

# LTRC

## MANUAL OF RESEARCH PROCEDURES



July 2019 Edition

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# 1 FORWARD

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The purposes of this manual are as follows:

- To define the policies and procedures for the Louisiana Transportation Research Center (LTRC) research and technology transfer (T<sup>2</sup>) program and its various functions.
- To ensure that all research and T<sup>2</sup> is conducted, managed, documented, and implemented in conformance with legal requirements and policies of LTRC, the Louisiana Department of Transportation and Development (DOTD), and the Federal Highway Administration (FHWA).
- To ensure that the programs, projects, and products generated by LTRC are provided for the benefit of DOTD, its employees, and other transportation agencies and users.
- To guide research administrators and managers in the successful and efficient initiation, conduction, and implementation of research, development, and technology transfer activities necessary in connection with the planning, design, construction, management, and maintenance of highway, public transportation, and intermodal transportation systems.
- To guide research administrators and managers in the successful and efficient initiation, conduction, and implementation of study, research, and training on the engineering standards and construction materials for transportation systems described in the bullet above, including the evaluation and accreditation of inspection and testing and the regulation and taxation of their use.

This manual is intended for LTRC employees as well as individuals and agencies conducting contract research for LTRC. The first chapter explains the organization, staffing, and purpose of the center. The remainder of the manual is organized to follow the development of a research project from the initial writing of problem statements and proposals to the approval, conduct, deliverables, and implementation of research studies. Samples of forms, LTRC Publication Guidelines for report preparation, and an LTRC Cooperative Research Agreement are provided in the appendixes of this manual and may also be found on the LTRC website. A list of terms is given in Chapter 2.

## 2 ADMINISTRATION

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### 2.1 DESCRIPTION

The Louisiana Transportation Research Center (LTRC) is a cooperative research, technology transfer, education, and training center administered jointly by the Louisiana Department of Transportation and Development and Louisiana State University. LTRC merges the resources of state and government, universities, and private industry to identify, develop, and implement new technology and provide educational services to improve the state and national transportation system. The primary goal of LTRC is to improve the transportation system in both Louisiana and the nation by conducting research, disseminating information, and assisting state and local transportation agencies.

Created by the Louisiana legislature in 1986, LTRC conducts short-term and long-term research while providing a variety of technical assistance, training, continuing education, technology transfer, and problem-solving services to DOTD and the transportation community.

Located near the College of Engineering on LSU's campus in Baton Rouge, Louisiana, LTRC provides researchers and students access to state-of-the-art laboratories and research equipment, as well as the full resources of LSU as a Carnegie Designated Doctoral/Research Extensive Institution. LTRC houses over 75 employees and up to 30 students in three facilities. The 25,300-square-foot LTRC Main Office Building includes six research laboratories, a conference room, and offices. The 14,000-square-foot state-of-the-art Transportation Training and Education Center (TTEC) includes a lectern auditorium, two classrooms, a conference room, a computer teaching laboratory, a library, and offices, and serves as a resource center for the entire transportation community. The DOTD Pavement Research Facility (PRF) is located in Brusly, Louisiana, across the Mississippi River from Baton Rouge and includes two full-scale accelerated loading machines and an office building.

In addition to its affiliation with LSU, LTRC fully participates with other Louisiana universities to meet the practical and academic needs of the transportation industry in such areas as engineering, law, business and management, basic sciences, planning, and environmental studies.

### 2.2 FACILITIES

#### 2.2.1 LTRC Main Office Building

Louisiana Transportation Research Center  
4101 Gourrier Avenue  
Baton Rouge, LA 70808-4443

#### 2.2.2 Transportation Training and Education Center (TTEC)

LTRC Transportation Training and Education Center  
4099 Gourrier Avenue  
Baton Rouge, LA 70808-4443



### 2.2.3 DOTD Pavement Research Facility (PRF)

DOTD Pavement Research Facility  
2865 Northline Road  
Port Allen, LA 70767

The official address for both postal and other LTRC deliveries is at the LTRC Main Office.

Tel: (225) 767-9131  
Fax: (225) 767-9108  
E-mail: [ltrc@ltrc.lsu.edu](mailto:ltrc@ltrc.lsu.edu)  
Website: [www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)

## 2.3 AUTHORITY FOR LTRC

LTRC was created in the 1986 regular session of the Louisiana Legislature via Act 137 (originating as Senate Bill No. 520), which was approved on June 26, 1986. This legislation (amended 1988, 1995) established the purposes and functions of LTRC in addition to the basis for administration and funding of the organization. The original and amended acts incorporated into Louisiana Revised Statute RS 48:105 are provided in Appendix A.

### 2.3.1 Purposes of LTRC

- Establish cooperation between all parties with concern for the enhancement of the transportation system of the state of Louisiana.
- Introduce new technology.
- Enhance higher education in the general transportation field.
- Benefit Louisiana economically by enhancing job opportunities.
- Promote research, technology transfer, and training.

### 2.3.2 Function and Duties of LTRC

- To develop and conduct a nationally recognized short-range and long-range transportation research program in order to implement more efficient planning, design, construction, operation, and maintenance practices, and to enhance traffic safety.
- To offer education and training programs in both fundamental and state-of-the-art practices in transportation and related areas by offering training courses, demonstration projects, and conferences.
- To develop, implement, and refine a technology transfer program that shall provide a mechanism for conveying modern transportation systems practices and procedures to municipalities and parishes.
- To maintain cooperative relationships with the Transportation Research Board, the research divisions of other state highway and transportation departments, universities, and national and international technical associations and agencies.
- To report and publish research findings that contribute to fundamental knowledge and facilitate the implementation of enhanced technologies, which may result in more economical practices in transportation systems engineering.
- To provide DOTD with short-term problem solving assistance.

### 2.3.3 Funding

The funding for the LTRC program is supported primarily by DOTD and FHWA. Part of these funds is derived through the Federal Highway Administration's State Planning and Research (SP&R) Program, Surface Transportation Program (STP), and other FHWA grant sources. Other federal and self-generated funding may be procured. Funding may also be provided by interagency transfer or other DOTD sections.

The LTRC research program as a whole is funded on a fiscal-year authorization. This authorization is composed of the anticipated fiscal year expenditures of individual research projects and program management line items as developed in the Annual Work Program (Section 3.2).

### 2.3.4 Contractual Agreements

In accordance with Louisiana RS 48:105, LTRC may enter into contractual agreements only with the approval of the Secretary of DOTD or his/her designee, and said agreements must conform to the contracting policies of DOTD.

### 2.3.5 Policy Committee

The LTRC Policy Committee is composed of eleven members: the Director of LTRC, three appointed by the Secretary of DOTD, one from each of the six public universities that have a college of engineering with a civil engineering department and that is appointed by the president or chancellor of the respective university, and one member who is the dean of a college of engineering of a nonpublic institution of higher education selected by the committee from a list submitted by the Louisiana Association of Independent Colleges and Universities. The FHWA is an invited observer of the committee. The chairman of the Policy Committee is elected by the committee. The term of office for Policy Committee members is two years. The committee meets at least twice a year to review the activities of LTRC. The major responsibilities of the Policy Committee are to coordinate the transportation research program by:

- Reviewing and recommending research and technology transfer programs
- Reviewing and recommending fiscal year budgets
- Reviewing the activities and progress of research programs

### 2.3.6 Peer Exchange Process

Federal regulations (23 CFR 420 Subpart B) require that each State Department of Transportation must agree to peer reviews of its Research, Development, and Technology Transfer (RD&T<sup>2</sup>) management process to be eligible for managing State Planning and Research (SP&R) funds. The FHWA interprets the peer meetings to be more of an exchange of information regarding the various practices used by states to manage their RD&T<sup>2</sup> programs. A peer exchange must be conducted a minimum of once every five years. The intent is to enhance research programs with a sharing of ideas. The peer exchange teams are generally composed of state research managers, FHWA, and university or industry personnel.

The peer exchange will be charged with examination of the LTRC management processes described in this manual, reviewing best practices of the research work, including the

solicitation, selection, contract process, project progress, staff training, and technology transfer activities, and assessing the overall effectiveness of the program and its implementation process. In addition, other topics of specific interest will be addressed during the exchange. The peer exchange team will develop a written report of its findings for LTRC. The report will be presented to the DOTD Secretary, DOTD Chief Engineer, and FHWA Louisiana Division Administrator.

## 2.4 ORGANIZATIONAL STRUCTURE

The administration of LTRC's activities is provided by the center's Director and Associate Directors.

**Director** - The Director of the Louisiana Transportation Research Center is the Chief Administrative Officer of LTRC and is directly responsible to the DOTD Chief Engineer. The Director is also functionally responsible to the Dean, College of Engineering, Louisiana State University in matters as related to LSU staff.

**Associate Director, Research** - The Associate Director of the Louisiana Transportation Research Center administers the state and federally funded research programs of DOTD as appointing authority of the DOTD Research Section. The Associate Director, Research, is responsible to the Director of LTRC.

**Associate Director, Technology Transfer and Training** - The Associate Director of the Louisiana Transportation Research Center administers the state and federally funded T<sup>2</sup> program of DOTD as the appointing authority of the Technology Transfer and Training Section. The Associate Director, Technology Transfer, is responsible for the technical and leadership training activities of DOTD and is responsible to the Director of LTRC.

**Associate Director, External Programs** - The Associate Director of External Programs coordinates university-based research programs funded by non-DOTD sources, administers these research projects on a case-by case basis, and facilitates development of multi-campus/multi-disciplinary initiatives in support of DOTD. The Associate Director, External Programs, is responsible to the Director of LTRC.

**Group Administrator** - The LTRC Group Administrator has responsibility and authority over a staff of LTRC engineers and technicians of a general technical area to which an individual research project is assigned.

**Project Manager** - An LTRC staff employee with responsibility and authority to act as a liaison between the Contractor and LTRC in guiding, inspecting, and monitoring the contractual and technical progress of a research or training project.

**Technology Transfer Engineer** - An LTRC staff employee with responsibility for technology transfer, training, and implementation assistance activities.

### 2.4.1 Office of the Director

The Office of the Director includes the Director, Administrative Assistant, and the LTRC business office.

#### 2.4.2 Research Section (*DOTD Section 19*)

LTRC's research section is organized in three major groups:

##### **Materials Research Group**

- Asphalt Research Unit
- Concrete Research Unit
- Engineering Materials Characterization and Research Facility (EMCRF)
- Structures Research

##### **Pavements & Geotechnical Research Group**

- Pavement Research Unit
- Pavement Research Facility
- Geotechnical Research Unit
- Geotechnical Engineering Research Laboratory (GERL)

##### **Special Studies Research Group**

- Planning & Intermodal (PLAN)
- Intelligent Transportation Systems Lab
- Louisiana Center for Transportation Safety (LCTS)

In addition to laboratories equipped to conduct research in soils, pavements, concrete, and asphalt materials, the following are part of LTRC's comprehensive research facilities:

**DOTD Pavement Research Facility (PRF):** The PRF conducts research on long-term performance of pavements subject to heavy loads. The PRF houses two accelerated loading devices, the ALF and the ATLAS 30, capable of applying truck loading to full-scale pavement test sections. The ALF device is a 100-ft. long, 55-ton, frame and wheel assembly that models one half of a single axle and the load is adjustable from 9,750 lb. to 18,950 lb. per load application. The ATLAS 30 is a 65-ft. long I-beam device designed to apply a rolling load of up to 30,000 lb. to a pavement surface through dual truck tires.

**Engineering Materials Characterization and Research Facility (EMCRF):** The EMCRF at LTRC conducts basic and applied research that is related to characterization and performance of transportation materials. The EMCRF is equipped with state-of-the-art equipment to fundamentally characterize transportation materials. This includes two MTS materials test systems and Superpave binder and mixture equipment.

**Geotechnical Engineering Research Laboratory (GERL):** The GERL conducts basic and applied research related to foundations for bridges, earthworks, and other structures. The laboratory provides state-of-the-art capabilities to assess the engineering properties of geosynthetic reinforced systems, chemically modified soils, and other geomaterials used in transportation.

**Intelligent Transportation Systems (ITS) Laboratory:** The purpose of the ITS lab is to develop and demonstrate procedures that successfully transform existing ITS data into useful information, and then pass the procedures on to agencies in order to apply them on a routine basis.

### 2.4.3 Technology Transfer and Training Section *(DOTD Section 33)*

**Workforce Development:** In support of a commitment to a safe and efficient transportation infrastructure, LTRC reaches out to the individual working in the transportation industry to provide specialized and intensive job-specific training and education. The education and training program internally develops and manages maintenance and construction training materials and programs; coordinates seminars, workshops, and conferences for continuing education and professional development; and contracts with the private and public sectors for unique training/education needs.

As part of its commitment to higher education, LTRC coordinates several programs that support civil engineering students and graduates:

The statewide **DOTD Engineer Resource Development Program** provides structured rotational training for entry-level DOTD engineers.

The **Cooperative Education Program for Civil Engineers** is a joint endeavor of DOTD and Louisiana universities to employ full-time students to perform engineering work and receive practical experience in transportation engineering.

The **DOTD Support Program for Senior Projects in Civil Engineering** encourages civil engineering students to pursue transportation as a field of study and consider DOTD as a potential employer while enhancing the civil engineering departments in the Louisiana higher education system.

**Transportation Training and Education Center (TTEC):** Located adjacent to LTRC, TTEC houses a lecture facility, a computer-based training classroom, library, two general classrooms, a conference room, and offices. Each of these is equipped with state-of-the-art education and training equipment and distance learning/video-conferencing capabilities.

Through TTEC, LTRC is expanding the scope and availability of training, thereby serving a larger population. Offerings range from job-related training for transportation technicians to continuing education for engineers. TTEC is also available for representatives of state and local governments, consultants, contractors, and other industry personnel.

**Local Technical Assistance Program (LTAP):** A cooperative effort of DOTD, the Federal Highway Administration, and LSU, LTRC's LTAP provides a diverse collection of experience and knowledge for local governments. The Louisiana LTAP center, one of 57 centers nationwide, travels the entire state presenting seminars, short courses, and workshops on current trends and techniques in the transportation industry.

### 2.4.4 LTRC Organizational Chart

The chart shown in Figure 2-1 relates the basic functional relationships of LTRC staff positions. See the LTRC website for a detailed list of unit responsibilities along with LTRC personnel indicating titles and contact information: [www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)

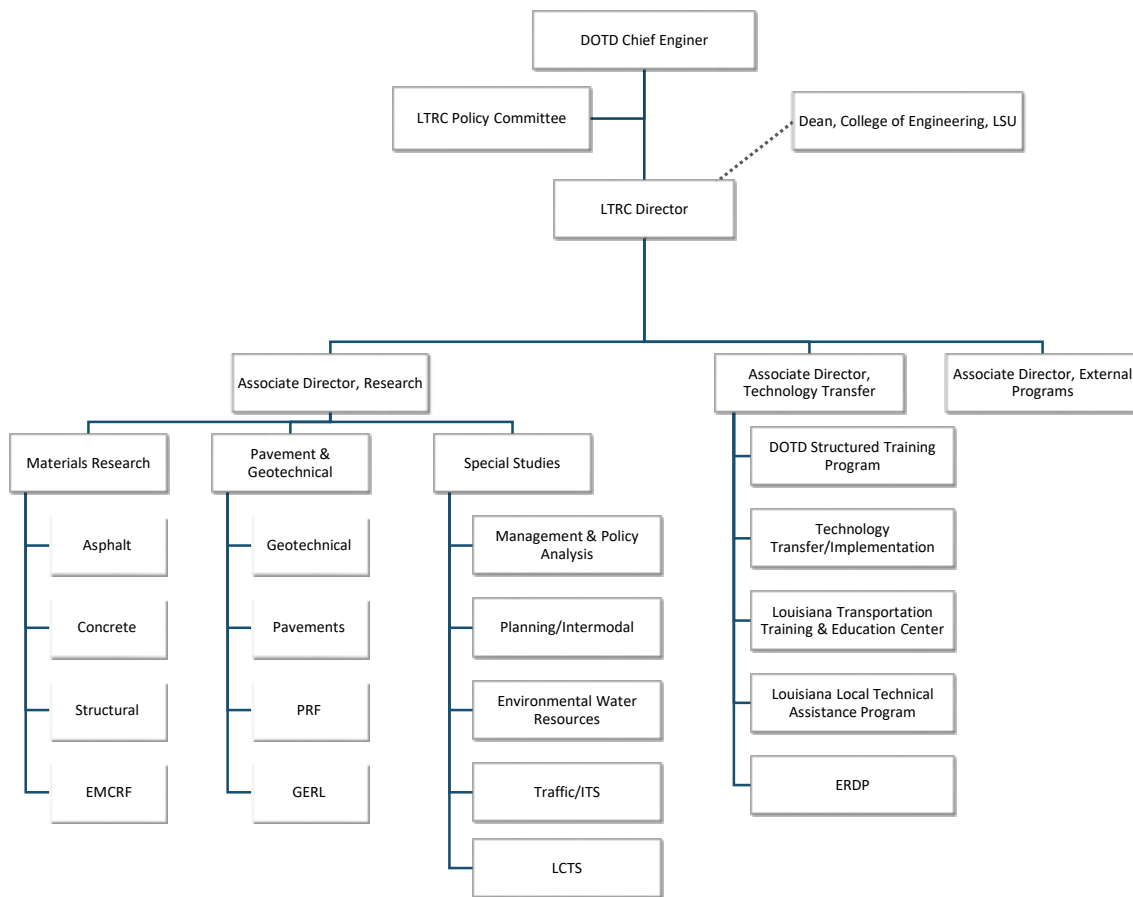


Figure 2-1 LTRC Functional Relationships

## 2.5 RESEARCH PROJECT LIFE CYCLE

There are several phases in a research project management plan that begins with the generation of a research idea and hopefully leading toward the successful deployment of the research findings. The LTRC project life cycle that generally defines the management of the research program includes the following phases:

- Development of a Problem Statement
- Initiation of a Research Project
- Conduct of the Research
- Dissemination of Research Results
- Deployment of Research Solutions

Figure 2-2 provides a flow chart of the research project life cycle at LTRC. The research team and the research project managers are heavily engaged during this time, conducting the research tasks and

performing management oversight. The Research Assessment and Implementation Report, represented by the red line, is the formal linking of the beginning of the project work with the implementation or deployment expectations of DOTD.

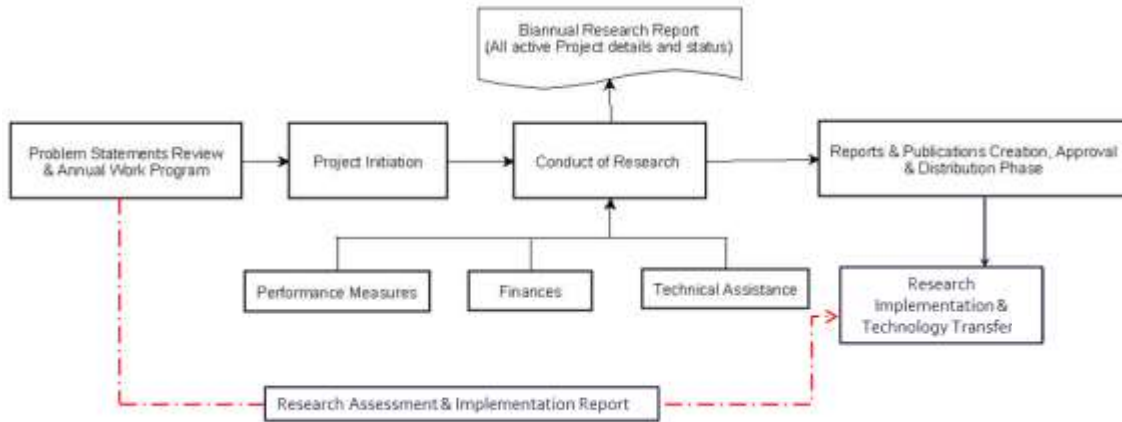


Figure 2-2 LTRC Research Project Life Cycle

## 2.6 LTRC PROJECT MANAGEMENT AND TRACKING SYSTEM

The Project Management and Tracking System (PMTS) is a relational database system used to manage and track LTRC research and technical assistance projects through the project cycle. All project information is entered and retrieved from the database through a webpage using individual user logins. In addition to storing project information digitally, the system offers reports and business data analysis enabling LTRC project management and associated business processes to be more efficient.

PMTS documentation and user manuals are available on the LTRC website. Access to the PMTS is restricted to LTRC staff and Principal Investigators on active projects. Restricted access to input and review data is controlled by user login and password with limited functionality based on user roles defined in PMTS.

Access to the PMTS can be made through the LTRC website under the Research homepage or at <http://projectmanagement.ltrc.lsu.edu/>.

## 2.7 EEO STATEMENT

The Louisiana Transportation Research Center assures equal opportunity for all qualified persons without regard to race, color, religion, sex, national origin, age, handicap, or marital status in participation, treatment, or employment in the programs and activities that LTRC operates. The implementation of all research programs shall be in accordance with the policy of the Federal Highway Administration to ensure compliance with Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972, Federal Executive Order 11246, the Federal Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1972, and the requirements of the Americans with Disabilities Act of 1990. Anyone having questions or complaints regarding equal opportunity at LTRC should

contact the Civil Rights Office, Room 404, Louisiana Department of Transportation and Development, P.O. Box 94245, Baton Rouge, Louisiana 70804-9245. Persons believing they have been discriminated against contrary to federal law are entitled to make an inquiry or file a complaint with the U.S. Equal Employment Opportunity Commission, 601 South Street, New Orleans, LA 70130.

## 2.8 TERMS AND DEFINITIONS

**Applied Research** - Means the study of phenomena to gain knowledge or understanding necessary for determining the means by which a recognized need may be met; the primary purpose of this kind of research is to answer a question or solve a problem.

**Annual Work Program** - The schedule of tentative LTRC research activities planned to be undertaken or continuing in one fiscal year (July 1 through June 30).

**Basic Research** - Means the study of phenomena, and of observable facts, without specific applications towards processes or products in mind; the primary purpose of this kind of research is to increase knowledge.

**Contract** - The basic contract under which research is conducted for LTRC by a Contractor. The term contract as used herein refers to the combination of documents which shall include the Research Proposal, Request for Proposals, Cooperative Research Agreement and Task Order, Legal Contract, and LTRC Manual of Research Procedures, as applicable, which constitute the legal basis for a research study.

**Contractor** - Any agency, institution, organization, individual, or other party that has entered into a signed agreement with LTRC/DOTD to conduct research or provide training.

**Cooperative Research Agreement** - A contract between LTRC/DOTD and a Louisiana research university, which forms the legal basis for individual research projects for the specified period. Individual studies during the period of the contract are activated and approved by task order.

**CFR, Title 23** - Code of Federal Regulation, Title 23; the source document for rules and regulations governing transportation research activities involving federal funds, and which is published by the Federal Highway Administration.

**Development** - Means the systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems or methods, including design and development of prototypes and processes.

**Direct Cost** - Expenses that include but are not limited to salaries, wages, fringe benefits, equipment, supplies, travel, reproduction, services, and equipment rental.

**DOTD** - The Louisiana Department of Transportation and Development, P.O. Box 94245, Baton Rouge, Louisiana 70804-9245

**FHWA** - The Federal Highway Administration of the U.S. Department of Transportation, whose rules are administered by the FHWA Louisiana Division Office, 5304 Flanders Drive, Suite A Baton Rouge, LA 70808, (225) 757-7600



**Indirect Costs** - Costs for general and research administration and overhead incurred in the research project for which no charge is made elsewhere in the study.

**LSU** - The Louisiana State University and Agricultural and Mechanical College, Baton Rouge, LA 70803.

**LTRC** - The Louisiana Transportation Research Center, 4101 Gourrier Avenue, Baton Rouge, LA 70808.

**NCHRP** - National Cooperative Highway Research Program, a pooled fund program directed toward the solution of problems of national significance sponsored by the state highway agencies and FHWA and administered by the Transportation Research Board (TRB), National Academy of Sciences, Engineering and Medicine.

**Nonexpendable Equipment** - Equipment having a useful life of more than one year and an acquisition cost of more than \$1000 per unit.

**Notice to Proceed** - Written notice from the department authorizing the date that a research Contractor (not under a cooperative research agreement) may proceed with the research project for a specific period of time to accomplish the objectives of the study.

**Peer Exchange** - The process by which LTRC partners with other state transportation, FHWA representatives, academics, and other transportation partners to share information on the research and implementation process toward the result of improving such processes.

**LTRC Policy Committee** - An appointed committee with responsibility for advising and assisting the Director in the coordination of the research, education, and training programs by reviewing activities and recommending policies, research projects, and program funding levels; and by reviewing and assessing both the implementation of research results and the overall effectiveness of programs.

**Pooled Fund Project** - A Transportation Pooled Fund (TPF) Program project funded by several federal, state, regional, or local transportation agencies, academic institutions, foundations, or private firms to solve a regional or national transportation-related problem, research, planning, and technology transfer activities.

**Principal Investigator (PI)** - The person principally in charge of and accountable for a research project whose duty is to plan and coordinate the work in accordance with the approved work plan and report the results. The Principal Investigator for contract research shall be a staff member of the Contractor having technical competence and responsible charge in the field in which the research is being conducted.

**LTRC Project Management and Tracking System (PMTS)** - A web-based system created to manage and track LTRC research projects, business processes, resources, and deliverables. The system was designed to accomplish the management processes outlined in the *LTRC Manual of Research Procedures*.

**LTRC Technical Report Review Panel** - An internal panel chaired by the Technology Transfer Engineer created to provide an independent technical review of research reports. In addition

to the Technology Transfer Engineer, the panel consists of one full-time research associate and one DOTD Staff Engineer generally from a working group not associated with the research topic.

**Problem Statement** - A concise description of the transportation related problem(s) for which solutions through research are deemed feasible.

**Project Review Committee (PRC)** - An advisory committee appointed by the Director with a major responsibility for assisting the LTRC Project Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings.

**Records** - The official paper or evidence that documents the findings, data collected, work-time spent, and monies expended for each individual research project.

**RD&T activity\*** - Means a basic or applied research project or study, development and technology transfer activity.

**Research** – Means a systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research can be basic or applied.

**Research Advisory Committee (RAC)** - An advisory committee appointed by the Director to review, prioritize, and rate research problem statements selected by RPICs. This committee is composed of key DOTD technical staff and field personnel as well as a FHWA representative.

**Research in Progress (RIP)** - A database managed by the Transportation Research Board containing active research projects.

**Research Project Modification Agreement** - An addendum to the contract document which authorizes the modification or continuation of a research study with respect to time, budget, personnel, objective, scope, or work plan.

**Research Problem Identification Committee (RPIC)** - Advisory committees appointed by the Associate Director, Research, and composed of DOTD employees, academics, governmental agencies, and other transportation industry representatives, with responsibility for developing, reviewing, and prioritizing research problem statements.

**Research Study/Project** - An individual research investigation having the limited scope of supplying, implementing, or confirming a specific theory, design, or data.

**Synthesis Study/Project** - An individual investigation on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. A synthesis provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

**Research Proposal** - A document that establishes the necessity for a research undertaking, clearly defines the objectives, provides a detailed work plan for achieving the objectives with cost estimates and time schedules, and indicates how the research findings are expected to be used and implemented.

**Request for Proposals (RFP)** - An RFP is a document prepared to solicit formal research proposals from prospective researchers.

**Secretary** - The Secretary of the Louisiana Department of Transportation and Development.

**State Planning and Research Program (SP&R)** - The FHWA State Planning and Research Program; Part II is managed by LTRC.

**Study Budget** - The total funds allocated for the accomplishment of an individual study for the period of time specified.

**Supplemental Agreement** - Mutually consented agreement that modifies, but does not replace, an existing agreement or contract required to alter an existing contract not under a Cooperative Research Agreement.

**Task Order** - The contract document that authorizes approval and initiation of an individual research project between LTRC and a university (Contractor) under the provisions of the Cooperative Research Agreement.

**Technology Transfer** - Means those activities that lead to the adoption of a new technique or product by users and involves dissemination, demonstration, training, and other activities that lead to eventual innovation.

**Transportation Research Board (TRB)** - One of seven major divisions of the National Research Council— a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The National Research Council is jointly administered by the National Academies of Sciences, Engineering, and Medicine.

**Transport Research International Documentation (TRID)** - An integrated database that combines the records from TRB's Transportation Research Information Services ([TRIS](#)) Database and the OECD's Joint Transport Research Centre's International Transport Research Documentation ([ITRD](#)) Database. TRID provides access to more than one million records of transportation research worldwide.

**Transportation Research Information Services (TRIS)** - Transportation Research Information Service, a computerized storage and retrieval system operated by Transportation Research Board containing abstracts of completed research.

**LTRC Website** - [www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)

**Work Plan** - The section of the study proposal that contains the detailed description of the methods and procedures (including approved modifications), which will be used to conduct the study.

***\*RD&T activities cease to be eligible for SPR Subpart B funds upon completion of testing, evaluation, and dissemination under Technology Transfer as appropriate, and/or if they no longer meet the definitions listed above.***

## 3 DEVELOPMENT OF ANNUAL WORK PROGRAM

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### 3.1 RESEARCH PROBLEM IDENTIFICATION

Research problems are identified through a biennial solicitation of problem statements from the transportation community at large. Problem statements received by LTRC in this process are assigned to Research Problem Identification Committees (RPIC) for rating according to need and implementation potential. The top problem statements from each RPIC are then submitted to the Research Advisory Committee, who also evaluates the problem statements according to need and implementation, resulting in a priority list used by LTRC to determine funding. This priority list is incorporated in the LTRC Annual Work Program.

In addition to the biennial solicitation, unsolicited problem statements may be submitted to the Director through the LTRC website at any time.

#### 3.1.1 Problem Statements

The problem statement is a concise description of a transportation-related problem for which solutions through research are deemed feasible. Problem statements are to be submitted through the LTRC website and the PMTS. Problem statements are welcomed by LTRC at any time; however, they are formally solicited from LTRC, DOTD, universities, and transportation industry representatives biennially. The statements are ranked by Research Problem Identification Committees (RPIC) and the Research Advisory Committee (RAC) for funding. The form, content, and purpose of a problem statement (Appendix B) are described as follows:

- A. PROBLEM TITLE – A concise, descriptive title of the problem.
- B. PROBLEM STATEMENT – A brief statement of problem, including some indication of its magnitude and impact on the highway program.
- C. RESEARCH PROPOSED – A brief description of the research, development, or evaluation activities proposed to resolve the problem.
- D. PROBLEM IMPLEMENTATION OF RESULTS – A brief description should state how it is anticipated that the results of the proposed research will be applied. This description should include a statement of the anticipated benefits from solving the problem.

#### 3.1.2 Research Problem Identification Committee

RPICs will be formed to assist the LTRC staff in the formulation and refinement of problem statements. Members of RPICs shall be appointed by the Associate Director, Research subject to the approval of the Director from the personnel of LTRC, DOTD, FHWA, universities, and private industry. Selection shall be based upon the expertise and interest of each individual relative to the technical subject matter. The RPICs are chaired by an appointed DOTD member with an LTRC staff member serving as facilitator. RPIC members shall discuss the pertinent facts of the proposed research and shall receive copies of the problem statements, along with any additional information to assist them in the decision-making process. RPIC meetings are open to non-voting participation during the problem statement discussions. Problem statement authors are encouraged to attend the meetings to

provide a brief overview. The RPIC's responsibility is to develop a refined problem statement or recommend disposition of the problem statement if research is not deemed a viable solution. In addition, each RPIC, as technical experts may develop additional problem statements according to DOTD needs. Each member will rate each problem statement based on need and implementation potential. Each committee shall provide a priority list of problem statements.

### 3.1.3 Research Advisory Committee (RAC)

Members of the RAC shall be appointed by the Director and be comprised of the RPIC chairs, DOTD administrator level staff, and an FHWA representative, with expertise appropriate to the technical areas included in the problem statements. The RAC shall be chaired by the LTRC Associate Director, Research. Each problem statement will be presented to the RAC by the RPIC chair or LTRC facilitator of the sponsoring RPIC. The problem statements will be evaluated based on research need and implementation potential. A resulting RPIC Priority List will be recommended for inclusion in the annual work program (AWP).

## 3.2 ANNUAL WORK PROGRAM

The AWP is the schedule of tentative LTRC research and technology transfer and training activities planned to be undertaken in one fiscal year. The scheduled period coincides with the fiscal year for both LTRC and DOTD for the period beginning July 1 of each year and ending June 30 of the following year.

Research projects may be conducted by LTRC staff or through contract and will address local, regional, and/or national problems such as exploratory, survey, feasibility studies; experimental construction incorporating new products or procedures studies; or implementation efforts.

The annual work program is formulated based on studies identified from the following:

- Continuing ongoing projects
- RPIC Priority List Projects
- Additional research needs follow-up projects recommended by existing PRCs
- Emerging technologies/issues in direct response to immediate problems of DOTD
- Research support line items

### 3.2.1 Budget Categories

A summary section by budget category shall provide a ready reference for the program as a whole. Research projects will be categorized by budget category as follows:

- FHWA
- State
- Federal (non-FHWA)
- Self-generated
- Interagency Transfer
- Other DOTD Sections

### 3.2.2 Funding Source

Funding for studies will be further identified by funding source within a budget category. Examples of funding sources within established budget categories may be as follows:

- FHWA
  - SP&R: TTF-Fed/TTF-Reg (80% /20%)
  - STP: TTF-Fed (100%)
  - SP&R: Pooled Funded: TTF-Fed (100%)
  - LTAP: TTF-Fed/TTF-Fed (50% / 50%)
  - (*FHWA Grants Acronym*): TTF-Fed (100%)
- State
  - State: TTF:Reg (100%)
- Federal
  - National Science Foundation
  - Corp of Engineers
  - US Agriculture
- Self-generated
  - NCHRP
  - (*private industry name*)
- Interagency Transfer
  - (*Agency name*)
- Other DOTD Sections
  - Safety: TTF-Fed
  - Operations: TTF-Reg

### 3.2.3 LTRC Program Management

LTRC staff may charge to appropriate LTRC line items are follows:

#### 3.2.3.1 *Research Section (19)*

- Program Management (XX-1PM)
  - Overall program management (restricted to LTRC administrators and support staff, i.e., Director, Associate Directors, Group Administrators, etc.)
- Technical Research Surveillance (XX-1TRS)
  - Management of LTRC research project contracts
  - Preparation of research proposals
  - Participation on LTRC Project Review Committees
  - Participation on RPIC and RAC committees
  - Participation in external research technical advisory panels (NCHRP, FHWA Pooled Fund Research Project Panels, etc.)
- Technology Transfer & Research Implementation (XX-1TTRI)
  - Research Implementation Activities
  - Technology Transfer Seminars
  - Participation in external technology transfer/training activities (TRB meetings, technical conferences, workshops, etc.)
- Equipment Management (XX-1EQM)
  - Routine and unscheduled laboratory maintenance

- Purchase and installation of equipment to support research functions
- Repair of existing equipment to support research functions
- Laboratory safety training and reporting duties
- Participation in standardized testing programs (Co-op, AMRL, CRRL)
- Technical Assistance (XX-1TA)
  - Laboratory, field work, forensic analysis for DOTD construction projects
  - Development of DOTD design standards or procedures not related to a formal research study or implementation of a research study
  - Development of construction specifications including serving on committees
  - Participation on DOTD technical committees
- Laboratory and Field Testing Support (XX-1LFT)
  - Laboratory, field work, and analysis for university assistance not related to an LTRC research study
  - General assistance to other public entities not related to a formal research study
- New Products Evaluation (XX-1NPE)
  - Support services for DOTD new product evaluation committee
  - General evaluation of new products and technologies not associated with a research project

#### 3.2.3.2 *Technology Transfer and Training Section (33)*

- Workforce Development (XX-1WD)
  - Planning, development, and delivery of workforce development programs
  - Registrations for external conferences
- Technology Transfer Program and Operations (XX-1TSQ)
  - Preparation of materials for technology transfer
  - Editing and publishing support for research publications
  - Development of program reports, capsules, brochures, newsletters, etc.
  - Development of technology transfer events such as conferences, seminars, webinars, etc.

#### 3.2.4 Annual Work Program Sheets

Each research study, a technology transfer and training activity to receive funding for any upcoming fiscal year will have an Annual Work Program Sheet (Appendix C) included in the AWP. AWP Sheets are submitted through the PMTS website. The compilation of work program sheets provides the basis for the funding required to support the LTRC research program each fiscal year. Work program sheets will include descriptions providing pertinent project information including project identification, budget, purpose and scope, and previous fiscal year accomplishment (if applicable) to support the funding requests. These work program sheets are subdivided by the following hierarchy:

1. Budget Category
2. Project Status (ongoing or proposed)
3. LTRC Group Codes (Section 4.1)

##### 3.2.4.1 *Proposed Research Projects*

Development of a work program sheet is the first step required to move a project from a problem statement into a formal research study. The project status is labeled as proposed

and subject to the approval process defined in Chapter 4. The project budget is estimated and subject to revision during the proposal development stage. Proposed study work program sheets may only be submitted by LTRC staff.

#### **3.2.4.2 *Ongoing Research Projects***

Work program sheets for ongoing research projects shall be submitted by the Principal Investigator through the LTRC PMTS website by March 15 of each year.

#### **3.2.5 RPIC Priority List**

The AWP shall include the RPIC priority list of research problem statements developed for the upcoming fiscal year. Each RPIC priority list is used for two annual FY work programs.

#### **3.2.6 Work Program Approval**

The LTRC Policy Committee reviews the annual work program and provides recommendations to LTRC Director.

The AWP is submitted to the FHWA Louisiana Division for review and approval of the FHWA funded portion of the work program. The AWP is submitted to FHWA by May 15 each year.

Upon approval of FHWA, the AWP is submitted to the DOTD Chief Engineer for approval to meet the requirements of Title 48:286 (Appendix A) for authorization to hire consultants.

#### **3.2.7 Work Program Modifications**

Research studies may be added to the annual work program throughout the fiscal year to address emerging issues, priority projects, or externally awarded grants, etc. Individual work program documents shall be submitted to the DOTD Chief Engineer for review and approval. Additionally, FHWA funded studies must be submitted to the FHWA Division Office as annual work program modifications.

#### **3.2.8 Work Program Process Flow Chart**

The process for development and approval of the work program is depicted in Figure 3-1.



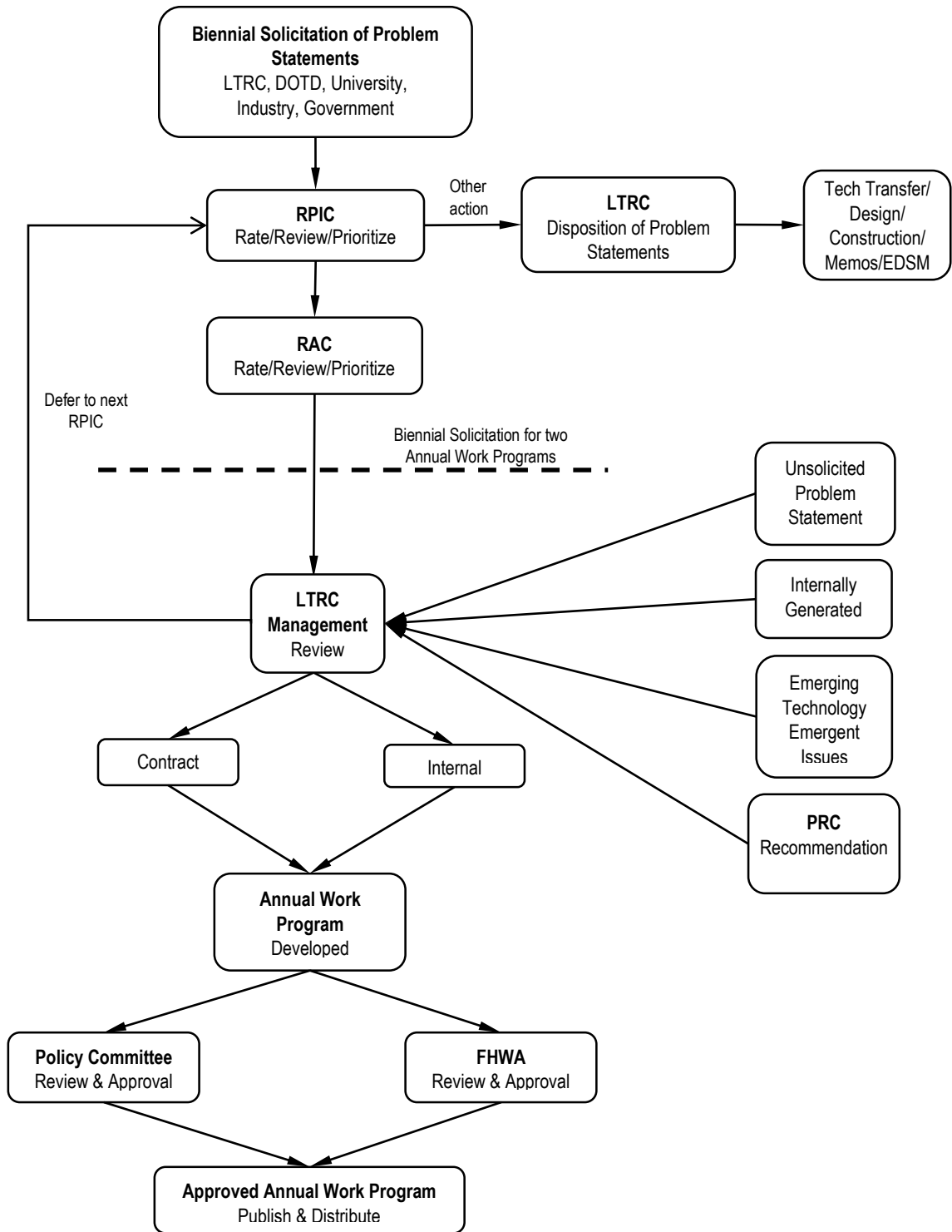


Figure 3-1 Annual Work Program Development Process

### 3.3 DEVELOPMENT AND APPROVAL OF RESEARCH PROPOSALS

Each research study will be assigned a project manager who is responsible for project initiation, monitoring progress, overseeing technical issues, PRC/DOTD coordination, and overall surveillance of the research study. The project manager is generally an LTRC Staff Engineer with technical expertise in the study area.

A PRC will be established when funding becomes available for a project included in the annual work program. The PRC will act in an advisory capacity to LTRC, DOTD, and the Policy Committee throughout the life of a project, including implementation activities. The PRC shall be composed of technical experts or users relative to the project objective and scope. The PRC is generally composed of five or more members from DOTD, FHWA, local entities, professional associations, industry, and academia.

A PRC chairman shall be appointed by the Director to act as project champion for the feasibility of the study and implementation of the results. The Project Manager, in collaboration with the PRC chairman, shall recommend PRC members to the Director for approval.

#### 3.3.1 Project Manager Proposal Development Responsibilities

The Project Manager's responsibilities include:

- Works as the direct liaison between the PRC and research team; communicates panel decisions to the research team; serves as a conduit for all information flowing between the PRC as a whole or individual committee members and the research team
- Schedules all PRC meetings and takes meeting notes and minutes
- Conducts preliminary literature searches to understand and support the need for the proposed research
- Develops draft requests for proposals and preliminary cost estimates in relationship to the proposed research plan
- Facilitates PRC review of proposals and makes recommendations for the selection of the selected proposal
- Rates proposals using the Proposal Review Form (Appendix D)
- Prepares the contract and other documents as needed for proposal approval

#### 3.3.2 PRC Chairman Responsibilities

In addition to the PRC responsibilities in Section 3.3.3, the Chairman's responsibilities include:

- Works with Project Manager to identify technical panel members and makes sure they have the time and are willing and able to serve on the technical panel
- Presents scope of work and business case information to PRC for approval
- Presents business case for the project and the proposal that the technical panel recommends for funding
- Chairs all PRC meetings
- Encourages active participation by all panel members
- Helps the panel reach consensus

### 3.3.3 PRC Research Proposal Development Responsibilities

The problem statement forms the basis for scoping the project. The PRC will be responsible with assisting the Project Manager in the development of the project objective, scope and expected deliverables. Responsibilities of the PRC members during research proposal development include but are not limited to the following:

- Attend PRC meetings
- Review problem statement
- Validate the need and implementation potential
- Define the objective and scope
- Determine support needs
  - Access to data
  - Available facilities
  - DOTD support (construction or personnel)
- Identify potential research teams
  - LTRC in-house researchers vs. external researchers
  - University or consultant
    - Request for proposals vs. non-competitive selection (develop justification for non-competitive selection)
- Assist in the development of the RFP for those problem statements selected for contract research
- Review proposals
- Suggest improvements to proposals
- Rate proposals using the Proposal Review Form (Appendix D)

### 3.3.4 Development of Proposals

Projects approved in the annual work program that have been identified by LTRC for funding are developed into research proposals.

**Research Proposal** – A research proposal is a document that establishes the necessity for a research project, clearly defines the objectives, provides a detailed work plan for achieving the objectives defines the deliverables, and indicates how the research findings are expected to be implemented.

**Support Proposal** – A proposal developed to support a lead research project by providing personnel support, facilities for testing, equipment, data collection, and/or other activities related to the lead research project. Support studies may also be developed to provide DOTD matching funds for other external federal or state funded research.

Proposals may be developed through the following processes:

#### 3.3.4.1 *Competitive Solicitation through RFP*

The RFP is a document prepared to solicit proposals from prospective contract researchers. RFPs are advertised in the following manner:

- A. Open solicitation – An RFP is advertised through the DOTD Consultant Services Section and open to all universities and public or private research contractors. LTRC's mission

includes the support of higher education in Louisiana. Consultant and out-of-state institutions submitting proposals are encouraged, although not required, to cooperate and collaborate with Louisiana universities for the purpose of sharing of knowledge and increasing transportation expertise in the academic community.

- B. Louisiana university solicitation – An RFP is distributed to Louisiana universities through the LTRC Policy committee and is open only to Louisiana university researchers.
- C. Proposals submitted to the LTRC Director in response to a competitive RFP may be submitted in the following manner: (1) Electronically in PDF format, or (2) 10 hard copies by the due date and time noted in the RFP advertisement.

#### **3.3.4.2 *Non-competitive Selection***

- A. Proposal by LTRC Staff – LTRC/DOTD research personnel may offer research proposals at any time when the project is approved in the annual work program as proposed studies.
- B. Proposal by a Louisiana University – LTRC/DOTD may contract directly with a Louisiana University through its Cooperative Research Agreement at any time when the project is approved in the annual work program as a proposed study.
- C. Proposal by External Contract – LTRC/DOTD may contract directly with a private or public research Contractor when approved for non-competitive selection by the DOTD Secretary as allowed in Louisiana RS 48:292 (Appendix A).

#### **3.3.4.3 *Specialty Services under \$50,000***

LTRC/DOTD may send notice of a proposed contract for specialty services to firms that, to its knowledge, have experience in such services. Such notice must provide a minimum of 10 business days for submittal of responses. After the time period provided in the notice, LTRC/DOTD shall review any responses and may contract directly for those specialty services, including, but not limited to specialized testing, for amounts less than \$50,000 with approval of the LTRC Director.

#### **3.3.4.4 *Externally Awarded Proposal***

LTRC/DOTD may contract directly with a research funding agency (NCHRP, NSF, etc.) as a research Contractor or part of a research team. LTRC will develop an LTRC research proposal for review and approval as defined in Section 3.4. Members of the research team on the LTRC/DOTD proposal will receive a 3<sup>rd</sup> party funding contract.

### **3.3.5 Proposal Form and Content**

This section provides the basic requirements for the form, sequence, and content of the research proposal. The proposal template is found in Appendix E. The proposal shall contain, but not be limited to, the following essential elements:

#### ***PART I- IDENTIFICATION***

The title sheet, which includes the amount of funding requested; duration of the project in months with beginning and ending dates indicated; a concise descriptive title for the proposed study; the name and business address of the organization that will conduct the work; the major subdivision of that organization responsible for the research and the name,

title, mailing address, telephone number, email address, and signature of the Principal Investigator.

**PART II – APPROVAL**

For LTRC use in the process of approval of the proposal, as noted in Section 3.4.

**PART III – AMOUNTS REQUESTED FOR PROJECTS**

This part of the proposal requires an itemized list of the funds requested for the proposed research by types of expense, total costs, and fiscal year (July 1 through June 30). If Sub-Consultants/Entities are used, the Prime Consultant/Entity must perform a minimum of 51 percent of the work for the overall project.

**A. PERSONNEL –**

1. **University Proposals:** List the names, positions, and percentage of time (based on a 40-hour work week) to be spent on the project for all persons involved in the research, including PI, Co-PI, research staff, and graduate students, if applicable. When the percentage time spent on the project varies with a given period (e.g., spring, fall, summer), the individual periods and appropriate percentage time shall be listed separately for each. The amounts requested for each person listed must not exceed the proportion of total salary computed from the percentage time spent on the project for that person. The salaries used as the basis for computing individual personnel costs shall be exclusive of the cost of employee benefits; however, that percentage used by the contracting agency to compute employee benefits shall be shown where indicated on the form and costs computed and included in totals. Graduate assistance stipends are allowed. Tuition reimbursement or tuition remission rates applied to stipends are not allowed. Personnel costs for report editing services are acceptable charges to be included in the study proposal. These costs must be itemized separately in the proposal.
2. **Consultant Proposals:** List the names, positions, and number of hours spent on the project for all persons involved in the research, including PI, Co-PI, and support staff. The salaries used as the basis for computing individual personnel costs shall be exclusive of the cost of employee benefits. However, that percentage used by the contracting agency to compute overhead (employee benefits, indirect costs and profit) shall be shown as indirect costs on the form and costs computed and included in totals. The proposal shall include a Work Plan which sets forth on an average the estimated staff-hours for each skill classification that will be utilized to perform the work required.

- B. NON-EXPENDABLE EQUIPMENT** - Itemize only non-expendable equipment that is to be purchased specifically for the performance of the study. Non-expendable equipment includes any items having a useful life of more than one year and an acquisition cost of more than \$1000 per unit.

- C. **CONSUMABLE SUPPLIES** - This item includes the estimated cost of all expendable equipment, materials, and supplies. Any item for which the cost exceeds \$500 must be listed individually.
- D. **TRAVEL** - Itemize expenses for trips to be made in connection with the research project and state the purpose of the trip. Expenses incurred for out-of-state travel should be listed separately from those for in-state travel. Funds budgeted for travel shall be limited to what is necessary for the conduct of the research. See Section 4.8 for additional details. Funds shall not be budgeted for conference, convention, or seminar travel. See Chapter 6 for travel request procedures for the dissemination of research results at conferences.
- E. **OTHER EXPENSES** - Itemize all miscellaneous expenses associated with the project that are not included in the agency's computation of indirect cost, such as those required for reference materials, copying, computer time and software, photography, etc. All costs to be incurred for equipment rental or use of subcontractors/consultants associated with the project should be listed in this section.
- F. **TOTAL DIRECT COST** - The sum of total estimated costs for items (A) through (E).
- G. **MODIFIED TOTAL DIRECT COST** - Modified Total Direct Cost (MTDC) includes all direct salaries and wages, applicable fringe benefits, materials and supplies, services, travel, and up to the first \$25,000 of each subaward (regardless of the period of performance of the subawards under the award). MTDC excludes equipment, capital expenditures, rental costs, participant support costs, and the portion of each subaward in excess of \$25,000.
- H. **TOTAL INDIRECT COST** - This item is intended to provide reimbursement for general and research administration and overhead expenses incurred by the contracting agency in the prosecution of the research project for which no charge is made elsewhere in the study. Indirect costs shall be distributed to MTDC. The actual percentage used and method of application shall be described in the proposal and shall be verifiable through audits by DOTD, FHWA, or their representative.
  - 1. Universities - The indirect percentage used shall not exceed 25 percent.
  - 2. Consultants - The indirect percentage used shall be the auditable overhead rate.
- I. **TOTAL COSTS** - The sum of total estimated costs for direct and indirect costs, items (F) and (H).

***PART IV – BIOGRAPHICAL SKETCHES***

Provide brief biographical sketches for the professional personnel indicated by Part III, Section (1), to be actively engaged in the study so that required expertise can be determined.

***PART V – TITLE VI STATEMENT***

This portion of the proposal shall include a statement that the agency or Contractor will comply with the provisions contained in Title VI of the Civil Rights Act of 1964.

***PART VI – PROPOSED RESEARCH***

This portion of the proposal is the basic guide to the study containing the detailed description of the approach the PI intends to employ to complete the study and its potential for implementation. This portion shall contain the following elements in the sequence indicated:

- A. PROBLEM STATEMENT** - Proposer’s understanding of the problem to be solved through research.
- B. OBJECTIVES OF RESEARCH** - Provide concise statements to describe the specific aims of the work proposed and relate them to long-term goals.
- C. METHODOLOGY** - This section should describe the details of the researcher’s approach to solving the problem:
1. **WORK PLAN** - LTRC is seeking the insight of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can be realistically accomplished within the constraints of available funds and contract time. Proposals must present the researcher’s current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. For each phase of the proposed research, itemize and discuss the tasks necessary to fulfill the objectives. Task descriptions are intended to provide a framework for conducting the research. In general, the following items should be considered for inclusion in the work plan:
    - A preliminary literature search should be accomplished and demonstrated in the discussion.
    - The discussion should include principles or theories to be used; devices, processes, materials, or systems to be developed; possible solutions to the problems; critical experiments to test the applicability of the theory; the type and range of variables to be used or considered; and the methods of data analysis to be used including statistical methods.
    - The methodology, including data required, for conducting an implementation assessment/cost benefit analysis should be presented.
    - The preparation of the final report should be acknowledged. A draft final report should be scheduled for delivery at least 90 days prior to the project completion date to permit time and charges for revisions.
  2. **WORK SCHEDULE** - A time chart in the format shown in Figure 3-2 shall indicate the proposed time schedule of completion for each task (and subtask when applicable) discussed in part (a). This should include periodic PRC meetings, preparation of progress, interim (if applicable) and final reports and other deliverables. The work schedule shall include 90 days for PRC review of the draft final report.

Task Description	Month																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Literature Review	X	X	X	X	X														
2. NDS Data Exploration				X	X	X	X	X	X	X	X	X							
3. Identify Surrogate Measures of Distraction											X	X	X	X					
4. Develop Distraction Index Model													X	X	X				
5. Final Report														X	X				
PRC review of Final Report																	X	X	X

Figure 3-2 Sample Research Study Work Schedule

3. **STAFFING PLAN** - The responsibilities and time allocation of personnel to the required tasks should be briefly stated for each fiscal year for the duration of the

project. Also include a table or chart indicating personnel by task with hours or percent of time and cost per task.

- i. The proposal shall include a list of current and anticipated commitments on other work to be performed by principal research staff during the planned duration of this project.
- ii. Any support relative to use of facilities, personnel, data, or access of information that is anticipated to be required from LTRC or DOTD shall be specifically detailed in the proposal.

4. **DELIVERABLES** - List all products that will be delivered during the research project. All products required for implementation must be included as project deliverables. Unless otherwise directed in the RFP or Scope of Work, if applicable, deliverables will always include the following items as products:
  - i. Biannual Progress Reports (See Section 4.7.1)
  - ii. Task Reports: Task reports are due by the end of the month following the completion of the task according to the timeline established in the proposal
  - iii. Final Report, including and implementation and cost/benefit analysis, as applicable
  - iv. Technical Summary (See Section 5.7)
  - v. Final Presentation
  - vi. Additional product deliverables may also include the following:
    - Reports
    - Manuals
    - Specifications
    - IT components or software
    - Training materials
    - Photographs
    - Video or other audio/visual materials
    - Detail drawings

**J. FACILITIES TO BE USED** - The facilities and major equipment at the disposal of the proposing agency that are to be used in the conduct of the study should be described.

**K. STATE OF THE KNOWLEDGE**

1. **PREVIOUS WORK BY RESEARCHERS** - The researchers should list and describe briefly any previous work they have done pertinent to the proposed study. Personal publication on the subject area or closely related work should be cited. (List no more than five). It should be demonstrated that previous work has not attempted to solve the problem using the same approach.
2. **RESULTS OBTAINED BY OTHERS** - Describe the results of the literature search for information on the findings of others pertinent to the proposed study. The findings available through TRID are required for all studies, as a minimum.
3. **SIGNIFICANCE OF RESEARCH** - The importance of the proposed work should be explained in this section. Adequate explanation must be given about how the proposed research will extend, modify, or refine the previous work of others.



- L. IMPLEMENTATION** - An assessment by the researcher of the areas of potential application of anticipated research findings. The form in which the findings might be reported (mathematical model or formula, test procedure, specification, design procedure, etc.) should be described. The specific area of practice that would be changed by the findings and those organizations or groups that might benefit from the new technology should be identified. The responsibility for and means of technology transfer relative to the study should be proposed when possible.
- M. AMOUNTS REQUESTED** - Provide justification for the itemized amounts shown in Part III for nonexpendable equipment, equipment rental, travel, and other items. It is required that the manner in which indirect costs are calculated and applied be stated.

#### ***PART VII – LIST OF REFERENCES***

A numerical list of references used in the text of the proposal should be included in the order referred to in the text.

### **3.4 REVIEW AND APPROVAL OF RESEARCH PROPOSALS**

The sequence of events necessary to obtain approval of a research proposal is described below:

- A. PRC** - reviews and rates proposals using the LTRC Proposal Review Form No. 1910 (Appendix D) within 14 days of reception.
- B. Associate Director, Research** - recommends acceptance, rejection, or revision of the study.
- C. Director** - recommends acceptance, rejection, or revision of the study.
- D. Policy Committee Chair** - recommends acceptance, rejection, or revision of the study.
- E. Directorate Sponsor for Implementation** - Each proposal will be sponsored by the appropriate DOTD Office Head. By recommending approval, the Directorate Head acknowledges that if the research is successful, solutions will be implemented.
- F. Secretary, DOTD** - Proposals recommended for approval by the Chair of the Policy Committee shall be submitted to the Secretary of DOTD for review and approval. This is the final step in the approval process.

## 4 CONDUCT OF RESEARCH PROJECTS

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Requirements outlined in this manual for research conducted or sponsored by LTRC will apply to all research projects regardless of their funding source.

### 4.1 STUDY IDENTIFICATION

An LTRC research project number is assigned for recordkeeping and indicates the fiscal year in which the study is approved in the annual work program, the LTRC program area, and the sequence number of the project for that fiscal year. An example is LTRC Project Number 15-1GT. The problem statement for this study was initiated in fiscal year 14-15; the program area is Geotechnical; and this was the first project assigned to this technical area in that fiscal year. In addition, a state-assigned Statistical Internal Order (SIO) number will be assigned by DOTD for fiscal tracking and payment purposes.

LTRC Group Codes are as follows:

- Research Support Line Item Codes:
  - PM: Program Management
  - TRS: Technical Research Surveillance
  - TA: Technical Assistance
  - LFT: Research Laboratory and Field Test Support
  - NPE: New Product Evaluation
  - TTRI: Technology Transfer and Research Implementation
  - EQM: Equipment Management
  - SSE: DOTD Staff Support for Research
- Research Program Area Codes:
  - GT: Geotechnical
  - P: Pavements
  - B: Bituminous (Asphalt)
  - ST: Structures
  - C: Concrete
  - SS: Special Studies
  - SA: Safety
  - PF: Pooled Fund (Louisiana lead)
  - PFE: Pooled Fund (External lead)
  - TIRE: Technology Innovation & Research Exploratory
- Technology Transfer and Training
  - TSQ: Technology Transfer Program and Operations
  - SWD: DOTD Staff Support for Workforce Development
  - WD: Workforce Development
  - TTRF: Technology Transfer Registration Fees
  - LTAP: Local Technical Assistance Program
  - COOP: DOTD CO-OP Program
  - WDC: Workforce Development Contracts

- TT: LTRC Student Program
- LRSP: Local Road Safety Program
- WDSC: Workforce Development Support for Safety Center

## 4.2 CONTRACTUAL AGREEMENTS

### 4.2.1 Awards to Louisiana Universities

For Louisiana universities with an executed cooperative research agreement, proposals approved by the Secretary will be issued a Task Order (Appendix F) by LTRC. The Task Order will include the investigative agency, study length, and funding, along with the research parties. The Task Order will indicate the starting date and serve as the notice to proceed with the study. No work may begin until the Task Order has been issued. All Task Orders issued by LTRC are cost reimbursable contracts for specific services, not grants.

### 4.2.2 Awards to Research Consultants

For private consultants or universities without a cooperative research agreement, a contract will be prepared by LTRC upon proposal approval by the Secretary. Upon signature of the contract by both parties, a notice to proceed will be issued. Consultants and business entities, including non-profit corporations, shall be registered with the Secretary of State in order to be able to work in Louisiana prior to award of contract.

<http://www.sos.la.gov/tabid/1011/Default.aspx>

A typical contract template for research (e.g., out-of-state university template, private consultant) is included in Appendix G.

### 4.2.3 External Awards to LTRC

Upon notice of receipt of a contract award to LTRC from an external funding agency, the PI will develop a LTRC research proposal to be approved by the Secretary. The approval process will be as defined in Section 3.4.

## 4.3 PROJECT MANAGEMENT

### 4.3.1 Project Manager Responsibilities

The Project Manager will review all invoices, progress reports, interim and final reports, and requests for changes in contract time and funding. The Project Manager should be contacted prior to preparing monthly invoices if the research investigator or the agency business office is uncertain about how specific expenditures should be invoiced. This will help avoid unnecessary delays in providing reimbursement for work accomplished, equipment purchased, and other budgeted items. The Project Manager's responsibilities include:

- Provides technical advice and guidance
- Helps in the identification of field test locations or sections by coordinating with Districts and/or other offices or agencies as needed
- Schedules meetings such as a kick-off meeting, PRC status meetings as required, a close-out meeting, and results presentations

- Develops and distributes PRC meeting minutes
- Ensures projects stay within scope, time, and budget, and addresses issues in a timely fashion
- Completes Project Manager section of Biannual Report
- Reviews task reports, biannual progress reports, interim reports, and research documents, providing comments as appropriate
- Makes recommendations to LTRC administrators and directors regarding modifications to project scope, budget, and time
- Reviews and evaluates subject matter content within interim and draft reports to assess the accomplishment of project objectives and goals
- Coordinates implementation activities of the research project
- Assists in the assessment of implementation activities, progress, and results
- Rates the overall effectiveness of the research team in the delivery of the contracted services

#### 4.3.2 PRC Chairman Responsibilities

In addition to PRC responsibilities in Section 4.3.3, the Chairman's responsibilities include:

- Chairs all PRC meetings
- Encourages active participation by all PRC members
- Helps the PRC reach consensus
- Serves as the liaison between DOTD practitioners and LTRC project manager and research team
- Serves as the primary champion of implementation activities if project is successful

#### 4.3.3 PRC Responsibilities

The PRC responsibilities in reference to an on-going research project include, but are not limited to, the following:

- Attends the kick-off meeting to review work plan with the PI
- Attends periodic meetings to provide feedback to the PI
- Reviews task reports, biannual progress reports, interim reports, and research documents, providing comments as appropriate
- Assists in development of implementation strategies, progress, and activities
- Reviews and evaluates subject matter content within the interim and draft final report to assess the accomplishment of project objectives and deliverables
- Completes the project satisfaction survey
- Assists in the assessment of implementation activities, progress, and results

## 4.4 MEETINGS

### 4.4.1 Kick-Off Meeting

Prior to the starting date of the study, the Project Manager will arrange a kick-off meeting with the research investigator and the PRC to review such items as study objectives, the time sequence of activities scheduled, and equipment or travel needs. The meeting will provide

an opportunity for discussion of concerns or comments as well as administrative and reporting requirements previously outlined by the PRC, unless these items have been resolved. The meeting will also enable the investigator to have questions answered concerning administrative details. Specific attention toward potential implementation activities will also be discussed. The LTRC Kick-Off Meeting Checklist included in Appendix H should be used as a reference to conduct the meeting.

#### 4.4.2 Progress Meetings

While a study is ongoing, the PRC will meet as required to meet the needs of the study, but shall meet a minimum of one time per year.

#### 4.4.3 Close-out Meeting

At the conclusion of the study, usually upon delivery and review of the draft final report, a project close-out meeting will be required to include a presentation of the research findings by the PI to the PRC. Research recommendations and implementation assessment and strategies will be updated.

### 4.5 CONTRACT MODIFICATIONS

During the conduct of a study, it may become necessary to modify the original study proposal. All such proposal changes affecting the budget, time, personnel, objective, scope, and work plan shall be justified by the Principal Investigator, subject to the approval of LTRC, and should be directed to the Project Manager. The Principal Investigator or investigators as shown in the proposal shall not be changed without prior LTRC approval, which shall not be unreasonably withheld. Failure to obtain prior approval from LTRC for a contract modification, when required, may result in the disallowance of costs. However, the Contractor may request retroactive approval; such approval or disapproval shall be at the discretion of the Director.

No changes or modifications shall be permitted to be made in the last 90 days of a contract unless such changes are determined to be necessary by LTRC.

#### 4.5.1 Re-budgeting

Except as noted below, contractors are permitted to re-budget within and between major direct cost categories in the approved budget to meet unanticipated requirements. For the re-budgeting items listed below, prior approval of the LTRC/DOTD is required:

1. Payment of supplemental compensation
2. Domestic travel costs that exceed the budgeted amount by more than 25 percent or \$500, whichever is greater.
3. Foreign travel (outside Canada or the US and its possessions)
4. Purchase of equipment (prior approval is not required for a different make or model included in the approved budget)
5. Equipment maintenance or repair of equipment approved for purchase
6. Subcontracting a substantive portion of programmatic work not included in the approved budget

Prior approval of LTRC is also required when cumulative transfers among major direct cost categories exceed or are expected to exceed 10 percent of the current total budget as last approved by LTRC or \$10,000, whichever is less. The PI shall notify the LTRC Project Manager of re-budgeting that does not exceed this threshold; said notification is not subject to audit review nor is approval of LTRC required.

#### 4.5.2 Project Modification

All project modifications shall be requested using the Research Project Modification Agreement form (Appendix I) and initiated by the Principal Investigator, approved by the university or institution research head, and submitted to LTRC for approval. Required information to be provided for revisions to proposal categories shall include, but not be limited to, the following:

- Budget: Attach a revised budget sheet
- Time: Attach a revised research study work schedule
- Personnel: Attach a personnel biography
- Scope/Work Plan: Attach revised tasks with appropriate descriptions and revised work schedule

For in-house studies and those conducted by Louisiana universities under a cooperative agreement, approval by the Director of the project modification form will constitute an executed contract modification.

For external contracts, not subject to a cooperative agreement, upon receipt of the project modification form and approval of the Director, a Supplemental Agreement to the original contact will be developed and executed upon signature by both parties.

## 4.6 FISCAL PROCEDURES

### 4.6.1 Fiscal Year

The LTRC fiscal year is defined as a 12-month period starting July 1 of each year and terminating on June 30 of the following year. Research project budgets are approved on the basis of expenditures by fiscal year as follows:

- The PI shall provide the budget for the current fiscal year when the project is initiated to the Project Manager at the project kick-off meeting.
- Subsequent fiscal years will be provided by the PI in the Annual Work Program sheet.
- Adjustments to the fiscal year budget shall be made and documented for approval with the January biannual report.

Expenditures in excess of the amount allocated for a fiscal year will not be reimbursed unless prior arrangements for extension of funds have been made. The LTRC Project Manager is responsible to notify the PI should the fiscal year budget or budget adjustment not be approved.

The overall effectiveness of the LTRC research program is predicated on accurate estimations and expenditures of individual project budget projections. It is imperative for research contractors to provide reasonable fiscal year budget projections to LTRC.

#### 4.6.2 Reimbursement of Expenditures

Claims for reimbursement of contract research expenditures shall be submitted on a monthly basis via the monthly invoice form shown in Appendix J. Contractors may request LTRC approval of other invoice formats. Alternate invoice formats must contain the appropriate expenditure distribution and itemization as provided in the LTRC form to be considered.

Claims received by LTRC on or prior to the tenth day of the month following the month of the expenditures will generally be authorized for reimbursement in the month received and paid within 30 days.

The monthly invoice form shall contain the information in the following subsections (attach to invoice form when additional space is required).

- A. **Identification** – The study shall be identified by title, state SIO number and research project number, research agency, and period for which the invoiced charges were incurred.
- B. **Equipment** – The cost of nonexpendable equipment as defined in Section 3.3.5 (having an acquisition cost of more than \$1000 per unit and useful life of more than one year) or rental charges shall be listed, along with the voucher number, date of payment, description of equipment, number of items, and total costs. Fees for rentals included in the proposal budget or authorized by LTRC should be listed in this section.

Nonexpendable equipment or rental charges for equipment not included in the proposed budget shall require the approval of the LTRC Project Manager prior to incurring the expense. Payment shall not be allowed for costs of service and repairs on equipment owned and normally maintained by the Contractor.

The *Disposition of Non-expendable Equipment Form* (Appendix K) shall be submitted to LTRC with the invoice to include a copy of the manufacturer's invoice indicating serial and model number.

- C. **Materials, Rentals, and Services** – List individually any expendable equipment, consumable material, or supply item purchased for the project which exceeds \$500. Computer software is normally budgeted as a supply item. However all computer software purchased with study funds, if approved in the proposal, shall become the property of LTRC upon completion of the study. List and identify costs incurred for computer charges, reproductions and copying, telephone use, and other services associated with the project. List only those items that are not included in the computation of the agency's indirect cost percentage.
- D. **Personnel Costs** – Include the names of authorized personnel and the corresponding charges showing hourly or monthly rate, number of hours or percentage of time worked on the project, and the percentage used for employee benefits.

- E. **Travel Costs** – Costs incurred for authorized travel shall include the name of the traveling party, destination, dates, and purpose of the travel. Refer to Section 4.8 for the details of conditions under which travel is authorized. Travel costs shall be reimbursed in accordance with Louisiana Division of Administration Policy and Procedures Memorandum 49 (The State General Travel Regulations (<http://www.doa.louisiana.gov/osp/travel/travelpolicy.htm>)).
- F. **Indirect Costs** – The total of all costs included on the invoice shall be shown, with the percentage used for indirect costs indicated. Indirect costs shall be computed in accordance with 3.3.5 Part III G. When sub-contracts are used in the conduct of research, each sub-contractor shall provide a separate budget including direct and indirect costs. Indirect charges by the prime Contractor for the sub contract costs will be limited to the first \$25,000, unless the majority of work by the sub-contractor is at the prime’s facilities. In that case, the prime Contractor can charge only indirect costs on the sub-contractor’s direct costs. Indirect costs for private consultants shall be as defined in Section 3.3.5 Part III H.
- G. **Balance** – The fiscal status of the project shall be indicated by completing this portion of the invoice.
- H. **Certification** – The invoice shall be certified correct and just by affixing the signature of the contract agency’s auditor.

4.6.3 **Cost Records**

The Contractor and its subcontractors shall maintain all books, documents, papers, accounting records, and other evidence pertaining to costs incurred relative to the project and shall make such materials available at their respective offices during the contract period and for three years from the date of final payment under this contract, for inspection by the DOTD and/or Legislative Auditor, and when federally funded, the U.S. General Accounting Office, or any other authorized representative of the federal government under state and federal regulations effective the date of the contract. Copies thereof shall be furnished if requested.

4.6.4 **Auditing**

DOTD may conduct an audit of the research Contractor prior to the initiation of a research project and upon termination of the project; however, DOTD may conduct an audit at any time deemed necessary.

4.6.5 **Budget Modifications**

- A. **Total Project Budget** – Requests for changes in an approved research project which affects funding shall be in accordance with Section 4.5.2.
- B. **Fiscal Year Budget** – Fiscal year budgets for research studies are established in the annual work program sheet submitted by the Principal Investigator. Request to change this budget may be submitted to the Project Manager for approval. Request to change the fiscal year budget must also be included in the December Biannual Progress Report.



## 4.7 PROGRESS REPORTS

### 4.7.1 Biannual Progress Report

Biannual Progress Reports are designed to ensure that progress agrees substantially with the research proposal and to indicate changes that have been made from the original work plan. A Biannual Progress Report shall be prepared by the Principal Investigator for the periods ending June 30 and December 31. These reports shall be submitted to the LTRC Project Manager through the PMTS website by July 15 and January 15 of each year during the duration of the study. The Principal Investigator shall submit biannual progress reports until the draft final report is approved by the Project Manager to be submitted for final editorial review by the LTRC editor. The Project Manager shall provide comments by July 31 and January 31. The Project Manager shall continue to submit manager comments to the biannual reports until a Notice-of-Completion is provided to the PI of acceptance of final deliverables. These reports shall contain sufficient information to enable the LTRC Project to evaluate the progress and possible future course of the study.

The following should be included, as indicated on the biannual progress report form shown in Appendix L:

- A. **Study Identification** – Provided by the PMTS
- B. **Budget Status** – Budget status shall include the total amount projected to be invoiced to the project by the end of the reporting period. It should also include any requested change to the fiscal year budget. It is of utmost importance that the PI project the fiscal year budget as accurately as reasonably possible based on the anticipated work schedule.
- C. **Accomplishments This Period** – Identify overall progress and briefly discuss technical achievements by task completed over the period represented by the report. Total percentage of work completed on each task is also required. Detail any proposed modifications of the work plan and advise when a formal request for approval will be made. Include any problems on which assistance is needed, changes in personnel, or equipment needs. Explain problems with respect to funding, progress, time, or delays in study tasks.
- D. **Proposed Activities Next Period** – Describe the work by task planned for the next reporting period. State the expected date of the Interim or Final Report if it will be submitted during the next period. Describe anticipated changes in scope, time, budget, etc.
- E. **LTRC Manager's Assessment** – This portion of the biannual report should be completed by the LTRC Project Manager monitoring the project. Information regarding study progress and accomplishments resulting from PRC meetings will be documented in this section.
- F. **Implementation Assessment** – The technology transfer manager will provide information regarding benefits and recommended implementation strategies. Items that can be immediately implemented should be identified.

### 4.7.2 Project Task Reports

Project Task Reports are prepared as required in the RFP and project proposal by the Principal Investigator. Task reports should be more oriented toward technical progress and

accomplishments. The reports must be written in sufficient detail such that they could be a chapter or an appendix in the final report. Task reports are due by the end of the month following the completion of the task according to the timeline established in the proposal.

#### 4.7.3 Interim Report

An Interim Report is to be submitted as outlined in the research proposal or upon request of LTRC. The report will present a complete documentation of all technical data and analysis, including results achieved.

### 4.8 TRAVEL

Travel charged to a research project shall be limited to what is necessary for the conduct of the research. Travel for conference, convention, or seminars is not allowed in the budget of a research project. Authorized travel made in connection with a research project shall be reimbursable under the following conditions:

- A. **In-State Travel** – Travel within the confines of the state of Louisiana necessary to the routine duties required for completion of the project and for which provision is made in the approved study budget.
- B. **Out-of-State Travel/Non-Routine Travel** – For travel outside the confines of Louisiana including travel to Louisiana from another state is allowed when included in the approved study budget with LTRC approval. A written request using the Out-of-State Travel Approval Request Form (Appendix M) shall be submitted for LTRC approval at least three weeks prior to the anticipated date of departure. Such requests shall include the name(s) of person(s) making the trip, purpose of the trip, anticipated dates of travel, and an itemization of costs to be incurred.
- C. **Travel for Dissemination of Research Results** – Travel reimbursement for dissemination of research results in connection with a research project at conferences, convention, or seminars may be requested from LTRC as defined in Section 6.5.2.

### 4.9 EQUIPMENT

All equipment owned by the Contractor and not included in the approved study budget for purchase or rental is considered routine equipment and shall be available for use on the project without charges of any nature made against the project. The cost of wear and tear, maintenance, service, operation, insurance, and depreciation are to be addressed in the indirect costs specified in the approved study budget.

#### 4.9.1 LTRC Equipment

The use of LTRC equipment and facilities by contract researchers shall be limited to what is specifically detailed in the proposal. When the use of such equipment and facilities is not stated in the study proposal, a written request must be sent to the Director detailing the specific equipment, timeline, LTRC staff support, and justification necessary to accomplish the objectives of the research project. If approved, the conditions under which LTRC equipment and facilities may be used shall be determined by the Director.

#### 4.9.2 Nonexpendable Equipment

All nonexpendable equipment, devices, or systems either built or purchased are the property of LTRC/DOTD. All computer software and reference publications purchased with study funds shall become the property of LTRC/DOTD whether budgeted as non-expendable equipment or supplies.

For purposes of property control inventory, and in accordance with Title 34.307 of the Louisiana Administrative Code, non-expendable equipment includes all items of movable property having an “original” acquisition cost, when first purchased by the state of Louisiana, of \$1000 or more. The term “movable” distinguishes this type of equipment from equipment attached as permanent part of a building or structure. The term “property” distinguishes this type of equipment from “supplies,” with supplies being consumable through normal use in no more than one year’s time. This category of equipment includes items fabricated for the study from items charged to the study budget and meeting the above definition.

#### 4.9.3 Expendable Equipment

Those minor items of equipment not meeting the definition of non-expendable equipment are considered as having no residual value upon termination of the study and become the property of the Contractor.

#### 4.9.4 Disposition of Nonexpendable Equipment

All nonexpendable equipment purchased or built using study funds becomes the property of LTRC/DOTD. Each piece of equipment or computer software purchased for the research project shall be assigned an inventory number in accordance with Louisiana Title 34.307 and DOTD property control procedures. The Principal Investigator shall submit the *Disposition of Nonexpendable Equipment* Form (Appendix K) to the LTRC Project Manager along with the invoice to include a copy of the manufacturer’s invoice indicating serial and model number within 30 days of receipt of equipment. LTRC shall maintain this form in the project files for the study.

During the conduct of the research, the Principal Investigator shall make the equipment available for inspection for inventory purposes in accordance with Louisiana Division of Administration and DOTD property control procedures.

Upon completion of the study, the Contractor shall make disposition of the equipment in accordance with directions of LTRC as follows:

- A. **Transfer To LTRC** – The equipment (including service manuals, accessories, tools, wiring diagrams, service history, and condition of equipment, etc.) shall be transferred to LTRC.
- B. **Transfer To Another Project** – At the discretion of LTRC, the equipment may be transferred to another LTRC research project for subsequent use. In this event, the amount of the residual value of the equipment, as determined by LTRC, shall be credited to the original study project and charged to the project to which it is transferred.

#### 4.10 COMPUTER SOFTWARE

Computer programs developed by a Contractor as a result of LTRC sponsorship of a research project are the property of LTRC and shall be modified as directed by LTRC for compatibility with LTRC/DOTD equipment.

#### 4.11 PROGRESS INSPECTIONS

During the progress of a research project, representatives of LTRC, DOTD, and FHWA (for federally funded studies) shall have the right to inspect the progress of the work and the facilities used by the Contractor in the conduct of the study. They shall be provided reasonable access to all personnel associated with the study.

#### 4.12 PATENT RIGHTS

The proprietary rights of any special equipment or procedures developed as a result of a research project, unless otherwise defined in the proposal, shall be governed by the following, which shall be physically incorporated in all contracts.

For any patentable discoveries or inventions that should result from the Contractor's work other than discoveries or inventions that are deliverable under the contract, all rights accruing from such discoveries or inventions shall be the sole property of the Contractor. However, the Contractor hereby grants to all state highway and/or transportation departments, local public agencies, the United States Government, and all contractors for any of the foregoing when such contractors are performing work under contract for the aforementioned entities, an irrevocable, non-exclusive, nontransferable, and royalty-free license to practice each invention in the manufacture, use, and disposition, according to law, of any article or material, and in the use of any method that may be developed as a part of the work under the research contract.

The Contractor shall notify LTRC of its intent to file a patent on work developed as a result of a research project.

#### 4.13 CORRESPONDENCE

Unless otherwise indicated, all correspondence, forms, reports, invoices, and other documentation for a research project should be directed to the appropriate LTRC Project Manager.

#### 4.14 PAPERS, ARTICLES, AND PRESENTATIONS

For publication of papers, articles, and presentation prior to the end of the project and acceptance of the final report, see Section 5.3.

#### 4.15 DELIVERABLES

All products are expected to be of exceptional quality. All deliverables shall be submitted first in draft format. Draft deliverables are the Contractor's vision of the complete and final deliverables. All draft deliverables must be spell checked and reviewed by a person. All

proposals must address deliverable quality and how quality will be guaranteed. (i.e., use of editing staff and/or peer reviewer)

Subsequent draft deliverables will be submitted within **two weeks** following receipt of LTRC comments.

For each deliverable, a *line item response to each comment is required*.

Deliverables are considered drafts until a project Notice- of-Completion is received.

LTRC reserves the right to withhold invoice payments for delinquent deliverables, including task order reports, as defined in the proposal.

When an acceptable final report or other required deliverables cannot be submitted to LTRC by the completion date of the study, the Principal Investigator shall submit a request for a time extension not to exceed 90 days. If the deliverables are not submitted within the approved time extension period, a stop order will be issued on any other LTRC study the researcher is conducting, and the researcher will be barred from submitting other proposals until the final report is received. If all of the above actions fail to result in submission of deliverables, consideration will be given to citing the study for lack of compliance and requesting return of the funds expended or a negotiated portion thereof.

A 15 percent retainage fee may be imposed on contract invoices to ensure compliance with these requirements. LTRC reserves the right to withhold 15 percent of the total amount invoiced on the project at any time during the study until all required deliverables have been submitted and accepted by LTRC.

#### 4.16 FILES AND RECORDS

Responsibilities for the maintenance and ownership of files and records are as follows:

- A. **LTRC** – Subsequent proposals and all records of PRC meetings, evaluations, and correspondence pertaining to each proposal and problem statement will be maintained in this file. The file shall be identified by the research project number to be assigned if and when the project is approved.
- B. **Contractor** – The Contractor shall maintain records of all data, findings and conclusions, reports, and other evidence and supporting documentation pertaining to the study in accordance with generally accepted research practice. Accounting records shall be maintained to support all costs invoiced for the project (see Section 4.6.3). These records shall be kept up-to-date and made available to representatives of LTRC, DOTD, and FHWA during the course of the study and for a period of three years from the date of final payment to the Contractor for completion of the project.
- C. **Ownership of Documents and Records** – All data collected by the Contractor and all documents, notes, drawings, tracings and files collected or prepared in connection with work completed, except the Contractor’s personnel and administrative files shall become the property of LTRC/DOTD and the LTRC/DOTD shall not be restricted in any way whatever in its use of such material, except as specified in Louisiana R.S. 38:2317.

No public new releases, technical papers, or presentations concerning the Contractor's work may be made without prior written approval of the LTRC/DOTD.

#### 4.17 CLOSE-OUT, TERMINATION, OR SUSPENSION

##### 4.17.1 Project Completion

Research contracts (or task orders) shall become effective from the date of execution and shall be binding upon the parties until the work has been completed by the Contractor in accordance with the terms of the research contract (or task order), research proposal, and any supplemental or modification agreements, and accepted by LTRC, and all payments and conditions have been met. Further, the contract shall remain in effect until LTRC has issued final acceptance of the services provided. Upon approval by the Director for publication of the final report, acceptance of all deliverables, and all invoices paid, the Project Manager will issue a Notice-of-Completion (Appendix N) to the contracting agency.

Upon a notice-of-completion, the Project Manager will complete the Project Evaluation Form (Appendix O). The form shall be placed in the project files for reference in consideration of future work of the research team for LTRC. The rating will only apply to future LTRC research contracts and will not be used in reference to future DOTD pre-construction contracts.

##### 4.17.2 Early Termination or Suspension

The contract (or task order) may be terminated earlier under any of the following conditions:

1. By mutual agreement and consent of the parties hereto
2. By LTRC/DOTD as a consequence of the failure of the Contractor to comply with the terms, progress or quality of work in a satisfactory manner, proper allowance being made for circumstances beyond the control of the Contractor
3. By either party upon failure of the other party to fulfill its obligations as set forth in the contract
4. By the LTRC/DOTD due to the departure for whatever reason of any principal member or members of the research team as defined in the proposal
5. By satisfactory completion of all services and obligations described herein
6. By the LTRC/DOTD giving 30 days' notice to the consultant in writing and paying compensation due for completed work.

Upon termination, the Contractor shall deliver to LTRC/DOTD a report in complete detail of all findings and all obtained data for LTRC/DOTD's use as well as copies of all records of the work compiled to the date of termination and LTRC/DOTD shall pay for all costs incurred in full for all work accomplished, including non-cancelable obligation up to the date of termination.

If for any reason, LTRC/DOTD wishes to suspend the contract, it may do so by giving the Contractor 30 days' written notice of intent to suspend. The Contractor shall, at expiration of the 30 days from the date of the notice of intent to suspend, stop all work on the Project. Work shall resume no later than 30 days after LTRC/DOTD provides the Contractor with a notice of intent to resume work.

The Contractor shall not have the authority to suspend work on the contract.

## 5 PUBLICATIONS

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The publications and electronic media development program serves as the voice of LTRC through publishing, multimedia development, and video/audiovisual production. As the communications bridge between research and the scientific community and training and the employee, LTRC disseminates research results, facilitates technology transfer, explores new training methods, and produces effective training materials.

### 5.1 GENERAL REQUIREMENTS

LTRC will be responsible for the publication of all reports funded solely by DOTD. Research reports from projects conducted by LTRC funded by other agencies/entities shall follow the publication requirements of the funding agency. The following provisions shall govern publication of resultant data from each contract research project.

1. The author shall be free to copyright material developed under each contract, with the provision that the Contractor hereby grants to all state highway and/or transportation departments, the United States Government, local public agencies, and all contractors for any of the foregoing when such contractors are performing work under contract for the aforementioned entities, an irrevocable, non-exclusive, nontransferable, and royalty-free license to reproduce, publish or otherwise use, and to authorize others to use the work for Government purposes.
2. Either party to this contract may initiate a request for publication of the final or interim reports or any portions thereof. Technical papers, articles, and submissions for review to technical journals, prepared for submission prior to approval of the final report required under the contract, must be submitted to the LTRC/DOTD for approval prior to publication. In the event of failure of agreement between the LTRC/DOTD and the Consultant relative to publication of the final report, or of any progress reports during the contractual period, either party reserves the right to publish independently in which event the non-concurrence of the other party shall be set forth as technical comments in the report in a clearly identified section such as “sponsor’s comments,” or “Consultant’s comments.” Following publication of the final report under a contract, no approvals are required from LTRC/DOTD for subsequent publications, as noted below in item 4.
3. Both parties to the agreement shall have equal responsibility to review and approve material for publication prior to publication of the final report, except that the LTRC/DOTD reserves the right initially to publish the final report. PI is required to address all comments with a written response to said comments.
4. After acceptance of the final report, the Consultant and the LTRC/DOTD are free to use the data and results without restriction except as noted above in item 2. Whenever the Consultant uses the data and the results, due credit will be given to the LTRC/DOTD and all other funding agencies.
5. All technical publications by LTRC and/or the Contractor shall contain a disclaimer statement similar to the following:

*The contents of this report reflect the view 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 Louisiana Transportation Research Center, the Louisiana Department of Transportation and Development, or the Federal Highway Administration (FHWA funded only). This report does not constitute a standard, specification, or regulation.*

6. Publication by either party shall give credit to the other party and to FHWA, unless, due to failure of agreement on any report of the study, the FHWA or either of the parties to the contract requests that its credit acknowledgment be omitted. When research is not supported by federal funding, the above credit requirement pertaining to FHWA does not apply.

## 5.2 FINAL REPORTS

Final reports are required to provide final documentation of the technical findings of the research study. Final reports should be written with the transportation practitioner as the primary target audience. However, the report should be inclusive of all data, analysis, and references as necessary to provide proper records for responsible documentation of study results.

The body of the final report **shall not exceed 100 pages** unless approved in writing by the LTRC Project Manager and the Associate Director, Research prior to submission of the draft report. There will be no limit to the number of pages allowed for the appendixes of the report. LTRC reserves the right to publish in hard copy only the body of the final report. Theses or dissertations, or portions thereof, will not be accepted as final reports.

All research reports shall be prepared in accordance with the publication "LTRC Publication Guidelines," which is available for download on the LTRC website: [http://www.ltrc.lsu.edu/pdf/2009/pub\\_guidelines\\_final.pdf](http://www.ltrc.lsu.edu/pdf/2009/pub_guidelines_final.pdf). It is the responsibility of the PI to ensure that all reports submitted have been previously edited by an outside source. It is strongly encouraged to include an editorial review in the budget and timeline to be used prior to submittal of the draft report to LTRC. Reports submitted needing substantial editing or not in compliance with the guidelines will be returned immediately. The LTRC editorial process will not require the PI to make changes that alter the scientific and technical content and interpretation of the research.

A draft of the final report will be submitted to LTRC in electronic form three months prior to the ending date of the study. This three-month period shall be accounted for in the study proposal work plan and budget. This will allow LTRC and the PRC ample time to review the report and provide comments to the Principal Investigator. The Principal Investigator should then be able to make needed corrections to the report prior to exhausting study time and funding. The report will present a complete documentation of all technical data gathered, analysis performed, and results achieved. The accepted final report shall be submitted in both hard-copy and electronic formats.



After acceptance of the final report, the Contractor and LTRC are free to use the data and results without restriction except as otherwise noted in this manual. Whenever the Contractor uses the data and the results, due credit will be given to LTRC and all other funding agencies.

The author shall be free to copyright material developed under each contract, other than with the provision that the Contractor hereby grants to all state highway and/or transportation departments, local public agencies, the United States Government, and all contractors for any of the foregoing when such contractors are performing work under contract for the aforementioned entities, an irrevocable, non-exclusive, nontransferable, and royalty-free license to reproduce, publish or otherwise use, and to authorize others to use the work for Government purposes.

All project reports will be submitted to the appropriate LTRC Project Manager.

### 5.3 PAPERS, ARTICLES, AND PRESENTATIONS

The presentation of study findings by formal papers, articles, or bulletins prior to the end of the project and acceptance of the final report shall not be made without the prior approval of LTRC. Notification of Submission of Papers Form (Appendix Q) shall be used to request approval for such publications. All such publications and presentations shall contain disclaimer statements similar to that given in Section 5.1. The sponsoring agencies shall be credited and copies submitted to LTRC prior to presentation or publication.

### 5.4 THESES AND DISSERTATIONS

Prior approval of LTRC is **not** required for publication of theses and dissertations. The website link to all theses and dissertations that are a result of research projects sponsored by LTRC shall be furnished to the Director when posted, and the sponsorship of LTRC shall be acknowledged. Theses and dissertations are not acceptable in lieu of other reporting requirements.

### 5.5 PROJECT CAPSULES

When a research study begins, a project capsule is published that outlines the need for the research, the study's objectives and methodology, and the potential for future implementation. The project capsule for each project shall be developed by the Technology Transfer Engineer Manager for all projects immediately following approval of the proposal. LTRC will publish and distribute the project capsules as approved by the Director.

### 5.6 INTERIM REPORTS

Interim Reports are generally for internal documents for use by the Principal Investigator and PRC to assess and evaluate the status of the research process and product. Interim reports may be used to provide for early disclosure of significant findings which may be implemented or problems with which the staff of LTRC, DOTD, or the FHWA may be able to assist. The interim report may be published as required by the proposal or as required by LTRC.

## 5.7 LTRC TECHNICAL SUMMARY

A technical summary for each study shall be prepared by the Principal Investigator at the conclusion of the study with the draft final report. A sample is provided in Appendix R. The summary in electronic format should not exceed two, single-spaced, typed pages and should include the following elements:

- A. REPORT TITLE AND AUTHOR**
- B. INTRODUCTION** - Identify the researchers and research agency and summarize the study. The cooperation of the FHWA and joint coordination with other funding agencies shall be acknowledged, as appropriate.
- C. STUDY OBJECTIVES**
- D. SCOPE**
- E. METHODOLOGY**
- F. CONCLUSIONS AND RECOMMENDATIONS**
- G. IMPLEMENTATION STATEMENT/PLAN**
- H. STUDY CONTACT(S)** - name, title, address, telephone number
- I. FUNDING SOURCE**
- J. DISCLAIMER STATEMENT** - in accordance with Section 5.1.

The LTRC Engineer Administrator/Manager shall include a copy of the technical summary at the time of the request for the PRC review of the draft report and indicate whether statewide, nationwide, or other distribution of the technical summary is intended.

## 5.8 TECHNICAL ASSISTANCE REPORTS

LTRC's research section often provides technical assistance to DOTD in the way of new product evaluations, forensic analyses, collection and analysis of field information, and problem-solving services that do not warrant a formal research study. The **technical assistance report** documents these efforts and is published at the discretion of the Director. A TA report format shall follow the final report format as defined in Appendix P.

## 5.9 SYNTHESIS REPORTS

Synthesis projects develop reports on current knowledge and practice, in a compact format, without the detailed directions found in manuals or exploratory work found in formal research projects. Each report provides a compendium of the best practices that were acceptable within the limitations of the knowledge available at the time of its preparation. The synthesis report format shall follow the final report format as defined in Appendix P.

## 5.10 LTRC ANNUAL REPORT

An annual report consisting of the activities of LTRC will be submitted to the LTRC Policy Committee, Secretary, and LSU Dean, College of Engineering as required is Title 48:105. The report shall address the activities and achievements of the center and provide an assessment of the extent to which the center is fulfilling its functions.

### 5.11 PUBLICATION REVIEW AND APPROVAL PROCESS

Unless otherwise required in the proposal, draft final reports are due 90 days prior to the end date of the project. The Principal Investigator shall submit an original draft report in hard copy and in electronic format to the LTRC Project Manager.

Upon receipt of draft report, the Project Manager shall review the report to assure the contents meet the basic format, quality, and reporting requirements. The review and approval process is as shown in Figure 5-1.

### 5.12 DISTRIBUTION

The distribution of all final, interim, summary, project capsules, and technical summary reports shall be distributed electronically as noted in the Report Distribution Checklist (Appendix S) as approved by the Editor, Implementation Engineer, LTRC Manager, LTRC Administrator, Associate Director, Research, and the Director.

Twenty hard copies of all publications are to be submitted to the Louisiana State Library for the Louisiana Public Document Depository Program using the Document Submission Form (Appendix T). In addition, all publications that are distributed electronically are to be submitted via email to [docs@state.lib.la.us](mailto:docs@state.lib.la.us) in PDF format.

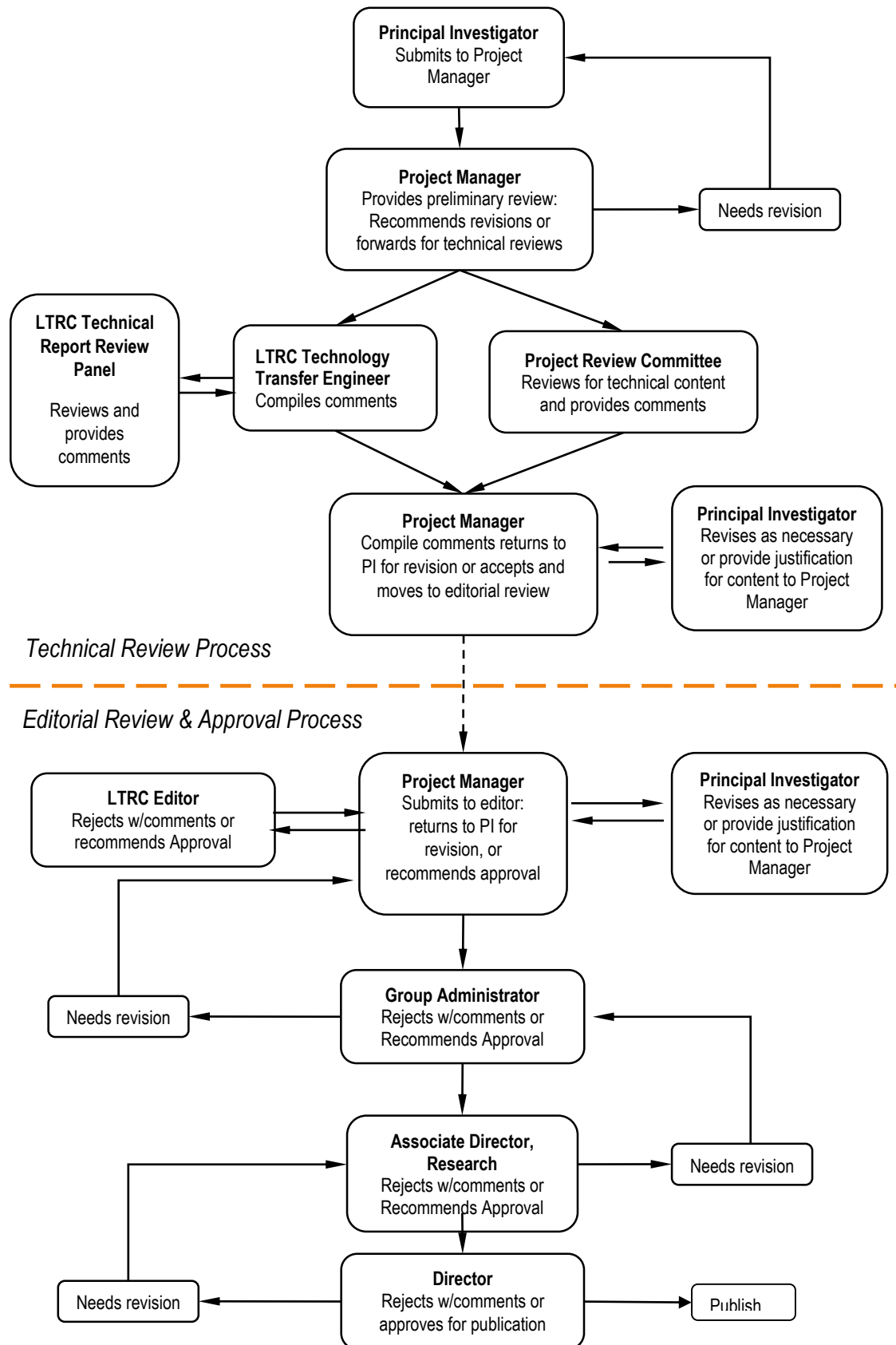


Figure 5-1 LTRC Publication Review and Approval Process

## 6 RESEARCH ASSESSMENT AND IMPLEMENTATION

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### 6.1 GENERAL INFORMATION

Each research activity is undertaken with the specific intent of eventually providing solutions to transportation problems or generating useful information. The findings of each study must be carefully assessed to determine those which offer potential benefits if implemented. Implementation is the logical follow-up and application of research results to provide the basis for adopting solutions and innovations into practice. It is the primary goal of LTRC to develop and manage a research program which emphasizes implementable products. The two criteria used in the selection and ranking of research problem statements are (1) importance of the problem to the Louisiana transportation community and (2) implementation potential, on an equal ranking basis. Research study proposals are required to contain clearly identified products. Implementable products often fall into one or more of the following categories: (1) products that are of immediate interest to the funding agency, which provide the basis for decision-making; (2) products that identify the reasons for underlying causes or data relationships which may be used to explain, improve, or develop processes; and (3) products that enhance the ability of researchers to conduct research.

The typical objective of the implementation phase of research is to create an atmosphere leading to improvement, to encourage efficiency, and to reduce costs. Successful implementation of findings requires a determined effort by both the research community and the potential user, who must be convinced of the applicable benefits.

### 6.2 RESPONSIBILITY FOR IMPLEMENTATION

The LTRC Engineer Administrator/Project Manager and the Technology Transfer Engineer have joint responsibility for insuring that study findings with potential for application are implemented. The strategies for implementation should be determined in conjunction with the Project Review Committee and the Principal Investigator, and recommended to the Associate Directors for Research and Technology Transfer. The feasibility of implementation should be documented in accordance with Section 6.4 and recommendations formally submitted using the Research Assessment and Implementation Report (RAIR) (Appendix U). Research projects should be cost-effective, and the anticipated benefits are of paramount importance to the justification and continuation of research activities.

In accordance with the DOTD Secretary's direction, each proposal must be recommended for approval by a DOTD Office Head as Implementation Sponsor. Such recommendation commits the sponsor to ensure that successful research products/deliverables are implemented. Should the Sponsor not choose to implement successful research, he/she must address his/her reasons to the Secretary in writing.

A Research Assessment and Implementation Report shall be completed by the Project Manager in conjunction with the PI, PRC, and Technology Transfer Engineer.

### 6.3 OBSTACLES TO IMPLEMENTATION

In most cases, deployment of research results will not automatically occur with the publication of a research report. Without engaged thought and a targeted deployment strategy, the research report will often die on the shelf. There are many obstacles to implementation, as depicted in Figure 6-1. The obstacles can be internal within DOTD or external beyond the influence of the research team or practitioner. Identifying and understanding these obstacles at the beginning of the research project life cycle can greatly increase the chances of achieving a successful research project. Providing the research team with the knowledge of these obstacles may greatly influence the project work program and deliverables. Unfortunately, waiting until the research project is completed to understand these potential roadblocks will decrease the potential for successful deployment.



Figure 6-1 Obstacles to Implementation

### 6.4 RESEARCH ASSESSMENT AND IMPLEMENTATION REPORT (RAIR)

LTRC employs a Research Assessment and Implementation Report (RAIR) (Appendix U) process to increase the chances of successful deployment of its research results. The process formally aligns the objective of a research project developed by the Principal Investigator with the expectations and implementation strategies of the end user. The RAIR process begins at the initiation of the research project and extends beyond the completion of the research work through deployment results. The process provides a better understanding of the deliverables and implementation products necessary for successful adoption of the research results into practice.

The PRC will remain active beyond the end of the research project end date through the implementation process as defined in the RAIR.

The development of the implementation strategy begins in the Conduct of Research phase with the first draft of the RAIR. It is imperative that the implementation strategy be considered early in the project. The RAIR is first reviewed at the kick-off meeting between the PRC and research team to achieve a clear understanding between the scope and deliverables of the research proposal and the anticipated deployment strategy needed for successful implementation. The RAIR is reviewed and updated at each subsequent PRC meeting.

The RAIR development process begins with the assumption that the research will be successful and that the results of the research will be implementable. The report begins as a planning document to generate discussion on how the results of a successful project would be moved into standard practice. Who are the key decision-makers? What deliverables/tools will be necessary? How will the benefits be defined? Not all components of the RAIR sections will be known at the beginning of a research project. The information is continually reviewed and updated at PRC meetings during the conduct of the research as the research outcome becomes more defined. The responsibility for development and updating and tracking of the RAIR document is with the Project Manager in cooperation with the PRC with input from the Principal Investigator and Technology Transfer Engineer.

The RAIR consists of a series of topics and questions designed to provide guidance and insight to the PRC and research team for development of a successful implementation strategy. The questions are presented as an aid and are not intended to be all inclusive. Individual sections of the RAIR are described in further details as follows:

#### 6.4.1 Project Identification Information

- Project Numbers
- Project Title
- Principal Investigator
- PRC Committee Members
- Project Manager
- Technology Transfer Engineer

#### 6.4.2 Objectives

Describe the expected objectives/deliverables/products of this research.

#### 6.4.3 Implementation Recommendations

Provide the implementation recommendations as developed by the Project Review Committee.

- Do the study findings have potential application?
- Are the results practical for application to the transportation system or some other area?
- Do the findings show no conclusion but suggest other research needed?

#### 6.4.4 Potential Impact

Describe potential impact of the recommendations in terms of cost, efficiency, safety, convenience, aesthetics, etc. Describe required changes to existing specifications, standards, procedures, etc.

- Will the findings have impact on the state of the art?
- Will the findings result in the application of new specifications, standards, or design procedures?
- Will the findings result in revision of existing specifications, standards, or design procedures?
- Will the findings result in the modification, development, and use of materials or equipment?
- Will the findings show other positive benefits such as reduced costs, greater efficiency, safer highways, greater convenience, aesthetics, etc.?
- What will be the economic result of applying the findings to the transportation and/or other applicable systems?

#### 6.4.5 Target Audience

List whomever you want to reach, their primary interest, and your objective in reaching them.

- Who will benefit from this research?
- Where in the transportation or other applicable area can the findings be applied?
- Who will benefit from the findings?

#### 6.4.6 Strategies and Tactics

Describe practical areas of application. List the activities required for implementation, including resource needs. Consider needs for training, multimedia, and marketing.

- What strategies would be most effective in implementation?

#### 6.4.7 Timeline

Create a schedule for each discrete strategy or tactic.

#### 6.4.8 Implementation Responsibility

Define roles and responsibilities of all personnel involved in the implementation effort. Identify who will be the decision-makers to implement results of the research.

#### 6.4.9 Evaluation

Identify methods for evaluating the implementation effort.

- How will benefits be quantified or assessed?

### 6.5 IMPLEMENTATION PRODUCTS

Communicating the value of research projects will also enhance implementation efforts. Decision-makers often do not have the time available to read lengthy research reports. Their interest is in the bottom-line effect of the implementation to the organization and transportation system. Will it make the Department more efficient? Will it save lives? Will it save money? Demonstrating the benefits of implementation will significantly increase the chances of successful adoption of the deployment.



The method of relating the potential benefits of study findings to the appropriate individuals or groups must be carefully considered. The following implementation strategies should be considered:

LTRC Publications - The following LTRC publications will be considered for Technology Transfer purposes:

- Project Capsule
- Interim Reports
- Final Reports
- LTRC Technical Summaries - These are required for each study upon completion and may be generated during the study when appropriate.
- Technology Transfer - The applicability of findings for inclusion in the LTRC Technology Today and Technology Exchange Newsletters should be considered.
- Implementation Brochures
  - Implementation Impacts
  - Implementation Fact Sheets
  - Implementation Updates

Distribution of reports should be based upon the applicability of findings to DOTD and other state and federal transportation agencies, academic institutions, industry and allied organizations, professional technical organizations, state public libraries, and local cities, parishes, and rural governmental entities which may benefit. For all research undertaken with federal funding, it is required that each interim report and final report be submitted to the federal source stated in the report distribution checklist.

#### 6.5.1 Issuance of Memoranda

Recommendations may be made by memoranda to incorporate findings into transportation or other applicable systems by their inclusion into specifications, standards, procedures or techniques for design, planning, construction, maintenance or administrative functions. In addition, the appropriate LTRC Engineer Administrator/Manager shall prepare a memorandum to the appropriate DOTD Office Head for the distribution of each interim report, final report, and technical summary published.

#### 6.5.2 Formal Presentations/Publications

Study findings may be implemented through formal presentations or papers by the researchers at conferences and seminars, articles in technical trade journals, meetings, and demonstrations for potential users.

Funding for dissemination of research results is available upon request subject to LTRC approval based on available funds and benefit of the travel to the state of Louisiana. Travel for presentations at conferences, conventions, seminars, implementation meetings may be requested using the Technology Transfer Travel Request Form (Appendix V). The travel must include justification as it related a specific LTRC research project. LTRC may limit the amount of travel granted to researchers for each research project based on the project results, implementation benefits, and number of times travel has be previously approved.

Travel reimbursement will be direct to the traveler subject to the State of Louisiana Travel Regulations and Division of Administration rules. Technology transfer travel will not be charged directly to research project funds.

Foreign travel will not be allowed without approval of the Secretary.

#### 6.5.3 News Releases

News releases shall be coordinated through the Director's office.

#### 6.5.4 Development and/or Delivery of Formal Training Materials

Either written or audiovisual training presentations should be initiated when necessary to implement findings.

#### 6.5.5 Demonstration or Pilot Projects

Findings may be incorporated into a project for further evaluation.

#### 6.5.6 Development of Study Proposals

Findings may warrant further research or evaluation in the study area.

#### 6.5.7 Personal Contact

The importance of personal contact with those individuals who may implement findings and benefit from them cannot be overemphasized. The use of seminars and workshops are encouraged. Dissemination at Construction, Maintenance, District Lab Engineers quarterly meetings is encouraged where appropriate.

#### 6.5.8 LTRC Web Site

LTRC capsules, technical summaries, interim and final reports, and brochures will be posted on the LTRC web site.

### 6.6 TRACKING OF RESULTS

A culture of implementation needs to be encouraged within the philosophy and processes of an organization. Tracking research performance measures relays the importance of deployment to the both the employees of an organization and to the research team.

#### 6.6.1 LTRC Biannual Progress Report

The LTRC Biannual Progress Report is submitted by the Principal Investigator to keep the PRC and Project Manager abreast of the status of the project. Included in the biannual report is a section labeled *Assessment of Benefits and Recommended Implementation Strategies*. This section is completed by the LTRC Technology Transfer Engineer with input from the Project Manager. It is developed as a summary of the RAIR document. As the biannual report is submitted through the LTRC Project Management System, the implementation assessment field is used as an implementation summary for the life of the implementation process from project initiation through determination of implementation outcome.

#### 6.6.2 Implementation Summary Report

The summary report is maintained for ease of review of its program and is presented annually to DOTD leadership and the LTRC Policy Committee. The implementation

assessment field in the biannual report provides the initial input for this report. The implementation summaries are updated by the LTRC Technology Transfer Engineer for a minimum of five years after the project end date or until full implementation is achieved.

### 6.6.3 Implementation Performance Measures

LTRC categorizes its implementation status with five different classifications from project initiation through five years after the project's end date.

- **Project/Implementation in Progress**  
Projects are classified in this status code from the start date through a minimum of five years after the end date. This category may be used to link continuing/phased projects or demonstration/pilot projects that may extend beyond the five-year minimum.
- **Implementation Recommended**  
Projects are classified in this status code upon a recommendation from the PRC that the results warrant deployment by DOTD. Acceptance of a PRC recommendation to not make a change due to the research may also be considered an implementation success.
- **Implementation Complete**  
Projects are classified in this status code upon adoption of the results into practice by DOTD. The outcome of the implementation has been documented in the Implementation Summary Report (i.e., specification change, process change, project application, etc.).
- **Not Implemented**  
Projects are classified in this status code when the project did not produce any implementable outcome. Projects not implemented in the five-year implementation window will be closed as not implemented unless it is linked to a successive phased project or follow-up implementation project/activity.
- **No Implementation Expected**  
Projects are classified in this status code upon project initiation when the objective of the project clearly is accepted without an implementation outcome. These projects could include basic research, syntheses, exploratory, technical assistance, support projects to other tracked research projects, etc.

## 7 APPENDIX A - LTRC AUTHORIZING LEGISLATION: TITLE 48

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### 7.1 PART VI-B. LOUISIANA TRANSPORTATION RESEARCH CENTER

#### **§105. Louisiana Transportation Research Center**

A. The Louisiana Transportation Research Center, hereinafter referred to as "LTRC", is hereby created as a cooperative research and technology transfer unit administered jointly by the Department of Transportation and Development, hereinafter referred to as the "department", and Louisiana State University and Agricultural and Mechanical College, hereinafter referred to as the "university". The domicile of the LTRC is Baton Rouge, Louisiana.

B. The purposes of the LTRC are as follows:

(1) Establish cooperation in the mutual efforts toward improvement of the transportation systems of the state of Louisiana.

(2) Introduce new technology.

(3) Enhance higher education in the general transportation field.

(4) Benefit Louisiana economically by enhancing job opportunities.

C. The functions and duties of the LTRC are as follows:

(1) To develop and conduct a nationally recognized short and long range research program in transportation systems in order to implement more efficient design, planning, maintenance, operation, and construction practices and to enhance traffic safety.

(2) To offer educational and training programs in both fundamental and state-of-the-art practice in the field of transportation systems and related areas by offering training sessions, short courses, demonstration projects, and conferences funded by the department and the United States Department of Transportation-Federal Highways Administration.

(3) To develop and implement a technology transfer program funded by the United States Department of Transportation and the department which shall provide a mechanism for conveying modern transportation systems practices and procedures to municipalities and parishes.

(4) To establish cooperative relationships with the Louisiana Transportation Research Board, the research divisions of other highway and transportation departments, other universities, and national and international technical associations and agencies.

(5) To report and publish research findings which contribute to fundamental knowledge and facilitate the implementation of enhanced technology which may result in more economical practices in transportation systems.

D. The activities of the LTRC will be funded by the department funds, part of which is funded with federal highway planning and research funds. The funding of LTRC shall be contingent upon the availability of federal highway and research funds as appropriated by the Louisiana Legislature.

E. The projects funded for research organizations other than LTRC shall have project account numbers appropriate to that organization and shall be administered in accordance with that organization's policies.

F. LTRC may enter into contractual agreements only with the approval of the secretary of the department, or his designee, and said agreements must conform with contracting policies of the department.

G.(1) A LTRC policy committee shall be established and charged with advising and making recommendations to the LTRC as well as reviewing and recommending research and technology transfer programs to be pursued by the center, reviewing and recommending fiscal year budgets, and reviewing the activities and progress of the center. The committee shall meet at least twice a year. It shall be composed of eleven members, one of whom shall be the director of LTRC, three who shall be appointed by the secretary, one from each of the six public universities that have a college of engineering with a civil engineering department appointed by the president or chancellor of the respective university and one member who shall be a dean of a college of engineering of a nonpublic institution of higher education selected by the committee from a list submitted by the Louisiana Association of Independent Colleges and Universities. The Federal Highway Administration shall be invited to appoint an observer. The director of LTRC shall be an ex officio member of the committee.

(2) The term of office of members of the policy committee shall be for two years; however, in order to assure continuity, two of the initial members appointed by the chancellor and two of the initial members appointed by the secretary shall be appointed to serve for three years. Thereafter each member shall be appointed to a two-year term. Committee members may be reappointed.

(3) No salaries shall be paid the members of the LTRC policy committee, but said members shall be reimbursed for their expenses as per Division of Administration regulations.

(4) The officers of the LTRC policy committee shall be a chairman, a vice chairman, and a secretary, all elected by the committee.

(5) Should a vacancy occur on the LTRC policy committee, that member shall be replaced in the same manner in which that particular member was appointed.

(6) The director of LTRC shall be chosen by the secretary of the department and the LTRC policy committee from a slate of nominees submitted by a search committee, which search committee shall be selected by the LTRC policy committee.

(7) The director shall annually develop fiscal year programs designed to implement the functions of LTRC described above, and to meet the funding commitments to the university, also specified above. The director shall administer the day-to-day activities of the LTRC. The director shall submit an annual written report on the activities of the center to the policy committee, to the dean of the college of engineering at the university, and to the secretary of the department by March fifteenth of each year. The annual reports shall address the activities and achievements of the center and provide an assessment of the extent to which the center is fulfilling its functions.

(8) The personnel of the LTRC shall consist of full-time classified employees of the department and faculty, staff, and students of the university. University employees will be participating in specific projects, but their activities shall not be limited to those being funded by

or under the administration of LTRC. Short-term appointments may also be made to provide assistance on specific problems or to work on short-term research projects. The university's personnel policies and benefits shall apply only to its personnel. Likewise, the personnel policies and benefits of the department shall apply to the department personnel. In accordance with its academic personnel policies and regulations, the university may utilize and recognize the department's professional personnel as active members of its academic community.

H.(1) The principal office of the LTRC shall be the Transportation Research Center building located on Gourrier Avenue on the grounds of Louisiana State University and Agricultural and Mechanical College in Baton Rouge, Louisiana, provided to the LTRC by the university.

(2) The LTRC shall carry, for the mutual protection of the university and the department, with an appropriate loss payable clause in favor of the university, as their interest may appear, a public liability insurance policy. In addition, the department shall, at its expense, maintain a worker's compensation policy in the minimum amount necessary to meet the requirements of the Louisiana Worker's Compensation Act in regard to any work performed by the department on the premises.

(3) The university shall not transfer, assign or sublease said building or any part thereof to any person or persons, corporation or corporations as long as the LTRC is a functional entity. In the event the LTRC becomes nonfunctional, the department shall have first opportunity to lease the building should the university decide to lease it.

(4) If the building shall be destroyed or damaged by fire, storm, or other casualty, the university shall restore the building to substantially its former condition as promptly as is reasonably possible.

Acts 1986, No. 137, §1; Acts 1988, No. 451, §1; Acts 1995, No. 1018, §1.

### **105.1. Transportation Training and Education Center Fund; creation**

A. The Department of Transportation and Development may assess reasonable registration fees to participants in transportation education courses offered by the Louisiana Transportation Research Center (LTRC) Transportation Training and Education Center.

B. The secretary shall promulgate rules and regulations in accordance with law to effectuate the provisions of this Section, to implement a registration fee policy, and to provide for the uses and disposition of the fees collected. All fees collected pursuant to this Section and the rules and regulations promulgated by the secretary shall be deposited into the LTRC Transportation Training and Education Center Fund as provided for in Subsection D of this Section.

C. The rules and regulations may authorize the chief engineer or his duly authorized representative to assess reduced fees for governmental personnel and faculty and staff of colleges and universities, provided those entities meet all state and federal requirements for a fee reduction.

D. There is hereby created, as a special fund in the state treasury, the LTRC Transportation Training and Education Center Fund, hereinafter referred to as the "fund". After compliance with the requirements of Article VII, Section 9(B) of the Constitution of Louisiana, relative to the Bond Security and Redemption Fund, an amount equal to the monies received by the state treasury pursuant to the provisions of Subsections A and B of this Section and rules and

regulations adopted by the Department of Transportation and Development shall be deposited into the fund. The monies so deposited shall be used to defray the expenses of the LTRC Transportation Training and Education Center in connection with the development, contracting, delivery, and administration of the center's transportation training program. Monies in the fund shall be invested by the state treasurer in the same manner as monies in the state general fund, and interest earned on the investment of such monies shall be credited to the fund after compliance with the requirements of Article VII, Section 9(B) of the Constitution of Louisiana. Excess monies over and above the expenses of the center shall be distributed to workforce development programs and projects within the Department of Transportation and Development. All unexpended and unencumbered monies in the fund at the end of any fiscal year shall remain in the fund for use in subsequent fiscal years.

Acts 2007, No. 49, §1, eff. July 1, 2007.

## 7.2 PART XIII-A. EMPLOYMENT OF CONSULTANTS

### **§285. Purpose**

It is the purpose of this Part to prescribe the policy of the Department of Transportation and Development and other grantee agencies applicable to employment of consultants for construction and preconstruction engineering services, research, planning, environmental, and other activities by a competitive process and a noncompetitive process, except those services under the authority of R.S. 39:1481 through 1526, R.S. 48:250.2, R.S. 48:250.3, and R.S. 48:292.1.

Acts 1991, No. 784, §1; Acts 2007, No. 40, §1, eff. Jan. 1, 2008; Acts 2009, No. 255, §1, eff. July 1, 2009.

### **§286. Retaining of consultants warranted; authorization**

A. There are three conditions which shall warrant the retention of the services of consultants by the department:

(1) The magnitude of the work involved in a project is determined to be so taxing to the department's available manpower that it will be necessary to defer other essential work if the work is performed by the department staff.

(2) The work required by a project is determined to be of such a specialized nature that the department will be required to go outside its own staff for experts in the appropriate fields to accomplish the work.

(3) The time frame within which the work must be completed is determined to be such that the department cannot undertake the work and maintain its program on schedule.

B.(1) When it is determined by any department section that consulting services are warranted, the section head shall submit a recommendation to the chief engineer, assistant secretary for operations, assistant secretary for planning and programming, or assistant secretary of public works, hurricane flood protection, and intermodal transportation, whichever is applicable to the project, stating the need and the supportive reasons for the services, including a description of the project and the estimated cost of the work to be performed.

(2) The chief engineer, assistant secretary for operations, assistant secretary for planning and programming, or assistant secretary of public works, hurricane flood protection, and

intermodal transportation, whichever is applicable to the project, shall decide if the need to use consultants for professional services for a project is warranted based upon information provided by the section head and the criteria established by Subsection A of this Section.

(3) Approval, when granted, shall be considered as being of a general nature, including not only the obvious components of the project which are immediately identifiable, but also ancillary components identified at any time during the life of the project. An additional selection process shall be used for ancillary components when the total of such ancillary components amounts to more than seventy-five percent of the original contract.

(4) When it is determined by the chief engineer, assistant secretary for operations, assistant secretary for planning and programming, or assistant secretary of public works, hurricane flood protection, and intermodal transportation, whichever is applicable to the project, that there is a need for an outside consultant, the selection shall be made in accordance with the provisions of this Part.

Acts 1991, No. 784, §1; Acts 1998, 1st Ex. Sess., No. 35, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

### **§287. Advertisement; solicitation list; response procedures**

A. A notice of intent to select a firm for performing consultant services and to request responses from qualified firms and teams shall be advertised by posting it on the department's Internet website. The department shall maintain a solicitation list of consultant firms and teams. The department shall send an email notice to consultant firms and teams on its solicitation list to notify of the posting of an advertisement for consultant services on the department's Internet website. In the case of planning, research, or other specialty services, the department or the **Louisiana Transportation Research Center** may send notices to firms which, to the knowledge of the department or the **Louisiana Transportation Research Center**, may have experience in such services.

B. Notices shall be advertised a minimum of ten business days prior to the deadline for receipt of responses.

C. If the department deems that the number of responses received is inadequate, the project may be readvertised using additional media or publications in an attempt to solicit additional responses.

D.(1) The advertisement shall detail all information to be submitted in response to the advertisement. In all cases, a properly completed current department response form shall be submitted by applicants. The response forms shall be made available by the department. If additional information to that provided by the response form is required, it shall be so noted in the advertisement.

(2) The applicant shall transmit the response form and any other required information, to the department prior to the deadline shown in the advertisement. Responses which do not meet the requirements provided for in this Subsection shall not be considered. The department shall consider false or misrepresented information furnished in response to the advertisement as grounds for rejection.

E. There shall be no advertisement when noncompetitive selection is utilized.

Acts 1991, No. 784, §1; Acts 1999, No. 1284, §3; Acts 2009, No. 255, §1, eff. July 1, 2009.



## **289. Compliance with Civil Rights Act of 1964**

A. Department personnel when selecting consultants and contractors who are doing business with the department shall comply with Title VI of the Civil Rights Act of 1964, as amended to provide that no person in the United States shall, on the basis of race, color, sex, or national origin, be excluded from participation in any program or activity receiving federal financial assistance.

B. As prescribed in Title 49 of the Code of Federal Regulations Part 26, the department shall ensure that maximum opportunity is afforded to socially and economically disadvantaged individuals to compete for and participate in consultant contracts.

Acts 1991, No. 784, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

## **§291. Selection procedure; evaluation teams**

A. Except for **research projects**, an evaluation team consisting of five department personnel ... The consultant contract services administrator, or his designee, shall report the results of the evaluation team members to the secretary for all projects except **Louisiana Transportation Research Center** projects. *(Not applicable to LTRC)*

B. The **Louisiana Transportation Research Center** project selection procedure shall be in accordance with the **Louisiana Transportation Research Center** "Manual of Research Procedures" for Louisiana **Transportation Research Center** projects.

Acts 1991, No. 784, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

## **§292. Noncompetitive negotiation selections**

A. In special and rare circumstances, noncompetitive selection may be utilized. These circumstances include, but are not limited to:

(1) Specialty contracts where the necessary expertise is available only from one or a few sources.

(2) The extension of services by the original consultant required on a project for which the contract has been satisfactorily completed and closed out at an earlier date.

(3) Contracts requiring immediate action.

B. The section head, after ascertaining the need for a noncompetitive selection, shall request approval from the secretary or his authorized designee through the chief engineer, assistant secretary for operations, assistant secretary for planning and programming, or assistant secretary of public works, hurricane flood protection, and intermodal transportation, whichever is applicable to the project, to engage a specific firm to perform the required services. The request shall be in written form containing the following information:

(1) The justification for a noncompetitive selection.

(2) The recommended firm and the reason for the recommendation.

(3) The type of contract recommended.

(4) The approximate cost.

C. For federal aid projects, the noncompetitive selection shall be submitted to the appropriate federal agency for approval at an early stage.

D. For **research projects**, the determination for noncompetitive selection shall be based upon a recommendation by the **Louisiana Transportation Research Center** to the secretary and documented as required in R.S. 48:292(B).

Acts 1991, No. 784, §1; Acts 1998, 1st Ex. Sess., No. 35, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

### **§293. Competitive selection**

A. (1) Except for **Louisiana Transportation Research Center** projects, upon termination of the deadline for receipt of responses, the evaluation committee team shall ... *(Not applicable to LTRC)*

C. (1) The **Louisiana Transportation Research Center** shall utilize the selection criteria and weighting factors in its "Manual of Research Procedures" and any special evaluation criteria and weighting factors specified in the advertisement required to meet particular project needs to evaluate responses to requests for proposals for research consultants.

(2) The director of the **Louisiana Transportation Research Center** shall recommend to the secretary or authorized designee the final selection of the consultant as determined by review procedures of the research project review committee and center director in accordance with its "Manual of Research Procedures".

D. The written records produced during the evaluation and selection process are subject to the Public Records Act, R.S. 44:1 et seq.

Acts 1991, No. 784, §1; Acts 1993, No. 375, §1; Acts 2003, No. 100, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

### **294. Contract types**

A. The department shall utilize either cost plus fixed fee with a maximum limitation, cost per unit of work, specific rates of compensation, or lump sum contracts for either competitive or noncompetitive selections. The fee shall either be negotiated or predetermined. In general, negotiated cost plus fixed fee contracts are used for larger projects with more complex and difficult to determine scopes of services, and pre-determined lump sum fee contracts are used for smaller projects with easier to determine scopes of services.

B. Procedures for utilizing negotiated lump sum fee, cost per unit of work, specific rates of compensation, or cost plus fixed fee with maximum limitation contracts shall be as follows:

(1) Advertisement as required by this Part shall include, but not be limited to the following:

(a) Length and description of project.

(b) Services required.

(c) Material or information to be furnished by the department.

(d) General information and an outline of the selection process, including the criteria/categories used to evaluate the responses and the weighting factors for each.

(2) Except for **Louisiana Transportation Research Center** projects, after a consulting firm has been chosen, such firm shall be invited to submit a proposal within a time limit.

Construction and preconstruction proposals shall conform to the "Consultant Contract Services Manual". Research proposals shall conform to the **Louisiana Transportation Research Center's** "Manual on Research Procedures". This proposal shall be analyzed by the technical personnel of the involved units and a pre-award audit may be obtained.

(3) The technical review personnel shall negotiate any differences between the man-hour estimates of the department and the consultant firm. Should attempts at agreement between

the department and the consultant be unsuccessful, negotiations shall be terminated and another selection shall be made. This process will continue until agreement is reached with a firm or team.

(4) Fees will be based on the negotiated man-hours, the audited salary and overhead rates of the firm or team subject to the department's salary and overhead maximums, the designated contingency percentage, and the computed fixed fee. The department's standard fixed fee computation includes consideration for complexity, overall fee size, and magnitude of the firm's overhead.

(5) The contract will be executed following agreement on the required work effort. The firm shall have ten business days from the date of mailing to execute and return the contract to the department. Should the firm fail to timely execute and return the contract, the department may either select another firm from the original respondents or republish the notice of intent.

C. Procedures for utilizing non-negotiated predetermined lump sum fee, cost per unit of work, specific rates of compensation, or cost plus fixed fee with a maximum limitation shall be as follows:

(1) Advertisement as required by the Part shall include, but not be limited to the following:

(a) Length and description of project.

(b) Services required.

(c) Material or information to be furnished by the department.

(d) Fees by phase of work.

(e) General information, including an outline of the selection process, including the criteria/categories used to evaluate the responses and the weighting factors for each.

(2) Fees shall be determined by using the department's man-hour estimate, the latest average of applicable wage rates, and the latest average overhead, together with a contingency where appropriate and a profit computed in accordance with the department's standard procedure. These fees shall not be subject to further negotiation.

(3) The contract will be executed following notification of selection. The selected firm shall have ten business days from the date of mailing to execute and return the contract to the department. If the firm fails to timely execute and return the contract, the department shall select another firm from the original respondents or republish the notice of intent.

Acts 1991, No. 784, §1; Acts 2009, No. 255, §1, eff. July 1, 2009.

# 8 APPENDIX B - LTRC PROBLEM STATEMENT SOLICITATION FORM (1909)

LTRC USE ONLY	
PROBLEM STATEMENT NO.	13-063
DATE OF RECEIPT	1/10/2013

## **LTRC PROBLEM STATEMENT SOLICITATION**

### **1. PROBLEM TITLE:**

*(GIVE A BRIEF AND APPROPRIATE NAME TO THE PROBLEM YOU ARE PROPOSING)*

Evaluating Louisiana New Continuity Detail for Girder Bridges

### **2. PROBLEM STATEMENT:**

*(BRIEFLY DESCRIBE THE PROBLEM YOU ARE PROPOSING)*

The new Bridge Design Manual (BDM) in Louisiana will include a different continuity detail for girder bridges. Other than continuous reinforcement in the bridge deck over supporting piers, the new detail does not call for continuity diaphragms. This is different from the continuity detail in previous versions of the BDM, which called for a continuity diaphragm, albeit a bond breaker such as asphaltic materials had to be applied on girder ends to allow relative movement between the girders and the continuity diaphragms. In 2008, designers of the John James Audubon Bridge utilized a different detail that uses positive moment reinforcement as recommended by NCHRP Report 519 to achieve full system continuity. LTRC sponsored a project (08-1ST) that monitored the performance of the new detail under long-term and live load effects.

It is proposed that the performance of the new detail in the BDM be monitored in a manner similar to that used in LTRC Project No. 08-1ST. The information from this project will assist in validating the proposed design method for the new detail. Furthermore, comparison between the performance of this detail and other ones will be performed.

### **3. PROPOSED RESEARCH:**

*(DESCRIBE THE APPROACH YOU ENVISION TO SOLVE THE PROBLEM)*

In this proposal, a new continuity detail that will be the standard detail in Louisiana Bridge Design Manual will be evaluated. Similar to LTRC Project 08-1ST, a field monitoring approach will be adopted to achieve the project's objectives. These objectives can be summarized in evaluating the performance of the new detail, validate the proposed design procedure, and compare its performance to other details. It is expected that the research would ultimately deliver:

- an instrumentation plan for a bridge utilizing the new detail,
- analysis and interpretation of monitoring data under long-term and live load effects, and
- a design method for the new detail that is validated using monitoring data.

Understanding the behavior of the continuity detail, which is extensively used through projects employing line girders, is of utmost importance. Many bridges have suffered from premature deterioration because of problems arising from detailing. It is expected that the appropriate amount of reinforcement will be established using the project results. As a result, girder end cracking, which may lead to corrosion of reinforcement or reduction in shear strength, will be eliminated to avoid such detrimental effects and allow the bridge to achieve their design life with minimal maintenance costs.

### **4. POTENTIAL IMPLEMENTATION AND BENEFIT:**

*(DESCRIBE HOW YOU FORESEE THE RESULTS WILL BE IMPLEMENTED AND HOW THE TRANSPORTATION COMMUNITY WILL BENEFIT. HIGHER PRIORITIES WILL BE GIVEN TO STATEMENTS WITH SIGNIFICANT IMPLEMENTATION POTENTIAL.)*

The thorough understanding of the continuity detail using field monitoring data and in light of results from previous projects will assist in the successful implementation of the new detail in the BDM. It is expected

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that the majority of new bridges will employ the new continuity detail. Bridge engineers will be able to design bridges employing the new continuity detail with confidence, and the state will benefit from building new bridges that are more sustainable as a result of the reduced maintenance costs that will be required with the implementation of the new continuity detail.

**5. SUBMITTED BY:**

NAME Ayman M. Okeil

AFFILIATION Louisiana State University

TELEPHONE # 225-578-7048

EMAIL aokeil@lsu.edu

**PLEASE SUBMIT TO: LTRC DIRECTOR, 4101 GOURRIER AVE. BATON ROUGE, LA 70808**

## 9 APPENDIX C - ANNUAL RESEARCH WORK PROGRAM FORM (1901)

LTRC Annual Research Program  
Fiscal Year 2013-2014

<b>Title:</b>	Field Demonstration of New Bridge Approach Slab Designs and Performance			<b>Project Status:</b>	Completed
<b>Funding Source:</b>	SPR: TT-Fed/TT-Reg		<b>Budget Category:</b>		FHWA
<b>SIO:</b>	30000116		<b>Project Start Date:</b>		8/1/2008
<b>Research Project Number:</b>	05-1GT		<b>Completion Date</b>	(original)	8/1/2011
<b>Research Agency:</b>	LTRC		<b>Completion Date</b>	(revised)	9/30/2014
<b>Principal Investigator:</b>	Dr. Murad Abu-Farsakh				
<b>BUDGET STATUS</b>					
<b>Total Budget</b>			<b>Estimated 2013-2014 Budget</b>		
<b>Total Cost</b>	(original)	\$393,176	<b>Total</b>		\$42,000
	(revised)	\$310,000			
<b>Est. Expended to Date</b>	\$287,900		<b>Salaries</b>		\$42,000
<b>FY 2012 - 2013 Budget</b>			<b>Equipment</b>	(expendable)	
<b>FY Funds</b>	(original)	\$39,500	<b>Equipment</b>	(non-expendable)	
	(revised)	\$28,000	<b>Travel</b>		
<b>Est. FY Expenditure</b>	\$28,000		<b>Other</b>		
<b>PURPOSE AND SCOPE</b>					
<p>This project implements the findings from two LTRC Projects: "The Rideability of a Deflected Bridge Approach Slab" (02-2GT) and "Determination of Interaction between Bridge Concrete Approach Slab and Embankment Settlement" (03-4GT). It will also study such major causes of extra settlement from the collapsible behavior of embankment soils and its relation with construction methods, the erosion control of embankment, the settlement of native ground as embankment foundation and its control, and etc. In this project, lab and field tests will be conducted for soil deformation. Field-testing sections of bridge concrete approach slabs will be built and their performance will be monitored and analyzed so that final recommendation can be made to LADOTD on the bump issue at bridge ends. These bridge approach slabs tested are based on new design from the Bridge Design Section in comply with the recommendations from the two finished research projects.</p>					
<b>FISCAL YEAR 2012 - 2013 ACCOMPLISHMENTS</b>					
<ul style="list-style-type: none"> <li>-Conducted more literature review relevant to the research project;</li> <li>-Analyzed the collected data from two truck load tests on the approach slabs at Bayou Courtableau Bridge;</li> <li>-Designed and developed the instrumentation and testing plan for the two approach slabs at Bayou Lacassine Bridge; and</li> <li>-Purchased the instrumentations for the the Bayou Lacassine Bridge approach slab, waiting for the start of construction.</li> </ul>					
<b>FISCAL YEAR 2013-2014 PROPOSED ACTIVITIES</b>					
<ul style="list-style-type: none"> <li>-Install the geogrid reinforcement layers and other instrumentations beneath the East and west approach slabs at Bayou Lacassine Bridge once construction started;</li> <li>-Install sister bar strain gauges within the approach slab structure at Bayou Lacassine Bridge;</li> <li>-Conducted truck load test on both approach slabs at Bayou Lacassine Bridge, and monitor collect data from all instrumentations during the test; and</li> <li>-Look for new bridge approach slab embankment sites for instrumentation and monitoring.</li> </ul>					

# 10 APPENDIX D - LTRC PROPOSAL REVIEW FORM (1910)

LOUISIANA TRANSPORTATION RESEARCH CENTER PROPOSAL REVIEW FORM	
LTRC PROJECT NO. _____ INDIVIDUAL RATING PROPOSAL _____ TITLE: _____ SUBMITTED BY: PRINCIPAL INVESTIGATOR: _____ UNIVERSITY / CONSULTANT: _____	
Please rate each proposal individually and provide your assessment of rating points for each category A-E. Total the rating points in item F.	POINT RATING
<b>A. CONCEPT AND OBJECTIVE OF THE WORK (10 pts)</b> 1. Proposal reflects conceptual understanding of problem demonstrated by: (5 max) a. literature search provided to avoid duplication of effort? b. background of the problem adequately described 2. Are the objectives and scope proposed: (5 max) a. clear and easy to understand? b. likely to produce the deliverables required?	
<b>B. RESEARCH PLAN AND APPROACH (20 pts.)</b> 1. Is the overall procedure or methodology adequately described appropriate to the study? (10 max) 2. Are the experimental methods and/or data analysis techniques adequately described and appropriate to the study? (10 max)	
<b>C. BUDGET AND TIME SCHEDULE (20 pts.)</b> 1. Is the budget reasonable for scope, personnel, travel, etc. necessary to accomplish objectives? (10 max) 2. Is the time schedule appropriate to accomplish the work described? (10 max)	
<b>D. PERSONNEL (30 pts)</b> 1. What is your evaluation of the qualifications, experience and management ability of the principal investigator and support staff relative to their specific assignments? (20 max) 2. Is the apportionment of personnel level (time allocated) to accomplish specific tasks appropriate and realistic? (10 max)	
<b>E. FACILITIES AND EQUIPMENT (10 pts)</b> 1. In your estimation, are available facilities and equipment listed adequate to accomplish study requirements? (5 max) 2. Is need for purchase or rental of equipment listed adequately documented and justified? (5 max)	
<b>F. IMPLEMENTATION PLAN (10 pts)</b> 1. Are the deliverables for the project adequately described to provide a reasonable expectation of successful implementation? (5 max) 2. Does the implementation plan include a reasonable methodology and effort to quantify the benefits of implementation? (5 max)	
F. OVERALL POINT TOTAL	
<b>G. IS PROPOSAL ACCEPTABLE</b> _____ Accept _____ Accept with modifications noted below _____ Reject	
<b>H. COMMENTS</b> Your comments below will be helpful to assist LTRC in making final decisions. Attach continuation sheets for additional comments, if necessary. (List deficiencies in proposal and improvements required)	
_____ _____ _____ _____ _____ _____	

# 11 APPENDIX E - RESEARCH PROPOSAL TEMPLATE (1913)

<b>LOUISIANA TRANSPORTATION RESEARCH CENTER RESEARCH PROPOSAL</b>		<small>(LTRC USE ONLY)</small> DATE OF RECEIPT <span style="float: right;">Page 1</span>
		LTRC PROJECT NO.
		LAGOV SID TRACKING NO.
<b>PART I: GENERAL INFORMATION</b>		
1. AMOUNT REQUESTED (SAME AS PART II)  \$ _____	2. DURATION OF PROJECT ANTICIPATED START DATE: _____ DURATION IN MONTHS: _____ TO BE COMPLETED BY LTRC: _____ ACTUAL START DATE: _____ ENDING DATE: _____	
3. TITLE OF RESEARCH PROPOSAL		
4. NAME AND BUSINESS ADDRESS OF PROPOSER (INDIVIDUAL, INSTITUTION, FIRM, OR CORPORATION)	5. NAME, TITLE, AND MAILING ADDRESS OF PRINCIPAL INVESTIGATOR (BEARING SCIENTIFIC RESPONSIBILITY)	
TELEPHONE NUMBER AND EXTENSION OF BUSINESS OFFICE	TELEPHONE NUMBER AND EMAIL ADDRESS OF PRINCIPAL INVESTIGATOR	
6. MAJOR SUB-DIVISION THAT WILL CONDUCT RESEARCH	7. NAME AND TITLE OF CO-PRINCIPAL INVESTIGATOR	
8. SUBMITTED BY: (SIGNATURE OF PRINCIPAL INVESTIGATOR)		DATE
<b>PART II: APPROVAL</b>		
RECOMMENDED BY THE ASSOCIATE DIRECTOR, LTRC, RESEARCH		DATE
Tyson D. Rupnow, Ph.D., P.E.		
RECOMMENDED BY THE DIRECTOR, LTRC		DATE
Samuel B. Cooper, Jr., Ph.D., P.E.		
RECOMMENDED BY CHAIRMAN, LTRC POLICY COMMITTEE		DATE
Christopher P. Knotts, P.E.		
RECOMMENDED BY IMPLEMENTATION SPONSOR		DATE
APPROVED BY THE DOTD SECRETARY		DATE
Shawn D. Wilson, Ph.D.		
APPROVED MODIFICATIONS: <small>(LTRC USE ONLY)</small>		





Part IV - BIOGRAPHICAL SKETCHES - Provide brief sketches for professional personnel already selected who are to be actively engaged in this project. The following questions should be completed with co-principal researcher immediately following principal researcher, followed by other professional personnel. <span style="float: right;">Page 3</span>				
NAME OF PRINCIPAL INVESTIGATOR			TITLE	
DATE OF BIRTH	PLACE OF BIRTH	SEX	CITIZENSHIP <input type="checkbox"/> US <input type="checkbox"/> OTHER (SPECIFY) _____	
EDUCATION (DEGREES CONFERRED - IDENTIFY HONORARY DEGREES IN FIELD)	DEGREE	INSTITUTION CONFERRING	FIELDS	YEAR
OTHER RESEARCH TRAINING AND EXPERIENCE, PARTICULARLY IN AREA COVERED BY THIS APPLICATION	LOCATION	NATURE	YEAR	
FIELDS OF PRESENT MAJOR SCIENTIFIC INTEREST IN ORDER OF CHOICE				
NAME OF CO-PRINCIPAL INVESTIGATOR			TITLE	
DATE OF BIRTH	PLACE OF BIRTH	SEX	CITIZENSHIP <input checked="" type="checkbox"/> US <input checked="" type="checkbox"/> OTHER (SPECIFY)	
EDUCATION (DEGREES CONFERRED - IDENTIFY HONORARY DEGREES IN FIELD)	DEGREE	INSTITUTION CONFERRING	FIELDS	YEAR
OTHER RESEARCH TRAINING AND EXPERIENCE, PARTICULARLY IN AREA COVERED BY THIS APPLICATION	LOCATION	NATURE	YEAR	
FIELDS OF PRESENT MAJOR SCIENTIFIC INTEREST IN ORDER OF CHOICE				

PART V	<b>TITLE VI STATEMENT</b>
	<p>The attention of the proposed research contracting agency or institution is directed to the need to comply with the requirements of Title VI of the Civil Rights Act of 1964.</p> <p>_____ (Name of Contracting Agency) acknowledges that we are aware of the requirements of Title VI and will not discriminate on the basis of race, creed, sex, or national origin and will endeavor to involve the members of minority groups in the conduct of the proposed contract research study.</p>
<b>TECHNICAL RESEARCH PROPOSAL</b>	
	<p>Details of the proposed plan and other necessary data shall be typed (double-spaced) in accordance with the sequence and requirements defined in Chapter 3.3 of the LTRC Research Procedure Manual. Continue numbering pages in sequence for the entire proposal using the continuation sheet.</p>
PART VI	<b>SUMMARY OF PROPOSED RESEARCH</b>

# 12 APPENDIX F - RESEARCH TASK ORDER FORM (1914)

**LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT  
LOUISIANA TRANSPORTATION RESEARCH CENTER  
RESEARCH TASK ORDER**

TASK ORDER NO.:	EFFECTIVE DATE:  CONTRACT TIME:
ISSUING AGENCY (FOR WHOM WORK PERFORMED):	COOPERATING AGENCY (WORK PERFORMED BY):
RESEARCH PROJECT NO.:	
RESEARCH PROJECT TITLE:	
FUNDS AVAILABLE: NOT TO EXCEED \$ _____   _____  (SEE DETAILED PROPOSED BUDGET AS ATTACHED)	
THE COOPERATING AGENCY AGREES TO PERFORM ALL THE SERVICES SET FORTH IN THE ATTACHED PROPOSAL FOR THE CONSIDERATION STATED HEREIN. THE RIGHTS AND OBLIGATIONS OF THE PARTIES TO THIS TASK ORDER SHALL BE SUBJECT TO AND GOVERNED BY THE RESEARCH AGREEMENT DATED _____.	
APPROVED BY (AUTHORIZED SIGNATURE OF ISSUING AGENCY):	APPROVED BY (AUTHORIZED SIGNATURE OF COOPERATING AGENCY):
TYPED NAME: Harold R. Paul DATE: TITLE: Director	TYPED NAME DATE: TITLE:

# 13 APPENDIX G - TYPICAL CONTRACT TEMPLATE

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**STATE OF LOUISIANA  
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT  
CONTRACT FOR RESEARCH SERVICES  
LTRC PROJECT NO. \_\_\_\_\_, SIO NO. \_\_\_\_\_  
TITLE**

**THIS CONTRACT** made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2012, by and between the Louisiana Department of Transportation and Development, Louisiana Transportation Research Center, hereinafter referred to as "LADOTD/LTRC," and **CONSULTANT NAME AND ADDRESS**, hereinafter referred to as "Consultant."

Under Authority granted by Part XIII-A of Title 48 of Louisiana Revised Statutes, the LADOTD/LTRC has elected to engage the Consultant to perform, and the Consultant agrees to perform the services described in the Scope of Contract Services under the terms and conditions, and for the compensation as stated in this Contract.

### ENTIRE AGREEMENT

This Contract together with the advertisement of the Request for Proposals (RFP) dated \_\_\_\_\_, the Consultant research proposal including work hour and compensation submitted and approved by LADOTD/LTRC, the LTRC Manual of Research Procedures, Publication Guidelines, and any attachments and exhibits are specifically incorporated herein by reference and constitute the entire agreement between the parties with respect to the subject matter. However, in the event of a conflict between the terms of this Contract and the referenced documents, this Contract governs.

### PROJECT IDENTITY

LTRC Project No. \_\_\_\_\_ and Statistical Internal Order No. \_\_\_\_\_ has been assigned to this special services contract. All invoices and correspondence in connection with this contract shall be identified by these project numbers.

### SCOPE OF CONTRACT SERVICES

**Project specific: project objective.**

The following tasks (all as specified in detail in the Consultant's proposal and made a part of this contract) shall be performed under this project:

**List tasks by title**

The Consultant will be responsible for performing the services as ordered by DOTD/LTRC in accordance with the terms of this contract under the direct administration of a DOTD/LTRC "Project Manager" who will be identified when the work is authorized in the Notice to Proceed.

## DELIVERABLES

Deliverables for this contract will include:

**Project specific.**

## CONTRACT TIME

The consultant shall proceed with the services specified herein after the execution of this Contract and upon written Notice-to-Proceed (NTP) from the LADOTD/LTRC and shall be completed within \_\_\_\_\_ calendar months, which includes review time. The delivery schedule for all project deliverables will be established by the Project Manager.

## COMPENSATION

Compensation to the Consultant for services rendered in connection with this Contract shall be made on the basis of a cost plus fixed fee with a maximum limitation of \$ \_\_\_\_\_.

The Consultant shall submit monthly invoices which shall be in accordance with the LTRC Manual of Research Procedures for work accomplished towards the completion of project tasks.

## PAYMENT

Payments to the Consultant for services rendered by the Consultant shall be made per the schedule provided above. The payments shall be based on a standard certified correct invoice. Invoices reflecting the amount and value of work accomplished to the date of such submission shall be submitted directly to the Project Manager. The invoice shall also show the total of previous payments on account of this contract, and the amount due and payable as of the date of the current invoice.

A principal member of the Consultant to whom the contract is issued must sign, date, and certify the invoice for correctness. The original and three copies of each invoice shall be submitted to the Project Manager.

Upon receipt and approval of each invoice, the LADOTD/LTRC shall check the invoice for correctness and return if required; upon acceptance and approval of a standard certified correct invoice, for services satisfactorily performed, the LADOTD/LTRC shall pay the amount shown to be due and payable within 30 calendar days, in accordance with Louisiana R.S. 48: 251.5.

## PUBLICATION OF DATA

The following provisions shall govern publication of resultant data from each contract research project.

- (1) The author shall be free to copyright material developed under each contract, other than with the provision that the contractor hereby grants to all state highway and/or transportation departments, local public agencies, the United States Government, and all contractors for any

of the foregoing when such contractors are performing work under contract for the aforementioned entities, an irrevocable, non-exclusive, nontransferable, and royalty-free license to reproduce, publish or otherwise use, and to authorize others to use the work for Government purposes.

- (2) Either party to this contract may initiate a request for publication of the final or interim reports or any portions thereof. Technical papers, articles, and submissions for review to technical journals, prepared for submission prior to approval of the final report required under the contract, must be submitted to the LADOTD/LTRC for approval prior to publication. In the event of failure of agreement between the LADOTD/LTRC and the Consultant relative to publication of the final report, or of any progress reports during the contractual period, either party reserves the right to publish independently in which event the non concurrence of the other party shall be set forth as technical comments in the report in a clearly identified section such as "sponsor's comments," or "Consultant's comments." Following publication of the final report under a contract, no approvals are required from LADOTD/LTRC for subsequent publications, as noted below in item 4.
- (3) Both parties to the agreement shall have equal responsibility to review and approve material for publication prior to publication of the final report, except that the LADOTD/LTRC reserves the right initially to publish the final report.
- (4) After acceptance of the final report, the Consultant and the LADOTD/LTRC are free to use the data and results without restriction except as noted above in item 2. Whenever the Consultant uses the data and the results, due credit will be given to the LADOTD/LTRC and all other funding agencies.
- (5) All reports published by the LADOTD/LTRC and/or the Consultant shall contain a disclaimer statement as provided in the *LTRC Manual of Research Procedures*.
- (6) Publication by either party shall give credit to the other party and to all other funding agencies unless, due to failure of agreement on any report of the study, any funding agency or either of the parties to this agreement requests that its credit acknowledgement be omitted.

#### PATENT RIGHTS

The proprietary rights of any special equipment or procedures developed as a result of this project shall be governed by the following provisions.

For any patentable discoveries or inventions that should result from the Consultant's work other than discoveries or inventions that are deliverable under the contract, all rights accruing from such discoveries or inventions shall be the sole property of the consultant. However, the consultant hereby grants to all state highway and/or transportation departments, local public agencies, the United States Government, and all contractors for any of the foregoing when such contractors are performing work under contract for the aforementioned entities, an irrevocable, non-exclusive, nontransferable, and

royalty-free license to practice each invention in the manufacture, use, and disposition, according to law, of any article or material, and in the use of any method that may be developed as a part of the work under the research contract. The Consultant shall notify LTRC of its intent to file a patent on work developed as a result of a research project.

#### CONTRACT CHANGES

Minor revisions in the described work shall be made by the Consultant without additional compensation as the work progresses. Considerations for minor revisions have been included in the compensation computations. If the LADOTD/LTRC requires more substantial revisions or additional work which the consultant believes warrants additional compensation, the Consultant shall notify the LADOTD/LTRC in writing within thirty (30) days of being instructed to perform such work.

If the LADOTD/LTRC agree that the required work is necessary and warrants additional compensation, the Contract shall be changed by a **Supplemental Agreement** or by an **Extra Work Letter**. The Consultant shall not commence any additional work until written authority to proceed has been given by the LADOTD/LTRC. An Extra Work Letter shall be utilized in cases when the additional compensation is small and the work does not constitute a change in scope. The cumulative value of all extra Work Letters shall not exceed 10% of the cumulative value of all contract compensation exclusive of Extra Work Letters (original contract compensation plus all Supplemental Agreements). In all other cases wherein the LADOTD/LTRC agrees that the required work is necessary and warrants additional compensation, a Supplemental Agreement shall be utilized.

If the LADOTD/LTRC disagrees that additional compensation is due for the required work it shall be the Consultant's responsibility to perform the work and adhere to the procedures set forth in the Claims and Disputes provisions of this Contract.

#### OWNERSHIP OF DOCUMENTS

All data collected by the Consultant and all documents, notes, drawings, tracing and files collected or prepared in connection with this work, except the Consultant's personnel and administrative files, shall become and be the property of the LADOTD/LTRC and the LADOTD/LTRC shall not be restricted in any way whatever in its use of such material, except as specified in Louisiana R.S. 38:2317.

No public news releases, technical papers, or presentations concerning this project may be made without prior written approval of the LADOTD/LTRC.

#### TERMINATION OR SUSPENSION

This contract shall become effective from the date of execution and shall be binding upon the parties until the work has been completed by the Consultant in accordance with the terms of this Contract and accepted by the LADOTD/LTRC, and all payments and conditions have been met. Further, this Contract shall remain in effect until the LADOTD/LTRC has issued final acceptance of the services provided for herein. However, this Contract may be terminated earlier under any or all of the following conditions:



1. By mutual agreement and consent of the parties hereto.
2. By the LADOTD/LTRC as a consequence of the failure of the Consultant to comply with the terms, progress or quality of work in a satisfactory manner, proper allowance being made for circumstances beyond the control of the Consultant.
3. By either party upon failure of the other party to fulfill its obligations as set forth in this contract.
4. By the LADOTD/LTRC due to the departure for whatever reason of any principal member or members of the Consultant's firm.
5. By satisfactory completion of all services and obligations described herein.
6. By the LADOTD/LTRC giving thirty (30) days notice to the Consultant in writing and paying compensation due for completed work.

Upon termination, the Consultant shall deliver to the LADOTD/LTRC a report in complete detail of all findings and all obtained data for the LADOTD/LTRC's use as well as copies of all records of the work compiled to the date of termination and the LADOTD/LTRC shall pay in full for all work accomplished up to the date of termination.

If for any reason, the LADOTD/LTRC wishes to suspend this Contract, it may do so by giving the Consultant thirty (30) days written notice of intent to suspend. The Consultant shall, at expiration of the thirty (30) days from the date of the notice of intent to suspend, stop all work on the Project. Work shall resume no later than thirty (30) days after the LADOTD/LTRC provides the Consultant with a notice of intent to resume work.

The consultant shall not have the authority to suspend work on this Contract.

#### **CLAIMS AND DISPUTES**

The Consultant's failure to provide the required written notification pursuant to the provisions of the Contract Changes section of this contract shall be deemed a waiver of any and all claims for additional compensation.

When the Consultant has timely filed notice pursuant to the provisions of the Contract Changes section of this contract, the Consultant shall submit the entire claim and supporting documentation to the LTRC Director within thirty (30) days of the notice. The LTRC Director shall submit the claim to the LTRC Policy Committee (hereinafter, "the Committee") for review.

The Consultant shall be notified in writing of the Committee's recommendation, and, if accepted by the Consultant and approved by the Chief Engineer and FHWA, if applicable, the parties hereto shall execute a Supplemental Agreement based upon said recommendation. If the Committee's recommendation is not accepted by the Consultant, the Consultant may file a written appeal to the Chief Engineer. The decision of the Chief Engineer shall be final, and the Consultant shall be notified in writing of the Chief Engineer's decision, which is final and unappealable.

#### **INSURANCE REQUIREMENTS**

During the term of this Agreement, the Consultant shall carry professional liability insurance in the amount of \$1,000,000. This insurance shall be written on a "claims-made" basis. The Consultant shall provide or cause to be provided a Certificate of Insurance to the DOTD showing evidence of such professional liability insurance.

#### **INDEMNITY**

The Consultant agrees to indemnify and save harmless the LADOTD/LTRC against any and all claims, demands, suits, and judgments of sums of money (including attorney's compensation and cost for defense) to any party for loss of life or injury or damage to persons or properties arising out of, resulting from, or by reason of, any negligent act or omission by the Consultant, its agents, servants, or employees while engaged upon or in connection with the services required or performed by the Consultant hereunder.

#### **CLAIMS FOR LIENS**

The Consultant shall hold the LADOTD/LTRC harmless from any and all claims for liens for labor, services or material furnished to the consultant in connection with the performance of its obligations under this Contract.

#### **COMPLIANCE WITH LAWS**

The Consultant shall comply with all applicable Federal, State and Local laws and ordinances, as shall all others employed by it in carrying out the provisions of this Contract.

#### **COMPLIANCE WITH CIVIL RIGHTS ACT**

The Consultant agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972, Federal Executive Order 11246, the Federal Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1972, and Consultant agrees to abide by the requirements of the Americans with Disabilities Act of 1990.

Consultant agrees not to discriminate in its employment practices, and will render services under this contract without regard to race, color, religion, sex, national origin, veteran status, political affiliation or disabilities.

Any act of discrimination committed by Consultant, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this contract.

#### **COVENANT AGAINST CONTINGENT FEES**

The Consultant warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for the Consultant, to solicit or secure this contract, and that it has not paid or agreed to pay any company or person, other than a bona fide employee working

solely for the Consultant, any fee, commission, percentage, brokerage fee, gifts, or any other consideration, contingent upon or resulting from the award or making of this contract. For breach or violation of this warranty the LADOTD/LTRC shall have the right to annul this contract without liability, or, in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift or contingent fee.

No legislator or person who has been certified by the Secretary of the State as elected to the legislature or member of any board or commission, members of their families or legal entities in which the legislator, person or board or commission member has an interest, may derive any benefit from this Contract or share in any part of the Contract in violation of Louisiana Code of Governmental Ethics (LSA-R.S. 42:1101, et seq.)

#### **CODE OF GOVERNMENTAL ETHICS**

The consultant acknowledges that Chapter 15 of Title 42 of the Louisiana Revised Statutes (R.S. 42:1101 et. seq., Code of Governmental Ethics) applies to the consultant in the performance of services called for in this contract. The consultant agrees to immediately notify the state if potential violations of the Code of Governmental ethics arise at any time during the term of this contract.

#### **DISADVANTAGED BUSINESS ENTERPRISES REQUIREMENTS**

It is the policy of the Federal Highway Administration that disadvantaged business enterprises, or DBE, as defined in 49 CFR 26, shall have the maximum opportunity to participate in the performance of contracts financed in whole or part with federal funds; consequently, the DBE requirements of 49 CFR 26 apply to this Contract.

The Consultant agrees to ensure that DBE, as defined in 49 CFR 26, have the maximum opportunity to participate in the performance of this Contract and any subcontracts that may be let. In this regard, the Consultant shall take all necessary and reasonable steps in accordance with 49 CFR 26 to ensure that DBE have the maximum opportunity to compete for and perform services relating to this Contract. Furthermore, the Consultant shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract.

Failure to carry out the above requirements shall constitute a breach of this Contract. After proper notification by the LADOTD/LTRC, immediate remedial action shall be taken by the Consultant as deemed appropriate by the LADOTD/LTRC or the Contract shall be terminated. The option shall rest with the LADOTD/LTRC.

The above requirements shall be physically included in all subcontracts entered into by the Consultant.

#### **SUBLETTING, ASSIGNMENT OR TRANSFER**

This Contract, or any portion thereof, shall not be transferred, assigned, or sublet without the prior written consent of the LADOTD/LTRC. In the event the Consultant does elect to sublet any of the services required under this Contract, it must take affirmative steps to utilize Disadvantaged

Business Enterprises (DBE) as sources of supplies, equipment, construction, and services. Affirmative steps shall include the following:

1. Including qualified DBE on solicitation lists.
2. Assuring that DBE are solicited whenever they are potential source.
3. When economically feasible, dividing total requirements into smaller tasks or quantities so as to permit maximum DBE participation.
4. Where the requirement permits, establishing delivery schedules which shall encourage participation by DBE.
5. Using the services and assistance of the Small Business Administration, the Office of Disadvantaged Business Enterprise of the Department of Commerce, and the Community of Services Administration as required.

#### **COST RECORDS**

The Consultant and its subcontractors shall maintain all books, documents, papers, accounting records and other evidence pertaining to cost incurred relative to this project. Costs shall be in accordance with 48 CFR 31 of the (FARS), as modified by the DOTD's audit guidelines, and which are incorporated herein by reference as if copied in extenso. The FARS is available for inspection through [www.transportation.org](http://www.transportation.org). Records shall be retained until such time as an audit is made by LADOTD/LTRC or the Consultant is released in writing by LADOTD/LTRC's Audit Director, at which time the Consultant may dispose of such records. The Consultant shall, however, retain such records for a minimum of three (3) years from the date of payment of the last invoice under this contract or the release of all retainage for this contract, whichever occurs later, for inspection by the LADOTD/LTRC and/or Legislative Auditor, and the FHWA or General Accounting Office (GAO) under State and Federal Regulations as of the date of this Contract.

#### **SUCCESSORS AND ASSIGNS**

This contract shall be binding upon the successors and assigns of the respective parties hereto.

#### **TAX RESPONSIBILITY**

The Consultant hereby agrees that the responsibility for payment of taxes on the payments received under this contract shall be its obligation.

#### **JOINT EFFORT**

This Contract shall be deemed for all purposes prepared by the joint efforts of the parties hereto and shall not be construed against one party or the other as a result of the preparation, drafting, submittal or other event of negotiation, drafting, or execution of the Contract.

#### **SEVERABILITY**

If any term, covenant, condition, or provision of this Contract or the application thereof to any

person or circumstance shall, at any time or to any extent, be invalid or unenforceable, the remainder of this Contract or the application of such term, covenant, condition or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term, covenant, condition, and provision of this Contract shall be valid and enforced to the fullest extent permitted by law.

IN WITNESS WHEREOF, the parties have caused these presents to be executed by their respective officers thereunto duly authorized as of the day and year first above written.

WITNESSES:

**NAME OF CONSULTANT**

\_\_\_\_\_  
Witness for First Party

BY: \_\_\_\_\_  
Authorized Person  
Title

\_\_\_\_\_  
Witness for First Party

#####  
Federal Identification Number

STATE OF LOUISIANA  
DEPARTMENT OF TRANSPORTATION  
AND DEVELOPMENT

\_\_\_\_\_  
Witness for Second Party

BY: \_\_\_\_\_  
Secretary

\_\_\_\_\_  
Witness for Second Party

RECOMMENDED FOR APPROVAL:

BY: \_\_\_\_\_  
Division Head

## 14 APPENDIX H - KICK-OFF MEETING CHECKLIST

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- Introductions
- Project Manager Responsibilities
- PRC Chairman Responsibilities
- PRC Responsibilities
- LTRC Manual of Research Procedures
- University Master Agreement / Consultant Contracts
- Review of Proposal
  - Objectives
  - Tasks
  - Timelines
  - Support
  - Deliverables
- Project Meetings & Correspondence
- Project Management & Tracking System
- LTRC Website & Downloads
- Monthly Invoice Form
- Project Capsule
- Biannual Reports
  - PI responsibilities
    - Task Accomplishments
    - Task Proposed Activities
    - Fiscal Year Budget Revisions
  - Manager Comments
  - Implementation Comments
  - PRC Review
- Annual Work Program
  - Total Budget Expenditures
  - Fiscal Year Budget Projection
  - Accomplishments
  - Proposed Activities
- Travel
  - Conduct of business
  - Out of State Travel Request
  - LTRC Technical Transfer Support (Conference Presentations)
- Project Modification Agreement
- Budget Adjustments
- Equipment
  - Purchases
  - Rental
  - Disposition of Equipment
- Requests for Publication Approval
- Final Report
  - Draft Due Date
  - Size Limitations
  - Publication Format
  - Report Template
  - Report Quality (including editing)
  - Report Review Process
  - Distribution
- Technical Summary
- PRC Closeout Process Survey
- Project Closeout Process and Timeline
- Principal Investigator / Research Entity Rating
- Research Assessment & Implementation Report
- DOTD/LTRC Performance Measures









# 17 APPENDIX K - DISPOSITION OF NON-EXPENDABLE EQUIPMENT FORM (1920)

Louisiana Transportation Research Center  
**DISPOSITION OF NONEXPENDABLE EQUIPMENT**

In accordance with Louisiana Title 34:307 items to be inventoried: All items of movable property having an "original" acquisition cost, when first purchased by the state of Louisiana, of \$1000 or more, must be placed on the statewide inventory system. The term "moveable" distinguishes this type of equipment from equipment attached as a permanent part of a building or structure. The term "property" distinguishes this type equipment from "supplies" with supplies being consumable through normal use in no more than one year's time.

UNIVERSITY / CONSULTANT		PRINCIPLE INVESTIGATOR		ACCOUNT NO.	PURCHASE ORDER / INVOICE NO.
LTRC PROJECT NO.	SIO NO.	STUDY TITLE			
DESCRIPTION OF ITEM		LOCATION (BUILDING ROOM)	MAKE / MODEL	SERIAL NO.	
DATE OF PURCHASE	PURCHASE PRICE	NAME AND CONTACT INFORMATION FOR PERSON RESPONSIBLE FOR ITEM			
Does equipment need to be tagged for inventory: Yes/No If no, justification not to tag for inventory					
RECEIVED BY		DATE RECEIVED	DOTD TAG NO.	DATE ENTERED IN SAP	AIIR NO. (OVER \$5,000.00)
<b>FOR PROPERTY COORDINATOR</b>					
PRINCIPAL INVESTIGATOR SIGNATURE: _____ DATE: _____					
PROJECT MANAGER SIGNATURE: _____ DATE: _____					
APPROVED BY (NAME AND TITLE): _____ DATE: _____					

FORM 1920 (Rev. 1/15)

# 18 APPENDIX L - BIANNUAL RESEARCH PROGRESS REPORT (1903)

**LTRC Biannual Research Progress Report**  
For Period Ending: 12/31/2014

<b>Title:</b>	Feasibility of using Local Public Transit Resources for Evacuations and Other Unscheduled Needs		
<b>Funding Source:</b>	SPR: TT-Fed/TT-Reg		
State Project Number:	30001506	Project Start Date	11/05/2013
Research Project Number:	14-4SS	Completion Date (original)	02/04/2015
Research Agency	LTRC	Completion Date (revised)	06/30/2015
Principal Investigator:	Dr. Chester Willmot		
<b>BUDGET STATUS</b>			
<b>Total Budget</b>		<b>Funds Expended (%)</b>	83%
Total Cost (original)	\$204,617	Time Expended (%)	70%
Total Cost (revised)		Progress (%)	70%
Total Expenditures	\$170,000		
<b>Fiscal Year Budget</b>			
F.Y. Funds (original)	\$135,804		
F.Y. Funds (revised)	\$104,000		
F.Y. Expenditures (to date)	\$70,000		
<b>PART I. PRINCIPAL INVESTIGATOR</b>			
<b>Accomplishments this period (use additional sheets if necessary) (include any problems on which assistance is needed)</b>			
<b>Task 1:</b>	<b>Identify means to secure collaboration among transit providers</b>		<b>100%</b>
	Pilot survey resulted in a 24% response rate after 3 reminder calls. An incentive was determined to be needed to improve response. A cover letter endorsing the survey was also obtained from the Secretary of Health and Hospitals in Louisiana and this was included in the survey for agencies sponsored by DHH.		
<b>Task 2:</b>	<b>Develop inventory of resources</b>		<b>100%</b>
	The list of transit providers, or organizations that contract with providers to provide transit services to special needs or human needs patrons, has been vetted and cleaned. Survey was mailed to recipients on 01/15/2015. Deadline for returns is February 15, 2015. Three reminders will be sent at 1-week intervals after initial mailing.		
<b>Task 3:</b>	<b>Establish demand for service</b>		<b>50%</b>
	A modified dasymmetric method of population migrations has been developed and applied in New Orleans on a test basis. A paper on the topic was submitted to the 2015 TRB Annual Meeting Conference and a poster presentation on the paper was presented at the TRB meeting on January 13, 2015.		
<b>Task 4:</b>	<b>Create GIS query program</b>		<b>50%</b>
	Initial test queries established. Further queries still to be developed.		
<b>Task 5:</b>	<b>Demonstrate the program in a test case</b>		<b>0%</b>
<b>Task 6:</b>	<b>Prepare final report</b>		<b>0%</b>

Proposed activities next period (use additional sheets if necessary)

Task 3:	<p><b>Establish demand for service</b>                  Use system developed for New Orleans to estimated spatial distribution of population in coastal parishes by time of day.</p>
Task 4:	<p><b>Create GIS query program</b>                  Develop query system to satisfy common queries.</p>
Task 5:	<p><b>Demonstrate the program in a test case</b>                  Chemical spill test case will be conducted in New Orleans.</p>
Task 6:	<p><b>Prepare final report</b>                  Draft final report will be prepared and submitted to PRC.</p>
<b>PART II. LTRC MANAGER'S COMMENTS</b>	
<p>A modification was requested and approved to add 4 months to the project to account for delays affiliated with getting the surveys approved by DOTD management.</p>	
<b>PART III. LTRC TECHNOLOGY TRANSFER MANAGER'S COMMENTS</b>	
<i>Assessment of Benefits and recommended implementation strategies</i>	
<p>The purpose of this project is to investigate the feasibility of using local public transit resources for emergency purposes. The product of this research will be an online GIS-based information system that can be accessed by emergency managers during an event to determine type, number, and location of transit resources. Procedures for securing these transit resources during an emergency will be determined (or developed), including incentives for participation and/or means for appropriate compensation.</p>	

# 19 APPENDIX M - OUT-OF-STATE TRAVEL APPROVAL REQUEST FORM (1917)

<b>Louisiana Transportation Research Center</b>  <b>OUT-OF-STATE TRAVEL APPROVAL REQUEST</b>		<b>LTRC USE ONLY</b>	
		DATE OF RECEIPT:	
		STATE PROJECT NO.:	
<b>PART 1 TRAVEL REQUESTED</b>			
1. PERSON(S) REQUESTING TRAVEL:		2. UNIVERSITY/AGENCY:	
3. ADDRESS:		4. DESTINATION/ITINERARY:	
5. DATE OF DEPARTURE:		6. DATE OF RETURN:	
7. PURPOSE OF TRAVEL (E.G. CONFERENCE ATTENDANCE/PRESENTATION, SITE VISIT, ETC.):			
8. EXPLANATION: EXPLAIN HOW THIS IS RELATED TO THE PROJECT TO BE CHARGED			
9. LTRC PROJECT NO.:		10. PROJECT TITLE:	
11. TOTAL COST OF TRAVEL (INDICATE \$0 IF TRAVEL WILL BE REIMBURSED BY THIRD PARTY AND NO STATE CHARGES MADE):		12. IS THIS A BUDGETED ITEM?	13. IF NOT A BUDGETED ITEM, EXPLAIN:
\$		YES <input type="checkbox"/>	NO <input type="checkbox"/>
<b>PART II APPROVAL</b>			
RECOMMENDED BY GROUP MANAGER:		DATE:	
RECOMMENDED FOR APPROVAL BY ASSOCIATE DIRECTOR, RESEARCH:		DATE:	
RECOMMENDED FOR APPROVAL BY ASSOCIATE DIRECTOR, TECHNOLOGY TRANSFER:		DATE:	
APPROVED BY DIRECTOR, LTRC:		DATE:	
COMMENTS FOR DISAPPROVAL:			

Form 1917 Rev. 06/05

## 20 APPENDIX N - NOTICE-OF-PROJECT COMPLETION TEMPLATE (1921)

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STATE OF LOUISIANA  
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT  
LOUISIANA TRANSPORTATION RESEARCH CENTER  
4101 Gourrier Avenue  
Baton Rouge, Louisiana 70808

*Date*

### NOTICE OF COMPLETION

*Project Title*

LTRC Project No. ???

SIO NUMBER No. ???

Dear ???.

Please be notified by this memorandum that the services performed for the Department under the captioned project as set forth in the **contract/task order** dated ???? between you and the Department of Transportation and Development has been satisfactorily completed and accepted by the Department. The necessary services under this **contract/task order** are complete.

Sincerely,

Harold R. Paul, P.E.,  
Director, LTRC

cc.

*Project Manager*  
Project Files

# 21 APPENDIX O - PROJECT EVALUATION FORM

## Louisiana Transportation Research Center Project Evaluation Form

LTRC Project No.	SIO No.	Completed by:
Research Project Title		
Principal Investigator:		PI Institution:
Co-Principal Investigators (if any):		
<p>The purpose of this form is to identify the strengths and weaknesses in the performance of the research project. Please be as objective as possible when completing the form as the information will assist LTRC in improving the project management process. A rating of 1 or 5 must include comments justifying the selection.</p>		
		Poor – Satisfactory -Excellent
1. Were the overall project objectives met?		1__ 2__ 3__ 4__ 5__
Comments:		
2. Was the research team responsive to requests/inquiries from the project manager/ PRC?		1__ 2__ 3__ 4__ 5__
Comments:		
3. Were the fiscal year project expenditures in line with the expenditures projected in the AWP and biannual reports?		1__ 2__ 3__ 4__ 5__
Comments:		
4. Was the project completed on schedule?		1__ 2__ 3__ 4__ 5__
Comments:		
5. Were the deliverables (bi-annual reports, task reports, final report, etc) submitted in a timely manner?		1__ 2__ 3__ 4__ 5__
Comments:		
6. Was the final report thorough and technically correct?		1__ 2__ 3__ 4__ 5__
Comments:		
7. Was the final report delivered in an editorially acceptable form?		1__ 2__ 3__ 4__ 5__
Comments:		
8. Would you consider the PI for future work?		1__ 2__ 3__ 4__ 5__
Comments:		
Other comments about the project that might be helpful?		
Comments:		



## 22 APPENDIX P - LTRC PUBLICATION GUIDELINES

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### 22.1 FINAL REPORTS

#### 22.1.1 Word Template Available

To utilize a template of a blank report, please visit [http://www.ltrc.lsu.edu/downloads.html#pub\\_forms](http://www.ltrc.lsu.edu/downloads.html#pub_forms) and click on “Download (Word)” under Publication Forms and Final Report Template. You will find a Word document set up examples and guideline reminders.

#### 22.1.2 Section 508 Compliance

Federally funded research with public facing PDFs must be accessible as of March 23, 2018, according to the final federal rule for the Information and Communication Technology (ICT) refresh under Section 508. This ensures that federal employees with disabilities have comparable access to, and use of, information and data just like federal workers without disabilities. The law also ensures that members of the public with disabilities receive comparable access to publicly available information and services. All internal and external researchers will have to follow the new template and use the accessibility tracker in Word before submitting to LTRC. It is also recommended that research report authors educate themselves on accessibility in general and begin using Word’s accessibility tracker immediately for all active reports.

#### 22.1.3 Clearances and Copyrighted Material

Authors must assume full responsibility for securing any necessary clearances and written permissions for publication from any contracting or supervisory agencies involved in the research or from holders of copyrights on material used in the report. All contributions to the work must be properly acknowledged. When a report that contains previously copyrighted material, authors must obtain written permission from the copyright holder(s) to publish the material.

#### 22.1.4 Editing

Once you complete the report and technical standard page and have it edited by an outside source first, you will submit the entire document to your project manager. It is strongly encouraged to include an editorial review in the budget and timeline to be used prior to submittal of the draft report to LTRC. From there, your project manager will submit an electronic copy and a hard copy to be edited by LTRC’s publication staff.

# 23 APPENDIX Q - NOTIFICATION OF SUBMISSION OF PAPERS FORM (1908)

## Louisiana Transportation Research Center

NOTIFICATION OF SUBMISSION OF JOURNAL PAPER/S, CONFERENCE PAPER/S (FOR EITHER PRESENTATION AND/OR PUBLICATION), CONFERENCE ABSTRACT/S, AND SIMILAR ARTICLES BASED ON LTRC FUNDED PROJECTS

TITLE OF PUBLICATION: \_\_\_\_\_

ASSOCIATED LTRC PROJECT NO. \_\_\_\_\_

PRINCIPAL AND CO-AUTHOR/S: \_\_\_\_\_

JOURNAL/CONFERENCE/LOCATION SUBMITTED TO: \_\_\_\_\_

AUTHOR/S PRESENTING PAPER (FOR CONFERENCE PRESENTATIONS ONLY): \_\_\_\_\_

### TYPE OF PUBLICATION

- Journal Paper
- Paper for Conference Presentation Only (Not included in conference proceedings)
- Paper for Publication in Conference Proceedings (No presentation is involved)
- Paper for Conference Presentation and Publication in Proceedings
- Abstract of Paper for Conference Presentation (Submission of full paper is not required)

### TO BE COMPLETED BY SUBMITTER

Will paper be presented even if publication in conference proceedings is declined?  Yes  No

Will travel funds be requested from LTRC?  Yes  No

(If yes, LTRC Technology Transfer Travel Approval Request Form will need to be submitted at least 2 months prior to travel)

### TO BE COMPLETED BY LTRC PROJECT MANAGER

#### LTRC APPROVALS NECESSARY FOR ON-GOING PROJECTS

Does project progress and results warrant:

Paper Presentation?  Yes  No

Publication?  Yes  No

\_\_\_\_\_  
LTRC Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
LTRC Research Area Administrator

\_\_\_\_\_  
Date

\_\_\_\_\_  
LTRC Associate Director, Research

\_\_\_\_\_  
Date

APPROVED  DENIED

\_\_\_\_\_  
LTRC Director

\_\_\_\_\_  
Date

Form 1908 Rev. 06/08

## 24 APPENDIX R - TECHNICAL SUMMARY



# TECHSUMMARY

January 2014

State Project No. 30000960 / LTRC Project No. 13-8GT

### Bayou Corne Sinkhole: Control Measurements of State Highway 70 in Assumption Parish, Louisiana

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#### INTRODUCTION

The sinkhole located in Assumption Parish, Louisiana, threatens the stability of Highway 70, a state maintained route. In order to mitigate the potential damaging effects of the sinkhole on this infrastructure, the Louisiana Department of Transportation and Development (DOTD) has requested accurate and precise measurements of control points along the affected portion of the highway. The Center for Geoinformatics (C4G) at Louisiana State University (LSU) was contracted to measure and collect horizontal and vertical positions at various locations along the highway using Global Positioning Systems (GPS) enhanced by a real-time network (RTN) of continuously operating reference stations (CORS) maintained by C4G.

#### OBJECTIVE

The fundamental objective for this project was to measure and assess the surface stability of the portion of Highway 70 that is potentially vulnerable to the sinkhole. Using GPS enhanced by RTN maintained by C4G, both horizontal and vertical positions were measured and collected at 20 point locations along the north shoulder of the highway and 8 locations on the bridges over Bayou Corne (west of the sinkhole) and Grand Bayou (east of the sinkhole).

#### SCOPE

Initially, the project identified 21 road surface control points for GPS measurements along Highway 70. All GPS measurements included the horizontal and vertical positions of the control points along the highway corridor bounded by Bayou Corne in the west and Bayou Choupique in the east. The field observations initially included two separate control measurements per session. This workflow produced two unique GPS datasets that were combined to provide a single weighted solution for each control point.

Following a request by DOTD to modify the data collection tasks, acquisition of weighted positions were abandoned in November 2012 in order to support an additional day of measurements at eight control point locations on the bridges over Bayou Corne and Grand Bayou. Furthermore, a control point was dropped from the workflow due to poor positional accuracy resulting from nearby tree canopy.

#### METHODOLOGY

The methods employed for this study were organized into three complementary tasks: field measurements, data processing, and data distribution. These tasks, including data backup strategies, are described in the following text.

**Field Measurements**  
Field measurement tasks were organized into three distinct observation periods. The methods employed for measuring data points are discussed in the final report.

**Observation Periods**  
During the 10-month period between September 2012 and June 2013, the highway control points were observed a total of 23 times. Thirteen bridge control point observations were collected between November 2012 and June 2013.

**Measurement Techniques**  
In order to avoid measurements potentially influenced by the sinkhole, all field observations were collected using GPS equipment (e.g., data collectors, antennas, and cellular modems) maintained by C4G and augmented by the C4Gnet RTN. Measurements at

**LTRC Report 514**

Read online summary or final report:  
[www.ltrc.lsu.edu/publications.html](http://www.ltrc.lsu.edu/publications.html)

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**LTRC CONTACT:**  
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225-767-9124

**FUNDING:**  
SPR: TT-Fed/TT-Reg

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[www.ltrc.lsu.edu](http://www.ltrc.lsu.edu)

each control point were comprised of occupations lasting 300 one-second epochs (i.e., 5 minutes).

As per best practice techniques for minimizing the effects of atmospheric instability and mitigating unfavorable satellite geometries, measurements were initially collected at separate times during each day in the field (i.e., session). Positional solutions were computed using a weighted average technique that emphasized accuracy by minimizing positional dilution of precision (PDOP) and root-mean square error (RMSE) values quantified by the equipment. This technique produced a single weighted solution for each position.

In November 2012, weighted positional measurements were abandoned in order to support a request by DOTD to add the measurements at control points on the Bayou Come and Grand Bayou bridges. Accordingly, 28 points were regularly measured: 20 locations along Hwy 70, 4 positions on the Bayou Come bridge, and 4 positions on the Grand Bayou bridge.

## CONCLUSIONS

No discernible movement of Highway 70 or the bridges over Bayou Come, Grand Bayou, and Bayou Chauquique have been detected relative to the sinkhole during the report's measurement period. Sporadic measurements collected in the field demonstrate random and systematic errors that confound detailed analysis for determining significant trends. A more effective strategy would employ long-term occupations that can better account for both random and systematic errors.

Despite the biases, the average range of horizontal error observed for the highway control points was 0.19 ft. (5.8 cm), which included a minimum error of 0.007 ft. (0.21 cm) and a maximum of 0.48 ft. (14.6 cm). The average range of vertical error observed along the highway was 0.3 ft. (9.14 cm), with a minimum value of 0.001 ft. (0.3 cm) and a maximum of 0.45 ft. (13.7 cm). For the bridge control point observations, the average range of horizontal error was 0.098 ft. (3 cm), with a minimum of 0.005 ft. (0.15 cm) and a maximum of 0.18 ft. (5.5 cm). The average range of vertical error observed for the bridges was 0.16 ft. (4.9 cm), with a minimum of 0.0 ft. (0 cm) and a maximum of 0.14 ft. (4.3 cm).

### *Sporadic vs. Long Term Occupation*

As depicted in the results, static, ad hoc occupations of control points are susceptible to random and systematic errors. Random errors refer to measurement variability caused by unknown and unpredictable changes in environmental conditions that can vary in magnitude and direction (Grewal, Weill, & Andrews, 2007). Examples include, but are not limited to: erroneous orbital information of GPS satellites (e.g., relativistic effects of gravity), atmospheric instability in the lower (e.g., troposphere) and upper (e.g., ionosphere) atmosphere, and signal interference due to multi-path reflections. Systematic errors are typically caused by predictable changes in the environmental conditions and/or processes. Examples include, but are not limited to: user and instrument error (e.g., clock synchronization, software malfunctions); unfavorable satellite geometry;

signal interference due to tree canopy cover; and finally the hydrographic heave and shrink on the local soils (related to the swamp and near-by bayous).

Long-term occupations are less susceptible to both random and systematic error by reducing their influence on the measurement solutions. For instance, random error can be reduced by occupying a location for a long period of time. Doing so provides a more reliable measurement of surface conditions by averaging, or smoothing, outlier values over time. The predictable, systematic errors can be constrained by following best practices when performing static occupations and using models to remove the unwanted sources of interference. For instance, known sources of multipath interference can be excluded (e.g., masked) from the positional solutions, user error can be mitigated, and EMI can be isolated. Errors expected for a fixed CORS station can be reduced to estimated precisions between 0.8 in. – 1.18 in. (2-3 cm) horizontal and 1.96 in. – 2.75 in. (5-7 cm) vertical (orthometric) (Armstrong, 2013).

It is important to note that systematic error that cannot be constrained may be indicative of movement associated with regional subsidence, or even the sinkhole itself.

## RECOMMENDATIONS

C4G recommends deploying continuously operating GPS reference stations (CORS) as a cost effective monitoring strategy for improving the accuracy, precision, and consistency of the surface stability. The variability associated with short-term, static GPS observations makes identifying specific trends difficult due to the myriad of random and systematic error associated with the techniques. While these biases can be reduced, they cannot be eliminated. Utilization of a network of CORS will permit second-by-second monitoring of the surface that, when correlated with the C4Gnet RTN, can minimize biases that plague the sporadic occupations of the current project. Additionally, utilization of a CORS will better detect trends and movement of the road surface, which decision makers and emergency managers require for establishing situational awareness and ensuring public safety. Therefore, nominal observation precision can be constrained to within 1.18 in. (3 cm) horizontal and 3.1 in. (8 cm) vertical under ideal conditions.

### *Improve Monitoring of Highway Stability Using CORS Technology*

Installing multiple CORS along the highway will provide consistent, accurate, and reliable telemetry of surface conditions. Additionally, the CORS network can be correlated with the C4Gnet RTN, a network of 70 CORS sites distributed across the State. In doing so, positional accuracy and precision will be improved by mitigating various sources of random error (e.g., atmospheric and satellite geometry). This logic is planned as part of LTRC research project 13-9GT.

# 25 APPENDIX S - REPORT DISTRIBUTION CHECKLIST FORM (1912)



## LTRC Distribution Checklist

Study Title: \_\_\_\_\_ Report No. \_\_\_\_\_

- Type of Report:
- |                                                      |                                                |                                            |
|------------------------------------------------------|------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Final Report                | <input type="checkbox"/> Interim Report        | <input type="checkbox"/> Technical Summary |
| <input type="checkbox"/> Technical Assistance Report | <input type="checkbox"/> Implementation Report | <input type="checkbox"/> Project Capsule   |
| <input type="checkbox"/> Other: _____                |                                                |                                            |

Group Administrator: \_\_\_\_\_

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#### LADOTD

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- Policy Committee
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- DOTD Chiefs
- DOTD Directors
- Assistant District Administrators
- District Area Engineers
- District Traffic Operations Engineers
- District Laboratory Engineers
- District Project Engineers
- DOTD Engineers
- LTRC Engineers

#### LA Universities

- Deans, College of Engineering
- Principal Investigator(s)

#### States

- AASHTO Research Advisory Committee (RAC)

#### National Libraries

- Federal Highway Administration Research Library ([fhwalibrary@dot.gov](mailto:fhwalibrary@dot.gov))
- TRIS & TRB Library—Russell Houston ([rhouston@nas.edu](mailto:rhouston@nas.edu)) & Nancy Choudhry ([nchoudhry@nas.edu](mailto:nchoudhry@nas.edu))
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- Federal Highway Administration—Office of Corporate Research, Technology, and Innovation MGMT ([john.moulden@dot.gov](mailto:john.moulden@dot.gov))
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#### Industry

- LAPA—Louisiana Asphalt Pavement Association
- CAAL—Concrete Aggregate Association of LA

## HARD COPY DISTRIBUTION

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## 26 APPENDIX T - PUBLIC DOCUMENT SUBMISSION FORM



### Public Document Depository Program DOCUMENT SUBMISSION FORM

Please include this completed form with all deposits of publications (tangible and digital).

Agency Name:	Mythical Agency				
Contact Name:	Ms. Jane X	Position:	Director of Something Important		
Contact Email:	jx@email.gov	Phone:	225-123-4567	Today's Date:	7/15/2015

#### DOCUMENT INFORMATION

Please use only one entry per title (e.g., multiple copies of "Meeting Minutes" may be entered in #1). To see examples of how different types of publications may be entered, please view the sample form on the agency web page at <http://www.state.lib.la.us/state-employees/depository-library-program/state-agencies>.

#1	Title and Subtitle:	Journal of Louisiana Something			
	Format(s) Distributed to Public:	<input checked="" type="checkbox"/> Print/Hard Copy <input checked="" type="checkbox"/> Digital	Number of Issues / Editions Sent:	2	Date(s) of Publication: v.24, n.6-7 (2014)

#2	Title and Subtitle:	Annual Report			
	Format(s) Distributed to Public:	<input type="checkbox"/> Print/Hard Copy <input checked="" type="checkbox"/> Digital	Number of Issues / Editions Sent:	1	Date(s) of Publication: Oct. 1, 2014

#3	Title and Subtitle:	Minutes of Board Meeting			
	Format(s) Distributed to Public:	<input type="checkbox"/> Print/Hard Copy <input checked="" type="checkbox"/> Digital	Number of Issues / Editions Sent:	3	Date(s) of Publication: Aug., Oct., Dec. (2014)

#4	Title and Subtitle:	Guide to Something			
	Format(s) Distributed to Public:	<input checked="" type="checkbox"/> Print/Hard Copy <input checked="" type="checkbox"/> Digital	Number of Issues / Editions Sent:	1	Date(s) of Publication: 2015

## 27 APPENDIX U - RESEARCH ASSESSMENT AND IMPLEMENTATION REPORT (1902)

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### **Research Assessment and Implementation Report**

**Project Number:**  
**Project Title:**  
**Principal Investigators:**  
**PRC Chairman:**  
**PRC Members:**  
**LTRC Project Manager:**  
**LTRC Technology Transfer Engineer:**

#### **Objectives**

[What are the objectives/deliverables/products of this research?]

#### **Implementation Recommendations**

[Provide the implementation recommendations as developed by the Project Review Committee.]

#### **Potential Impact**

[Describe potential impact of the recommendations in terms of cost, efficiency, safety, convenience, aesthetics, etc. Describe required changes to existing specifications, standards, procedures, etc.]

#### **Target Audience**

[Who will benefit from this research? List whom you want to reach, their primary interest, and your objective in reaching them.]

#### **Strategies and Tactics**

[Describe practical areas of application. List the activities required for implementation, including resource needs. Consider needs for training, multimedia, and marketing.]

#### **Timeline**

[Create a schedule for each discrete strategy or tactic.]

#### **Implementation Responsibility**

[Define roles and responsibilities of all personnel involved in the implementation effort. Identify who will be the decision makers to implement results of the research.]

#### **Evaluation**

[Identify methods for evaluating the implementation effort. How will benefits be quantified or assessed?]



# 28 APPENDIX V - TECHNOLOGY TRANSFER TRAVEL APPROVAL REQUEST FORM (1922)

Louisiana Transportation Research Center  <b>TECHNOLOGY TRANSFER TRAVEL APPROVAL REQUEST FORM</b>  To be used for all travel funds requested for presentation of results not related to conduct of research tasks for on-going and completed projects. Reimbursement direct to traveler not to be invoiced through project funds.		LTRC USE ONLY  DATE OF RECEIPT:  STATE PROJECT NO.:	
<b>PART I TRAVEL REQUESTED</b>			
1. PERSON(S) REQUESTING TRAVEL:		2. UNIVERSITY/AGENCY:	
3. ADDRESS:		4. DESTINATION/ITINERARY:	
5. DATE OF DEPARTURE:		6. DATE OF RETURN:	
7. PURPOSE OF TRAVEL (E.G. CONFERENCE ATTENDANCE/PRESENTATION, SITE VISIT, ETC.):			
8. EXPLANATION: EXPLAIN HOW THIS IS RELATED TO THE PROJECT TO BE CHARGED			
9. LTRC PROJECT NO.:		10. PROJECT TITLE:	
11. TOTAL COST OF TRAVEL (INDICATE \$0 IF TRAVEL WILL BE REIMBURSED BY THIRD PARTY AND NO STATE CHARGES MADE):		12. IS THIS A BUDGETED ITEM?	13. IF NOT A BUDGETED ITEM, EXPLAIN:
\$		YES <input type="checkbox"/>	NO <input type="checkbox"/>
<b>PART II APPROVAL</b>			
RECOMMENDED BY GROUP MANAGER:		DATE:	
RECOMMENDED FOR APPROVAL BY ASSOCIATE DIRECTOR, RESEARCH:		DATE:	
RECOMMENDED FOR APPROVAL BY ASSOCIATE DIRECTOR, TECHNOLOGY TRANSFER:		DATE:	
APPROVED BY DIRECTOR, LTRC:		DATE:	
COMMENTS FOR DISAPPROVAL:			