

Connecticut Department of Transportation

Research Proposal Development Guide

Revised July 2018

Proposal Organization

The research proposal is a document that defines the research problem and objectives, provides a detailed work plan for achieving the objectives, indicates how the research findings are expected to be used, and provides time and cost estimates. Proposals should provide a straightforward description of the research to be accomplished to meet the requirements of a need for research.

The following instructions are intended to help researchers prepare a proposal that will be accepted with a minimum of changes.

A. Title Page

The proposal cover should include the following information, as illustrated below:

- Proposal Title (based on the need for research)
- "A Project Proposed for Inclusion in the SP&R Work Program"
- Proposal Date (MM, DD, YYYY)
- "Prepared by:" Name (and Institution, if not CTDOT)
- Proposal Number (assigned by the Research Section)
- "Connecticut Department of Transportation, Bureau of Policy and Planning, Research Section"
- "Colleen A. Kissane, Transportation Assistant Planning Director"

Project Title
A Project Proposed for Inclusion in the SPR Work Program
Date of the Proposal
Prepared By (Full Name)
Proposal Number (Number will be assigned by the Research Section)
Connecticut Department of Transportation Bureau of Policy and Planning Research Section
Colleen A. Kissane Transportation Assistant Planning Director

B. Table of Contents

On a separate page, list the proposal sections and page numbers.

C. Introduction and Background Summary

Include background information on the research topic. Summarize the findings of the preliminary literature search and state the relationship of the proposed project to prior research. The summary should reveal your understanding of underlying principles and should clearly express your appreciation of the problem. Consider significance, relevance, timeliness, and contribution to the field of study.

The importance of the background summary should not be underestimated. A comprehensive summary ensures that all aspects of the research topic have been adequately considered so new research can build upon prior work rather than duplicate it. Depending on the topic, a need assessment or summary of a literature review may be appropriate to attach as an appendix.

D. Problem Statement

Concisely express your understanding of the problem that needs to be researched and demonstrate your insight into the problem. The problem statement should convey to the reader that the proposed project is definitely needed. It is persuasive to cite the Departmental areas that would support the need for the project.

E. Objectives

State each of the study's technical objectives in precise order. Describe how each objective will be accomplished in the course of the research. Anticipated challenges, if any, from the objectives listed should be mentioned. Measurable objectives are easier to understand than abstract ideas. Lastly, objectives form the basis for the work tasks in the proposal.

F. Evaluation Plan

A final evaluation of the completed project will undoubtedly be based upon how well project objectives were met. State what measures will be used to determine if the research project has been successful.

G. Benefits

Describe the principal benefits of the proposed project. Some possible benefits are:

- Cost savings
- Process improvement/simplification
- Reductions in labor intensive activities
- Improved performance
- Improved customer service
- Safety improvement
- Reducing accidents and/or accident severity
- Enhancing productivity
- Reducing highway congestion
- Increasing infrastructure longevity
- Conserving energy
- Reducing energy usage
- Recycling/Reuse
- Reducing pollution (air, noise, water)
- Improving quality of life
- Saving time

H. Research Results

List the products that will be delivered during the research project. Explain how findings or products will be made available to outside parties through the project deliverables. Describe the form in which the research findings are anticipated to be reported, such as a mathematical model, a laboratory test procedure, a procedure or method for an operating unit, software and/or hardware system, a specific new design or a design technique. Describe these results in terms of the practicing engineer or administrator.

Unless directed otherwise, always include the following items as products:

- Quarterly progress reports (1 electronic copy in both Microsoft Word and Adobe PDF)
- Interim report, if applicable to the project (3 printed copies plus electronic copy in Microsoft Word and Adobe PDF)
- Draft final report (3 printed copies plus electronic copy in Microsoft Word and Adobe PDF)
- Final report (8 printed copies plus electronic copy in Microsoft Word and Adobe PDF)
- Executive summary (8 printed copies plus electronic copy in Microsoft Word and Adobe PDF – may be included in Final Report)

Other deliverables might include:

- Computer programs or other information system
- Methods (test, design or other)
- Laboratory test procedure
- Manuals or other Process Documentation
- Physical models or materials
- Physical equipment or prototypes
- Photographs
- Databases
- Streaming media materials
- Video or other audio/visual materials

I. Implementation

Describe how CTDOT can apply the research results to improve its practice and how the need for research will have been addressed (or resolved) by the research study/project.

- List who would logically be responsible for applying the research results, such as the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), the Connecticut Department of Transportation, and particular offices within CTDOT.
- Identify specific standards or practices that might be affected by the research findings, such as AASHTO or CTDOT specifications, policies and procedures, legislation, and funding or staffing requirements.
- Identify institutional issues, including resource requirements that may need to be addressed for successful implementation.

If findings are not anticipated to be suitable for immediate application at the conclusion of the research project, indicate what further work might be necessary. It is understood that the actual research may produce unanticipated findings, making changes in the implementation plan necessary. This is acceptable; however the approval of a project to address a need for research is strongly influenced by the practicality and direction of the implementation plan presented in the research proposal.

J. Work Plan

Describe how the objectives will be achieved through a logical plan. State, in order, each task required for the research. Normally, some project tasks will be performed concurrently (overlap). Describe in appropriate detail how each task will be performed, and how each task contributes to accomplishing the project’s stated objectives.

The plan should also describe the technical basis of the research. Describe the following, as appropriate:

- Literature search and synthesis
- Principles or theories to be used
- Significant variables to be tested
- Analytical and statistical procedures
- Experimental and testing procedures
- Development steps
- Prototype testing steps
- Iterative development steps
- Evaluation criteria
- Inspection and survey methods
- Controls to be used
- Material, specification or procedure development

The plan should be complete, providing the greatest level of detail that the researcher's understanding of the problem permits.

K. Anticipated Work Schedule

Provide a bar chart or other graphical presentation illustrating the scheduling of the major research tasks (Table 1). Indicate the number of months allocated to each task. Always allow ninety (90) days for FHWA and CTDOT review of draft reports.

Table 1. Sample Task Time Schedule

Task	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Etc...
1	Field Surveys																			
2	Literature Review																			
3	DOT Interviews																			
4	Field Tests																			
5	Observe Construction																			
6	Analyze Cost Effectiveness																			
7	Develop Recommendations																			
8	Prepare Final Report																			

L. Cost Estimate

Unless otherwise directed, show the estimated cost for the entire research project by fiscal year, as illustrated in Table 2. CTDOT's fiscal years run from July 1 through June 30; for example, FY16 runs from July 1, 2015 through June 30, 2016. If the proposal includes effort through contractual services (i.e., University), a similar budget table, prepared by the University, should be included that can be utilized to prepare required contractual documents.

Table 2. Cost Estimate by Fiscal Year

Item	FY2016	FY2017	FY2018	Total
Salaries, Research Personnel *				
Burden &Fringe				
Other DOT Unit (a)				
Other DOT Unit (b)				
Other DOT Unit (c)				
CO-OP Salaries				
Subtotal, Salaries				
Contractuals (i.e., subcontracts such as for University)				
Equipment				
Materials (expendable supplies including report publication)				
Computer software & hardware				
Travel/Vehicle Charges				
Miscellaneous (footnote unusual items)				
Subtotal, Other Costs				
Total				

1. Cost Estimate – Internal Staffing

Provide a table showing CTDOT personnel required for the project, as illustrated in Table 3. Personnel may be identified by titles or classifications. List estimated person-months required by fiscal year. The estimates should be built up from task-by task estimates of time required.

Table 3. Estimate of Research Personnel Person-Months & Cost by Fiscal Year

*Research Personnel	FY2016		FY2017		FY2018		Total	
	Mo.	Cost	Mo.	Cost	Mo.	Cost	Mo.	Cost
Supervising Engineer	0.5	\$3,000	0.5	\$3,150	0.5	\$3,300	1.5	\$9,450
Trans. Engineer 3	4.0	\$21,300	4.0	\$22,450	2.0	12,000	10.0	\$55,750
Trans Engineer 1	0.5	\$1,820	2.0	\$7,600	0.5	2,000	3.0	\$11,420
COOP Student	6	\$12,000	6	\$12,000	6	\$12,000	18	\$36,000
Subtotal		\$38,120		\$45,200		\$29,300		\$107,620

2. Cost Estimate – Involvement by University

If partnering with a University, or if the University is the lead for the project (contracting), following a standard university project-budget format, the University will need to provide an itemized proposed budget for the expenses estimated to be required for the University’s role in the project, as illustrated by Table 4. The budget table will need to show the estimated person-months that will be devoted to each task by university research team members and the associated cost.

						FY10		FY11		Total
						4/1/10-6/30/10	7/1/10-6/30/11			
						3 mos	12 mos			
A. Senior Personnel										
Salary		Appt	% Effort							
Name, PI	\$84,980	12	5%	6%	4%	4%				
Name, CoPI	\$24,504	3	13.25%	10.00%	10.00%	13.25%	1,062	5,354	6,416	
		Mos	0.40	0.30	0.30	0.40	3,247	2,573	5,820	
							-	-	-	
B. Other Personnel										
Name, Title	\$54,000	11	5%	5%	5%	7%	736	2,835	3,571	
Name, Title	\$52,080	12	0%	3%	3%	0%	-	1,641	1,641	
Name, Title	\$55,087	11	5%	6%	5%	10%	751	3,470	4,222	
Graduate Assistant	\$6,366	3	50%	50%			3,183	3,231	6,414	
Total Salaries										
						8,980	19,103	28,083		
C. Fringe Benefits										
<u>Current Fringe Rates</u>										
						Yr 1	Yr 2			
Name, PI			36.0%	34.8%			382	1,863	2,246	
Name, CoPI			23.9%	21.0%			776	540	1,316	
Name, Title			36.0%	34.8%			-	-	-	
Name, Title			36.0%	34.8%			265	987	1,252	
Name, Title			36.0%	34.8%			-	571	571	
Name, Title			36.0%	34.8%			270	1,208	1,478	
Graduate Assistant			6.7%	6.7%			213	216	430	
Total Fringe Benefits						1,907	5,385	7,292		
Total Salaries & Fringes						10,887	24,489	35,375		
D. Equipment						*				
E. Travel										
						Domestic				
						Foreign	150	250	400	
G. Other Direct Cost										
Supplies & Materials										
Contractuals						100	200	300		
Consultant Services						100	100	200		
Computer Services										
Subawards						**				
Other										
Tuition						.				
Tuition Calculator										
Total Other Direct Costs						200	300	500		
H. Total Direct Costs						11,237	25,039	36,275		
I. Indirect Costs (F&A) @ 20%						2,247	5,008	7,255		
						<small>** no F & A applied, ** F & A on 1st \$25,000</small>				
J. Total Costs						\$ 13,484	\$ 30,046	\$ 43,530		

The University should provide pertinent background information for the principal or co-principal investigator(s) and other university team members with significant participation in the project. Describe how the academic, professional and research experiences of university personnel relate to the project. Include a summary of past accomplishments in the same or closely related problem areas.

The University should provide descriptions of current commitments of university team members with significant participation in the project to other work in sufficient detail to permit assessment of the researchers' ability to meet the proposal's commitments.

3. Cost Estimate -- Facilities & Equipment

If applicable, describe the facilities available to accomplish the research. Indicate equipment necessary for completion of the research and specify any restrictions on its use. Specify any equipment that is necessary but not currently on hand. If additional equipment is to be purchased with project funds, identify it in the budget estimate. Equipment purchased with project funds is the property of CTDOT, regardless of where it is located or who uses it during the project.

4. Cost Estimate -- CTDOT Involvement by other Units

Describe any assistance required from other units within CTDOT for the proposed research and estimate the cost for their involvement, as work orders will be required for each unit number.

Include such items as work required and which CTDOT Unit would likely be involved:

- Traffic control (Unit 57211)
- Construction
- Highway maintenance (Unit 57211)
- Drilling and sampling (Unit 57197)
- Photolog (Unit 57521)
- Material tests or pavement coring (Unit 57184)
- Wisecrux pavement condition (Unit 57196)
- GIS databases maintained by CTDOT
- Transportation databases maintained by CTDOT
- Access to other outside records or databases
- Access to transportation facilities (bridges, highways, railways, etc.)
- Interviews with or surveys of CTDOT personnel

Describe and quantify the required level of effort as fully as possible.

5. Cost Estimate - Travel

Out-of-state travel, which is defined as travel between the researcher's base and destinations other than Connecticut, must be identified separately.

6. Cost Estimate - Total Funding

Total funding should not exceed the amount indicated as "Funds Available" by the Transportation Assistant Planning Director. When the funds available are a limiting factor, proposers should set the scope and depth of the proposed project accordingly.

M. References Reviewed

Cite the references utilized in the preliminary literature review, which is written up under the *Background and Significance* section of the proposal. List also the search terms utilized, as they can be a starting point for the researchers conducting the project.

N. Appendices

If required, attach pertinent materials in proposal appendices, such as excerpts from state standard specifications as applies to the proposed research.

System of Units

All studies must be conducted and reported using imperial (English) units as the primary system of units. Values in the International System of Units (SI), commonly referred to as "metric" units, may be included in parentheses following the imperial values. In published research reports, include a standard metric conversion chart (copy available from Division of Research). This requirement is consistent with the Connecticut Department of Transportation's decision to return to imperial units as its preferred system of units.

Guidance on use of the metric system is given in ASTM Standard E380 for Metric Practice, available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.