the Federal Highway Administration.

C. Purpose And Use of Technical Memorandums

It is frequently advantageous for individuals involved in the Cooperative Research effort to communicate in writing with one another on technical matters. The means for this has been provided through the Department's and Research Agencies' Technical Memorandums. The Technical Memorandum should not be used as a means for official correspondence. Policy, procedures, action

items, budget matters or other official commitments are not to be included in Technical Memorandums. Neither should a Technical Memorandum be referenced in official correspondence or in a report. It is signed by the writer, and as a matter of courtesy, the Engineer of Research is provided an information copy to enable him to keep abreast with current developments. An advantage of the Technical Memorandum is that it is the most rapid means of mail communication. It goes directly from the writer to the addressee, by-passing all official channels.

The use of the Technical Memorandum is encouraged within the guidelines covered in the above paragraph. Departmental personnel can obtain the Texas Highway Department Technical Memorandum form No. 1292 through File D-10, Research Agency personnel can obtain the form through their respective organization.

D. Scripts, Photographs, And Publicity

Occasionally, organizations prepare scripts for various purposes regarding matters involving the Cooperative Research Program. In all cases approval should be obtained through established lines of communication. Permission to use Departmental photographs should be cleared in this same manner.

A file is maintained in the Department regarding Departmental research publicity. It consists of newspaper articles, magazine articles, etc. Therefore, it is desired that D-10 be provided copies of pertinent publicity for the file.

E. Out-Of-State Travel

Out os state travel is not authorized unless specifically approved by the State Highway Engineer. Requests for out-of-state travel should be submitted for each case through normal administrative channels. Normally out-of-state travel is not approved.

F. Major Changes In Personnel

A major change in study personnel is to be submitted to the Department for approval. Minor personnel changes involving the study should be noted in either the quarterly or annual report.

G. Change In Objective And Scope

Changes in the objective and scope of a study which may have a significant bearing on the research shall be fully documented and forwarded for approval to the Department.

H. Method Of Study

When the basic method of study outlined in the agreement is to be changed to a degree which may substantially affect the outcome of research, such changes shall be outlined in detail and forwarded to the Enginner-Director, Planning and Research Division for approval.

I. Specialized Services

Specialized services required beyond those itemized in a study work plan shall be forwarded to the Engineer-Director, Planning and Research Division for approval.

J. Files And Records

All records, which include working files, test data, correspondence etc., must remain intact for a period of three (3) years after the study has been financially closed out. In certain cases this may mean that the files must remain intact for a period of approximately five (5) years since it may take two years after termination to close out all financial matters. Furthermore, files should be considered open for inspection by responsible Department and Federal Highway Administration personnel at any time.

K. Computer Programs

Computer programs developed for use by the Department must be programmed so that they will operate without modification on the Texas Highway Department's computer system. Furthermore, except in unusual cases, core storage requirements for each program should be restricted to 100,000 Bytes. Plans for all proposed automated procedure developments must be coordinated with the Division of Automation for review of hardware and system requirements. Funds may be required for testing programs on the Department's computer system, and if so, the requirements should be included in the study budget.

L. Research Services Available

1. Library Services

Library facilities are available through the Cooperative Research Program located at the Texas Transportation Institute. The purpose for this is to provide research library service to the Texas Highway Department and Research Agencies. Requests for services should be addressed to D-10.

2. Highway Research Information Service (HRIS)

HRIS is an automated information storage and retrieval system developed by the Highway Research Board with financial support from the State Highway Departments and the Federal Highway Administration. A HRIS run is a collection of computer printout sheets, each of which is an abstract of a report, magazine article, or research project dealing with a specific topic. Requests for such runs should be directed to the Research Section, File D-10. The subject requested should be stated in the most specific terms possible.

3. Research Digest

The Digest is published by D-10 for the purpose of informing Departmental and Research personnel of publications available. The publications are generally available on a loan basis only.

4. Information Exchange

Many new research ideas, techniques, and procedures are developed by Departmental personnel which are of value on a state-wide basis. Those who have developed or discovered such new ideas are encouraged to share them with the Department as a whole. To facilitate dissemination of the information, contact D-10 by any appropriate means.

EXHIBITS

TEXAS HIGHWAY DEPARTMENT

CONTACT REPRESENTATIVE
RESEARCH STUDY REPORT

I. Research Study No.

II. Date of Report.

III. Names of Persons involved.

IV. Is the study progressing according to the Work Plan and objectives of the study as stated in the agreement?

V. Has any of the research progressed to the point that implementation of the results should be started by the Department?

VI. Remarks.

_____
Signed
Texas Highway Department
Contact Representative

cc: Division Head
Study Supervisor
Engineer of Research
Area Coordinator

Exhibit No. 1

STUDY PROPOSAL/RENEWAL
AGREEMENT

BETWEEN
TEXAS HIGHWAY DEPARTMENT

AND

_____

_____
agency

For Fiscal Year: 197_____ - 197____ Study Type_____*

Study Title:_____

_____

Study Number_____ _____ _____ _____ Federal No._____
Agency Div. No. Beg. Yr. No.

This is the_____ year of a_____year study.

Estimated Total Study Cost: _____

Expenditures through August 31, 19___ _____

Estimated Cost for: September 1, 19___to August 31, 19___ _____

Estimated Cost to Completion of Study: _____

Proposal/Renewal Prepared by:_____Date:_____

Study Supervisor:_____Title_____

Recommended for Approval:

_____ Date:_____
Official Title-Agency

_____ Date:_____
Engineer - Director, Planning & Research
Division

_____
Date Approved by FHWA

Exhibit No. 2

*See page 47

Study Title and Study Number

Estimated Budget for the Period September 1, 19 to August 31, 19

A. Direct Costs

Salaries and Wages

Professional Services (man-yr.) _____

Sub-Professional and Technical Services (man-yr.) _____

Clerical Services (man-yr.) _____

Total Salaries and Wages _____

Expendable Supplies - Miscellaneous Items

Reproduction and Expendable Office Supplies

Equipment Rentals, IBM Cards, etc. _____

Total Supplies _____

Operating Expenses

Travel _____

Telephone _____

Others _____

Total Operating Expenses _____

Equipment (list equipment to be rented)

Rental _____

Total Equipment Rental Cost _____

Total Direct Cost _____

B. Indirect Costs: _____

C. Services and Equipment to be Provided by the Department (include salary, travel, expenses for Contact Individual or other Departmental personnel connected with the study).

Services _____

Equipment Purchase _____

(List items of Equipment to be purchased)

Total Services and Equipment Cost _____

Total Study Cost _____

Date: _____

Study Title and Study Number

D. Study Problem Statement: (see page 48)

E. Background and Significance of Work. (see page 48)

F. Objectives of Study: (see page 49)

G. Accomplishment: (A summary of progress to date for renewals; a brief statement concerning the "state of the art" for new projects)

H. Implementation (Application) (see page 49)

I. Benefits (see page 51)

J. Work Plan (see page 51)

K. Work Time Schedule (see page 52)

L. Level of Effort (see page 52)

M. Staffing Plan (see page 52)

N. Computer Programs (see page 52)

O. Facilities Available (see page 52)

Research Study Types

Studies are classified as Type A or Type B, depending on the objective, duration and total cost.

a. Type A Studies

The total cost of these studies exceeds $25,000 and/or the time required to complete the study exceeds 24 calendar months.

b. Type B Studies

These studies include research and development of the following types:

1. Short-term, low-cost studies having a well-defined limited objective.

2. Evaluation studies of new materials, techniques, and processes. These may be preliminary studies, or may be research and development activities directly concerned with experimental construction or operational studies. Excluded from this category are field or laboratory evaluations of competitive materials done on a regular or recurring basis for the purpose of periodically preparing or revising purchase specifications.

3. Exploratory, survey, or feasibility studies. These may be short-term preliminary investigations of the applicability of a new material, concept, or procedure to highway transportation which may subsequently lead to larger scale (Type A) studies.

(a) Limitations on a Type B study

(1.) The total cost of a single Type B study shall not exceed $25,000 or require more than 24 calender months to complete. Type B studies may be extended or allocated more money with the prior approval of the Department and in accordance with established procedures.

(2.) The total expenditure for nonexpendable special equipment purchased or rented for use on these studies shall not exceed 20 percent of the total cost of the study. The estimated salvage value of the equipment should not be considered in this determination. If expenditures for equipment are to exceed this limitation, adequate justification should be provided to the Department for approval.

(3.) Exceptions to these limitations are long-range, performance-evaluation studies of construction materials or processes for such studies. After the initial research tests associated with installation or construction have been completed, performance evaluation may continue at an annual cost of not more than $5,000 until such time as it becomes evident that additional information of interest or experimental value is unlikely to develop, or for a maximum not to exceed eight (8) years, whichever is lesser.

PROBLEM STATEMENT - This should be a clear and concise statement of the problem to be solved by the proposed research.

BACKGROUND AND SIGNIFICANCE OF WORK - Here should be a statement:

a. Describing the findings of a literature search (complete or partial) or furnishing other indications of existing technology.

b. Indicating the researcher's understanding of the underlying principles involved.

c. Tracing the relationship of prior research to that now proposed, and

d. Supporting the researcher's approach to the problem.

OBJECTIVES OF THE STUDY - (If the objective and scope has not changed since the proposal/renewal was approved, this fact should be stated (first.) These are the technical objectives upon which the study staff is to focus attention and upon which study efforts are to coverage. The objectives should be phrased in positive terms, (e.g., "to develop," "to determine," "to measure," etc., rather than broad generalities such as "to investigate," "to study," etc.). The objectives should clearly and concisely identify (in about 25 words) the results being sought. As the focal point of the study, the attainment of the objectives must be recognizable as the terminus of the study.

Where some latitude exists in the selection of the scope of a study, maximum and minimum objectives indicative of the range that a study may have and still be a potentially profitable endeavor should be stated. If this is done, the maximum and minimum applications, benefits, costs and study duration should also be stated.

IMPLEMENTATION (APPLICATION) - The HP&R research and development program ordinarily directs its primary research effort toward the solution of operational problems. Most of the research performed under this program, other than theoretical studies, is undertaken with the expectation that the findings can be translated into immediate practice. The proposal should include the researcher's assessment of potential areas for **application** of the research findings, such as changes in specifications, standards, policy statements and other Highway Department practices. For theoretical studies the researcher should indicate the potential of the new knowledge in the ultimate solution of problems.

Preparation of this portion of the proposal may be facilitated if the researcher discusses the subject with State Highway Department personnel concerned with operations in the area to be studied. For studies which are expected to provide results which may be utilized either during the progress of a study or shortly after completion, the proposal should include the researcher's assessment of:

a. The form in which the findings might be reported (mathematical model or formula, laboratory test procedure, design technique etc.)

b. The organization logically responsible for application of the results. (i.e., American Association of State Highway Officials, Federal Highway Administration, State Highway Department, etc.)

c. The specific medium of practice that would be changed by the findings. (i.e., AASHO Standard Specifications, State Highway Department Standard Specifications, etc.)

d. The means by which the research findings might best be conveyed to operational people for utilization or application (circulation of written report resume, personal contact between State Highway Department research and operating engineers, demonstration, etc.)

If the findings of a study will not be suitable for immediate application the research proposal should set forth additional steps which are required prior to implementation (i.e. testing for verification and subsequent correlation and interpetation of the additional research).

BENEFITS - Benefits anticipated from the study findings should be enumerated. These might be advantages gained by the traveling public in terms of savings in time and money, increased safety, better service or improved aesthetic quality. Reduction in the initial cost of a product or an improvement in its durability are also possible benefits.

WORK PLAN - The work plan should fully describe the intended plan or approach to the problem, and specify how the study will be performed to meet each study objective. The work plan should contain the following information, depending upon the type of study:

a. Applied Research (problem oriented)

1 Principles or theories to be used in the solution.

2 Possible solutions of problem.

3 Critical experiments to test the applicability of the theory.

4 The kind and range of variables to be tested.

5 Experimental facilities available.

6 Data analysis and statistical procedures

b. Development

1 The device, process, material or system to be developed.

2 The applied research upon which the development is to be based.

3 Method(s) to solve problem.

4 The work plan to complete the development.

5 The kind and range of variables considered in the development.

6 Facilities available for the development.

7 Data analysis procedures to be used, including adequate statistical methods.

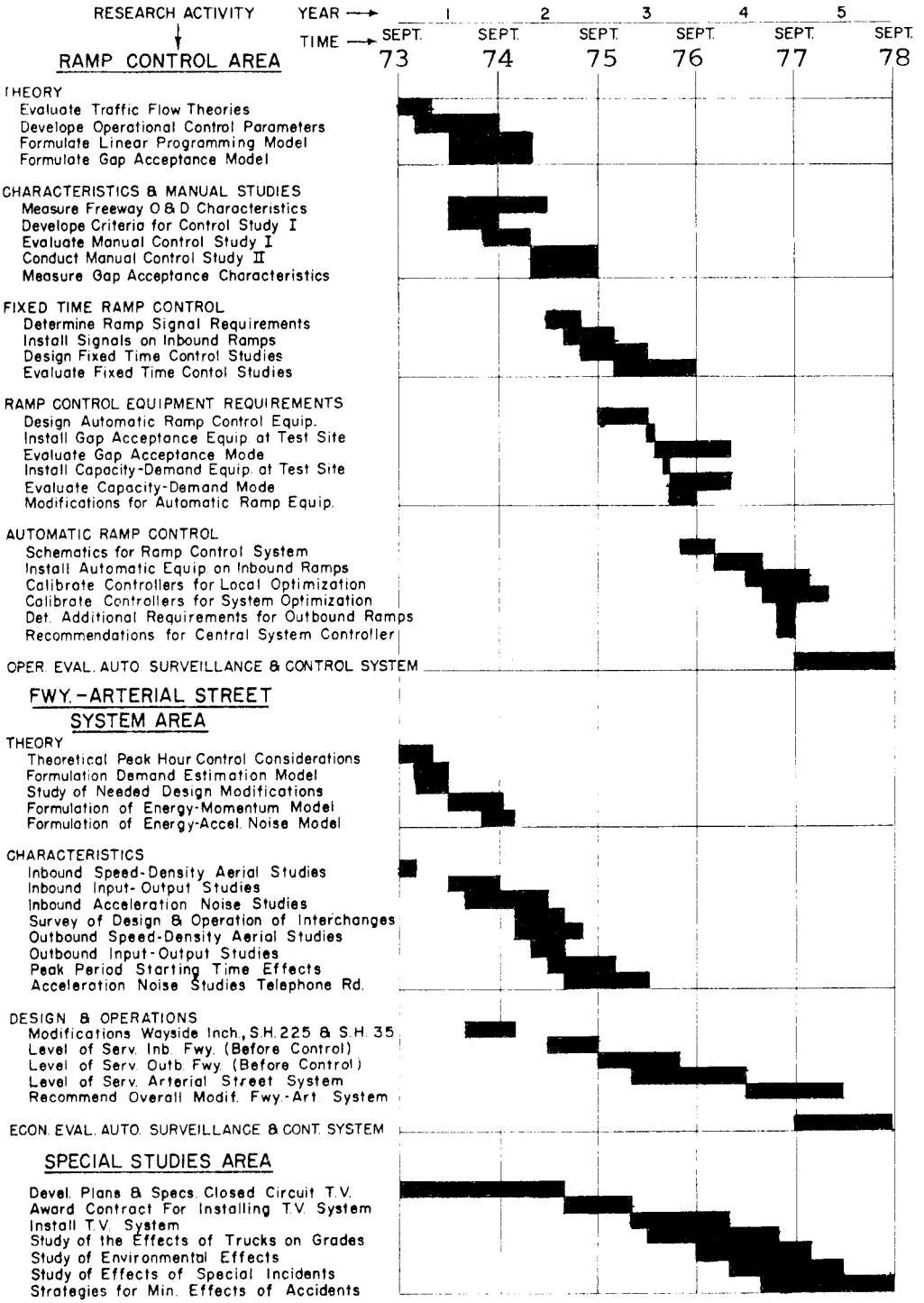
A "STAFFING PLAN" - should indicate the capabilities, staff organization and function of the study personnel, with information on their availability and necessary augmentation to properly conduct the study, relative to specific aims and procedures.

The "LEVEL OF EFFORT" - should show the percentage of the effort for intermediate parts of the overall plan in terms of the total effort and professional manpower. Breakdown by HP&R work program periods is desirable.

The "FACILITIES AVAILABLE" - should describe the general facilities at the study supervisor's disposal which are important to the conduct of his work.

COMPUTER PROGRAMS - Computer programs developed for Departmental use must be compatible with Departmental computer facilities. (See Chapter IX, paragraph K, page 40)

WORK TIME SCHEDULE - A bar chart, CPM diagram, or other type of flow chart should be provided in the study proposal to illustrate the interrelationship and scheduling of the major operational tasks of the study. (See page 53)



SCHEDULE OF RESEARCH ACTIVITIES

RESEARCHER'S EXPERIENCE SHEET

NAME: AGE: DATE PREPARED:

TITLE:

EDUCATION:

AREA OF SPECILIZATION:

EXPERIENCE:

PROFESSIONAL LICENSES:

PUBLICATIONS:

OTHER INFORMATION (i.e., society memberships, honors, patents, etc.)

Exhibit No. 3

_____

and

TEXAS HIGHWAY DEPARTMENT

CO-OPERATIVE HIGHWAY RESEARCH PROGRAM AGREEMENT

For Fiscal Year September 1, 197__, through August 31, 197___

State and Federal Aid Projects

Research Agency: _____

_____

The program listed on Exhibit A attached hereto and described in the respecive project agreements is hereby approved for activation under the terms of a Cooperative Research Agreement dated_____, _____, between the_____ and the Texas Highway Department relative to highway research. The conduct of each study is contingent upon availability of funds. Transfer of funds between approved projects during the fiscal year may be made when requested in writing by the Director of the (Name of Research Agency) and approved by the Research and Development Committee of the Texas Highway Department.

_____	_____
State Highway Engineer Texas Highway Department	Title of Agency, Director
Date:_____	Date:_____

Exhibit No. 4

Exhibit A

_____

and

TEXAS HIGHWAY DEPARTMENT

COOPERATIVE HIGHWAY RESEARCH PROGRAM AGREEMENT

For Fiscal Year September 1, 197___through August 31, 197____

State and Federal Aid Projects

RESEARCH STUDY RENEWALS

Study No.	Title	Study Budget
	Total (Renewals)	

RESEARCH STUDY PROPOSALS

Study No.	Title	Study Budget
	Total (Proposals)	
	Total Research Study Program	

COOPERATIVE HIGHWAY RESEARCH PROGRAM AGREEMENT

(Continued)

DEMONSTRATION STUDY RENEWALS

Study No.	Title	Study Budget

Total (Demonstration Renewals)

DEMONSTRATION STUDY PROPOSALS

Study No.	Title	Study Budget

Total Demonstration Study Proposals

Total Demonstration Program

Grand Total (Program)

TEXAS HIGHWAY DEPARTMENT

REPORT ON RESEARCH PROGRESS

Study No._____

Federal No. _____

Annual (or Quarterly) Report for the Period

_____1, 19___ - _____31, 19____

for

_____
(Study Title)

by

_____
Study Supervisor

A. PROGRESS

1. Percentage of planned work accomplished this fiscal year_____%
2. Summarize work accomplished
   (Specify items completed during quarter ahead of schedule and those behind schedule.)

B. FINANCES

1. Total estimated study cost_____
2. Accumulated expenditures from inception to date _____
3. Budgeted cost for current work program _____
4. Current work program expenditures to date _____

C. EXPECTED DATE OF NEXT INTERIM OR FINAL REPORT

1. Interim Report_____
2. Final Report _____

D. OTHER PERTINENT INFORMATION

1. State problems
2. Brief implementation statement*
3. Describe work planned for next quarter
4. Detail any proposed major modifications of the Work Plan, and advise when formal request for approval will be made.

*Identify and describe briefly the potential application of significant technical information developed. Describe steps being planned, taken or recommended to implement these findings. Provide periodic followup information on benefits of those items previously reported and implemented.

Exhibit No. 5

REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle		5. Report Date
		6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
9. Performing Organization Name and Address		10. Work Unit No.
		11. Contract or Grant No.
12. Sponsoring Agency Name and Address		13. Type of Report and Period Covered
		14. Sponsoring Agency Code
15. Supplementary Notes		
16. Abstract		
17. Key Words	18. Distribution Statement	
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages / 22. Price

Exhibit No. 6 (see directions on following page)

GUIDELINES FOR FILLING OUT THE REPORT STANDARD TITLE PAGE

1. Items 1, 2, 3, 6, 10, 14, 18, and 22 should be left blank.

2. Item 4 - Include title as written on cover.

3. Item 5 - Insert report date as indicated on title page.

4. Item 7 - Include names of authors.

5. Item 8 - Include report number.

6. Item 9 - Include the name and address of the research agency.

7. Item 11 - Write in complete study number.

8. Item 12 - Write in: Texas Highway Department; Planning & Research Division; P.O. Box 5051; Austin, Texas 78763

9. Item 13 - Include "Interim" or "Final" and period report covers - if applicable.

10. Item 15 - Included the phrase, work done in cooperation with FHWA, DOT." Also include the title of the study.

*11. Item 16 - Include a brief (not to exceed 200 words) summary of the most significant information contained in the report. If the report contains a significant bibliography or literature review, it should be mentioned.

**12. Item 17 - Select terms or short phrases which identify the principal subjects covered in the report and are sufficiently specific and precise to be used as index entries for cataloging.

13. Items 19 and 20 - Insert the word "unclassified".

14. Item 21 - The total number of pages should be inserted.

* This abstract may replace the one required previously in the front of the report.

** These key words may replace these previously required at the bottom of the abstract page.