



Missouri  
Department  
Of  
Transportation

Project  
Scoping  
Team

# Implementation of Recommendations for Project Scoping



April 2003

## Executive Summary

A project's scope can be defined as the set of design parameters that precisely satisfy the purpose and need of the project. A poorly identified scope that is broader than the purpose and need will result in an unnecessarily high project budget and schedule, while a scope which falls short will yield a project that accomplishes little of significance. Further, a construction program based on poorly scoped projects will eventually fragment, whether by expanding the scope to meet the need during design or through field adjustment to correct errors and additional needs during construction.

State departments of transportation in general, and the Missouri Department of Transportation (MoDOT) in particular, are currently experiencing rather difficult economic circumstances. Recently, the lack of funding brought about by a sluggish economy, coupled with MoDOT's strong desire to increase its level of credibility and accountability, reinforced the need to utilize the decreased existing revenue as efficiently as possible. An adequate level of efficiency was thought to be achievable through the use of careful and methodical project scoping. The link between a good scope and a realistic, accurate program became apparent and a task force was assembled to study the process and devise a new methodology.

The new method is based on the assertion that a project has a functional scope only when its elements and limits become so well defined that accurate costs and project delivery schedules can be forecast. At this point, the agency can devise an accurate design and construction program with a high degree of confidence that adequate funding is included for all projects and that projects can be delivered on time. While the actual project cost and timeline cannot be known until the project is fully designed and constructed, a careful, multidisciplinary examination of the purpose and need will produce the desired level of certainty much earlier. The point in the project timeline at which this confidence is achieved is difficult to isolate but is believed to occur somewhere between preliminary plan and right of way plan completion.

Efficient use of the project core team is essential in identifying the design elements of the project. When the various disciplines represented by the core team work together and strive to consider as many project development factors as possible, an accurate scope can and will be achieved. To ensure the proper factors are being considered a series of checklists were developed. The checklists are designed to encourage thought upon common development factors as well as those elements that are often overlooked. Strong core team participation is another benefit of the checklists, as they cannot be properly completed without the full commitment of a multidiscipline core team. Finally, the completion of the checklists could act as a signal to the project manager that the project scope is nearing completion.

When transportation needs arise, planning staff will prioritize them and present them to the project manager, marking the commencement of project development. The project manager will then assemble the core team and begin to scrutinize the need in search of a

solution. The core team will use meetings, field checks, and public input as well as the checklists to arrive at a preliminary scope. At this stage, there is a point of concurrence where the draft scope is submitted for approval as to whether or not it addresses the original need. The level of concurrence sought is dependant upon the nature of the project, for example rehabilitation and reconstruction projects may only require district approval while major projects require approval within the General Headquarters.

Project development will resume following the preliminary scope approval. As development proceeds, more and more aspects of the project will become apparent and the core team, acting through the project manager, will adjust the scope accordingly. When the appropriate level of confidence in the scope has been reached, the project manager will resubmit the scope for final approval. Again, the level of approval sought will depend upon the nature of the project. Right of way and construction funds, as well as the delivery date, will only be publicly committed to a project upon approval of the final scope.

The integrity of the right of way and construction program can only be assured if the scopes of the projects contained within it do not change once they are finalized. Occasionally, however, the known parameters of a project can change unexpectedly, introducing variations that could not have been foreseen regardless of the amount of scrutiny given the project. In these cases, scope changes, even to publicly committed projects, become necessary. These changes must be kept to an absolute minimum, however, and must be approved by the appropriate level of authority depending on the budget and complexity of the project.

If, with the cooperation of planning personnel and management, the project team takes great care to analyze each aspect of the project, both the budget and the schedule will be precise. Such precision will allow MoDOT to realistically meet any resulting public commitment and continue to ensure efficient solutions to the needs of Missouri's traveling public.

## Background

The Project Scoping Team first officially met on July 20, 2001. At the first meeting Dave Nichols, Director of Project Development, provided a team charter and explained the charge of the team.

The current process for scoping projects is characterized by the following statements:

- Adequate project scoping is not happening at the beginning of the project, therefore creating chaos at the end of the project.
- Project scoping should answer the question, “What is the solution to the need?” This is not happening under the current process.
- The efficiency to deliver a quality product is compromised due to the chaos created because sufficient activity and effort was not put forth early on in the project development process.

The desired outcomes identified in the team charter that characterize a successful solution are:

- Ability to produce a larger program
- Build in efficiencies
- Balance of discretionary effort
- Quality projects delivered on-time and on-budget (95 percent of the time)
- Win – win situation for all employees and MoDOT
- Reduce the sense of urgency at the end of the project
- Increase the sense of urgency at the beginning of the project
- Increase the sense of success of a project

The undesirable outcomes identified for the team are:

- Status Quo
- Continuing to function in the current fashion with chaos at the end of the project development process
- Inefficiencies within the project development process
- Ineffective processes

The boundaries outlined for the team are:

- Must not be illegal unlawful or immoral
- Can’t get top heavy
- No increase in MoDOT staff

## Mission Statement

Given these goals and restrictions the team developed a mission statement to guide the efforts to improve the Project Scoping process. The mission statement is as follows:

**The mission of the Project Scoping Team is to define a scoping process for MoDOT and its partners to use in developing projects so they can produce a STIP that only includes quality projects that meet identified needs, and establishes reasonable timelines and cost estimates.**

## Definition of Project Scoping

One of the first items the team addressed was to come to an agreement on exactly what constitutes project scoping. The team came to consensus on the following definition for project scoping:

**That portion of the project development process during which the elements and limits of a project become so well-defined that accurate costs and project delivery schedules can be forecast.**

## Methodology

The team also had to decide on a strategy that would be used to accomplish its mission. The team decided to use the following steps to analyze and improve the project scoping process:

1. Identify concerns and problems of the existing process
2. Look at how we currently operate (define the existing process)
3. Collect and analyze data (costs, accuracy, etc.) related to the current process
4. Identify root causes of why the existing process is not working
5. Create a new process
6. Define a way to quantify and measure the benefits of the new process

## Concerns and Problems With the Existing Process

The team believed that the statements about the existing process, provided in the team charter, provided a good summarization of the concerns and problems associated with the current process.

- **Adequate project scoping is not happening at the beginning of the project, therefore creating chaos at the end of the project.**
- **Project scoping should answer the question, “What is the solution to the need?” This is not happening under the current process.**
- **The efficiency to deliver a quality product is compromised due to the chaos created because sufficient activity and effort was not put forth early on in the project development process.**

These statements together with the team members' first hand knowledge of the scoping process was considered as adequate justification that the existing process could be improved.

### Define the Existing Process

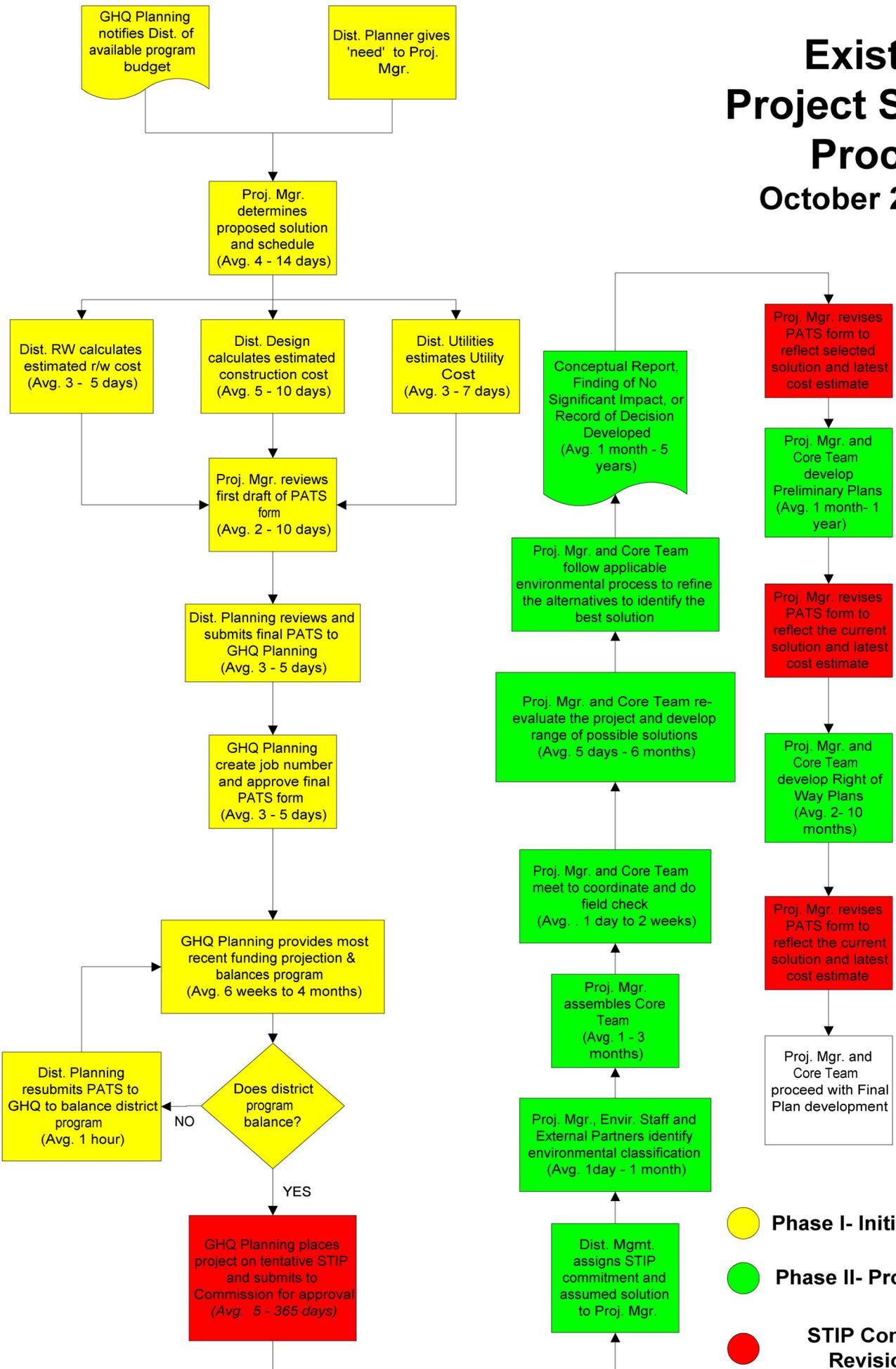
Under the existing process project scoping occurs in two phases. In the first phase, a problem or deficiency is identified in the system and funding is established for an assumed solution. Generally, very little effort towards identifying the proper solution and developing the project occurs prior to the inclusion of right of way and construction funds in the STIP. These initial amounts and the year of the STIP that include them are the commitments from which MoDOT's accountability is measured.

The second phase of project scoping is the actual Project Development process. Through the process of identifying the needs and deficiencies, designing solutions and determining right of way needs, the assumed solution is either verified as the correct solution or modified to fit the actual need. In either case there is a low probability that the initial cost estimate, used to program right of way and construction dollars, or the initial project completion schedule is accurate.

The following flowchart was developed to illustrate the existing project scoping process:

# Existing Project Scoping Process

October 29, 2001



- Phase I- Initial Project Scoping
- Phase II- Project Scoping
- STIP Commitments or Revisions to STIP

## Data Analysis

Once the existing process was defined the team looked for ways to quantify the results that MoDOT was receiving from it. Even before a thorough analysis of the data was conducted the team identified the following basic problems that are inherent to the existing process:

- The initial STIP commitment is made with little or no project knowledge and prior to a detailed analysis of the needs and range of solutions.
- The early public commitment locks the project manager into time and budget constraints for possibly the wrong solution.
- The team believes that this early public commitment is the cause of the chaos at the end of the Project Development process.
- The existing process provides three opportunities for STIP revisions prior to development of the final design.

As stated previously the initial programmed amounts determined in Phase 1 of the scoping process are the estimates from which MoDOT's accountability is measured. Once projects are identified in the STIP they are viewed by the public and MoDOT as commitments. These commitments must be kept in order for MoDOT to maintain its credibility. Not only is the estimate of cost important, but the description of the improvement to be made and the project completion schedule are also viewed as commitments.

This quote from the document Reaching a Missouri Transportation Consensus supports the need for accurate estimates and the importance of defining good project scopes at the initial stages of the Project Development process.

*“The 15-Year Plan projects built by MoDOT since 1992 have exceeded the original estimates by about 43 percent. Other high costs are more controllable such as improved design factors (some are federally mandated) and changes in the original scope of the projects”.*

An additional quote that was taken from Cost Estimate Classification System, AACE International Recommended Practice No. 17R-97 supports the team's belief that in order to obtain more accurate project estimates, a greater level of project development is necessary to accurately define the project.

*“There are numerous characteristics that can be used to categorize cost estimate types. The most significant of these are degree of project definition, end usage of the estimate, estimating methodology, and the effort and time needed to prepare the estimates”*

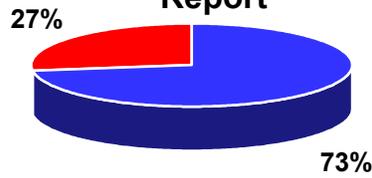
Rather than creating additional data the team decided to utilize the data contained in MoDOT's Annual Accountability Report to the legislature. This data was analyzed to see if there were any trends that could identify the type of results that the current project

scoping process was not providing and if those results were desirable. The following table summarizes the data that was reported in three years of reports.

<b>Summary of Data Reported in the Annual Accountability Report</b>			
	<b>1999 Accountability Report</b>	<b>2000 Accountability Report</b>	<b>2001 Accountability Report</b>
Total Projects Completed	172	104	169
Projects that deviated from the Original Estimate by more than +/- 10%	134 (78%)	72 (69%)	119 (70%)
<b>Reason Why Project Deviated from Original Estimate by more than +/- 10%</b>			
Changes in Project Scope	40 (30%)	36 (50%)	58 (49%)
Inaccurate Estimates	78 (59%)	31 (43%)	53 (45%)
Splitting or Combining Projects	10 (7%)	3 (4%)	8 (6%)
Variations in Field Conditions	6 (4%)	2 (3%)	0 (0%)

MoDOT's accountability report includes data for projects where the final project cost deviates more than +/- 10 percent from the original STIP estimate. The requirement for reporting these projects is dictated by law. Since this measure is used by the legislature to judge MoDOT's overall effectiveness, the team decided that it might also provide a measurement of the effectiveness of the current project scoping process. The data indicates that on average 73 percent of MoDOT's projects have met the criteria for inclusion in the report. The following chart is used to illustrate this fact.

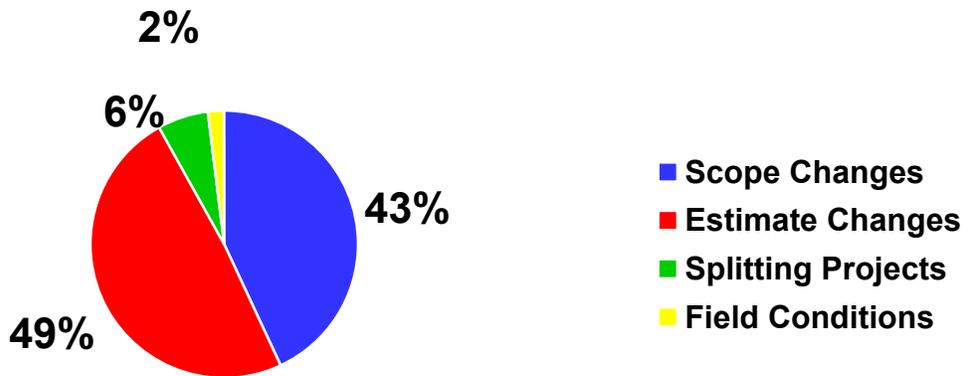
**Average of Three Years (1999-2001) of the Accountability Report**



- more than 10% difference in cost compared to original programmed amount
- less than 10% difference in cost compared to original programmed amount

For those projects that are included in the report MoDOT is required to include a reason why the final project costs varied more than +/- 10 percent from the original STIP estimate. Under the current project scoping process, changes in project scope and inaccurate estimates accounted for an average of 92 percent of the projects that were reported. Both of these factors are directly attributable to the accuracy of the project scoping process. The following chart summarizes the data contained in the preceding table.

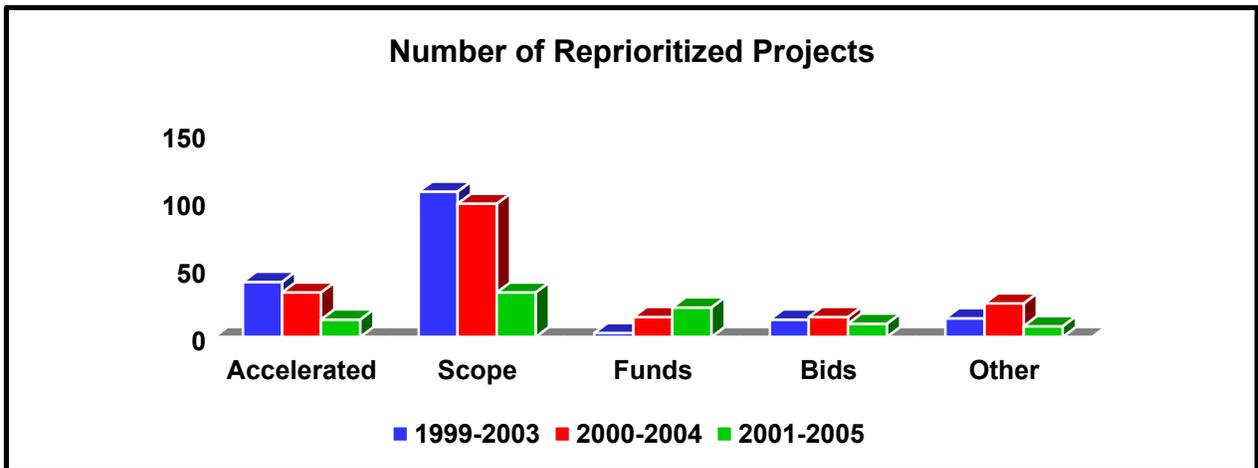
**More than +/- 10% Difference in Cost Compared to Original Programmed Amount - Reasons for Cost Differences for Three Year Average (1999-2001)**



Another measure of MoDOT’s accountability is the ability to deliver projects on time. The criteria by which MoDOT is judged for this measure is the delivery of projects within the fiscal year that construction dollars are included in the STIP. The initial timeline for delivering the project is based on the assumed solution determined during Phase 1 of the current scoping process. The following table categorizes the reasons for projects shifting from one fiscal year to another for a three-year period.

<b>Number of Projects Reprioritized Based on Project Schedule Adjustments</b>			
<b>Reason for Reprioritization</b>	<b>1999-2003 STIP</b>	<b>2000-2004 STIP</b>	<b>2001-2005 STIP</b>
Accelerated Schedules	41	33	14
Scope Changes	108	99	33
Changes in Available Funding	3	15	22
Rejection of Bids Received	13	15	10
Other Reasons	14	25	8
<b>Total Number of Projects</b>	<b>179</b>	<b>187</b>	<b>87</b>

In each of these STIPs changes in the project scope was the leading reason for the project not meeting the original commitment date. This data is also represented in the following chart.



## Root Causes

The team believes that the data analysis supports the fact that the current scoping process is not providing the results that MoDOT must have in order to be accountable to its customers. The data also indicates that the initial project scope, project estimate and project timeline included in the STIP are all areas where the current process is failing. The team identified two root causes that have contributed to the failure of the current scoping process.

- The STIP commitment is made on a project before we know the proper solution, schedule or cost estimate. Since the STIP is a public document, MoDOT is held accountable for its content. As a result we try to fit the given solution (which is not always the right solution) into a tight budget and timeline. Otherwise, we go over budget.
- Core teams are not used properly or consistently throughout the state. Because of this, certain areas of expertise may be left out of the project development process, resulting in an incomplete scope.

## New Project Scoping Process

Under the existing project scoping process the actual determination of the project scope occurs in Phase 2. Phase 2 is actually the part of the Project Development process that consists of identifying the needs and deficiencies, designing solutions and determining right of way needs. Based on the analysis of the data, the team identified that there was no need to completely change the Project Development process. The real problem with project scoping is not so much the process as it is the timing of when the public commitments are made. With this in mind the team developed a process that allows for the public commitments to be made later in the Project Development process.

Based on the team's definition of project scoping, the new process begins with the delivery of the need to the project manager and continues until the elements and limits of a project become so well-defined that accurate costs and project delivery schedules can be forecast. The point at which the project becomes "well-defined" was a subject of much discussion by the team. Under the existing project scoping process STIP commitments occur when very little project knowledge is available. On the other extreme, the most accurate estimates that the core team can produce are made when there is the greatest project knowledge available (completed final plans). However, the team realized that the practicality of obtaining the most accurate estimates possible is not feasible for the purposes of making STIP commitments.

For most projects the minimum level of project development that is necessary to accurately identify the costs and delivery schedule of a project occurs at the Preliminary Plans stage. A preliminary plan is required for every project. The plan is developed to show preliminary geometric details, and includes design criteria, proposed alignment, profile, tentative grade, tentative right of way, schematic intersection or interchange layouts, bypasses and pertinent topographic features. For some projects this minimum level of project development will be adequate to predict accurate right of way costs,

construction costs and delivery schedule. Other more complex projects may require a greater level of development in order to achieve the desired level of accuracy.

The stopping point for project scoping is not an absolute milestone and some amount of judgment must be exercised by the project manager and core team to determine the exact point at which the project has been developed to enough detail to predict accurate right of way costs, construction costs and delivery schedule. For example a project that has no right of way needs and a limited scope of work will reach the end of the project scoping process much quicker than a very complex project. However, the relative level of details developed through the project scoping process should be comparable. The ultimate goal of the project scoping process is to perform enough of the Project Development process that reasonably accurate STIP commitments can be made.

The determination of when the scoping is completed for a project will be based on the best combination of many factors and may vary for each individual project. The nature and complexity of the project, the requirements for showing STIP commitments, the time when project scoping begins and the timing of the yearly programming cycle will all help determine when right of way and construction dollars are first shown in the STIP for the project.

Another important element of effective project scoping is the inclusion of the appropriate type and amount of public involvement and outreach prior to the determination of the solution. Since the STIP commitments are made later in the Project Development process, appropriate public involvement and outreach can now be included in the development of the solution. Under the existing process details of the assumed solution are presented to the public for comment. These comments may lead to a change in the scope of the project and therefore a change in the STIP commitment. The new process will allow for inclusion of this involvement prior to determining specific solutions and making STIP commitments. This should help change the misconception that MoDOT has already determined the solution and is not receptive to public input.

It is important to remember that key factors to the success of any public involvement efforts are the inclusion of the appropriate type and amount of public involvement. Early in the project scoping process the core team should develop a public involvement plan that is appropriate for each project. The nature and complexity of the project along with the core team's specialized knowledge of any sensitive issues within the area will determine the best course of action to gain public input into the development of the project's scope. Proper public input can be an effective tool to help verify that we have identified the correct need and are developing an appropriate solution for it. The guidance found in Section 2-03 PUBLIC HEARINGS AND MEETINGS of the Project Development Manual provides a good background for what constitutes appropriate public involvement and should be consulted when developing a public involvement plan.

Some advantages of this process are:

- Project scoping occurs in one continuous process.
- The public commitment is not made until the project manager knows the time and budget constraints and details of the correct solution.

- The chaos at the end of the Project Development process should be reduced.
- One STIP commitment is made prior to development of the final design.
- Appropriate public input has helped verify the need and determine the appropriate solution prior to making STIP commitments.

Implementation of this process will cause changes in the way we currently identify, prioritize and program projects. The team identified several problem areas in the existing process and has developed the following list of recommended changes to the existing process. These changes have been incorporated into the new process.

**1. Identified and prioritized needs are given to project managers instead of assumed solutions at the beginning of the scoping process.**

This change will allow the project manager and the core team to determine the correct solution to satisfy the need and establish an accurate budget and reasonable project delivery schedule.

One question that this recommendation raised is the definition of exactly what data constitutes an identified and prioritized need. To help address this question the team met with a focus group to identify this data. The results of this meeting were given to GHQ Planning staff and will be incorporated into the new process that Planning is developing to address how needs are identified and prioritized. This process is expected to be completed in time for use in next year's programming cycle.

**2. The core team will collect and analyze the data that constitutes the need prior to determining the solution.**

The existing process provides assumed solutions to the core team with the budget and timeline already established. The team identified this item as one of the root causes for the failure of the existing process. This change allows for development of the correct solution to satisfy the need and establish an accurate budget and reasonable timeline.

**3. Only preliminary engineering (PE) will be included in the STIP to identify a project until the Project Scoping process is complete.**

This change in the way MoDOT programs right of way and construction dollars in the STIP will allow the core team to complete the necessary steps of the Project Development process prior to making STIP commitments for the scope, cost or delivery schedule of the project.

In accordance with the team's recommendations, right of way and construction dollars will not be included in the STIP until the development of the project has progressed to at least the Preliminary Plans stage. At this point that the tentative right of way needs along with the proposed alignment and profile grade are known. For some projects this minimum level of project development will be adequate to predict accurate right of way costs, construction costs and delivery

schedule. Other more complex projects may require a greater level of development in order to achieve the desired level of accuracy.

Remember there is no absolute ending point for project scoping and it will be the responsibility of the project manager and core team to determine the exact point at which the project is detailed enough to predict accurate right of way costs, construction costs and delivery schedule.

This being said, it is also important to remember that MoDOT is required by law to produce a fully funded STIP. This requirement together with public expectations will not allow MoDOT to produce a STIP that only includes preliminary engineering funds for individual projects. There must be a balance between the desire to produce the most accurate estimates possible and these requirements. MoDOT does not have the option to scope projects through four years of the STIP and include right of way and construction estimates for projects in only the current year.

In order to ensure that we have an adequately funded STIP new requirements and procedures for programming projects have been developed. These are included in **Appendix A, Overview of Revised Planning and Programming Procedures** of this document. These procedures identify the required percentage of each year's funding, based on category, that must be identified for individual projects.

Therefore the determination of when the scoping is completed for a project will be based on the best combination of many factors and may vary for each individual project. The nature and complexity of the project, the requirements for showing individual projects as STIP commitments, the time when project scoping begins and the timing of the yearly programming cycle will determine when right of way and construction dollars are first shown in the STIP for the project.

By their nature some projects are not as complex as others and the determination of accurate cost estimates and schedules does not require the same level of effort to reach an acceptable level of project detail. These less complex projects typically also have a much smaller budget and overall project development timeline. In fact the need may not be identified and delivered to the project manager until the anticipated construction year is within the first few years of the STIP. For these projects it will be acceptable to include a cost adjustment factor with the estimates to compensate for the unknown factors that may not be identified as a result of the short amount of time to scope the project.

More complex projects typically include a much larger budget and require a greater level of effort to achieve accurate estimates of cost and schedules. For these projects the inclusion of a cost adjustment factor is not an acceptable substitute for completing all the steps of the Project Development process necessary to properly define the parameters of the project. For these projects the Project Scoping process must be started early enough to allow sufficient time for the project to be developed to the correct level of detail that allows STIP commitments to be made and also satisfy the new programming requirements.

These projects may require the programming of preliminary engineering funds in the last year of the STIP for multiple years in order to allow the scoping process to be completed prior to the first year that the STIP commitment is required to be included as a project specific commitment.

Establishing this method of programming will lead to more accurate cost estimates and realistic project delivery schedules. Accurate delivery schedules will improve MoDOT's ability to deliver projects on time. This change should also allow the core team to develop and work with a project delivery schedule instead of a letting schedule.

**4. Additions or deletions to a project's scope after the STIP commitment has been made (right of way and/or construction dollars appear in the STIP) must have approval of MoDOT Management before becoming part of the project.**

Another item that presents problems for the core team, under the existing process, is the ability of the scope to be changed after the STIP commitments have been made. These changes may be necessary and occur for good reasons but the end result is that they cause the STIP commitments for scope, budget and project delivery to be missed or at least they create much of the chaos at the end of the Project Development process.

This change will not eliminate additions or deletions to a project's scope but will ensure that MoDOT management is aware of the implications associated with the modification and understands how it will impact the STIP commitments.

This change should reduce the scope modifications to only those that MoDOT management feels are critical and lead to less re-design during the final design stage of projects. Project schedules should be met more consistently as a result of this change.

The specific procedures for documenting approval of scope modifications are included in **Appendix B, Project Development Manual Revisions** of this document. Section 1-02.5 SCOPE CHANGES describes the procedures and approvals required for major and non-major project scope changes that occur after the STIP commitment has been made.

**5. MoDOT Management and Planning must review and concur with the project concept, projected budget and timeline for implementation of the selected solution prior to programming any right of way funds, construction funds, or prior to making any project-specific STIP commitments.**

Since identified needs are delivered to the project manager (not assumed solutions as with the existing process) for determination of the correct solution, the team felt it was necessary to include a step in the new project scoping process for MoDOT Management and Planning to concur in the recommended solution. This concurrence point will occur early enough in the process to ensure that MoDOT

resources are not wasted, developing solutions that do not solve the identified need or meet the expectations of MoDOT Management. Documentation of this concurrence will be accomplished through completion of a Project Scoping Memorandum.

Since all projects do not involve the same level of complexity and design effort, the procedures describe two methods for completing the memorandum. Projects that are classified as System Expansion Projects generally have a larger statewide impact, budget and level of effort associated with them. For this reason System Expansion Projects require completion of a draft and final version of the Project Scoping Memorandum. All other projects only require preparation of one Project Scoping Memorandum.

The specific procedures for completing the Project Scoping Memorandum are included in **Appendix B, Project Development Manual Revisions** of this document. Section 2-01.13 DRAFT PROJECT SCOPING MEMORANDUM FOR SYSTEM EXPANSION PROJECTS and Section 2-06.9 PROJECT SCOPING MEMORANDUM describe the approval process and required signatures for these project types.

**6. Design of the solution must progress to at least the Preliminary Plan Stage prior to programming any right of way funds, construction funds, or prior to making any project-specific STIP commitments.**

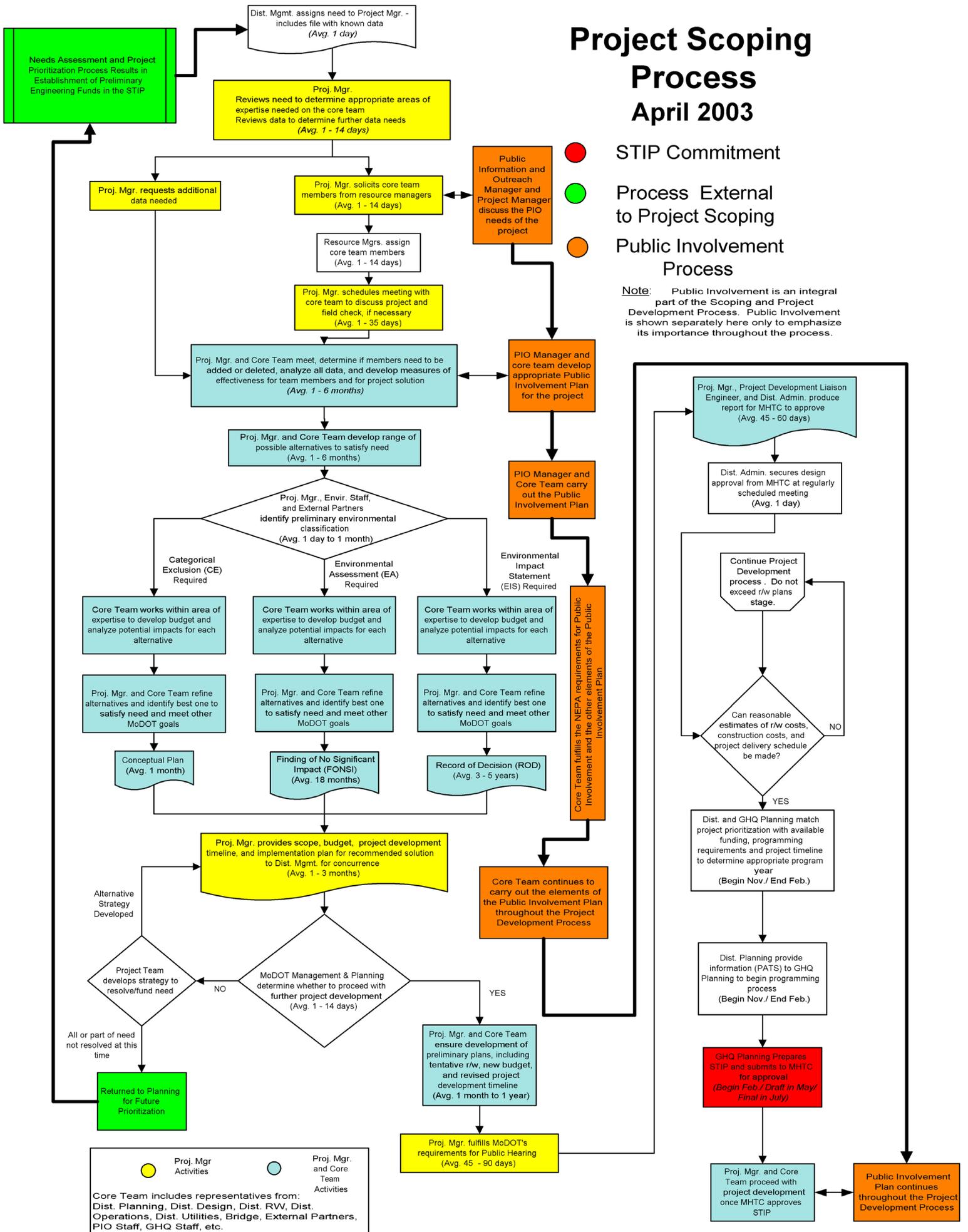
As discussed previously in this section, the team felt that the best balance between the degree of accuracy required to make the STIP commitments and the level of design effort that should be expended prior to making commitments generally occurs sometime after the Preliminary Plans have been developed.

The Preliminary Plan stage is not an absolute milestone and it will be the responsibility of the project manager and core team to determine the exact point at which the project is detailed enough to predict accurate right of way costs, construction costs and delivery schedule.

The following flow chart was developed to illustrate the new project scoping process and to show how these changes have been incorporated:

# Project Scoping Process

## April 2003



## Core Team Involvement

In addition to the problems with the process, the team identified another root cause for failure of project scoping. Based on first hand knowledge of the team members and input from the Project Manager's Coordination Team it was determined that involvement and participation of core team members in the project development process could be improved. Since the initial stages of the Project Development process constitute the project scoping process, these changes will result in improvements in project scoping as well as the overall Project Development process.

The two main problems that the team identified with core team involvement are having the proper members included in the decisions for which they should have input and the lack of knowledge by members of exactly what the expectations are of the functional unit that they represent.

In order to address these issues the team has developed two types of checklists that can be used to help ensure proper core team involvement. The goal of the team was to develop a standardized checklist of the most probable issues a core team will address through the process of scoping a project. These lists are not intended to be all-inclusive, but a good representation of the key issues. The checklists are also not intended to be static, but are intended to be flexible in the fact that they can be modified as issues arise and expectations of core team members change. It is the expectation of the team that as these checklists are used they will be refined and modified to more accurately reflect the correct issues and team member's expectations. Copies of the checklists are included in **Appendix C, Project Scoping Checklists** of this document.

One checklist (Project Scoping Checklist) has been developed to assist the project manager in determining the members who are required to be involved in various project decisions. This checklist summarizes the expectations that each type of core team member is trying to meet. The project manager's checklist will have the following benefits:

- Allows for uniform and consistent data gathering
- Identifies the critical issues that the project manager must have addressed by the core team for common types of projects
- Helps make the project scoping process a part of MoDOT culture

The other type of checklist that was developed consists of a list of expectations that each functional unit has for the core team member who will be representing them. With these lists an individual core team member will know the areas of the Project Development process for which they are responsible to provide input to the core team. These individual Core Team Member checklists will provide the following benefits:

- These checklists identify the critical issues affecting each functional unit.
- This checklist identifies the expectations for a core team member's participation.
- When each member's checklist is complete, they will know they have fulfilled their basic role as a core team member. However, each project is unique and

duties other than those listed on the checklist may be required of each core team member.

The requirement for completing the Project Scoping Checklists is included in **Appendix B, Project Development Manual Revisions** of this document under Section 2-01.12 PROJECT SCOPING CHECKLISTS.

A third item that the team identified as a deficiency with current core team usage is the lack of post-design meetings to provide feedback to the core team. The intention of this type of meeting would be to discuss the successes and failures of the project and look for suggestions on how to improve the scoping and design of future projects. In most cases the core team for a project is dissolved at the conclusion of the project's design and the development of other more current projects becomes the priority of the core team members. The team recommends that post-design and post-construction meetings be held and believes that the following benefits will be realized from them:

- Best and worst practices will be identified for use in future projects
- Allow a method for core team members to provide feedback on how well the project satisfied the identified need

#### Critical Success Factors

In addition to the changes identified by the team the following factors will also be critical to the success of the new scoping process:

- Core team members must have the proper knowledge to represent their functional unit and they must actively participate in the core team
- MoDOT Management and supervisors must use performance management to insure that district engineers and functional unit leaders are requiring the use of core teams for all projects
- If last-minute requests for projects and scope changes continue to be the norm rather than the exception, then this process cannot accomplish the desired outcomes

#### Benefits of this Process

The team identified the following benefits that they believe will occur from using the new project scoping process:

- This process will become part of MoDOT's culture.
- The percentage of projects that deviate from their original program estimate by more than +/- 10 percent will be significantly reduced. Currently 73 percent of program estimates meet this criterion. The team believes a reduction to 15 percent is achievable with this process.
- Projects will be scope-driven rather than STIP-driven.
- All projects will be scoped prior to making the STIP commitment. Currently, only 5 percent of projects are scoped prior to commitment.

- Properly scoped projects will improve accuracy of the STIP estimate and project delivery schedule.
- 100 percent of projects will have appropriate public involvement prior to STIP commitment.
- This process will lead to fewer project cost increases after the STIP commitment is made.
- This process will lead to less reworking of plans and therefore a more efficient use of staff.
- This process will lead to fewer supplemental agreements by consultants and therefore save money.

### Evaluation Measures

In order to evaluate the effectiveness of these changes the team looked for ways to quantify the results that will be received from the new project scoping process. The following measures are some of the items that can be tracked to see if the level of improvement that implementation of these changes have provided.

- Initial Cost vs. Final Construction Cost
- # Of projects each year that are completed within +/- 10 percent of initial STIP commitment for construction cost
- # Of projects each year that are delayed from one fiscal year to another
- # Of project sites that have to be revisited within three years of construction completion- This measure will evaluate the effectiveness of the solution that was chosen to satisfy the need.
- Measure the effectiveness of core team participation
  - **Make sure items on functional unit checklist were addressed**
- Measure the effectiveness of the solution
  - **Planning will include success measures for each project along with the data supplied with the “need”**
  - **Core teams will also create a list of additional success measures as the project is developed. These can be measured throughout the project development process and at the post-design meetings.**

### Desired vs. Probable Benefits

The following chart represents the effectiveness of these changes and revised process when measured against the goals provided to the team in the team charter. An “X” represents those items that the team believes achieve one of the identified goals and a “?” indicates those that are questionable.

# Desired VS. Probable

## Benefits

	Identified and prioritized needs; not solutions	Develop standardized checklist – Project Manager	Develop standardized checklist – Functional Unit	Core Team Members	Data is collected and analyzed by Core Team prior to solution determ.	P.E. only on the STIP until the scoping process is complete	Additions / Deletions to scope after ROW to be approved by DE & CE	District Mgmt. must review & concur with solution prior to programming	Plans are developed to equivalent of ROW stage prior to programming	Core Teams are to have a post-design meeting to discuss the project
<b>GOALS</b>	Ability to produce larger program									
	Build in efficiencies	X	X	X	?			?	X	X
	Balance of discretionary effort	X	X	X			X	X	X	X
<b>IDEAS</b>	All projects delivered on-time and on-budget – 95%				X	X	X	X	X	X
	Win-win situation for all employees and MoDOT	X	X	X	X	X	X		X	X
	Reduce the sense of urgency at the end of a project		X	X	X	X	X	X	X	
	Increase the sense of success of a project	X	X	X	X					X
<b>Bonus Outcomes</b>	Produce the right solution	X	X	X	X	X			X	X
	Restore MoDOT's Credibility					X	X	X	X	

## Implementation of the New Project Scoping Process

The next phase for the new project scoping process will be its implementation. The Project Scoping Implementation team has enlisted the aid of the statewide Project Managers Coordination (PMC) team and to a lesser extent the district planners in developing checklists and refining processes. Therefore, some exposure to the ideas contained in this report has already occurred. Implementation in some sense has already begun because of this early and continuous involvement of these two groups. Some districts have already implemented aspects of the proposed process, such as identifying a need, forming core teams to scope projects and programming preliminary engineering (PE) for scoping purposes.

Implementation will initially consist of sharing this report with district and general headquarters (GHQ) staff (both electronic and hard copies will be provided). Staff will be given time (approximately three weeks) to review the document and provide feedback to the Project Scoping Implementation Team. From this feedback a list of the most frequently asked questions will be developed with the corresponding answer or explanation. This list of frequently asked questions will become a part of the final report to be included in Appendix D. The Project Scoping Implementation Team will also evaluate any recommendations for changes to the Project Scoping process that result from this review. Those that are found to have merit will be incorporated into the final version of the report.

The real success of this process will depend on its day-to-day usage in the districts as they develop and program projects. The project development liaison engineers (PDLE), through the course of their regular interaction with the districts and their participation in project core teams, will ensure these recommendations become a part of the district's daily operating procedures. In addition to this ongoing effort to support this process the PDLE as well as others will visit each district to participate in a work session to answer questions related to the report and assist with the implementation of the new processes. The PDLE will make the arrangements for the district meetings. The participants for this work session should consist of district management, planning managers, project managers, core team members plus others. Members of the Project Scoping Team and the PMC team will also assist in conducting these work sessions in their own districts.

The timing of this implementation plan will fit in well with the yearly cycle for programming projects. The target for sharing this report is January 2003. This should allow time to conduct all phases of the implementation plan prior to completion of the yearly programming cycle. The new process will be incorporated into the development of the 2004-2008 STIP to the fullest extent possible for projects not previously committed. However, the time required to fully scope previously unidentified projects is likely to prohibit the full attainment of the project specific programming requirements for the 2004-2008 STIP. It is anticipated that the requirements can be met in the 2005-2009 STIP.

Changes to the Project Development Manual occur on a quarterly basis or more often as needed. The recommended PDM changes included in Appendix B will be included with the revisions effective for January 1, 2003. We recognize that much more extensive

changes to the PDM will be required to fully describe the scoping process. There are also procedures and processes described in the PDM that conflict with this new process. These are mainly associated with the programming and estimating of projects. When a conflict exists the procedures described in this document shall take precedence.

Additional PDM changes will be forthcoming as the implementation of the Project Scoping process is carried out. Feedback from the district meetings and from the earlier sharing of the report with the district will be evaluated and used to improve the document and develop these additional PDM changes. The Project Scoping process will remain a dynamic process and will be updated as conditions warrant.

## **Communication Plan**

### Spokespeople

- Dave Nichols, Director of Project Development
- Diane Heckemeyer, State Design Engineer
- Members of the Project Scoping Team
- Project Development Liaison Engineers

### Publicity

#### Internal

- Article in *inside MoDOT*, early 2003.
- Inclusion on MoDOT Web site (in front-page “general information” box)
- Presentation before Missouri Highways and Transportation Commission (after plan has been implemented and successes documented).

#### External

- Letter to transportation partners and stakeholders to solicit feedback.
- Targeted press releases (after plan has been implemented and successes documented).
- Inclusion in annual Accountability Report to Legislature.

### Plan Rollout

Share report with district and general headquarters staff in January 2003 (electronic and hard copies) and provide three weeks for review and feedback to Project Scoping Implementation Team. The comment period ends January 31, 2003. From this feedback a list of frequently asked questions will be developed with answers or explanation. FAQs will become a part of final report.

Project development liaison engineers will play a key role in ensuring these recommendations become a part of each district’s daily operating procedures through the course of their regular interaction with the districts and participation in project core

teams. They will also schedule and administer a work session in each district to answer questions and to assist with implementation of the new scoping process.

At conclusion of the review and comment period, seek approval of the Engineering Policy Committee. After allowing time for compilation of the comments and making any changes that are necessary, this presentation will occur in the second quarter of 2003.

After approval by the Engineering Policy Committee, the process will be presented to the Policy and Position Committee for approval.

The Missouri Highways and Transportation Commission should also be briefed about the new process – initially in written form and later via a “live” presentation given by Dave Nichols at a regular meeting of the MHTC. This presentation will have its greatest value if it is given after the new plan has been implemented and successes have been realized.

### Consensus Building

- ❑ Briefings with DEs/FULs and MHTC (supplemented with “talking points/FAQs”).
- ❑ In addition to written distribution of project scoping policies and procedures, personal outreach to each district and its affected staff (district management, planning engineers, project managers, core team members, etc.) would be conducted.
- ❑ Make appropriate changes to department manuals such as the Project Development Manual, Planning Manual, Bridge Manual, Construction Manual, Maintenance Manual, Traffic Manual, Right of Way Manual, Public Information and Outreach Manual, etc.