Nevada Department of Transportation

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RESEARCH MANUAL

Nevada Department of Transportation
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Prepared by
The
Research Division

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INTRODUCTION

Research is vital to the Nevada Department of Transportation's (NDOT's) efforts to improve transportation technology. The purpose of this manual is to improve the effectiveness of the department's research, development and technology transfer (R,D&T) efforts. It contains general information on the conduct of research and specific information on the prioritization and selection of projects contained in the Annual R,D&T Work Program. By identifying the various processes of the research program and providing procedural information about research operations, department employees, potential researchers, and other users will have a greater understanding and utility of research.

The goals of NDOT's research program are to improve operational efficiency and increase serviceability of the transportation system and its support organizations through better understanding and usage of materials, methods, design, and the environments in which they are used. The objectives of the R,D&T program are to develop new technical knowledge and implement that knowledge into common use throughout NDOT.

Because the Product Evaluation Program has been an integral part of recent R,D&T activities, it is incorporated into this Research Manual. The following text is divided into two chapters. Chapter One addresses NDOT's Annual R,D&T Work Program and details the required research management process. Chapter Two describes the organizational structure and procedures relative to a formal process for NDOT's Product Evaluation Program.

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CHAPTER ONE

ANNUAL R,D&T WORK PROGRAM

PROGRAM ADMINISTRATION

Research Management Committee

The Research Management Committee (RMC) makes the final decision regarding which research projects/activities to include in the Annual R,D&T Work Program. The RMC approves the researcher (university, private consultant, or in-house), and determines research implementation as recommended by project technical panels. The RMC is comprised of the following members:

1. Deputy Director/Chief Engineer;
2. Assistant Director – Planning;
3. Assistant Director – Operations;
4. Assistant Director – Engineering; and
5. Assistant Director – Administration; and
6. Southern Nevada Deputy Director

The Deputy Director presides over the RMC meetings.

Research Advisory Committee

The RAC serves to review and prioritize research problem statements and research proposals. It is responsible for recommending to the RMC a listing of research proposals that should be included in the Annual R,D&T Work Program. The RAC is composed of the following members:

1. Planning and Research Engineer from the FHWA Nevada Division Office;
2. NDOT Chief Construction Engineer;
3. NDOT Research Division Chief;
4. NDOT Chief Materials Engineer;
5. NDOT Chief Maintenance Engineer;
6. NDOT Chief Bridge Engineer;
7. NDOT Chief Road Design Engineer;
8. NDOT Operations Analysis Engineer;
9. NDOT Chief Safety/Traffic Engineer; and
10. A District Engineer Representative.

The Research Division Chief coordinates and presides over the RAC meetings. The FHWA representative serves as a non-voting member of the RAC. Members serve for as long as they hold their respective positions. The District Engineer representative serves on a rotational basis for three years.

Research Division

The Research Division coordinates the department's R,D&T program and has immediate responsibility for the management and conduct of research. To ensure that research undertaken is responsive to the department's needs, an interactive process of research prioritization is established in the form of NDOT's Research Management Committee (RMC) and the Research Advisory Committee (RAC) as described above.

The Research Division is responsible for the following administrative duties pertaining to the department's R,D&T program:

1. Conduct an annual solicitation of research problem statements;
2. Coordinate the prioritization of problem statements;
3. Issue RFPs for the highest-rated problem statements;
4. Coordinate the prioritization of research proposals;
5. Represent NDOT and coordinate its participation in national transportation research programs such as AASHTO's Research Advisory Committee, the National Cooperative Highway Research Program (NCHRP), and the Transportation Research Board (TRB) Research Correlation Service;
6. Prepare and submit to FHWA the Annual R,D&T Work Program;
7. Ensure that all R,D&T activities maximize to the fullest extent State Planning and Research funding and that they are in keeping with the research management process incorporated into this manual;
8. Coordinate the establishment of technical panels for each research project and serve as the panel secretary; and
9. Publish a research newsletter that serves as an outreach tool to inform NDOT employees of research management processes and to provide information on current research activities.

PROGRAM DEVELOPMENT

Problem Statement Solicitation

The development of the research program has both its conceptual and practical origin in the research problem statement solicitation process. The focus of the solicitation process is the identification of critical needs that can be addressed through research. The solicitation is the first attempt at putting research needs into a project formation process.

There are several benefits to the solicitation process: first, department personnel are provided an opportunity to submit problem statements with the expectation that their operational concerns will receive an objective review; and second, the academic community can use the identified problem areas to submit research proposals within their field of expertise.

In October of each year, the Research Division solicits research problem statements from each NDOT division/district and the University of Nevada System. Problem statements must be submitted prior to January 31 if they are to be considered for the following R,D&T work program. A formatted sheet is sent to all prospective problem statement submitters containing the elements as shown in Appendix A-1.

The forms provide sufficient information to allow the Research Advisory Committee to appreciate the significance of the problem, yet they are not too difficult or time consuming to complete.

A division or district must endorse a problem statement originating from outside the department. Once the responsible district engineer/division head has approved a problem statement, it is submitted to the Research Division. Utilizing the TRIS database, proposed problem statements are screened by research staff to determine if research is necessary or feasible. Problem statements broad in scope, i.e., of interest to a number of other transportation agencies, or requiring large amounts of funding, may be referred to

national research programs. Potential research programs include the National Highway Research Program (NCHRP), the Transit Cooperative Research Program (TCRP) , or transportation pooled-fund research.

Problem statements determined to be feasible for research within the department's research program, are sent to the RAC along with a ballot for rating each proposed statement. The RAC rates each problem statement based on whether the statement is aligned with the department's strategic research plan, the urgency of the problem, and potential for implementation. The Research Division compiles the ballot results. After notifying the RAC of the rating results, the Research Division issues requests for research proposals (RFPs) for the highest-rated problem statements and notifies the submitters of problem statements not selected for the RFP process.

Requests for Proposals

In March of each year, the Research Division issues requests for proposals to prospective researchers. Proposals are due on the date specified on the RFP, usually around the first of May. All prospective researchers must use the format for proposals as shown in the Research Proposal Guide (Appendix A-2).

The Research Division reviews proposals for completeness; any incomplete proposals, or ones not containing the elements depicted in the Research Proposal Guide, are disqualified. Proposals found to be in good order are submitted to the affected division/district for review and comment prior to being presented to the RAC for prioritization.

Project Prioritization

Setting priorities for the research proposals received through the solicitation process allows the Research Division to develop a work program that is financially constrained. Proposed research

is balanced against ongoing research projects and commitments such as NCHRP, TRB, and pooled-fund projects.

The RAC prioritizes proposed research studies based on the following criteria:

1. Addresses a critical need;
2. Strong commitment for the proposed research by the affected division/district;
3. Results of the literature search;
4. High probability for success and implementation within a usable time frame;
5. Adequacy of research staff and facilities; and
6. Proposal submitter's record of past performance for NDOT.

The individual RAC members receive prioritization ballots and other pertinent information prior to the annual RAC meeting. Prior to the meeting, the Research Division tallies the ballots then submits an ordered list of project titles to the RAC at the meeting. The list is a starting point for the RAC's discussion of project priorities. The RAC may promote or demote proposed projects from the list. By means of consensus, the RAC establishes a prioritized list of projects recommended for inclusion in the next R,D&T work program.

Research staff submits minutes of the RAC meeting, along with the recommended list, to the RMC prior to their annual meeting. The RMC makes the final decision as to which research activities are included in the Annual R,D&T Work Program. Once the Annual R,D&T Work Program is finalized, the Research Division submits the planned work to the local FHWA office for final program approval.

Pooled-Fund Studies

Pooled-fund studies present an opportunity for states to consolidate resources to address a common problem or need that may be either national or regional in scope. Once a pooled-fund solicitation is

received, either from FHWA or a lead state organizing a project, NDOT's participation is determined in the same manner as described above. Solicitations received after the work program is approved are referred to the affected division for their determination of interest/participation. If the affected division is interested in participating in the proposed project to the extent that staff is dedicated to serve on the technical panel to shape and guide the research, the Research Division forwards the recommendation to the RMC for a final decision regarding participation and contribution level. The Research Division notifies the affected division and the solicitor of the final decision and submits a work-program revision request to FHWA if the project is approved.

Contract Research

Once the proposed research is included in the Annual R,D&T Work Program and the project determined by the RMC to be contract research, the technical panel finalizes a scope of work for the project based on recommendations from the affected division representative. The Research Division representative supplies financial information to the panel for the development of a final budget (see standard budget itemization format as shown in Appendix A-3). The negotiation process must produce a mutually-acceptable scope of work and budget for the researcher and the panel, or another researcher will be selected and the project delayed, or canceled altogether.

Once the scope of work and budget is established, the Research Division drafts either an Interlocal Agreement with a university, or a consultant agreement and coordinates the agreement review with NDOT's Agreement Services Coordinator. Research may be initiated only after the agreement is fully executed. Generally, contracted research begins as of January 1, however it can begin as early as October 1.

In-House Research

If sufficient staff exists in either the affected division or the Research Division, the RMC may decide to have the proposed research conducted inside the department (in-house). In-house research follows much the same process as contract research with the exception of no contractor/researcher being involved. The principal investigator is the proposer of the research and most likely will be the affected division representative, or the affected division may select an additional representative to the technical panel. As in the case of contracted research, the technical panel finalizes the scope of work and budget. The Research Division creates a unique job/project number and issues it to the principal investigator(s). Generally, in-house research is initiated as of October 1.

PROJECT MANAGEMENT

Technical Panels

Technical panels are established for each research project. At a minimum they are composed of the principal investigator, the affected division representative, a Research Division representative and a representative from the FHWA Division Office. The principal investigator serves as a non-voting member of the panel. In addition, individuals knowledgeable in the research subject may also be appointed to the panel by the Research Division, however, the panel should remain relatively small in size. The affected division chief or district engineer selects the panel chairperson. The Research Division representative serves as the panel secretary and is responsible for scheduling meetings and recording panel decisions. The duties and responsibilities of the technical panel include the following:

1. Finalize the project scope of work and set the project budget;
2. Monitor the project's progress as compared to the planned scope of work, review timelines proposed and track project expenditures;
3. Provide technical guidance for the project;
4. Review quarterly progress reports, interim reports, and the final report; and
5. Based on study findings, make an implementation recommendation to the RMC.

Technical panels are in place for the life of a project and meet at least twice a year.

Reports

Research should be conducted with implementation in mind. The implementation process is aided by the exchange of information, which starts with clear, concise, and complete quarterly progress reports, final reports, or interim reports if applicable.

Progress reports detailing accomplishments to date, are due on a quarterly basis (no later than two weeks

after the end of the quarter) and are produced by the principal investigator(s) for both contracted and in-house projects. Quarterly progress reports are submitted to the Research Division for distribution to technical panel members. A statement of work completed by task during the report period, progress of the overall study, and a statement of work to be undertaken during the next quarter, must be included. The planned and actual time schedule for each of the tasks, and the overall percent complete, are shown using the expended versus planned budget. No payment is made unless a current progress report is on file with the Research Division.

Projects that are expected to take more than eighteen months to complete, or are expected to have a significant accomplishment during the course of the research, may have appropriate interim reports due at the designated project milestones.

The final report is the most lasting and complete document of research activity. As such, it contains at least the following information:

1. Technical Panel Acknowledgement;
2. Technical Report Documentation Page (see Appendix A-4);
3. Introduction, background information on problem, and history of research;
4. Scope of Work, including experimental research, data collection sites;
5. Executive Summary, including a brief description of work along with conclusions;
6. Recommendations, based on the findings and conclusions;
7. Implementation Plan, defining the procedure to introduce the results into practice, including suggestions for organizational responsibility; and
8. An appendix that includes data arrays, analysis procedures or other information supporting the recommendations and conclusions.

Final reports are due by the project termination date. Time extensions are granted only in cases in which there is sufficient justification and/or extenuating circumstances outside the control of the principal

investigator. The Research Division must receive an application for a no-cost time extension at least 60 days in advance of the original project expiration date. A project is allowed only one no-cost time extension.

The principal investigator submits a draft final report to the technical panel for review and comment. Once the review process is complete, one unbound original is submitted to the Research Division for publication and distribution to national research repositories as required. In addition to a hard copy, an electronic version of the report must be provided in WordPerfect or Microsoft Word format.

An interim report is similar to a final report, but is usually prepared at some significant point in the research prior to its completion. It may advise the technical panel of preliminary findings and/or recommendations that will affect the course of the remainder of the study, or report findings that can be adopted prior to project completion. Because of the substantial effort involved in an interim report, it should not be used to report normal study progress. An interim report should be intended for publication and be formatted in the same manner as a final report.

Financial Reporting

The Research Division is responsible for documenting project costs and, in the case of contracted research, processing billing invoices. Research Division staff provides project financial information to the technical panel and the RMC on an as-needed basis in addition to providing quarterly financial reports**.**

Allowances are made with appropriate revisions to the work program for over-spending at the project level for a particular year. However, annual State Planning and Research apportionments will not be exceeded. The Research Division reviews all modifications to the scope of work and budget. Modifications, which result in a 10% change in the project budget, must receive RMC approval.

Implementation

Genuine operational and/or administrative problems are identified and addressed through the research process. Implementing the results of successful research is essential for the future of any organization.

The final research project reports must contain an implementation plan developed by the principal investigator and the technical panel. The implementation plan is approved by the appropriate division head/district engineer and submitted to the RMC for concurrence. As required, implementation committees may be appointed by the Deputy Director/Chief Engineer to track and coordinate implementation.

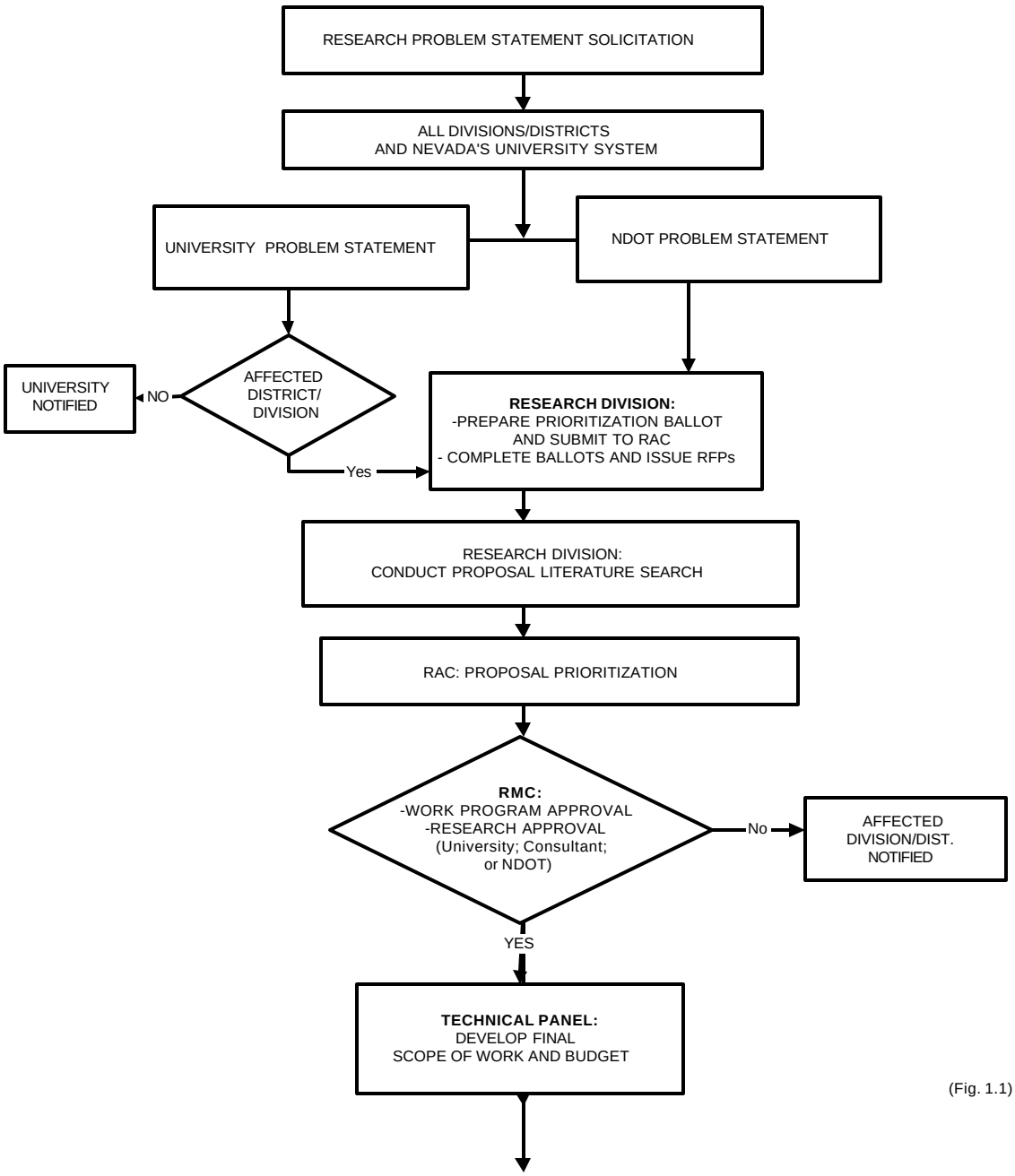
Technology Transfer

Research is the systematic study to establish facts on a specific topic/field, but the crux of the effort is in the application of research results. Technology transfer, in research, goes beyond using the results of departmentally-funded research projects to not only improve the department's operations, but to share the results with the transportation community at large.

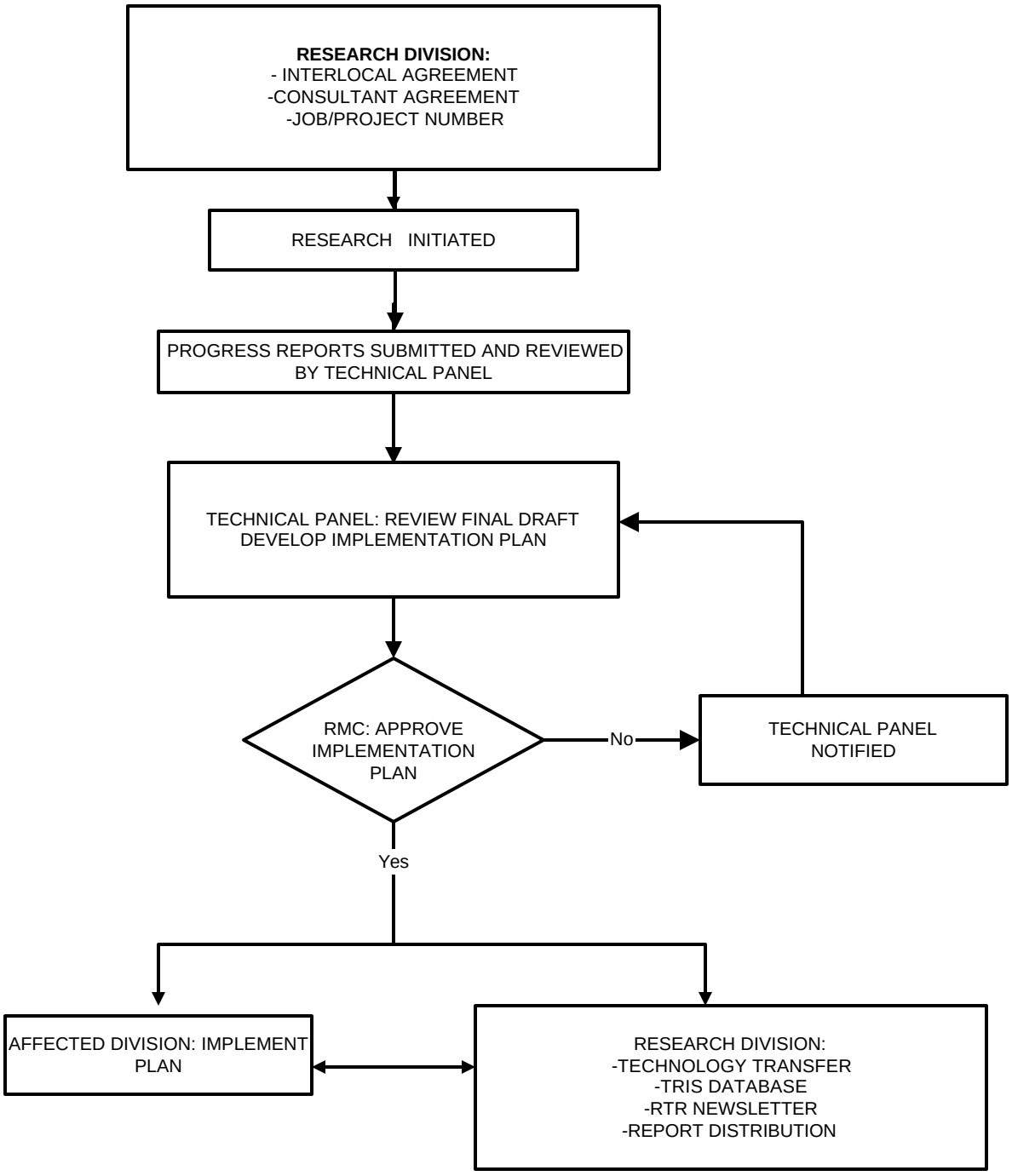
Research Division staff report ongoing research activities to the Research in Progress database as required. The information provided includes the status of existing projects, significant changes to existing projects, the addition of new projects, and document the completion of projects. In addition, research staff disseminates the results of research from other agencies and distribute pertinent research publications to affected divisions/districts.

(Figure 1.1, pages 14 – 15, depicts the procedural flow chart for the Annual R,D&T Work Program.)

NDOT ANNUAL R,D & T WORK PROGRAM FLOW CHART



(Fig. 1.1)


RESEARCH DIVISION:
- INTERLOCAL AGREEMENT
-CONSULTANT AGREEMENT
-JOB/PROJECT NUMBER
RESEARCH INITIATED
PROGRESS REPORTS SUBMITTED AND REVIEWED BY TECHNICAL PANEL
TECHNICAL PANEL: REVIEW FINAL DRAFT
DEVELOP IMPLEMENTATION PLAN
RMC: APPROVE IMPLEMENTATION PLAN
No
TECHNICAL PANEL NOTIFIED
Yes
AFFECTED DIVISION: IMPLEMENT PLAN
RESEARCH DIVISION:
-TECHNOLOGY TRANSFER
-TRIS DATABASE
-RTR NEWSLETTER
-REPORT DISTRIBUTION

PEER EXCHANGE

Process

A peer exchange provides a forum for a free exchange of ideas and techniques involved with research management. The host state research manager, together with other research peers, are given a means to improve the quality and effectiveness of their research program.

The peer exchange is a comprehensive effort conducted for the benefit of the Research Division. Peer exchange team members consist of qualified research peers from the FHWA, other state research units, universities, the Transportation Research Board, or the private sector. A peer exchange is conducted at least once every three years.

Peer exchange issues are decided by the Research Division in advance of each exchange and conveyed to the team leader during initial discussions. The issues may include the following:

1. Problem solicitation and prioritization;
2. Committee structure;
3. Work program process;
4. Project monitoring;
5. Reporting;
6. Technology transfer;
7. Implementation effectiveness; and
8. Accomplishment of goals for improvement identified in prior peer exchanges.

Participants

Each division represented on the RAC, the RMC, and researchers from the University of Nevada System

are interviewed by the team to determine their satisfaction with, and/or their perspective of, the department's research program. Major observations/recommendations, including the Research Division's identified opportunities for improvement, are presented to the Deputy Director/Chief Engineer, in the form of a final report, prior to the close of peer exchange. The final report is sent to each team member, the RAC, RMC, and the FHWA along with anyone else taking part in the exchange. In addition, copies of the report remain on file within the Research Division.

CHAPTER TWO

PRODUCT EVALUATION PROGRAM

GENERAL

Chapter Two outlines the product evaluation procedure and provides directions to departmental units involved in the review, assessment, and evaluation of products submitted for acceptance by vendors. This procedure is applied to products/materials initially introduced to the department, products/materials that may have been modified since the original submittal, or products that have been determined to be performing unsatisfactorily in the field.

Because of technological advances, the number of products available for highway application is increasing. Due to the number of products being presented to NDOT for evaluation, and the fact that some previously approved products have performed poorly or are now considered technologically obsolete, a Product Evaluation Program was initiated. It has since been demonstrated that the pre-qualification of highway products/materials is instrumental to the success of NDOT's construction operation.

Without a formal evaluation process involving high-level managers from the major operating divisions, there would be a lack of communication between districts and divisions regarding which products should be accepted for use or tested and whether the products could be of benefit to the department; product acceptance and/or evaluation would not be documented or communicated departmentwide. As such, the Product Evaluation Program is coordinated with other divisions/districts to ensure that all facets of the evaluation process work to improve the quality of products/materials used on state roadways. In addition, a formal, written, product evaluation procedure ensures that manufacturers/vendors are able to recognize that they are being treated fairly and in the same manner as their competitors.

The mission of the Product Evaluation Program is to serve as a clearinghouse for the evaluation and approval of products/materials proposed for use on NDOT construction projects.

Program Objectives

All products/materials submitted for approval are evaluated on the basis of need, performance, cost-competitiveness, and compliance with recognized specifications, i. e., AASHTO, ASTM, NDOT, etc. The objectives of the Product Evaluation Program are to:

1. Establish a formal policy and procedure for evaluation of highway products/materials, methods and procedures requested by outside parties;
2. Establish a formal procedure for the suspension from use of poorly-performing products/materials listed in the QPL when NDOT personnel initiate such an action;
3. Evaluate products/materials to ensure that various NDOT operating units are presented with legitimate solutions to product/material related problems;
4. Provide NDOT personnel with a centralized location for the submittal and referral of product/material evaluations;
5. Coordinate, document, and evaluate test programs of various products/materials and/or procedures;
6. Provide a tracking system for the evaluation and approval of products/materials and procedures;
7. Provide preliminary investigation and evaluation of a product/material prior to establishing a work plan/test protocol or undertaking a new procedure; and
8. Promote implementation and technology transfer (T^2) of new products/materials or procedures for highway application.

PROGRAM ADMINISTRATION

Product Evaluation Committee

The Product Evaluation Committee (PEC) acts in an advisory capacity to address requests for specification revision, establishment of qualified product lists, and requests for product field-testing. The PEC promotes interdisciplinary staff discussion of common problems dealing with the use of products/materials in construction or maintenance operations. The Deputy Director/ Chief Engineer makes the final determination regarding implementation of the PEC actions and recommendations.

The PEC is comprised of the following NDOT staff members, or their designees:

1. Chief Construction Engineer;
2. Chief Bridge Engineer;
3. District I Engineer;
4. District II Engineer;
5. District III Engineer;
6. Chief Materials Engineer;
7. Specifications Engineer;
8. Chief Maintenance Engineer;
9. Chief Traffic Engineer; and
10. Operations Analysis Engineer.

In addition to these ten voting members, the PEC includes the FHWA Nevada Division Office Pavement and Materials Engineer and the NDOT Research Division Chief as non-voting members. The Research Division Chief presides over the PEC meetings and the Product Evaluation Coordinator serves as the committee secretary.

Research Division

The Research Division coordinates the department's Product Evaluation Program and has immediate responsibility for the management of product evaluations and subsequent approvals for use on NDOT projects. The Research Division's responsibilities include the following activities pertaining to the department's Product Evaluation Program:

1. Advise and respond to all external and internal inquiries regarding use of products/materials on NDOT projects along with disseminating appropriate NDOT policies and form relating to product evaluation;
2. Document all inquiries for product evaluations using a computerized database;
3. Ensure appropriate referral to QPLs by reviewing the Special Provisions for construction projects;
4. Conduct user surveys, literature searches, and needs assessment surveys for affected divisions/districts;
5. Conduct surveys of other state DOTs or other transportation agencies regarding the past history of products submitted for evaluation and approval;
6. Administer the department's qualified products list (QPL);
7. Represent NDOT on, and coordinate its participation in AASHTO's National Transportation Product Evaluation Program (NTPEP) Oversight Committee;
8. Coordinate revisions and establishment of Standard Specifications involving a QPL;
9. Coordinate/conduct field tests of products/materials that require in-service evaluation;
10. Prepare agendas and record minutes of PEC meetings; and
11. Provide a summary of PEC actions for a newsletter that enhances technology transfer (T^2) as it relates to product/material information and the outcome of product evaluations.

EVALUATIONS REQUESTED BY OUTSIDE PARTIES

Initiation

All appropriate contacts with NDOT regarding a product's evaluation and/or approval are referred to the Product Evaluation Coordinator. These contacts and the subsequent submittal of product information are logged into a database.

Based on product literature supplied by the requesting party, the NDOT Product Evaluation Coordinator decides on the appropriate evaluation avenue of three options (acceptance based on current specifications, acceptance based on a revision to specifications and acceptance based on field testing). It is incumbent on the submitting party to provide all pertinent product specifications, test data, etc. used to compare the proposed product to current NDOT specifications. The submitted Product Information Package (PIP) shall include but is not limited to the following:

1. The completed product information form indicating compliance with NDOT, AASHTO, ASTM or other recognized specifications or standards, past history, etc.; and
2. Product literature, which may include photographs, material specifications, results of independent testing, approvals or documented use by other agencies, engineering designs or calculations, the Material Safety Data Sheet(s) (MSDS) for the product, if required, and any other information which will enable NDOT staff to adequately determine the purpose, need, and viability of the product.

All products submitted for evaluation must be produced in compliance with the latest revision of the AASHTO or ASTM standard within six (6) months of the publication of the revision.

Upon the initial assessment of a product, the Product Evaluation Coordinator sends the manufacturer/vendor NDOT's "Policy for Product Evaluation Requested by Outside Parties" and an appropriate product information form to complete (Appendices A-5, A-6, A-7 and A-8).

Acceptance Based on Current Specifications

NDOT has Standard Specifications and Standard Plans which encompass many of the products in the highway industry. The proposed product's literature, along with a completed form as shown in Appendix A-6 is submitted to the affected division(s) for their review. If the affected division determines that the product meets current specifications, the product is added to the master qualified products list (QPL) under the appropriate specification section/subsection. In some instances, the affected division not only considers compliance with current specifications, but also considers department inventory issues prior to placing a product on the QPL. Once a determination is made regarding acceptance based on current specifications, the vendor is notified.

Request for Specification Revision

Products that have been adequately field-tested, or are acceptable based on sound engineering practice, may be accepted through revisions to current NDOT specifications. The proposed revision submitted on the form shown in Appendix A-7 is reviewed by the affected district(s)/division(s). Once the divisional response is submitted to the Product Evaluation Coordinator, an action-item is placed on the agenda for the next quarterly meeting of the PEC. The PEC takes action on the specification revision and forwards the action taken to the Deputy Director/Chief Engineer for concurrence. If the Deputy Director /Chief Engineer approves a specification revision, the revision is coordinated with the Specifications Engineer and Research makes the necessary adjustments, if applicable, to the corresponding QPL. The Product Evaluation Coordinator notifies the vendor in writing of the final decision.

Request for Field Test

Products that cannot be accepted under current specifications, and have not been adequately field tested by other state DOTs or national testing organizations, may require evaluation under in-service conditions. In this case, the vendor must submit a completed form as shown in Appendix A-8. Formal field-testing involves product systems, or product lines such as protective coatings or bridge deck overlay systems. Products/materials needing this type of testing are placed as experimental features within construction contracts and may result in the formation of test decks to determine their performance and durability under in-service conditions. The Research Division is responsible for preparing comprehensive test protocols describing the monitoring, testing, and documentation required during the evaluation period. Placement of the product is documented in a construction report. Performance and durability are monitored over a specified evaluation period (at least one to two years) and documented in a final report. Upon completion of the field test, the Research Division makes a final recommendation to the PEC through the submittal of a comprehensive final report detailing proposed specifications and acceptance criteria if applicable. The information is presented to the Deputy Director/Chief Engineer for a final decision.

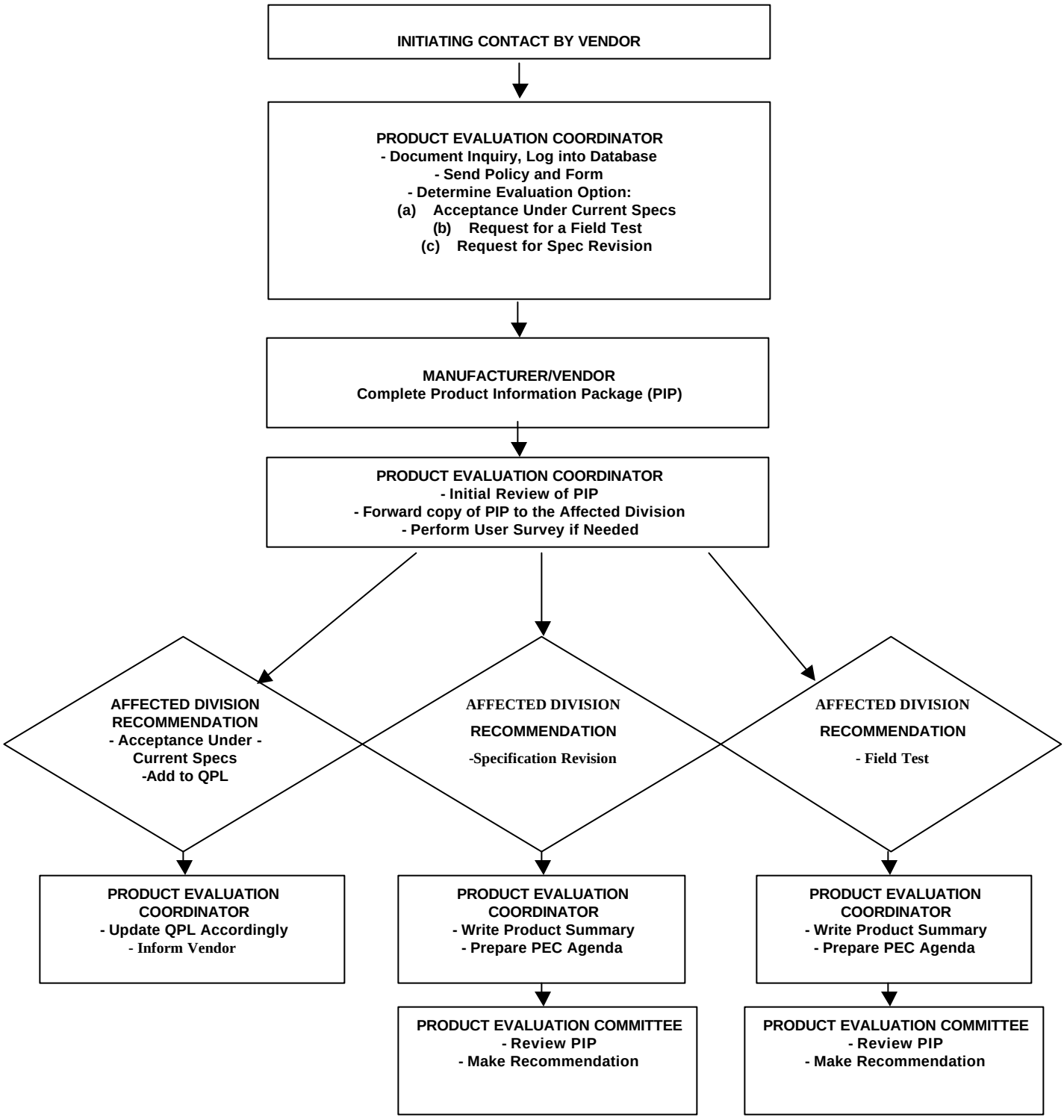
In cases where long-term performance (durability) is not an issue, e.g., a pre-engineered/tested structures-related product, a field test may consist of a trial installation. In such cases, the primary issue is the constructability of the product or the design process leading to the bid process. In most of these instances, the product is incorporated into a construction contract after the criteria to be evaluated is determined by the affected division. The PEC takes action on the final recommendation; the Deputy Director/Chief Engineer makes the final decision.

In some cases, a district or division may wish to have a product demonstration to determine operating and/or functional characteristics under local conditions. Usually the type of product being evaluated will be a single product, e.g., a raised pavement marker. This is the least formal type of field test, yet requires be a single product, eg, a raised pavement marker. This is the least formal type of field, yet requires

documentation in the form of a work plan. NDOT maintenance personnel generally complete the installation and the test section is evaluated based on established criteria. Any resulting action such as specification revision or establishment must be acted on by the PEC and concurred with by the Deputy Director/Chief Engineer.

Figure 2.1, pages 26 - 27, depict the procedure involved with product evaluations requested by outside parties in a flow chart format.

PRODUCT EVALUATION PROCEDURE



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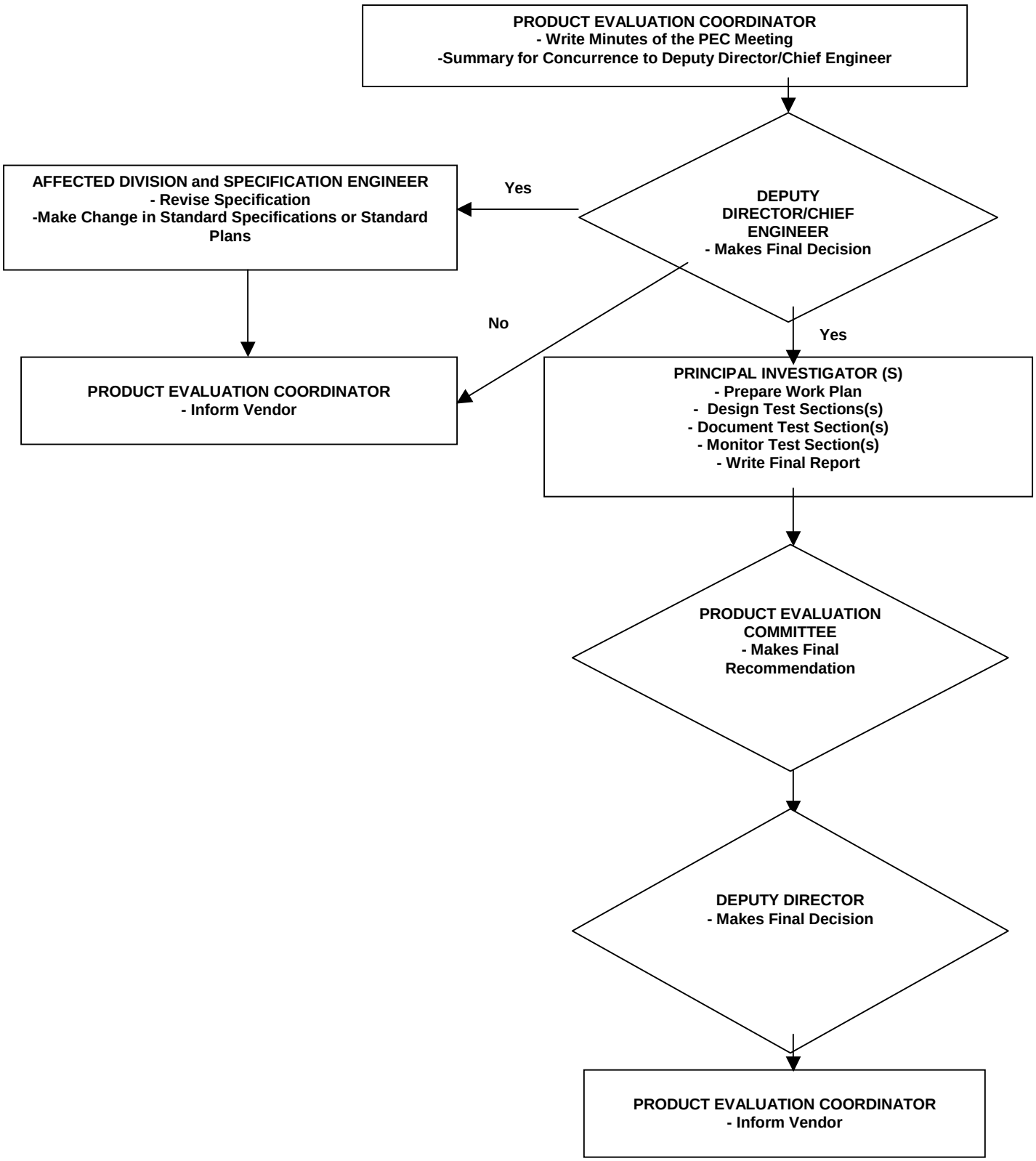


(Fig. 2.2)

INTERNALLY REQUESTED EVALUATIONS (RE-EVALUATIONS)

Initiation

Internally-initiated product evaluations or, more appropriately named as re-evaluations, are conducted in the case of a poorly-performing product or a product rendered technologically obsolete through advances in product/materials technology.

It is the initiating division's/district's responsibility to complete a product review form (refer to Appendix A-9) documenting the product's poor performance. The affected division head or district engineer must sign the form. In cases of obvious product failure which constitute an emergency situation with regard to public safety, the division/district may immediately terminate use of the product pending further review.

Review

The form and accompanying documentation such as pictures, written accounts of product failure, etc., are submitted to the Product Evaluation Coordinator for review. The Product Evaluation Coordinator reviews the documentation contained on the form and surveys other users of the product including other NDOT divisions/districts and state DOTs. The Product Evaluation Coordinator then writes a product summary detailing a history of past use and outlining those instances of unsatisfactory performance as documented by the initiating district/division.

PEC Action

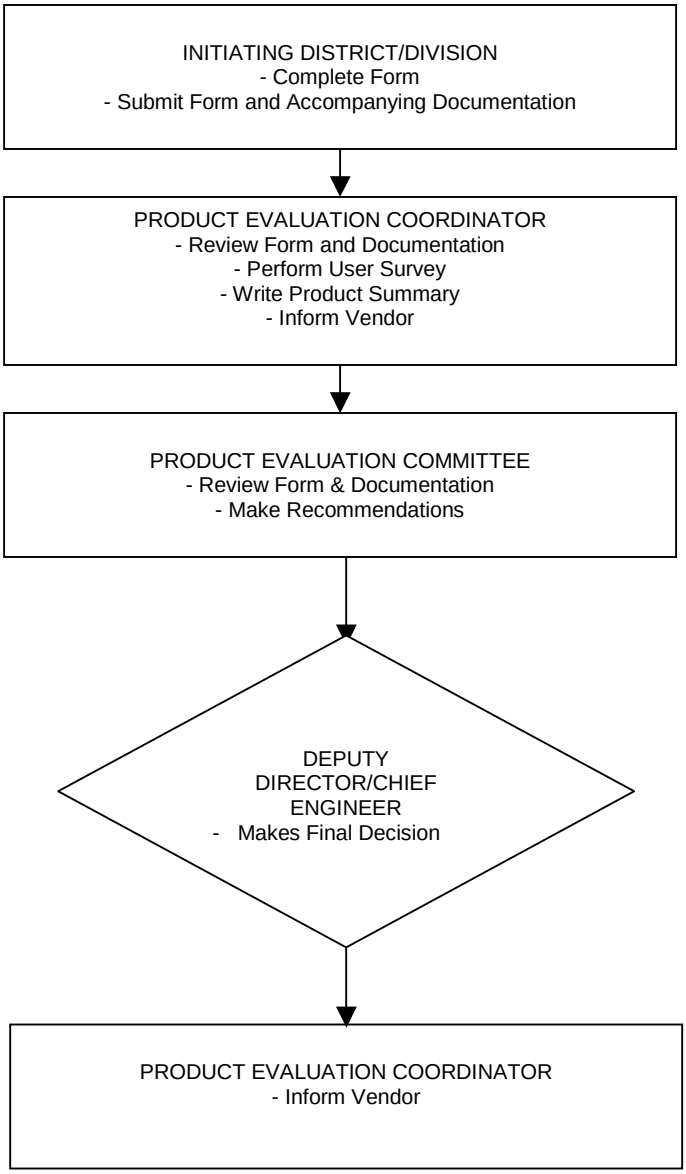
After completion of the product review, the information is sent to the PEC prior to their next regularly-scheduled meeting and the vendor is notified. Based on the information provided from the Product Evaluation Coordinator, along with any rebuttal provided by the vendor, the PEC makes a recommendation regarding product use, i.e., limit the product's use, suspend usage ending a specification revision, or such other action as may be warranted.

Final Action

The Deputy Director/Chief Engineer makes the final decision regarding product status. The vendor is informed of the final decision and provided with the supporting documentation. The initiating district/division and the PEC are notified of the final decision. The Specifications Engineer is then responsible for making all necessary changes to the Standard Specifications and/or Standard Plans and the Product Evaluation Coordinator makes changes as appropriate to the master QPL.

Figure 3.1, page 30, depicts the procedure for an internal product re-evaluation.

INTERNALLY REQUESTED PRODUCT REVIEW



PROGRAM IMPLEMENTATION

Qualified Products List

The QPL for construction products/materials is the end result of the Product Evaluation Program. The QPL is a list of manufactured products available on the market that have been evaluated and determined suitable for a specified use. Typically, an individual QPL for a particular type of product/material contains at least two products. However, as stated by NRS 338.140, part 2, "in those cases involving a unique or novel product application required to be used in the public interest, or where only one brand or trade name is known to the specifying agency, it may list only one."

The QPL is maintained by the Product Evaluation Coordinator and is appended to contract Special Provisions for each NDOT construction project. Specification numbers in the QPL correspond to the applicable subsection in the Standard Specifications where the item is specified.

A contractor's procurement and use of products is limited to those listed in the QPL or to those products/materials meeting current specifications. A QPL ensures that products/materials used on construction projects are pre-qualified and approved for use through a formal process. The establishment of a QPL provides for thorough evaluation on a one-time basis rather than each time the product is submitted for use on a project. Acceptance criteria are established for each individual QPL that include, but are not limited to, the following:

1. Acceptance under current standard specifications;
2. Compliance with crashworthiness requirements prescribed in the NCHRP Report 350;
3. Acceptance by the FHWA;
4. Evaluations through AASHTO/NTPEP testing;
5. Highway Innovative Technology Evaluation Center (HITEC) testing; and

6. Such additional criteria as may be considered necessary.

Evaluation of a product listed on the QPL does not constitute an endorsement by the department, nor does it imply a commitment to purchase, recommend, or specify the product in the future. Testing and certification of specific products remains in effect regardless of the status shown in the list.

Products/materials remain on the QPL as long as their performance in the field is satisfactory. The NDOT product evaluation procedure provides for the suspension and re-evaluation of a product/material exhibiting poor performance in the field.

GLOSSARY OF ACRONYMS

ACRONYMS	DEFINITION
SPR	State Planning and Research
R,D&T	Research, Development and Technology Transfer
FHWA	Federal Highway Administration
NDOT	Nevada Department of Transportation
TRIS	Transportation Research Information Service
RAC	Research Advisory Committee
RMC	Research Management Committee
RFP	Request for Proposal
TRB	Transportation Research Board
NCHRP	National Cooperative Highway Research Program
T^2	Technology Transfer
PEC	Product Evaluation Committee
QPL	Qualified Products List
PIP	Product Information Package

NEVADA DEPARTMENT OF TRANSPORTATION

RESEARCH PROBLEM STATEMENT

1. **Problem Statement** (brief statement of problem**)**

2**. Proposed Research** (briefly describe what needs to be done)

3**. Urgency** (ramifications if the problem is not solved)

4. **Anticipated Benefits/Implementation** (expected benefits and how will the department use the results)

5**. Submitter** (name and division)

PLEASE NOTE THAT ALL PROBLEM STATEMENTS MUST BE SUBMITTED TO YOUR DIVISION HEAD OR DISTRICT ENGINEER FOR APPROVAL PRIOR TO BEING SUBMITTED TO THE RESEARCH DIVISION.

NEVADA DEPARTMENT OF TRANSPORTATION

RESEARCH PROPOSAL GUIDE

(Proposal Elements)

1. **TITLE**: State the title of the research study as you think it should be stated.

2. **PRINCIPAL INVESTIGATOR**: Provide the title(s) and name(s) of the Principal Investigator(s).

3. **PROBLEM STATEMENT**: Provide a clear, concise summary of the problem to be studied.

4. **BACKGROUND SUMMARY**: Include background information on the research topic. Summarize the finding of a preliminary literature search and state the relationship of the proposed study to prior research. The summary should reveal your understanding of underlying principles and should clearly indicate your appreciation of the problem. A comprehensive background 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.

5. **PROPOSED RESEARCH**: Provide a specific account of the research that should be conducted. Include the technical objectives upon which the staff will focus their attention, and upon which their efforts will converge. Fully describe the test methods to be used and specify how the study will be structured to address the problem statement. Information should also be provided regarding sampling plans, number of test sections, statistical analysis methods, use of existing models or development of new models, expected survey techniques, criteria which will be used to judge acceptability, etc.

6. **ANTICIPATED BENEFITS**: Provide an accounting of specific benefits anticipated as a result of this research. Include an estimate of the savings in terms of time, money, increased safety, improved service, or improved procedures. Explain how these benefits will be realized, and how they relate to solving the initial problem.

7. **PRODUCTS AND IMPLEMENTATION PLAN**: List the products which will be delivered during the research project: reports, computer programs, manuals, etc.

Provide information pertinent to the following questions: Will the expected research findings be readily adoptable by the intended user? If not, will further work be necessary to develop or field test the findings? Will the findings be presented as a proposed specification, procedural manual or guide, etc.?

(Continued)

8. **DURATION/SCHEDULE**: Provide an estimate of total time to complete the project including a schedule for completion of major phases of the project, if applicable.

9. **FACILITIES**: Describe the facilities available to accomplish the research. Indicate equipment which is necessary for completion of the research and specify any restrictions on its use. Specify any equipment which is necessary but not currently on-hand. If additional equipment is to be purchased with project funds, identify it in the budget estimate.

10. **BUDGET**: Provide a summary tabulation showing the staffing plan, person-hours, and total cost broken down by year and by each phase of the study. The budget should include salaries, overhead, and indirect costs; travel; computer time; equipment (purchases and/or rental); and special services (where applicable).

11. **NDOT INVOLVEMENT (OTHER DIVISIONS)**: Include the total amount of involvement that will be required from any NDOT division outside of the originating division. If extensive, include specifics.

STANDARD BUDGET ITEMIZATION FOR NDOT RESEARCH PROJECTS[6]

PROJECT TITLE:
PROJECT DURATION:

ITEMS			
A. PERSONNEL	Monthly Rate[1]	Man-Mo.	Sum of salary & fringe/(Fringe[2])
Principal Investigator			
Co-PI[3]			
Research Staff[3]			
Graduate Student (indicate number)			
Undergraduate Student (indicate number)			
Other Personnel			
Total Personnel Costs			
B. Travel[4]			
C. Materials and Supplies			
D. Publication and Communication			
E. Other Costs (if any)			
F. Subtotal Direct Costs (sum of A thru E)			
G. Total Indirect Cost (% of F)			
H. Permanent Equipment Including Computers[5]			
I. Student Tuition and Fees			
J. TOTAL PROJECT COSTS (sum of F thru I)			

NOTES:

1. Faculty pay rate should be based on their 9 month salaries.
2. Fringe benefits cannot exceed rates established by current university policy.
3. If there are more than one Co-PI or Research Staff, please list them separately.
4. NDOT only pays for travel that is essential for the completion of the project and costs are per state rates.
5. Permanent equipment includes anything purchased equal to or more than $2,000. NDOT will retain ownership of equipment purchased for research and will provide disposition instructions at the conclusion of the project.
6. Please attach detailed justification for equipment purchases, travel costs, and materials/supplies.

TECHNICAL REPORT DOCUMENTATION PAGE

Report No.	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle	5. Report Date	
	6. Performing Organization Code	
7. Author(s)	8. Performing Organization Report No.	
9. Performing Organization Name and Address	10. Work Unit No.	
	11. Contract or Grant No.	
12. Sponsoring Agency Name and Address **Nevada Department of Transportation**	13. Type or Report and Period Covered	
	14. Sponsoring Agency Code **NDOT**	
15. Supplementary Notes		
16. Abstract		
17. Key Words	18. Distribution Statement **Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161**	
19. Security Classif is report) **Unclassified**	20. Security Classif. (of this page) **Unclassified**	21. No. Of Pages / 22. Price

NEVADA DEPARTMENT OF TRANSPORTATION
POLICY FOR PRODUCT EVALUATIONS

REQUESTED BY OUTSIDE PARTIES

Product evaluations are often requested by outside parties as a means for demonstrating claimed advantages of a product or procedure. These evaluations require commitment of time and resources by the department.

To ensure that requests are uniformly and impartially administered, the following procedures shall apply:

A. REQUEST FOR EVALUATION

All requests by an outside party shall be submitted with the appropriate forms and information. This information shall be addressed to:

Nevada Department of Transportation
Research Division
1263 South Stewart Street
Carson City NV 89712

To obtain forms and information on the evaluation process, please contact Ms. Masha Wilson at:

Phone: (775) 888-7894
Fax: (775) 888-7230
email: mwilson@dot.state.nv.us

B. OPTIONS FOR EVALUATION

Based on product literature supplied by the requesting party, the NDOT Product Evaluation Coordinator will decide on the appropriate evaluation option of the three options listed below. It is incumbent on the submitting party to provide all pertinent product specifications, test data, etc. used to compare the proposed product to current NDOT specifications. All products submitted for evaluation must be produced in compliance with the latest revision of AASHTO or ASTM standards within six (6) months of the publication of the revision.

1) ACCEPTANCE BASED ON CURRENT SPECIFICATIONS

NDOT has standard specifications and standard plans which encompass many of the products in the highway industry. Acceptance under current specifications will be determined by the appropriate division.

To initiate such an evaluation, the vendor must submit THREE copies of the form titled, "Request for Product Acceptance Under Current NDOT Specifications, as well as THREE copies of all pertinent literature.

(Continued on next page)

2) REQUEST FOR REVISION TO EXISTING SPECIFICATIONS

Products which have been adequately field tested or are acceptable based on sound engineering practices, may be accepted through revisions to current specifications.

Requests for a change to existing specifications or standard plans may be initiated by submitting THREE completed copies of the form titled, "Request for Change in NDOT Specifications Or Standard Plans, as well as THREE copies of all pertinent literature.

3) REQUEST FOR FIELD TESTING

Products which cannot be accepted under current specifications may require evaluation under in-service conditions.

Requests for a product field test may be made by submitting THREE completed copies of the form titled, "Request for a Field Test, as well as THREE copies of all pertinent literature.

Regardless of the evaluation option selected, a separate form must be submitted for each product. In addition, products with more than one application in the highway industry must be submitted with a separate completed form for each proposed application.

C. REVIEW OF EVALUATION REQUESTS

The Nevada Department of Transportation, Research Division, will consult with other NDOT Divisions/Districts and/or state agencies and research organizations to verify the information provided. Vendors submitting products for acceptance under current specifications will be advised by the NDOT Research Division Chief as to the results of the review. Requests involving a specification revision or a field test proposal will be submitted to the NDOT Product Evaluation Committee for consideration. Vendors may be offered an opportunity to make a final presentation to the committee, and each submitting party will be informed in writing of the committee's decision.

D. EXCEPTIONS

The above policy shall not preclude the Department from performing, on its own initiative, evaluations or field tests of any product or procedure which may benefit NDOT. This includes products or procedures originating from sources other than vendors, as well as vendor proposals which include exceptions to requirements set forth in this policy.

E. PRODUCT ENDORSEMENT

The evaluation and/or use of a product in the course of an evaluation does not constitute an endorsement by the department nor does it imply a commitment to purchase, recommend, or specify the product in the future.

Rev. August 22, 2001

NEVADA DEPARTMENT OF TRANSPORTATION
REQUEST FOR PRODUCT ACCEPTANCE
UNDER CURRENT NDOT SPECIFICATIONS

Date: _____

Distributor/ Manufacturer:

Address: _____ Telephone: _____

City/State_____ Fax: _____

Contact Person: _____ Signature: _____

PRODUCT:

TRADE NAME: _____
DESCRIPTION: _____
PRIMARY USE: _____
SECONDARY USE: _____
GUARANTEE:_____

PRODUCT MEETS SPECIFICATIONS AND TEST PROCEDURES AS FOLLOWS:

NDOT: _____ ASTM: _____
AASHTO: _____ OTHER: _____

PRODUCT IS PROPOSED FOR THE FOLLOWING USES:

_____
_____
_____

ESTIMATED COST OF PRODUCT OR PROCEDURE (delivered to Reno).

_____
_____

HISTORY OF PAST USE, IF ANY. *Included shall be any and all evaluations available, along with names and phone numbers of contacts.*

_____
_____

GENERAL:

Attach any pertinent product literature including: instructions and limitations for use, field test data, composition or laboratory analysis, product specifications, precautions in handling, hazards to health, availability, special tools or supplies needed, etc.

NEVADA DEPARTMENT OF TRANSPORTATION
REQUEST FOR CHANGE IN NDOT SPECIFICATIONS OR STANDARD PLANS

Date:_____

Distributor/ Manufacturer :

Address: _____ Telephone: _____

City/State_____ Fax:: _____

Contact Person: _____ Signature: _____

PRODUCT:

TRADE NAME: _____
DESCRIPTION:_____
PRIMARY USE: _____
SECONDARY USE: _____
GUARANTEE: _____

PRODUCT MEETS SPECIFICATIONS AND TEST PROCEDURES AS FOLLOWS:

AASHTO: _____ ASTM: _____ OTHER: _____

CURRENT NDOT SPECIFICATION (include spec. no.)

_____
_____

POINTS OF CONFLICT _____
_____

PROPOSED REVISION_____
_____

ESTIMATED COST OF PRODUCT OR PROCEDURE (delivered to Reno):

HISTORY OF PAST USE, IF ANY. *Included shall be any and all evaluations available, along with names and phone numbers of contacts.* _____
_____

GENERAL: _____

Attach any pertinent product literature including: instructions and limitations for use, field test data, composition or laboratory analysis, product specifications, precautions in handling, hazards to health, availability, special tools or supplies needed, etc.

NEVADA DEPARTMENT OF TRANSPORTATION
REQUEST FOR A FIELD TEST

Date:_____

Distributor/ Manufacturer : _____

Address:_____ Telephone:

City/State_____ Fax: _____

Contact Person:_____ Signature: _____

1. (a) Trade Name/Name: _____

   (b) Full description of product or procedure: _____
2. Estimated cost of product or procedure (delivered to Reno). _____
3. Specifications for product or procedure. _____
4. Claimed advantages (please be specific): _____
5. Verification of advantages: _____
6. History of past use, if any. Included shall be any and all evaluations available, along with *names and phone numbers of contacts.* _____
7. Safety and environmental precautions. Include a complete copy of the materials safety data sheet

   _____
8. Description of proposed field test(s): _____
9. Agreement to provide product free of charge for purpose of the field test(s). Yes [ ] No [ ]
10. Agreement to provide technical assistance in formulating the field test(s) at no cost to the department.

    Yes [ ] No [ ]
11. Agreement to negotiate additional costs involved in conducting laboratory testing, if necessary, to complete this evaluation. Yes [ ] No [ ]
12. Agreement to provide technical assistance on-site during any field test. Yes [ ] No [ ]
13. Permission for **NDOT** to reproduce in full, or in part, any information supplied by the submitting organization unless specifically marked otherwise. This includes any material with copyrights held by the submitting party. Yes [ ] No [ ]

Attach any pertinent literature including: instructions and limitations for use, any field test data, composition or laboratory analysis, product specifications, availability, special tools or supplies needed, etc. *Please attach additional information as necessary*. The Department will conduct field tests at its convenience. Evaluations will be performed in strict accordance with a sampling, testing, and evaluation program developed for the test section by the project investigator(s).

NEVADA DEPARTMENT OF TRANSPORTATION
INTERNAL REQUEST FOR PRODUCT REVIEW

DATE :_____

REQUESTED BY (Division head/Dist. Engineer): _____

PRODUCT:

TRADE NAME: _____

DESCRIPTION: _____

INTENDED USE: _____

LOCATION OF INSTALLATION/APPLICATION: _____
_____

PROBLEM: _____
_____
_____
_____
_____

SUGGESTED ACTION (Remove from approved list or standard plan, suspend, or limit use): _____
_____

EXPLANATION: _____
_____
_____
_____

ARE ALTERNATIVE PRODUCTS AVAILABLE? (List): _____
_____
_____

YOUR HISTORY WITH THIS PRODUCT, IF ANY: _____
_____
_____
_____

SIGNATURE _____

NOTE: please provide all available information, including pictures, pertinent to this request.