# NCFRP

## National Cooperative Freight Research Program

# Users' Manual

*"Improved transportation is an indispensable condition for increasing national income and wealth. Good roads and canals do more than just reduce the expenses of moving cargo and people. An improved transportation system would make it possible for the first time [Note: with the completion of the Erie Canal in 1825] to move goods that had been excluded from trade and commerce, due to their excessive weight or the distance of their origin from potential markets. By increasing the volume of goods entering trade and commerce, the transportation system would instantaneously increase in national wealth.*"

Peter L. Bernstein

"Wedding of the Waters – The Erie Canal and the Making of a Great Nation"

**Prepared for the NCFRP Oversight Committee**

**By**
**Bob Reilly**
**November 2006**

# National Cooperative Freight Research Program

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**The National Cooperative Freight Research Program is managed by the Cooperative Research Programs Division of the Transportation Research Board**

**For more information go to:**
**http://trb.org/**
**or contact**


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# SUMMARY

*The National Cooperative Freight Research Program (NCFRP) was authorized in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The NCFRP is sponsored by the US Department of Transportation's Research and Innovative Technology Administration (RITA) and managed by the National Academies, acting through its Transportation Research Board (TRB), with program governance provided by an Oversight Committee including a representative cross section of freight stakeholders. A contract to begin work on the NCFRP was executed between RITA and the National Academies and became effective on September 6, 2006.*

## NEED AND PURPOSE

America's freight transportation system makes critical contributions to the nation's economy, security, and quality of life. More than $660 billion (about 6.4 percent of the US Gross Domestic Product) is spent annually to move freight, and the cost and volume of goods movement are crucial to the productivity of the entire US economy.

The freight transportation system in the United States is a complex, decentralized, and dynamic network of private and public entities, involving all modes of transportation--trucking rail, waterways, air, and pipelines. In recent years, the demand for freight transportation service has been increasing fueled by growth in international trade, and bottlenecks or congestion points in the system are exposing the inadequacies of current infrastructure and operations to meet growing demand. US domestic freight, measured by ton mileage, is expected to grow by some 50 percent in the next 20 years. Strategic operational and investment decisions by governments at all levels will be necessary to maintain freight system performance, and will in turn require sound technical guidance based on research.

The National Cooperative Freight Research Program (NCFRP) will carry out applied research on problems facing the freight industry that are not being adequately addressed by existing research programs. SAFETEA-LU, in authorizing the NCFRP, called for development of a national research agenda addressing freight transportation and for implementation of a multi-year strategic plan to achieve it. The act also states that "the national research agenda shall ... include research in the following areas:

(1) Techniques for estimating and quantifying public benefits derived from freight transportation projects,
(2) Alternative approaches to calculating the contribution of truck and rail traffic to congestion on specific highway segments,
(3) The feasibility of consolidating origins and destinations for freight movement,
(4) Methods for incorporating estimates of international trade into landside transportation planning,

(5) The use of technology applications to increase capacity of highway lanes dedicated to truck-only traffic,
(6) Development of physical and policy alternatives for separating car and truck traffic,
(7) Ways to synchronize infrastructure improvements with freight transportation demand,
(8) The effects of changing patterns of freight movement on transportation planning decisions relating to rest areas,
(9) Other research areas to identify and address emerging and future research needs related to freight transportation by all modes."

The NCFRP will cover a broad range of issues related to the objective of improving the efficiency, reliability, safety, and security of the nation's freight transportation system.

**PROGRAM PARTICIPANTS**

The primary participants in the NCFRP are (a) the NCFRP Oversight Committee, appointed by the National Research Council, and composed of a representative cross section of public and private sector freight stakeholders, including shippers, carriers, US DOT, other federal agencies, state transportation departments, local governments, nonprofit entities, and academia; (b) the Transportation Research Board (TRB) as program manager and secretariat for the Oversight Committee; and (c) the US DOT's RITA as program sponsor. The NCFRP will benefit from the cooperation and participation of public and private sector freight professionals; federal, state, and local government officials; and research organizations. Each of these participants has different interests and responsibilities, and each is an important part of this cooperative research effort.

**SELECTION OF RESEARCH**

The NCFRP Oversight Committee will formulate the research program by identifying the highest priority projects and defining funding levels and expected products. Research problem statements, recommending research needs for consideration by the Oversight Committee, will be solicited periodically but may be submitted to TRB at any time.

**PROGRAM MANAGEMENT**

The NCFRP is managed using procedures modeled after those used by TRB in managing the National Cooperative Highway Research Program and other cooperative research programs. Day-to-day program management includes the following tasks:

- Assisting the Oversight Committee in identifying and prioritizing research needs;
- Appointing and coordinating expert technical panels to guide research projects;
- Developing and distributing Requests for Proposals (RFPs);

- Processing and evaluating proposals to select the best qualified research agencies;
- Executing contracts with the selected researchers;
- Guiding the research;
- Reviewing research reports;
- Publishing and disseminating research reports; and
- Promoting the application of research results.

## PROJECT PANELS

Each project is assigned to a panel, appointed by the Transportation Research Board, which provides technical guidance and counsel throughout the life of the project. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including members representing the intended users of the research products. The panels prepare requests for proposals and select contractors based on evaluation of the proposals received; they guide the projects and review the reports. As in other TRB activities, NCFRP project panel members serve voluntarily without compensation.

## SELECTION OF CONTRACTORS

The process for selecting NCFRP researchers has been used by TRB in managing cooperative research programs for more than 40 years. This open process allows all potential research agencies to compete on the basis of technical merit, and ensures that all proposers are treated fairly and that the program has access to the best talent available for each project. NCFRP RFPs will be available on the World Wide Web until the deadline for proposal submission. Each RFP will be announced by e-mail. To register for e-mail notification of RFPs, please click **here** for instructions.

Proposals, submitted by potential research contractors in response to NCFRP requests for proposals, are evaluated by the project panels. The evaluation considers the following: (1) the proposer's demonstrated understanding of the problem; (2) the merit of the proposed research approach and experiment design; (3) experience, qualifications, and objectivity of the research team in the same or closely related areas; (4) the plan for promoting application of results; (5) the proposer's plan for participation of Disadvantaged Business Enterprises--small firms owned and controlled by minorities or women; and (6) the adequacy of the facilities.

## FUNDING

SAFETEA-LU authorized $3.75 million per year for the NCFRP in Fiscal Years 2006 through 2009. NCFRP funding is determined by the annual federal appropriation process. The total available in FY 2006 is $2,647,583.

## PRODUCTS

The NCFRP will produce a series of research reports and other products. Primary emphasis will be placed on disseminating NCFRP results to the intended end-users of the research: freight shippers and carriers, service providers, suppliers, and public sector officials. Relevant industry associations will play key roles in making research information available through their committee structures. The NCFRP may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by practitioners.

**STATUS**

An NCFRP Memorandum of Agreement was executed by the cooperating parties in April 2006. A contract between RITA and the National Academies was executed on September 6, 2006; it authorizes TRB to begin the program and to carry out research projects in the fiscal year 2006 program. The NCFRP Oversight Committee will be appointed by the National Research Council and will hold its first meeting on December 14 and 15, 2006, to establish operating procedures for the NCFRP and to prioritize research needs. A limited solicitation of freight–industry associations and government agencies was used to compile statements of research need for consideration by the Oversight Committee in formulating the NCFRP agenda for Fiscal Years 2006 and 2007.

# 1. INTRODUCTION

## 1.1 ORIGIN

*The division of labour, in order to opulence, becomes always more perfect by the easy method of conveyance in a country.*
Adam Smith "Lectures on Jurisprudence" 1766

America's freight transportation system makes critical contributions to the nation's economy, security and quality of life. More than $600 billion (about 6.4 percent of the U.S. Gross Domestic Product) is spent annually to move freight, and the cost and volume of goods movement affect the productivity of the entire U.S. economy.

The freight transportation system in the United States is a complex, decentralized, and dynamic network of private and public entities, involving all modes of transportation – trucking, rail, waterways, air and pipelines. In recent years, the demand for freight transportation service has been increasing, fueled by international trade growth, and bottlenecks or congestion points in the system are exposing the inadequacies of current infrastructure and operations to meet growing demand. U.S. domestic freight, measured by ton mileage, is expected to grow by more than 50 percent in the next 20 years. Strategic operational and investment decisions by governments at all levels will be necessary to maintain freight system performance, and will in turn require sound technical guidance based on research.

A number of federal agencies – including the Department of Defense, the Department of Homeland Security, and the component "modal" administrations of the Department of Transportation – sponsor and conduct research relating to freight transportation. For the most part, however, this research supports each federal agency's specific mission, from protecting the environment to ensuring safety and security, and does not provide the freight industry with information and guidance sufficient to find and implement solutions to problems that stem from the requirements and demands of the global marketplace and of multiple federal, state and local entities. The diverse participants in the freight transportation system have many common research needs, but they generally lack the capacity to undertake such research themselves. As a result, research targeted to the issued of the freight transportation system has received only modest attention.

Consequently, in August 2005, the Congress authorized a new National Cooperative Freight Transportation Research Program (NCFRP) in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. The act authorizes $3.75 million per year over the four-year authorization period starting in FY 2006. An Oversight Committee for the program with representation from freight stakeholders will be

appointed by the National Research Council to select projects and allocate funds.
The act authorizing the NCFRP calls for the Oversight Committee to establish a national research agenda addressing freight transportation and to implement a multi-year strategic plan to achieve it. The act also states that "the national research agenda shall…include research in the following areas:

(1) Techniques for estimating and quantifying public benefits derived from freight transportation projects,
(2) Alternative approaches to calculating the contributing of truck and rail traffic to congestion on specific highway segments,
(3) The feasibility of consolidating origins and destinations for freight movement,
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(7) Ways to synchronize infrastructure improvements with freight transportation demand,
(8) The effects of changing patterns of freight movement on transportation planning decisions relating to rest areas,
(9) Other research areas to identify and address emerging and future research needs related to freight transportation by all modes."

As indicated in Item 9, the NCFRP will be expected to cover a broad range of issues related to the objective of improving the efficiency, reliability, safety and security of the nation's freight transportation system.

Following enactment of SAFETEA-LU, the RITA entered into an agreement with the NAS to manage the NCFRP, under the direction of an NRC-appointed Oversight Committee.

TRB will issue solicitations for potential topics for the NCFRP, and research problem statements will be collected from freight shippers and carriers, academia, consulting/engineering firms, industry associations, state and federal agencies and TRB standing technical committees. The NCFRP Oversight Committee will be responsible for selecting and prioritizing these research needs based on the funding available.

## 1.2 BACKGROUND

### 1.2.1 The Freight System

*All this canal building, launched by the great innovations at Bridgewater [Note: The Bridgewater Canal near Manchester, England was completed in 1761], was the prelude to the modern world economy, a system people could never even have dreamed of without the spectacular reduction in the costs of transportation provided by the canals, and the manner in which they linked inland producers with one another and with the great ports on the coasts.*

Peter L. Bernstein
"Wedding of the waters – The Erie Canal and the Making of a Great Nation"

The nation's freight system is essential to domestic productivity, international competitiveness, and quality of life, and freight professionals must find innovative ways to provide safe and efficient facilities and service under more demanding conditions in the years to come. It is increasingly clear that many of the challenges faced by the freight system can only be met by innovation based on research.

### 1.2.2 Innovation

*Progress is a continuing effort to make*
*the things we eat, drink, and wear*
*as good as they used to be.*
Bill Vaughn

Freight leaders must anticipate the demands that will be placed on the system. Innovation will be needed for a system that is safe, efficient, reliable, and secure and will meet capacity demands. In recent years, the nation has seen rapid innovation in many fields—such as the space program, national defense, health care, environmental protection, and communications; and of many kinds—technological, managerial, and operational. In the years ahead, it will be innovation that exerts the greatest influence on the health of our freight system. The pace of change is so rapid that no industry can lag and remain effective, and the rate of discovery and innovative breakthroughs for the freight system must be accelerated.

### 1.2.3 Research

*The simplest schoolboy is now aware of truths*
*for which Archimedes would have given his life.*
Ernest Renan, 1883

It is important to understand and use the linkages between research and innovative practice; and between innovation and the quality of our

freight system. The nation's existing freight transportation system must be sustained, and the opportunities for a more effective system must be developed through innovation available from research.

The needs of the freight industry and the scope of the NCFRP are not confined to research in the narrow sense of the word. It is essential that the needs and opportunities for innovation in freight transportation be met by not just research (either fundamental and applied) but also by development, education, technology transfer, and other activities needed to bring about improvements in practice, both in administrative as well as technical activities. In the context of the NCFRP, the term "research" is used to denote all of the activities that are used to promote innovative approaches to improve freight transportation.

For the NCFRP to receive earn support, administrators, legislators, budget analysts, and others must be convinced that investments in the NCFRP actually produce valuable returns. This necessity does not mean that every research study has to result directly in specific, quantifiable benefits, but it is certainly reasonable to expect that, on a program-wide basis, benefits should exceed costs.

In addition, research may develop critical in-house expertise more effectively than any other form of professional experience. The real payoff from research cannot be measured only by implementation of findings; the benefits of the expertise gained may be incalculable when used in future planning, operations, litigation, special investigations, and decision making.

## 1.3 NCFRP NEEDS AND OBJECTIVES

*You can't build a reputation on what you are going to do.*
Henry Ford

The nation's freight transportation system is showing the effects of limited operating capacity. At the same time, the nation's continued economic growth and the need to meet environmental, energy, and mobility objectives place ever greater demands on the system. Innovative solutions are needed to meet those demands and to protect our vital transportation network.

The rapidly changing freight-transportation environment presents an array of challenges. Emerging national problems, more varied societal needs, regional differences with respect to capacity, the regulatory environment, the changing economy, and resource constraints are making new and different demands on the freight system. At the same time, dynamically evolving technologies and other innovations can provide improved responses to the demand for better services. There are unprecedented opportunities for innovation in the freight system. It is clear

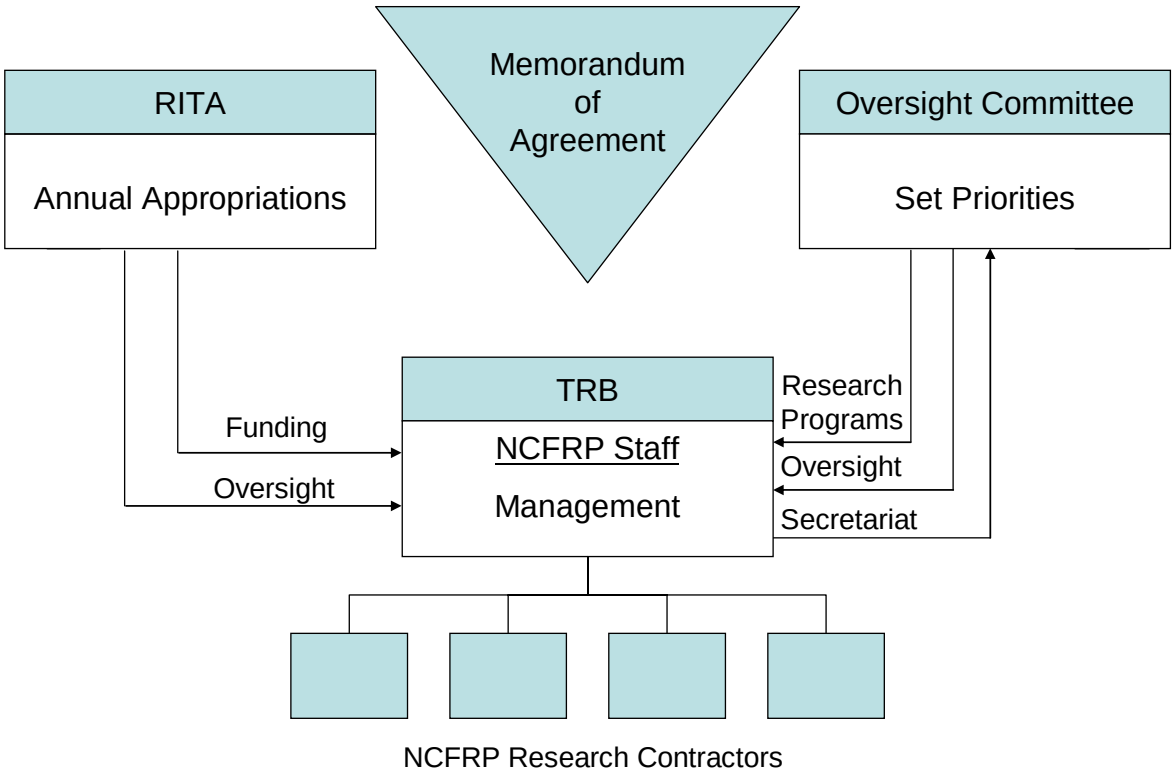
that even small improvements in some areas can yield cost-effective results.

## 1.4 NCFRP PARTICIPANTS AND THEIR ROLES

*Keep your eyes on the stars, and your feet on the ground.*
Teddy Roosevelt

The primary participants in the NCFRP are (1) The NCFRP Oversight Committee appointed by the National Research Council; (2) the TRB as program manager and secretariat for the Oversight Committee; and (3) the RITA as program sponsor. The relationships among these organizations are illustrated in Figure 1. Other important participants in the NCFRP include freight shippers and carriers, state and local government officials, equipment and service suppliers, and research organizations. Each of these participants has different interests and responsibilities, and each is an important part of National Cooperative Research Freight Program.

Figure 1
National Cooperative Freight Research Program
Organizational Structure



### 1.4.1 The Oversight Committee

*Learning is what most adults will do for a living in the 21st century.*
S.J. Perelman

#### Responsibilities

The Oversight Committee provides policy guidance and sets priorities for NCFRP research. The NCFRP Memorandum of Agreement assigns the following responsibilities to the Oversight Committee: (1) reviewing research needs; (2) selecting research topics; (3) setting project priorities and funding levels; and (4) evaluating program effectiveness. More specifically, the Oversight Committee (1) determines if proposed topics represent important research needs on freight issues; (2) determines, on the basis of evaluations provided by the TRB and other information sources, whether the proposed research topic does or does not duplicate other research; and (3) formulates an annual program with recommended project funding consisting of new projects and, when appropriate, continuation of projects. The Oversight Committee will not provide advice or recommendations to the US DOT.

#### Composition

As called for in SAFETEA-LU, membership on the Oversight Committee includes a representative cross section of freight stakeholders, including US DOT, other Federal agencies, state transportation departments, local governments, nonprofit entities, academia, and the private sector. Private sector members include freight shippers and carriers and members of industry associations involves in all modes of freight transportation.

The Oversight Committee Chair and members are appointed by the Chair of the National Research Council (NRC), the operating arm of the NAS, in consultation with US DOT and national associations representing the freight transportation industry. Committee appointments, including appointments of replacements for unexpired terms, shall be made for 3-year terms with possible 3-year reappointments.

The US DOT Assistant Secretary for Transportation Policy, the RITA Administrator, and the Federal Highway Administrator, or their designees serve a voting, ex-officio members of the Oversight Committee. NAS, in consultation with the Oversight Committee, US DOT and national associations representing the freight transportation industry, will appoint additional ex-officio members as the non-voting representatives of the US DOT, other Federal agencies, and other relevant agencies, associations or institutions.

**Procedures**

The Oversight Committee, operating within NRC's Transportation Research Board (TRB), shall meet at the call of the Chair, but not less than one time per year.

No member of the Oversight Committee may receive compensation for serving, but members may be reimbursed reasonable and necessary expenses in connection with carrying out the business of the Committee to the extent consistent with the funding agreements and applicable procurement regulations and guidelines.

A competitive process will be used to select contractors, to the maximum extent practicable. If the Oversight Committee determines that a specific contractor is uniquely qualified to conduct specific elements of the work program, it may recommend that NAS make a sole-source award, subject to its polices and procedures.

The Oversight Committee will make use of technical panels, as appropriate, to bring experience, expertise and counsel from academia, government and other interested parties to the NCFRP. Panel appointments will be subject to the policies and procedures of NRC and TRB.

The presence of 50 percent of the voting members constitutes a quorum. A vote of a majority of the members present is necessary to decide a question. Action may be taken without a meeting with prior written consent by all members.

It is essential that members of the Oversight Committee carry out their responsibilities with great care to avoid even the appearance of conflict of interest; the Oversight Committee will develop guidelines for this purpose.

### 1.4.2 The TRB as Secretariat and Program Manager

*Opportunity is missed by most people,*
*because it is dressed in overalls and looks like work.*
Thomas Edison

The TRB is the secretariat for the Oversight Committee and the program manager of the NCFRP with responsibilities carried out in consultation with the Oversight Committee Chair. TRB staff carries out the following secretariat activities:

- Issuing announcements to solicit research needs statements for consideration by the NCFRP,

- Conducting preliminary evaluation of research needs statements to determine whether the proposed research duplicates previous or ongoing studies,

- Making preliminary estimates of the cost of conducting each proposed research topic,

- Distributing material necessary for the Oversight Committee's prioritization of research for the NCFRP,

- Recording Oversight Committee meeting decisions on matters related to the NCFRP,

- Scheduling meetings and preparing and distributing agendas for Oversight Committee meetings,

- Preparing and distributing minutes following Oversight Committee meetings,

- Keeping records related to NCFRP activities,

- Rendering to the Oversight Committee and the RITA quarterly reports on the progress and financial status of the NCFRP, and

- Providing other necessary staff support.

Management of the research program is critical to the NCFRP's success. The TRB manages the day-to-day operations of the program. The TRB is responsible for the following program management tasks: appointing expert technical panels with responsibility to direct, monitor, and review the research progress; developing and distributing requests for proposals (RFPs); processing proposals; executing contracts with the selected researchers; reviewing research reports; publishing and disseminating research reports; and promoting dissemination of research results. The TRB cooperates with the Oversight Committee and the RITA in performing these program-management functions. More specifically, TRB program-management responsibilities for the NCFRP are detailed in the NCFRP Memorandum of Agreement. Details on the approach the TRB uses in the management of the NCFRP are described in Articles III and IV of this document.

### 1.4.3 Research and Innovative Technology Administration (RITA)

The RITA provides funding to support the NCFRP. The RITA's role as the steward of federal funds necessitates its participation in program oversight functions relative to achievement of NCFRP technical objectives, budget adherence, and schedule milestones. The RITA also provides the TRB with timely guidance and information on emerging

issues of national priority, new federal program initiatives, and information on complementary RITA programs or projects that can enhance the NCFRP's effectiveness. The RITA provides the Oversight Committee with current program information on the RITA research program and with guidance in the coordination of any potentially overlapping research studies. The RITA and the TRB maintain close coordination in the development of detailed technical program plans, RFPs, and technical work statements. The close coordination among the Oversight Committee, the RITA, and the TRB staff provides fertile opportunities for structuring creative and more cost-effective projects.

The RITA works cooperatively with the Oversight Committee, the NAS, and others as may be appropriate in the management of the NCFRP. This cooperative effort is designed to ensure the effectiveness and success of the overall NCFRP process and is consistent with sound fiscal and resource management. The RITA's responsibilities include the following activities:

1. Participating with the Oversight Committee in developing the NCFRP annual program;

2. When practicable, selecting and assigning RITA staff personnel to serve on project panels;

3. Supporting periodic program reviews;

4. Participating in planning, developing, and conducting conferences, workshops, seminars, and other technical meetings associated with NCFRP activities; and

5. Working closely with the TRB and industry associations to ensure dissemination, distribution, marketing, and promotion of the results of NCFRP studies, with an emphasis on timely deployment and mainstreaming of products and practices resulting from the NCFRP.

## 1.5 RELATIONSHIP OF THE NCFRP TO OTHER FREIGHT RESEARCH PROGRAMS

*Overturning the chessboard is not a chess move.*
Andre Malraux

Strong coordination should exist among the technical objectives and individual projects in the NCFRP and other freight-related research programs. However, research programs include differences that can be attributed to policies, management perspectives, and emphasis in project definition and scope. The NCFRP was conceived as an stakeholder-driven, problem-solving program (i.e., real-world issues with near- to mid-term R&D timeframes). Other U.S. DOT research programs includes these

objectives, but also provide for projects of longer term R&D, DOT-mission issues, and initiatives promoted by the Administration.

Recognizing that the RITA representatives are party to selection of each annual program of NCFRP projects and that the RITA is regularly briefed by NCFRP staff on progress, coordination between the research activities of the RITA and the NCFRP is ensured. The programs are complementary.

All research program areas need to be closely examined by the Oversight Committee during the problem-statement evaluation and selection process. The Oversight Committee may discover certain research areas that the RITA is emphasizing that the NCFRP is overlooking and vice versa. Adjustments in NCFRP program definition and categorization may also be necessary, when the Oversight Committee identifies strategic objectives for the NCFRP. A strategic planning process can provide the Oversight Committee and RITA officials with fresh insight that can be used to calibrate or redirect the programs and to sort out some of the issues associated with the roles and operating characteristics of the NCFRP, the U.S. DOT's research program, and other freight–related research activities.

## 1.6 INITIATING THE NCFRP

*I am rather like a mosquito in a nudist camp; I know what I ought to do, but I don't know where to begin.*
Stephen Bayne

Table 1 summarizes milestones in the creation of the NCFRP.

**TABLE 1 – MILESTONES IN THE CREATION OF THE NCFRP**

| | |
|---|---|
| August, 2005 | SAFETEA-LU authorizes NCFRP |
| April, 2006 | NCFRP Memorandum of Agreement is executed |
| September, 2006 | RITA provides $2.647 million to TRB for NCFRP |
| December, 2006 | NCFRP Oversight Panel holds its first meeting |

Cooperative research is not new; a number of cooperative research programs are in existence and have worked well in a variety of environments. The opportunity exists, in initiating the NCFRP, to incorporate the best features of other successful programs.

As with any new program, it is important to produce accomplishments soon after the NCFRP is initiated. The research must have freight-industry support and visibility, a high potential for payoff, and broad application across the freight industry. A favorable, early

response by freight professionals to NCFRP products will increase interest, acceptance, and support for the program.

### 1.6.1 The First Program

*In the middle of difficulty lies opportunity.*
Albert Einstein

During the NCFRP's first year, the Oversight Committee will not have agreed on strategic objectives for use in selecting projects. Because limited research has been performed on freight–system topics in recent years, there may be a substantial backlog of important research problems that are ready to be solved.

Concerned about the source and quality of the problems to be included in the first (Fiscal Year 2006) program, TRB staff, in May 2006, solicited research problems from a select group of freight industry associations and government agencies. At its 2-day meeting in December 2006, the Oversight Committee will use these problem statements and other materials complied by TRB staff in formulating the initial round of NCFRP research.

The structure and operating practices for the NCFRP will evolve over time. The Oversight Committee will have the flexibility to determine what is best for the NCFRP, and, in its oversight role, will make changes, add to the program, and redefine processes as necessary.

# 2. PROGRAM FORMULATION

*Making up your mind is the hard part – the rest is just pure work.*
Tom Hirschfeld

The annual research programs selected by the Oversight Committee are the foundation of the NCFRP. Formulating the annual program, i.e., identifying the highest priority projects to be researched in a given fiscal year, is probably the Oversight Committee's most important duty. Projects to be funded are based on the Oversight Committee's assessment of current freight–system issues. The NCFRP staff assists the Oversight Committee by compiling candidate problem statements for the Committee's consideration in programming research projects. The Oversight Committee provides the NCFRP with guidance on the technical content and scope of work for each selected research project. For example, the Oversight Committee defines the scope of research, funding levels, and expected products.

## 2.1 PROGRAMMING PROCESS

*The will to win is important, but the will to prepare is vital.*
Joe Paterno

The items to be funded are based on the Oversight Committee's decisions regarding the type of research to be performed and the current needs of the freight system. NCFRP staff prepares the necessary material on the candidate items for the Oversight Committee to review, and, at a meeting to be held annually, the Committee selects the projects to be programmed. The programmed projects use the funds available for that given year. Contingent projects may also be selected, in case one or more of the programmed projects cannot proceed.

In formulating an annual program, the Oversight Committee makes decisions on the specific content of the program and selects the types of research and subject areas for the projects to be researched. The Oversight Committee has the opportunity to select specific subjects based on current needs; research of strategic importance also can be factored into the program at this point. Each annual program may include both new and continuing research and will have a unique composition, based on the most important issues and problems at the time.

## 2.2 DEVELOPMENT OF A STRATEGIC PLAN

*If you want to hear God laugh, tell him your plans.*
Irish Proverb

NCFRP research projects are selected on a year-to-year basis, driven by emerging issues and current priorities. Nevertheless, the Oversight Committee may want a frame of reference from which to evaluate needs and formulate priority projects. The frame of reference could be a strategic plan that includes freight-system business needs, priorities, and objectives.

In authorizing the NCFRP, SAFETEA-LU called for the NCFRP Oversight Committee, "….in consultation with interested parties, (to) recommend a national research agenda for the program. The agenda shall include a multiyear strategic plan."

Development of a strategic plan may be accomplished through a dynamic and flexible process that is subject to review, scrutiny, and adjustment. The process may involve consideration of freight priorities, past and current expenditure levels, transportation and other trends, technology advances, operational processes, and a range of national considerations such as international competitiveness, national and local economics, and pending legislation. The strategic plan may assist the Oversight Committee in assigning project priorities and in allocating financial support. The Oversight Committee may use the strategic plan as a point of departure in the annual programming process and may also request the TRB to investigate specific strategic areas of interest prior to final project selection.

## 2.3 NCFRP CLASSIFICATION SYSTEM

The Oversight Committee may need to have a means to oversee the program as a whole. It needs to know what subjects are receiving attention and what research is required to produce solutions to current needs. The subject matter of the research and the types of research approaches are the basic building blocks of an effective program. As the NCFRP matures, a system may be needed to organize the many problems and research topics that will be suggested to the Oversight Committee.

The NCFRP will cover a broad spectrum of freight problems. A classification system will assist the Oversight Committee in (1) evaluating multiple problems that fall into the same research categories, (2) accounting for funding that has been committed to a specific research category, and (3) communicating to the research community what research areas are important to the NCFRP program. This administrative grouping of projects also would help the Oversight Committee to monitor the overall technical balance of the NCFRP program and to determine the distribution of resources being expended in the research fields.

## 2.4 RESEARCH CHARACTERISTICS

*He that would have the fruit must climb the tree.*
Thomas Fuller

In addition to classifying research by subject matter, it is useful to consider other important, cross-cutting characteristics. A truly effective program must be designed to achieve appropriate balance among various alternatives.

*Do not let what you cannot do interfere with what you can do.*
John Wooden

Applied vs. Fundamental—Most NCFRP research would be classified as applied research, as opposed to fundamental research. A useful definition is that the results of fundamental research are intended to be used primarily by researchers; whereas, applied research is intended to be used by decision makers and practitioners. Clearly, both types of research are needed for continued progress on freight–system issues; applied research cannot flourish without a constant supply of new ideas flowing from fundamental research. For applied research programs to be effective in producing practical results, projects of a more fundamental nature must also be supported.

*The lure of the distant and the difficult is deceptive.*
*The great opportunity is where you are.*
John Burroughs

Local vs. Nationwide—There is a need for balance between research on problems that exist nationwide and those that are regional or local in scope. The NCFRP concentrates on national issues—problems common to most, if not all, parts of the freight industry.

Top Down vs. Bottom Up—Most NCFRP research projects will originate from problems identified and suggested by professionals at the grassroots level; on the other hand, some research may be guided by a strategic plan developed with strong involvement by high-level freight–industry decision makers. This "top-down" approach can enhance the effectiveness of a program in dealing with high-priority, long-term problems, while the "bottom-up" approach ensures the responsiveness necessary to address changing research needs. In either approach, it is important that there be support for researchers with innovative ideas and with new solutions to pressing problems.

*Sometimes the road less traveled is less traveled for a reason.*

Multi-Year Plan vs. The Market Place—Some research is guided by a master plan set out several years in advance. There is also a need for research to be programmed on a year-to-year basis to work on problems in emerging areas that do not necessarily fit into predetermined emphasis areas. The latter "market-place" approach to setting research priorities can, at times, appear to be chaotic and random, but it has proven to be effective and is expected to be an important part of the NCFRP.

*Experience is the name everyone gives to their mistakes.*
Oscar Wilde

Hard vs. Soft—There should be a balance between "hard side" research directed at problems related to design, construction, and preservation of freight infrastructure and "soft side" research related to administrative, social, financial, safety, and planning considerations. From time to time, emphasis will shift between hard and soft studies, but each type is an essential part of freight-related research. The NCFRP is expected to concentrate on policy-related studies.

*He that will not sail till all dangers are over must never put to sea.*
Thomas Fuller

Short Term vs. Long Term—Some research can be designed to produce usable results at the conclusion of a study in 2 years or less, but there are other objectives that can only be achieved over a longer term through multi-stage studies. The NCFRP is expected to include a mix.

*Everyone is trying to accomplish something big,*
*not realizing that life is made up of little things.*
Frank A. Clark

Incremental vs. Breakthrough—Progress sometimes can occur in giant steps, but most applied research is intended to produce incremental progress. The Oversight Committee will need to decide where NCFRP should concentrate its efforts.

*High-risk research doesn't have to end in tears.*
D. Reynaud

Low Risk vs. High Risk—A primary objective in managing applied research is to maximize the probability of success. This is accomplished in the NCFRP first by selecting researchable problems that have a reasonable chance for solution within the time and funding available. Next, an agency with an established

track record must be selected to do the research, based on a proposal promising the greatest probability of success. Finally, the study must be managed to make sure that the research agency adheres to a research plan that will produce the intended results within the budget. On the other hand, there can be situations where a higher risk of failure is acceptable, in order to attempt to reach an objective with a significantly higher payoff. A well-balanced research program will include some high-risk projects, and some of them may not be fully successful. Researchers continually demonstrate how difficult it is to produce specific innovations on a timetable, no matter how much money is spent. But it has also been shown repeatedly that investing research money in a worthwhile goal can produce important results, even when the results are not exactly what was expected.

There are other categories of research activities, including field testing, synthesizing existing information, demonstration projects, preparation of standards-of-practice manuals or instructional documents, and development of specifications and other application documents based on new technologies. This full range of activities may be considered for inclusion in the NCFRP.

## 2.5 TYPES OF NCFRP RESEARCH

There are advantages to using various research approaches depending on the nature of the problem to be solved. A variety of research types are available within the NCFRP, and the Oversight Committee will make decisions on the types to be included in each annual program. Below are descriptions of types of research that might be appropriate for inclusion in the NCFRP.

### 2.5.1 Research Projects

*The reason the Yankees never lay an egg is because they don't operate on chicken feed.*
Dan Parker

Research projects are the primary activity of the NCFRP. The research to be undertaken is based on needs that have been identified by published literature, surveys, Oversight Committee members, and freight operators. Research objectives are aimed at responding to immediate problems and opportunities for the freight system. Research projects focus on high-priority issues with a reasonably high expectation of producing usable results. Contracts to perform the research for these projects are awarded based on competitive proposals.

The annual process begins with an announcement of a general solicitation for problem statements. TRB staff solicits and collects problem statements for review. Close coordination is maintained with

RITA staff. Problem statement evaluations are based on need, urgency, probability of success, and funds available. A search for relevant research may be made using the TRB's computerized information retrieval system, the Transportation Research Information System (TRIS). After the initial evaluation, problem statements are considered by the Oversight Committee, and the problem statements chosen are included in the annual program. Research projects derived from the problem-submittal process tend to be complex and require a budget of more than $300,000 and 15 to 24 months to accomplish the objective.

### 2.5.2 Synthesis Studies

Reports on the state of the practice in critical areas are an important part of a well-rounded research program. Synthesis studies examine what freight professionals have done about specific problems and the findings are collected into a readable, useful form for practitioners. Given the decentralized nature of the freight industry, where many hundreds of organizations and individuals face many similar issues, transferring information on practical experiences can be extremely valuable. The NCHRP and the TCRP have produced more than 400 synthesis reports, and they are rated among TRB's most useful products.

These synthesis reports present case studies, based on an extensive examination of current and recent activity on the topic and often include results of surveys of practitioners. Synthesis studies produced by the NCFRP could inform freight professionals about innovations that are being used by others to solve problems. The Synthesis studies facilitate a broader implementation of successful innovation by effectively communicating the current state of practice and highlighting critical problems which may need additional research. Synthesis study topics may be selected by a panel appointed to oversee this portion of the program.

### 2.5.3 Legal Studies

*Never interrupt someone doing something*
*you said couldn't be done.*
Amelia Earhart

Legal research has proven to be an important area in the NCHRP and the TCRP, and similar legal studies may be included in the NCFRP. Problems in transportation law are so specific that general solicitations for research needs are not effective and a special mechanism is used to generate legal research problem statements. In other cooperative research programs, a panel, composed of experts in freight law, addresses legal issues and recommends problems to be solved. The need for legal studies continues from year to year, and the emphasis areas could be determined by an NCFRP legal panel on a periodic basis. These emphasis areas will change over time, depending on conditions in the freight industry. Examples of TCRP and NCHRP legal studies include "Restrictions of

Speech and Related Activity at Transit and Terminal Facilities," "Transportation Construction Contracts," "Liability under Federal and State Environmental Laws," and "Impact of the Americans with Disabilities Act on Transit Operations." Legal studies have proved to be highly cost-effective in producing timely information on legal findings, conclusions, and precedent-setting cases.

### 2.5.4 Emphasis Areas

Emphasis-area research might encompass families of studies that would provide strategic direction to the NCFRP. What are the areas of particular concern to the freight industry? Do these areas require special treatment? Should the NCFRP set aside funds for such emphasis areas? An example of such research is the NCHRP effort aimed at producing management-oriented solutions specifically designed to assist chief executive officers of state transportation agencies. The NCHRP commits funds to this emphasis area and annually reviews the industry's needs and selects appropriate research.

During the formulation of the NCHRP annual program, the AASHTO Research Committee (the NCHRP counterpart to the Oversight Committee) sometimes establishes an emphasis area and instructs NCHRP staff to convene a workshop, at which experts identify and rank specific research needs. These emphasis-area workshops are intended to provide potential research projects to the NCHRP, as well as to the research community at large. Workshop participants and NCHRP staff agree that this is an effective mechanism for sorting out the highest priority issues within an emphasis area. The expense involved in the conduct of the workshops is more than off set by the value of a more coordinated program of studies that results from this process. This approach may be considered for use in the NCFRP.

Emphasis-area research enables the overall program to address issues from a "top-down" perspective. The Oversight Committee may delegate responsibility for an emphasis-area workshop to a panel that would develop research priorities. Identifying potential emphasis areas may be accomplished as a part of an NCFRP strategic planning process.

### 2.5.5 Continuation Projects

*Success is never final…*
Winston Churchill

Research projects may take two years or more to complete the necessary research. During the course of some projects, the NCFRP panel may identify additional related work that requires additional funding. Each annual program may include funds for projects that started in an earlier year and have a need to continue. The Oversight Committee decides the

amount of funding to be allocated to continuation projects as a regular part of the annual programming and funding process.

### 2.5.6 Rapid-Response Studies

*Transportation Research: Fast, Cheap, Good.*
*Pick two.*
R. Reilly

Rapid–Response studies are used for problems that demand a near-term response. Such studies are of short duration and require a concentrated level of effort. The flexibility to perform such research could be important for the NCFRP. The normal process for cooperative research requires lead time to define the scope of work, solicit proposals, and select the researcher. On the other hand, rapid-response studies can complement research that is undertaken through this normal process. Rapid-response studies may provide a more timely response to new or emerging regulatory requirements or may produce answers to a problem where help is needed urgently. Such studies may be carried out in collaboration with committees of freight-related associations or other organizations to enable groups of volunteers to accomplish more than they could accomplish without the help of paid consultants.

### 2.5.7 IDEA Investigations

*You can't steal second base and keep your foot on first base.*
Michael D. Peary

The NCHRP and the TCRP both include projects called "Innovations Deserving Exploratory Analysis" (IDEA). The IDEA projects present an opportunity to encourage creative approaches to highway and transit problems. Annual funds are set aside to support innovations offering alternative and new approaches to solving transportation problems. The program emphasizes approaches that have the potential to produce "leapfrog technologies." Typical IDEA research, under the NCHRP or the TCRP, is funded for a first phase, and, if results look promising for development and testing of the IDEA, second-phase funds are approved. If the Oversight Committee were to decide to initiate this type of research, the NCFRP would announce that such IDEA proposals are being accepted for problems in a specific area. This approach could also be used in conjunction with planned emphasis-area studies.

## 2.6 SOLICITATION AND SELECTION OF RESEARCH

*The best way to have a good idea is to have a lot of ideas.*
Linus Pauling

Methods of identifying research opportunity areas and corresponding problem statements for the NCFRP can be grouped into four categories: annual problem solicitations, recommendations from specially appointed panels or committees, recommendations from workshops, and unsolicited proposals.

*Never mistake motion for action.*
Ernest Hemingway

Problem Solicitation Process—The most straightforward method for determining the problems to be researched is to use an annual process to solicit input from all of NCFRP's stakeholders. The annual problem-submittal process, used by the NCHRP and the TCRP, has proven to be a most effective approach for gathering problems for research. The first step is a broad solicitation for research problem statements. The staff at the TRB and the RITA then (1) review each statement, (2) identify related research, (3) make suggestions regarding the probability of success of the effort, and (4) comment on the technical content and relevance of the problem to be solved. The problem statements and backup information then are considered by the Oversight Committee in selecting projects to be programmed for the upcoming fiscal year.

An "unlimited" solicitation can result in a very large response. There are at least two disadvantages when a very large number of problem statements are received: (1) examining each statement and evaluating its technical feasibility for success can take an inordinate amount of effort and time by the Oversight Committee and NCFRP staff, and (2) many submitters may be frustrated when their statements are not selected to be researched. If solicitations are handled in this manner, the NCFRP staff must take care to explain the process so that submitters realize that their problem statement did receive careful consideration.

When problem statements are solicited, NCFRP staff provides clear instructions of how they must be written. This is important because many potential submitters are not experienced in writing research problem statements. The success of the NCFRP and the benefits to the freight system will depend on good ideas being clearly presented.

Solicitations for NCFRP problem statements may go to the broad freight community. Suppliers of equipment and services, universities, other research organizations, and consultants will want to offer input to the NCFRP. The extent of the distribution of solicitations will be decided by the Oversight Committee.

Table 2 illustrates the time required from solicitation of problem statements until a research agency is under contract to perform the research. Although this schedule is a compressed version of the schedules used for the NCHRP and the TCRP, it will still be almost a year from the time a problem statement is submitted until the project is under contract. The longer timeframe for the standard projects makes it important also to consider alternative types of research, to produce some results more quickly.

**TABLE 2—SAMPLE NCFRP SCHEDULE**

| | |
|---|---|
| Start | Announcement of problem-statement solicitation |
| Week 12 | Due date for problem statements |
| Week 17 | Evaluation of problem statements by NCFRP and RITA staff |
| Week 19 | Distribution to the Oversight Committee of candidates for research and ballots for project selection |
| Week 24 | Oversight Committee meets to select research topics and set funding levels for new projects |
| Week 26 | Announce new NCFRP projects and solicit panel nominations |
| Week 40 | Project panels meet to write project statements (RFPs) |
| Week 41 | RFPs issued |
| Week 48 | Proposals due |
| Week 54 | Project panels meet to select research contractors |
| Week 60 | Contracts are executed with selected agencies, and research begins |

Appointed Panels or Committees—Specially appointed panels or committees are also excellent sources of research problem statements or research topics. These panels or committees can be created by the TRB with guidance by the Oversight Committee. The NCFRP Oversight Committee may use a variety of panels and committees to supply input when forming its annual program. For example, the Oversight Committee may rely on a special panel to determine which topics would benefit by having a synthesis study performed. The panels or committees must have members who are very knowledgeable about the freight system.

Recommendations from Workshops—The Oversight Committee may request the TRB to conduct workshops to gather specific problems for research. Not only can individual problems be identified in this way, but emphasis areas can be developed through workshops. Workshops are effective tools for bringing together the thinking of many experts and practitioners within a short period of time. The product of a workshop is usually a prioritized list of research needs in a well-defined emphasis area.

Unsolicited Proposals—In addition to requesting problem statements, the Oversight Committee can direct the TRB to issue a general

request for proposals for IDEA investigations or other investigator-initiated studies where the proposer identifies both the problem and the potential solution.

# 3. PROGRAM MANAGEMENT

*Great works are performed not by strength, but by perseverance.*
Samuel Johnson

Management of the NCFRP is the responsibility of the TRB staff. This responsibility encompasses ten major activities necessary to formulate, manage, and administer research projects and ultimately disseminate research results to the freight community. The activities are

- Serving as secretariat to the Oversight Committee,
- Appointing and coordinating expert technical panels to guide research,
- Developing and distributing RFPs,
- Processing and evaluating proposals to select the best-qualified research agency,
- Executing contracts with the selected researchers,
- Providing technical and financial oversight of research agencies,
- Coordinating review of research reports by project panels,
- Preparing research reports for publication and dissemination,
- Promoting the application of research results, and
- Closing out contracts.

## 3.1 SECRETARIAT TO THE OVERSIGHT COMMITTEE

The TRB's role as Secretariat to the Oversight Committee is a critical factor in the success of the NCFRP. The Oversight Committee members rely on TRB staff for timely and accurate information on all aspects of the NCFRP. The TRB's responsibilities as secretariat to the Oversight Committee are specified in the Memorandum of Agreement for the NCFRP. The TRB's responsibility for individual projects begins after they are selected by the Oversight Committee and accepted by the NRC.

## 3.2 FORMING PROJECT PANELS

The credibility of NCFRP research findings and recommendations will be based, to a great degree, on the program's ability to reach consensus among technical professionals through the NCFRP advisory panel system. Each project is assigned to a TRB-appointed panel, which provides technical guidance and counsel throughout the life of a project. The panel writes a research project statement (Request for Proposals) based on the problem statement submitted for the research. Each panel also selects a research agency, oversees the project, and reviews and approves final reports. Nominations for panel membership are solicited for each new round of projects. In addition, staff supplement nominations by networking with RITA staff and industry contacts to form panels that meet

strict National Research Council requirements for subject matter knowledge; balance; and gender, ethnic, and geographical diversity.

Project panels provide the technical strength in the TRB's approach to management of research projects in cooperative research programs. Panel members are chosen for their technical expertise within the specific problem areas. They are appointed for the duration of individual projects and are looked to for technical guidance and counsel throughout the research and reporting phases. As in other TRB activities, NCFRP project panel members serve voluntarily without compensation. Panel members cannot act as individual consultants or advisors to the researchers; any panel guidance to a researcher must emanate from a majority consensus within the panel membership. Also, a condition for accepting appointment to a panel is that members are prohibited from submitting proposals on research projects under their jurisdiction.

Project panels are responsible for

1. Developing project objectives and an estimate of the total cost and time to achieve the objectives,

2. Drafting definitive statements of scope and requests for proposals,

3. Reviewing proposals submitted by research agencies and making decisions regarding selection of research agencies,

4. Reviewing the progress of research,

5. Providing counsel and advice to researchers regarding technical aspects of projects,

6. Reviewing and evaluating project reports as to accomplishment of objectives, suitability for publication, and potential for implementation,

7. Making recommendations to the Oversight Committee on the need for continuation of projects included in prior fiscal year programs.

Panels include individuals from freight shippers and carriers; federal, state, and local government agencies; universities; national associations; institutions with related interests; consultants; industry; and other agencies. Panel members are appointed as individuals possessing expertise in specialized areas and not as representatives of the organizations by which they are employed. Panel size varies depending on the types of expertise required to cover the project subject. Some panel members may have more than one qualifying area of expertise, and six or seven voting members represent a typical panel size. Members of the

Oversight Committee are encouraged to serve on panels for projects of particular interest. Emphasis is placed on considering women and minorities for panel membership as a means of increasing opportunities for participation by individuals from these traditionally under-represented groups.

The panels also have non-voting liaison members from the TRB and US DOT staffs to provide lines of communication with those organizations on ongoing and completed research so that the NCFRP can address pertinent needs without duplicating other efforts. Liaison members participate fully in all panel deliberations but do not vote on issues before the panel.

The panel is the driving force in the technical direction and conduct of the research project. NCFRP staff officers serve as coordinators, facilitators, and full-time project managers. Each project panel has the responsibility for developing the project's objectives, selecting the researcher, monitoring project output, and reviewing the final research report. This approach is used successfully in the NCHRP and other cooperative research programs.

NCFRP staff selects panel members through a solicitation of a wide variety of people and organizations having knowledge of the desired expertise. Where possible, the person primarily responsible for preparing the original project statement will be included as a panel member, because the insight of potential users of the research is vital to the successful implementation of the final products.

After invitations are issued and individuals accept, the proposed panel membership is submitted for approval according to NRC procedures used by the TRB. Confirmation of appointments will be made by the TRB Executive Director. An important concern to the National Academies in the selection and approval of panel members is the avoidance of conflicts of interest and prejudicial biases. Because it is rarely possible to secure panel members with the required knowledge and judgment who do not have technical biases, the staff pays particular attention to maintaining a balance of such biases. NCFRP staff acts as the secretariat for panel meetings and as coordinator of all technical, management, and administrative matters requiring panel action.

## 3.3 DEVELOPING REQUESTS FOR PROPOSALS

*It's what you learn after you know it all that counts.*
Earl Weaver

The first major task of each project panel is to translate its assigned problem statement into a fully detailed project statement, or Request for Proposals (RFP), that will be used to solicit proposals from the research community. Project statements include (1) a statement of the background on the problem and associated needs; (2) a statement of the research desired to satisfy the needs, including a clear and specific statement of the objectives that are expected to be met; and (3) statements of the funds available for the agreement, the project's performance period, and the deadline for proposal submission. The project statements also include "Notes" to provide policy and procedural guidance and general information. Project statements are distributed using an e-mail list of more than two thousand potential proposers, including individual researchers, private and public research institutions, transportation study centers, university researchers, and consulting firms.

In coordination with RITA, NCFRP staff will continue to expand the existing RFP mailing list for a broad distribution of the project statements to the freight-research community. The Cooperative Research Programs mailing list includes contacts at traditionally black colleges and women-owned and minority-owned firms. All who ask to be included on the list are retained until they ask to be removed or the supplied e-mail address fails to accept mailings. Special efforts will be made, particularly in the early years of the NCFRP, to ensure that opportunities for participation are well known to all potential researchers.

A level of available funding is stated in the project statement, and the proposers submit responses outlining their technical plans for spending these funds to complete the project. The project panel evaluates proposals entirely on the basis of technical merit and the probability of success and does not attempt to obtain a "lowest bid." This approach is well accepted by panel members and proposers.

Usually, project panels are scheduled for meetings of 2 days each in Washington, DC, to prepare the project statements. The project panels also prepare information needed to evaluate the need for more research in the problem area. Each panel member decides the importance to be assigned to key elements of the proposal-evaluation criteria as enumerated in the following Special Note included in all RFPs.

> Proposals are evaluated by the NCFRP staff and project panels consisting of individuals collectively very knowledgeable in the problem area. Selection of an agency is made by the project panel considering the following factors: (1) the proposer's demonstrated understanding of

the problem; (2) the merit of the proposed research approach and experiment design; (3) the experience, qualifications, and objectivity of the research team in the same or closely related areas; (4) the plan for promoting application of results; (5) the proposer's plan for participation by Disadvantaged Business Enterprises—small firms owned and controlled by minorities or women; and (6) the adequacy of the facilities.

TRB is continuing efforts to expand its contractor base by identifying additional disadvantaged business enterprises and adding them to the NCFRP e-mail list for RFP notification.

NCFRP staff maintains a web-based brochure, *Information and Instructions for Preparing Proposals*, for use by proposing organizations. The staff is available to discuss the specifics of each research project and the instructions for preparing proposals but does not generally schedule pre-proposal briefing meetings for proposing organizations. Proposers are allowed at least forty-five (45) days to respond to the problem statements. It is the proposer's responsibility to review and comply with the requirements in the proposal brochure. The proposal must be self-contained; it constitutes the only opportunity for a proposer to state its case.

## 3.4 SELECTING RESEARCH CONTRACTORS

*It's easy to get good players.*
*Getting 'em to play together, that's the hard part.*
Casey Stengel

The process for selecting researchers, which has been used by the TRB in managing the NCHRP for more than 40 years and the TCRP for more than 14 years, also will be used for the NCFRP. This open process allows all potential research agencies to compete on the basis of technical merit and ensures that all proposers are treated fairly and that the program has access to the best talent available for each project.

Proposals for NCFRP research projects are evaluated by the project panels and NCFRP staff. The evaluation is based on the six factors enumerated in Section 3.3. Following this approach, cost is usually not a deciding factor in the evaluation, inasmuch as the funds available for the project have been announced in the project statement. Line items in the proposed budget are examined to determine the reasonableness of the allocation of funds and staffing to the various tasks. The unit costs of the research proposed, and such elements as compensation for key personnel, distribution of effort for key tasks, overhead rate, size of any fixed fee, and those expenditures included in direct costs, are evaluated.

Proposals are reviewed by the staff for completeness and conformity with required standards. NCFRP staff will not accept proposals after the submission deadline; late proposals are disqualified with no further review. The conforming proposals are forwarded to the panels for their evaluations within one week; the submitters of any disqualified proposals are informed of the reasons for their rejection at the same time.

The technical panel selects the contractor at a second panel meeting, held at least twenty-five (25) days after the panel has received the proposals; the staff assists the panel chair and records the meeting notes. The staff and liaison members participate fully in the discussions during the 1- or 2-day deliberations; however, formal voting on the selections is limited to the appointed members (not the liaison members or NCFRP staff). The panel is instructed (1) to evaluate and rate each proposal in accordance with the criteria discussed at the first meeting and (2) to arrive at the second panel meeting prepared to discuss the pros and cons of each proposal. A summary of these pros and cons is used by the staff for debriefing any proposer requesting one. Each proposal is discussed during the meeting before any decisions are made. During or after that discussion, panel members are free to alter their preliminary ratings. A panel's first and second (contingency backup) choice for contract award requires a two-thirds consensus and is based on technical merit. The panel's specific reasons for selection are fully documented. Strict confidentiality is applied to all panel deliberations.

## 3.5 EXECUTING RESEARCH CONTRACTS

*In business as in life, you don't get what you deserve,*
*you get what you negotiate.*
Chester L. Karrass

Research-contract negotiations begin when the first-choice proposer receives notification of the project panel's decision, following the second panel meeting. NCFRP staff notifies the first-choice organization of its tentative selection, provides the necessary documentation for it to complete the contracting procedure, notifies the Oversight Committee and the RITA of the selection, and requests the NAS Office of Contracts and Grants (OCG) to begin a pre-contract financial investigation. Each selected organization must provide documentation to support its proposed indirect cost rates and forward information concerning its travel policy and salary and wage schedules. Enclosed with the first-choice notification, the selected organization is referred to an online *Procedural Manual for Agencies Conducting Research in the NCFRP*. This manual provides the organization with detailed guidance in policy and procedural matters.

Final contract negotiations will be the responsibility of the OCG, which incorporates the proposal into the contract as the binding scope of work along with provisions previously agreed to between the NAS and the

RITA. Depending on the circumstances, three types of contracts may be used by the NAS: Cost Reimbursement, Cost Reimbursement Plus Fixed Fee, and Fixed Price.

NCFRP staff is responsible for notifying unsuccessful proposers of the results of the second project panel meeting and debriefs these organizations on request. The oral debriefings indicate the technical areas in which their specific proposals were judged to be weak or deficient and how the weaknesses or deficiencies were factors in their proposals not having been selected. The information given to the unsuccessful proposers is factual and consistent with the panel evaluations and is delivered in a fair, objective, and impartial manner. The staff disposes of the unsuccessful proposals in accordance with NAS policy.

## 3.6 MONITORING RESEARCH PROJECTS

*Most people like hard work. Particularly, when they are paying for it.*
Franklin P. Jones

Once research begins, the project panel and NCFRP staff monitor the administrative and technical progress of the project. Drawing on the contents of the approved proposal and working plan, NCFRP staff maintains a close awareness of the researcher's activities to ensure conformance with contractual obligations. However, a careful balance must be maintained in the practical exercise of project management; it must be penetrating enough to be effective, and yet, it must not be so complex or burdensome as to distract the researchers from their primary efforts or add unreasonably to the organization's cost of doing business.

The project panel maintains control over the research process during execution of the study. Their first involvement is to review and approve the researcher's working plan. This amplified research plan, due fifteen (15) days after the contract beginning date, provides a detailed expansion and update of the research plan that was included in the contractor's proposal and furnishes a complete description of the activities to be pursued in the conduct of the research. Its purpose is to assist the panel and staff in monitoring activities.

The panel receives copies of quarterly reports directly from the researcher and is encouraged to comment on them. The researcher is required to respond in writing to the panel's comments; correspondence, both to and from the researcher, must pass through the responsible NCFRP staff. Panel approval is required for any changes in the conduct of the research plan, any change in principal investigators, and any interim reports required in the work plan.

NCFRP staff usually meets with each contractor at least once a year. Between site visits, the TRB maintains frequent telephone and mail contacts with the principal investigators. NCFRP staff checks researcher

invoices to ensure that use of project funds is consistent with the approved plan. Contractors are required to budget for two trips to Washington, DC, to discuss research progress.

Usually, NCFRP staff will make an initial site visit soon after panel approval of the project's working plan. NCFRP staff provides all liaison necessary to maintain the project panel's awareness of research progress and to acquire panel guidance and counsel in technical matters. NCFRP staff members work with panel chairs to coordinate panel actions (e.g., additional meetings or mail ballots) that may be necessary for major changes to account for promising new leads or unproductive lines of study, interim or final report reviews, and so on.

NCFRP staff is responsible for producing quarterly progress reports to the Oversight Committee and the RITA. In addition to continuous updating of project status reports on the NCFRP website, annual reports are prepared to provide a comprehensive overview of NCFRP progress in general and particulars on the status of each project. Annual reports include a comprehensive overview of the NCFRP from initiation through December 31$^{st}$ of each year. They include a narrative on the overall operation of the NCFRP, a summary table of projects and their status, a list of NCFRP publications, and brief summaries of all NCFRP projects. The annual report is submitted before February 15$^{th}$ of each year. In addition, NCFRP staff is available, at the request of the US DOT and others, to make presentations to selected audiences summarizing NCFRP activities and progress.

The researchers must prepare and submit monthly progress schedules and quarterly reports to the TRB in a timely manner. While the researcher's proposal is part of the agreement, it is not the intent of the program to limit the principal investigator's flexibility in conducting research that is consistent with the general scheme of the proposal. The contract amount cannot be exceeded, and anticipated major changes in the original budget estimate must be discussed with the responsible NCFRP staff members.

The researchers must obtain prior written approval of certain expenditures; these include travel to general scientific or technical meetings, and any purchase order or subcontract over twenty-five thousand dollars ($25,000). A researcher may submit periodic vouchers (not more than once a month) to the NAS for payment. Payments will exclude an amount being withheld as a performance guarantee. NCFRP contracts may be transferred to another research agency, subject to agreement of all parties concerned.

## 3.7 REVIEWING RESEARCH REPORTS

*Tell a man there are 300 billion stars in the universe,*
*and he'll believe you.*
*Tell him a bench has wet paint on it, and he'll have to touch it to be sure.*
Jaeger

All NCFRP projects conclude with a final report prepared by the researcher. All contractors are required to include the review/revision process in their proposed schedule. The NCFRP contracts require submission of preliminary drafts in a standard CRP format that has proved successful in documenting research and facilitating acceptance and implementation of the findings. The preliminary draft reports are treated as privileged documents (available only to the sponsors and participants in the NCFRP) and are reviewed by the panels for acceptability as to the fulfillment of the technical obligations under the contracts. The contract performance periods include ninety (90) days for panel and staff reviews and for the researchers to revise the reports to reflect the review comments.

Panels review draft final reports to assess fulfillment of objectives as set forth in the individual contract, adequacy of documentation, and clarity of presentation. Each panel member is asked to recommend publication or non-publication of the research report on a form accompanying the draft final reports. The NCFRP staff member reviews each report at the same time it is undergoing panel review and summarizes and transmits all reviewer comments to the principal investigator. Based on reviews by panel and staff, decisions are made concerning publication in the report series.

Individual panel member names are not shown on the comments sent to researchers. On receipt of the revised final report, the staff reviews it to determine compliance with panel recommendations and forwards the revised report and researcher's point-by-point response to the panel.

Researchers must give careful thought during proposal preparation to the level of funds that will be required to ensure satisfactory compliance with contract requirements for preparation, editing, submission, and revision of preliminary draft reports and submission of forty (40) copies of the final report. Revised final reports are due by the contract's expiration date. The final reports must reflect the reviewers' comments and incorporate editing by a competent technical editor to ensure compliance with the TRB requirements for report style and organization.

When interim reports are required, they must be submitted according to the schedule in the working plan. Such reports are reviewed for acceptance under the same criteria as specified for final reports. It is not usually intended that interim reports will be published. If, however, the

panel's reviews or other factors determine that publication is warranted, the principal investigator will proceed as for final reports.

## 3.8 PUBLISHING AND DISSEMINATING RESEARCH REPORTS

Research results are of little value if not disseminated; it is the normal practice of the TRB to make every reasonable attempt to publish and distribute widely the reports submitted on each project. NCFRP research reports will be part of an ongoing publication series and it is important to maintain consistency in their presentation style.

These reports are written in language that is understandable and succinctly summarizes the research project's results. Freight operators and others must be able to easily determine the applicability of the research to their daily operations. Appendix material is included in each report to address the interest of researchers, developers of transportation manuals and guidelines, and other professional users of the research results who are interested in a high level of technical detail.

Rights to publish and distribute project reports, digests, technical articles, computer software, slides, and audio-visual aids for presenting research findings are reserved by the NAS and are exercised according to NAS policies for broad dissemination of all publications and ancillary materials through the TRB, the RITA, and other appropriate distribution processes.

Permission to use copyrighted materials that are to be included in NCFRP research reports must be obtained by the NCFRP contractor in writing from both the author and the publisher. Documents granting permission must be transmitted to the NCFRP where they become part of the permanent file on the particular report.

Researchers may not copyright or cause or permit to be copyrighted any article, data, written materials, computer software, or other information prepared under an NCFRP contract, whether published directly or by others, in book form or in a scientific or technical journal.

Material contained in interim or final reports that have been reviewed by NCFRP may be published by the researcher, provided that credit is given to the individuals and organizations who conducted and sponsored the work.

## 3.9 PROMOTING APPLICATION OF RESEARCH RESULTS

*Great ideas need landing gear as well as wings.*
C.D. Jackson

The success of an applied research program must be measured by the benefits derived from application of the results. The NCFRP puts a strong emphasis on delivery of results to potential users. During the early stages of the NCFRP, the Oversight Committee and TRB staff will work on strategies for ensuring that NCFRP products are disseminated to the right people in a timely manner. Each report published in the NCFRP series contains a staff-prepared foreword that directs the attention of the reader to the individuals who would be most interested in the results and also to how the results fit into present knowledge and practice.

Prior to publication, extra measures are taken to ensure that useful research results are made immediately available to target audiences. After publication, each report is distributed widely through the TRB's and selected freight–related organizations' distribution systems. Copies go automatically to about 100 libraries, more than 150 university-liaison representatives, appropriate TRB panels and committees, and individual TRB members who have selected publications in the particular subject area of the report. As a further means of disseminating the research reports, announcements of their availability go to freight industry press and are included in TRB's weekly e-newsletter which reaches more than 20,000 readers. RITA and freight-association staff automatically receive a copy of each published report. Every NCFRP publication is posted in full text, free of charge on the NCFRP website.

Selected groups receive mailings outlining specific research results in their areas of operations, but there may be segments of the freight industry that are not easily reached by the current system, and the need to further expand the distribution process will be considered. The Oversight Committee may decide to authorize an NCFRP study to systematically evaluate options and develop a plan for promoting application of NCFRP research results.

## 3.10 CLOSING OUT CONTRACTS

*It's a little like wrestling a gorilla. You don't quit when you're tired. You quit when the gorilla is tired.*
Robert Strauss

After receipt of each project final report, the close-out of the contract for that project begins. The TRB obtains and evaluates the researcher's inventory of data and equipment. Generally, the NAS's policy is that researchers will retain data for three (3) years, following which the researchers can notify the NAS of their intent to destroy the data unless

otherwise directed. Capital equipment purchased or fabricated by researchers using project funds is retained by the researchers until disposition is determined by the NAS. If the NAS decides the equipment is to be sold by the researchers rather than delivered to TRB for further use in the NCFRP, the researchers credit its fair and reasonable price to the Program. NCFRP staff also is responsible for notifying the NAS and the RITA of the status of the close-out activities and for, at the appropriate time, disbanding the technical panels.

## 3.11 SUMMARY

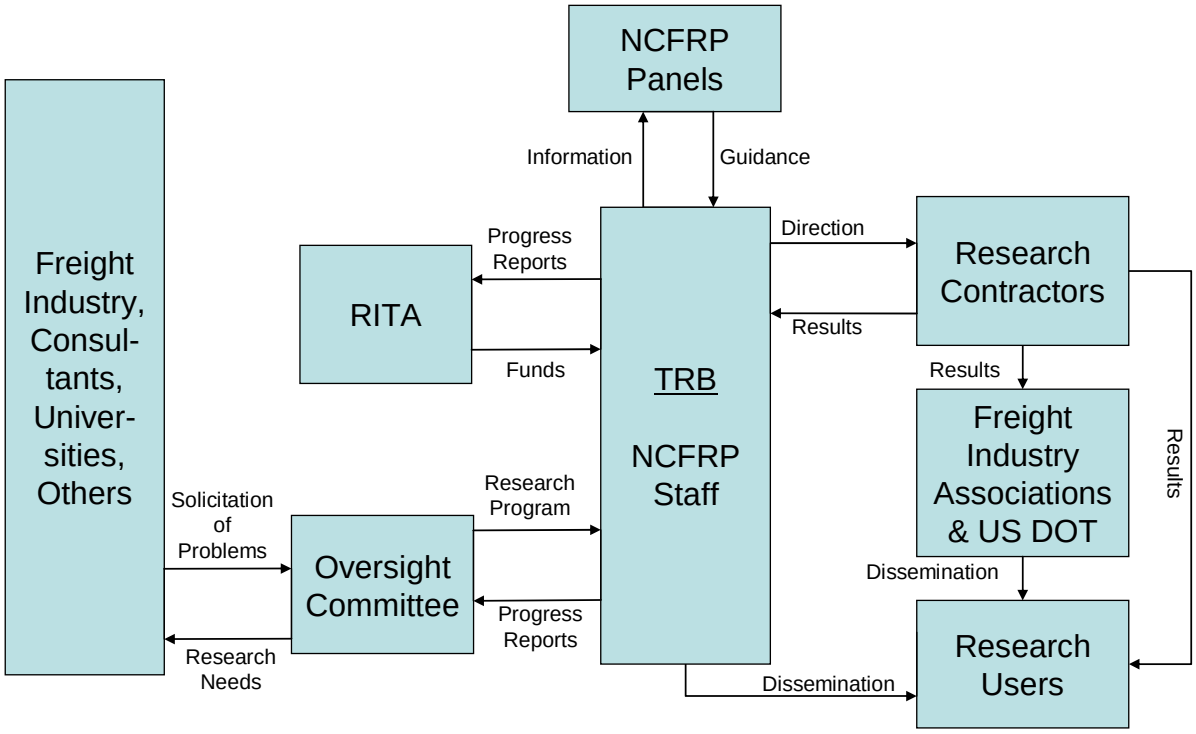
*If you have a job without any aggravations, you don't have a job.*
Malcolm Forbes

To summarize the roles and responsibilities described in Sections 2 and 3 of this document, the activities and actors are listed in Table 3 and illustrated in Figure 2.

**TABLE 3 – NCFRP RESPONSIBILITIES**

| Activity | Responsible Party |
|---|---|
| Submit research needs | Anyone—e.g., freight industry, government, consultants, universities |
| Evaluate submittals | NCFRP and US DOT staff |
| Select projects | Oversight Committee |
| Form project panels | NCFRP staff |
| Develop RFPs | Project panels, staff |
| Select contractors | Project panels |
| Execute contracts | NAS Office of Contracts and Grants |
| Guide progress | Project panels, staff |
| Review reports | Project panels, staff |
| Publish reports | NCFRP staff |
| Disseminate results and encourage applications | Project panels, US DOT, TRB, freight-industry associations |

**Figure 2**
**National Cooperative Freight Research Program**
**Operating System**



## 3.12 PROGRAM FINANCE

*There are a handful of people money won't spoil,*
*and we all count ourselves among them.*
Mignon McLaughlin

The NCFRP is envisioned as a continuing program, and it is intended that a seamless operation be achieved through a series of multi-year agreements. The agreement for each new fiscal year will overlap with all previous agreements that have not yet reached their termination dates.

Funds provided by the RITA will be expended within 5 years following the RITA's authorization to begin. This time period is needed to ensure that all NCFRP researchers are able to complete their research and submit final vouchers for all project costs before the expiration date of the agreement between the RITA and the NAS.

Expenditures for TRB's administration of the NCFRP will be charged against the earliest agreement in which funds budgeted for administration are still available, and costs for each research project will be billed against the agreement from which the funds for that particular project were derived.

Although research funds will be expended over a 5-year period, administrative costs are estimated for a 12-month period supported by each grant. Authorization to begin the NCFRP Fiscal Year 2006 program is effective on September 6, 2006; administrative funding in the Fiscal Year 2006 program will be sufficient to cover costs through September 30, 2007, thus ensuring continuity in the event that authorization of the Fiscal Year 2007 program is delayed. Use of administrative funds from a given fiscal-year program will begin only after administrative funds from the previous fiscal-year program have been exhausted.

In the event that the NCFRP is terminated, all remaining administrative funds will be redistributed over a period of up to 5 years to provide for monitoring research through completion of the remaining projects. In addition, some research funds will be reallocated, as necessary, for administrative expenses with the concurrence of the RITA.

The budget for a typical NCFRP fiscal year grant breaks down approximately as follows:

| | | |
|---|---|---|
| Direct Costs | | 14% |
| Salary & Benefits | 5% | |
| Travel | 5 | |
| Publications | 2 | |
| Other Direct Costs | 2 | |
| Indirect Costs | | 11 |
| Research | | 75 |
| | TOTAL | 100% |

The amount budgeted for indirect costs is determined by indirect cost rates established and adjusted each year by government auditing agencies. These costs are used to support rent, utilities, accounting, contracts and grants, personnel administration, and other services.

An important contribution to the NCFRP that is not reflected in the NCFRP budget is the value of volunteer time contributed by NCFRP panel members. All panel members serve as volunteers; they are reimbursed only for travel expenses. When the NCFRP is in full operation, the value of time spent by volunteers is expected to be more than $300,000 million annually, representing significant savings for the NCFRP budget.