Implementation of Recommendations for Project Scoping

Missouri Department Of Transportation

Project Scoping Team

January 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 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

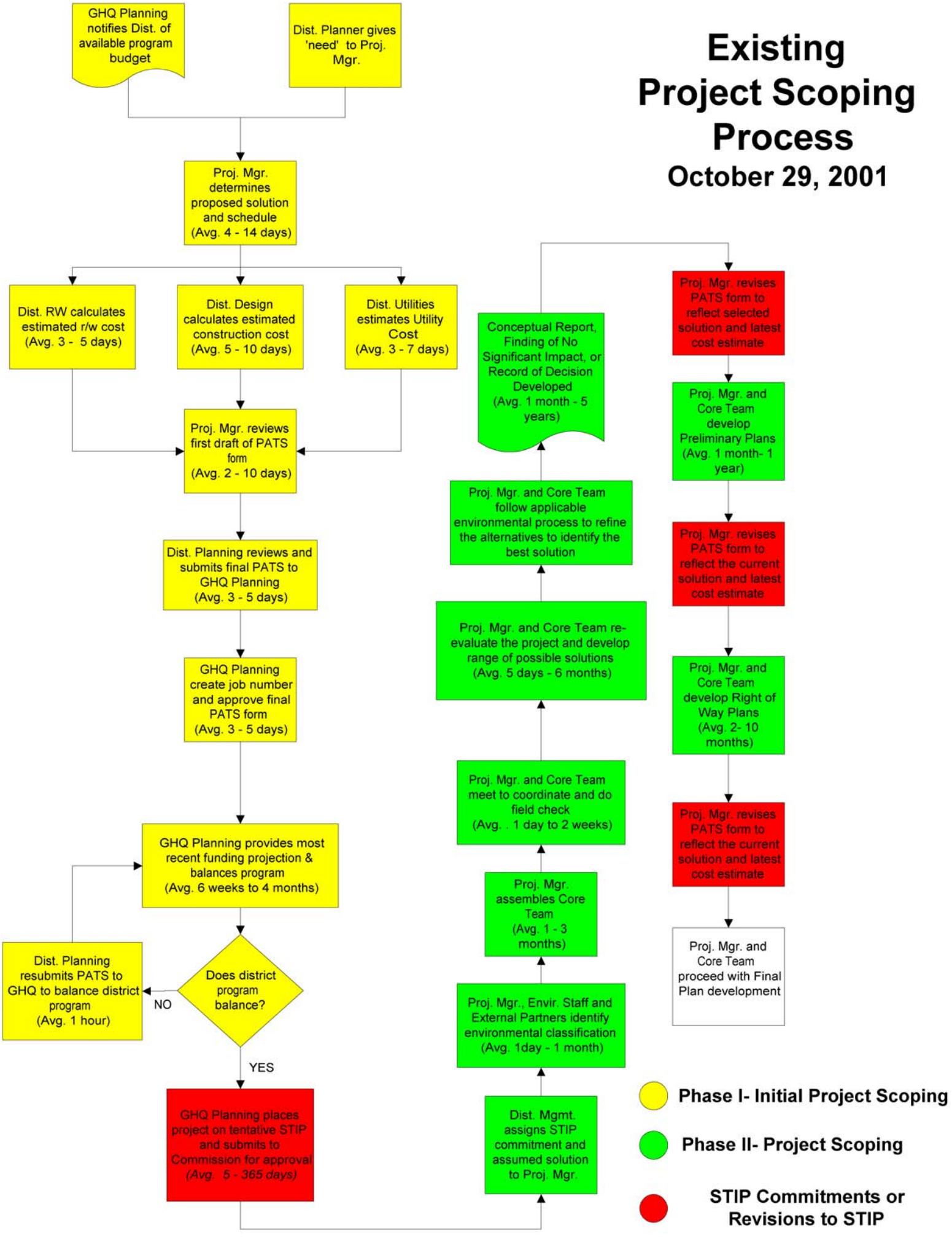
Under the existing process project scoping occurs in two phases. In the first phase, a problem or deficiency is identified in the system and funding is established for an assumed solution. Generally, very little effort towards identifying the proper solution and developing the project occurs prior to 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



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.

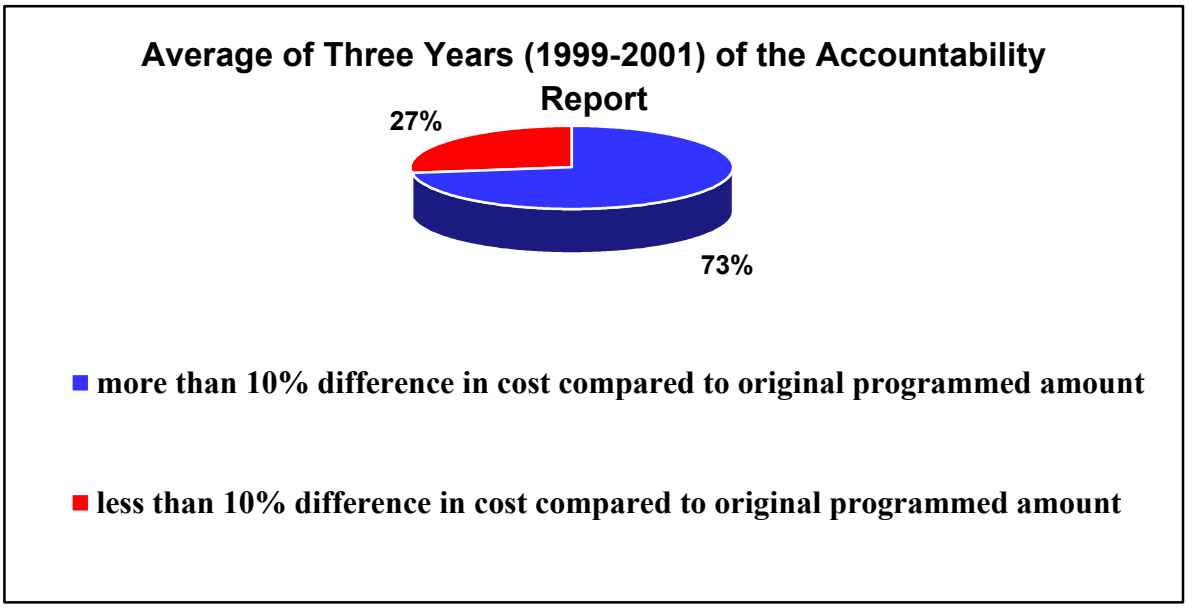
> *"There are numerous characteristics that can be used to categorize cost estimate types. The most significant of these are degree of project definition, end usage of the estimate, estimating methodology, and the effort and time needed to prepare the estimates"*

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

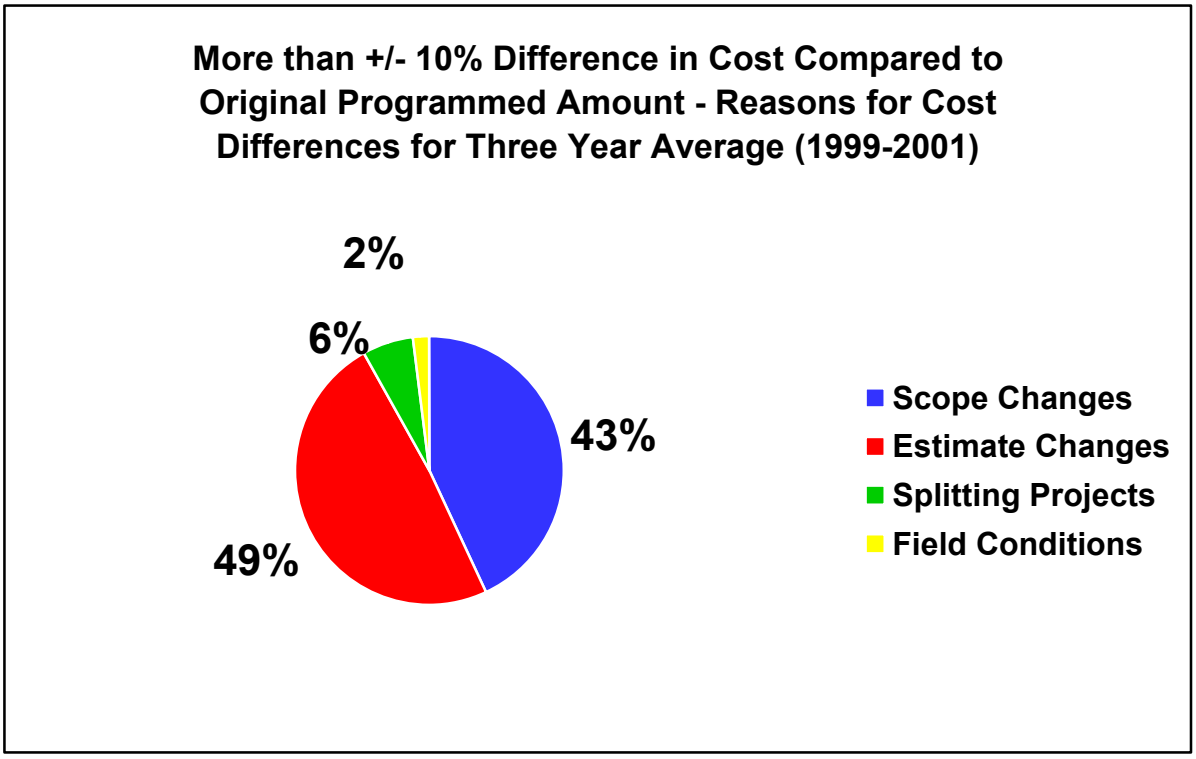
scoping process was not providing and if those results were desirable. The following table summarizes the data that was reported in three years of reports.

Summary of Data Reported in the Annual Accountability Report			
	1999 Accountability Report	**2000 Accountability Report**	**2001 Accountability Report**
Total Projects Completed	172	104	169
Projects that deviated from the Original Estimate by more than +/- 10%	134 (78%)	72 (69%)	119 (70%)
Reason Why Project Deviated from Original Estimate by more than +/- 10%			
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.



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.

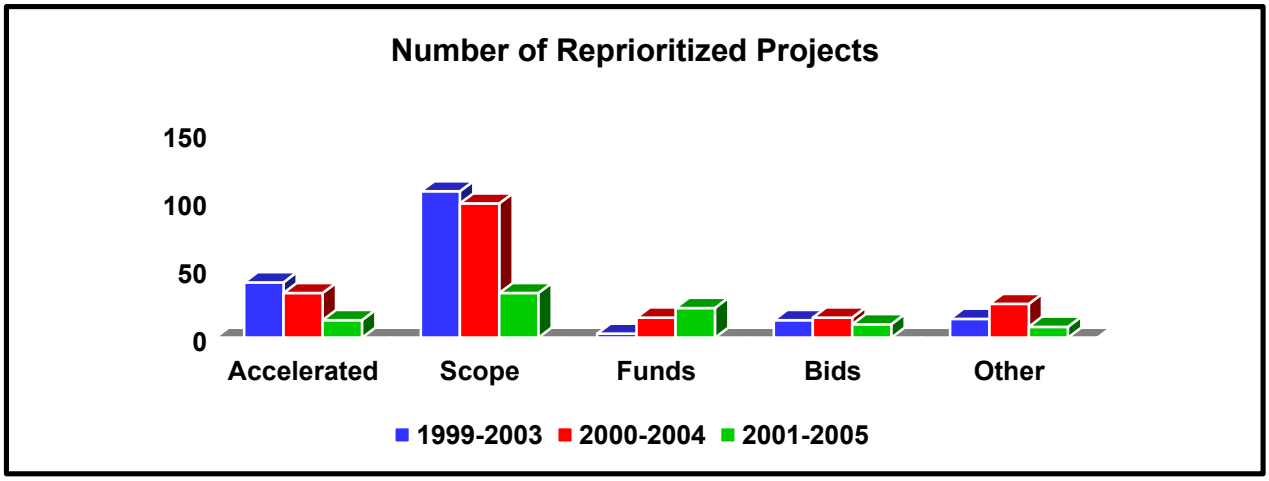


Another measure of MoDOT's accountability is the ability to deliver projects on time. The criteria by which MoDOT is judged for this measure is the delivery of projects within the fiscal year that construction dollars are included in the STIP. The initial timeline for delivering the project is based on the 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.

Number of Projects Reprioritized Based on Project Schedule Adjustments

Reason for Reprioritization	1999-2003 STIP	2000-2004 STIP	2001-2005 STIP
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
Total Number of Projects	179	187	87

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 a 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 <u>not</u> 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 manger (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

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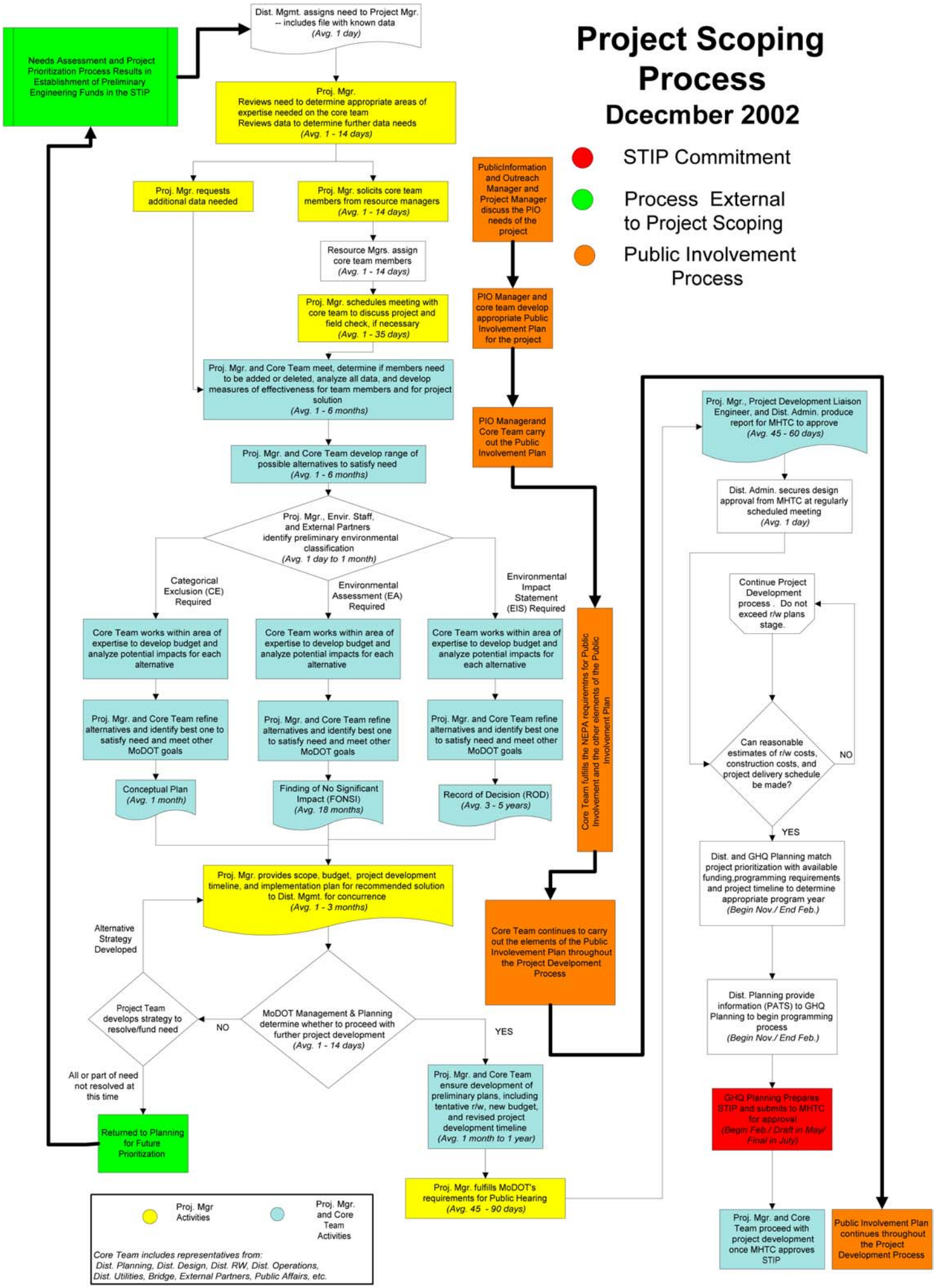


Core Team Involvement

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 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 to15 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

GOALS	IDEAS	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
Charter Outcomes	Ability to produce larger program									
	Build in efficiencies		x	x	?			?	x	x
	Balance of discretionary effort	?	x	x			x	x	x	x
	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
Bonus Outcomes	Produce the right solution	x	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 engineers, 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 mid to late February 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.

APPENDIX A

OVERVIEW OF REVISED PLANNING AND PROGRAMMING PROCEDURES

Many of the recommendations for improving the Project Scoping Process will directly affect the way that projects are defined and programmed. The recommendations that will have the greatest effect are:

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

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

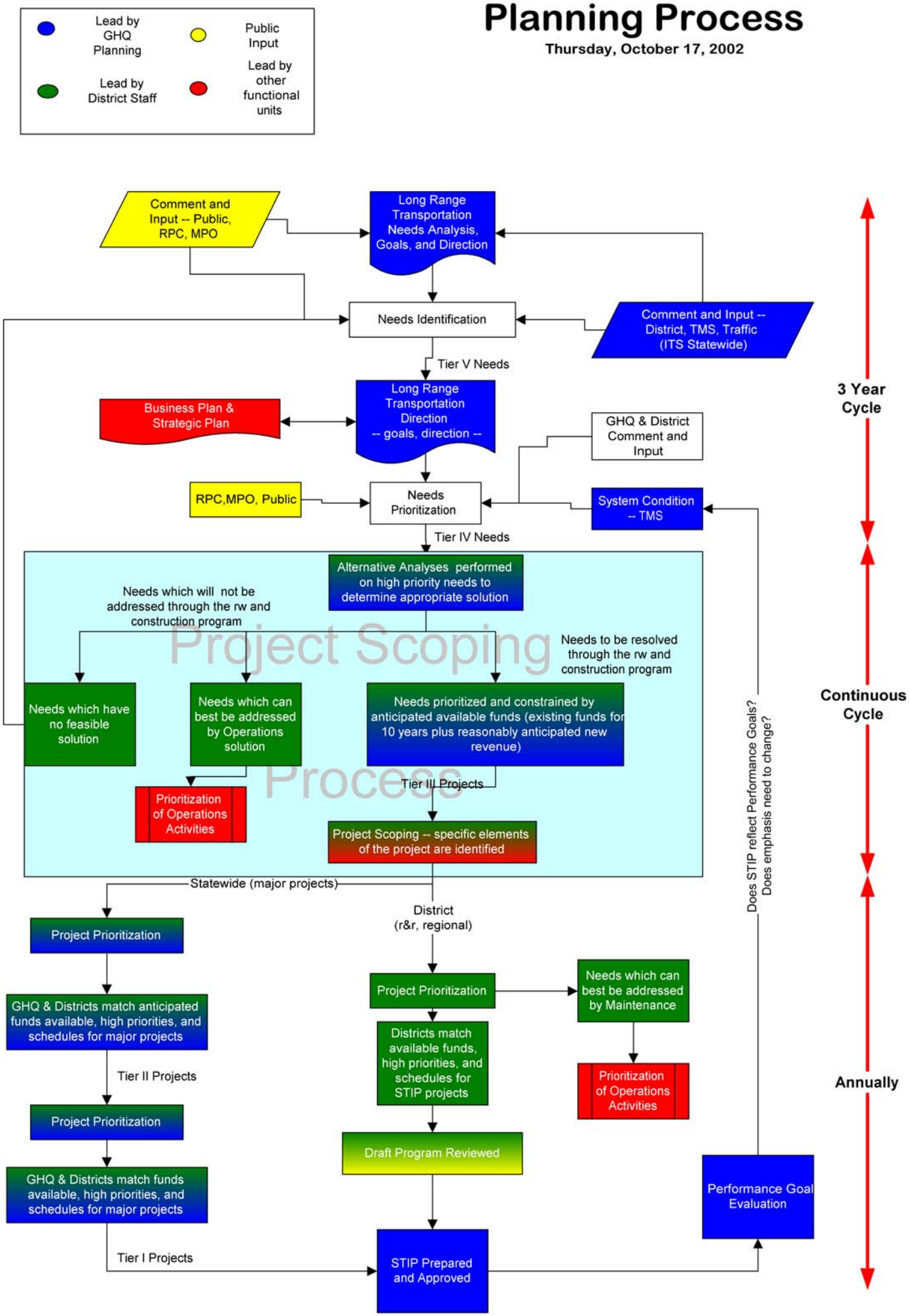
3. **Only preliminary engineering (PE) will be included in the STIP to identify a project until the Project Scoping process is complete.**

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.**

MoDOT is also in the process of re-defining the way priorities are determined and funds are distributed throughout the state. Together all of these changes have resulted in the creation of a new Planning and Programming process. This document will not attempt to fully explain the new process, but provide enough information to show its effect on the Project Scoping process. The following flowchart provides an overview of the new Planning and Programming process.

Planning Process

Thursday, October 17, 2002



As a result of incorporating the scoping recommendations, the STIP will no longer contain right of way or construction dollars for individual projects until the Project Scoping process is complete. This means that the projects will be developed to a much more detailed level prior to making STIP commitments for costs and schedule. More time will be required from identification of the need to programming of the individual project in order to allow the proper amount of development to occur.

State law requires that the STIP provide a full accounting of all funds and that individual projects be identified to the fullest extent possible. These requirements are somewhat in conflict with the new Project Scoping process that requires more time before individual projects can be identified. In order to ensure that MoDOT still meets the requirements for the STIP, the following table was developed to indicate the acceptable level of individual projects that must be identified for each year of the STIP. The percentages represent the amount of the funding in each category that must be attributable to individual projects for the given program year.

Project Specific STIP Programming Requirements

% RW and Construction Funds That Must be Project Specific in STIP
(No unspecified pots of funds)

Funding Category	Current Year	Year 2	Year 3	Year 4	Year 5
Interstate (minimum)	100%	100%	100%	50%	0%
Bridges (minimum)	100%	100%	100%	50%	0%
Pavements (minimum)	100%	100%	100%	50%	0%
Safety (maximum)	75%	50%	0%	0%	0%
Contracted Maintenance (minimum)	100%	50%	0%	0%	0%
System Operations (minimum)	100%	50%	0%	0%	0%
Major Projects (minimum)	100%	100%	100%	100%	50%
Regional (minimum)	75%	50%	0%	0%	0%

In order to meet these requirements, the identification and delivery of the need to the project manager must occur much sooner than the current process allows. For most new projects entering the STIP the need will be delivered to the project manager in the fifth year of the program. In that year only preliminary engineering funds will be shown for the individual projects. By the following programming cycle half of those projects should have the Project Scoping process completed and include individual STIP commitments for cost and delivery schedule. The remaining projects will still only reflect costs for preliminary engineering. By the third programming cycle the remaining half of the projects should have completed the Project Scoping process and be included in the STIP as individual project commitments.

This process will account for the majority of projects, but as indicted by the table some projects will require the process to be started sooner. In the case of Major Projects the fifth year of the program will need to include preliminary engineering funds to allow for the development of projects that are anticipated to be included in the STIP beyond the fifth year. These projects are normally much larger in scope and magnitude and will require much more effort to complete the scoping process. Since these projects also have a statewide significance the needs will be determined and prioritized on a statewide basis. Therefore preliminary engineering funds will be included in the STIP well in advance of the project's anticipated entry into the STIP.

In contrast to Major Projects, Safety, Contracted Maintenance, System Operations and Regional Projects are typically smaller in scale and of a more localized importance. These needs are not typically identifiable far into the future and do not require long project delivery schedules. Therefore the table includes more relaxed requirements for these categories of projects.

As mentioned at the beginning of this section this is only intended to be a brief overview of the new Planning and Programming process. More specifics on the details of how the requirements of this table and the other elements of the new Planning and Programming process will be implemented will be forthcoming. It is anticipated that an additional report will be provided to fully describe the new process in the near future.

APPENDIX B

PROJECT DEVELPOMENT MANUAL REVISIONS

SECTION 1-02 PROJECT INITIALIZATION AND PROGRAM ESTIMATING

1-02.1 PURPOSE. This section covers the program estimating process developed by the department to meet a higher level of accountability expected of MoDOT. MoDOT is expected to produce reliable and documented program estimates.

1-02.2 PROJECT ESTIMATES. Projects with a plan completion date within the five year program must have a detailed, (one cost, no range) estimate and shall be submitted to the GHQ Transportation Planning on a Project Amendment Tracking System (PATS) form. This form is part of the Notes database "PL\Project Amendment Tracking." The estimate should be updated annually as the project progresses to plan completion.

Projects with completion dates more than five years into the future should have a sufficiently detailed estimate created and submitted to GHQ Transportation Planning on a PATS form. This estimate should be generated from the most reliable information at the time. However, on rare occasions, depending on the project's size and lack of a clear scope, a project's estimate may be composed of only an estimate for the preliminary engineering during the project initialization phase. Although no ranges will be allowed, this preliminary engineering estimate will permit the project to be added to the program.

A project estimate consists of four major cost components:

- preliminary engineering
- right of way
- construction
- construction engineering

Please refer to Subsection 1-02.8 for additional details to be considered in estimate preparation.

1-02.3 MANAGEMENT INVOLVEMENT. Involvement by district senior management and the project team at early stages in the estimate process is necessary to produce reliable estimates. Meetings and field checks scheduled at the earliest possible stage will allow input from design, right of way and construction personnel, the project manager, and if necessary, the district engineer. Input from operations personnel, area engineers, and GHQ personnel may also be included, if appropriate. The goal is to clearly define the scope of the project at the earliest time possible, to produce an estimate less susceptible to project growth prior to the plan completion commitment date.

The district engineer is responsible for maintaining the consistency of the estimates' documentation. The district engineer should establish a review team that will implement a plan to ensure quality control of all project estimates. It is recommended this team include the transportation planning coordinator, project development engineer, right of way manager, transportation project managers, and other personnel deemed necessary. This team is not expected to inspect each estimate in detail, but rather establish consistent procedures to annually update the estimates of the projects. The team should work to ensure these processes are applied to each project so the best possible estimate is obtained. The team should ensure the project's scope is clearly and completely defined, and documentation justifying the assumptions made for the cost-per-mile [km] factors are used and placed in the project folder.

General Headquarters will provide quality assurance to ensure consistent project program estimates are produced throughout the department. This plan will include periodic reviews of the project files, the program estimating process, the district's quality control plan, and the district's plan for annual updating of the program estimate.

1-02.4 PROJECT FOLDER FILES. Each project shall have an estimate file folder with a copy of the right of way and program estimate histories with documentation of assumptions made for the specific scope of work. This folder shall be reviewed and revised at project development milestones or at least once per year. The documentation

shall include assumptions made, maps, photos, as-built plans, functional classification, design criteria, scope of work and a copy of cost data used to support the estimate. The source of unit cost or cost-per-mile [km] data shall be included, (such as estimate software, data from Figure 1-02.1, unit bid price books, or some other reputable source.)

Prior to the completion of the preliminary plan, a cost-per-mile [km] type of estimate is suitable and acceptable. Districts shall note deviations from the estimated costs given in Figure 1-02.1. Project development, after preliminary plan approval, shall have the project estimate based upon pay item quantities. All estimate data sheets and the PATS form shall be dated when prepared and include the estimator's name. A copy of each PATS form prepared for the project shall remain in the estimate file. This procedure shall be followed for all projects, whether designed internally or by a consultant.

Variations of the Miscellaneous and Utility Costs percentage (see Figure 1-02.1) shall be documented. Cost adjustment factors not recognized in Figure 1-02.1 shall not be used to inflate estimates. Examples of factors that are not permitted include estimating uncertainties, errors, omissions, and local "adjustment" factors.

The folders shall be retained in a central filing system from the time of project initialization until final payout of construction costs. The name of the person responsible for the folder, the folder's location, and the general contents should be maintained by the district. The project folders shall include awarded bid costs, change orders and incidental costs.

1-02.5 SCOPE CHANGES. The scope of a project refers to the elements and limits of a project that are so well defined that accurate costs and project delivery schedules can be forecasted. A change to the scope of the project will result in a deviation from the estimated cost and delivery schedule.

1-02.5 (1) TYPES OF SCOPE CHANGES. There are two kinds of scope changes: non-major scope changes which must be approved by the district engineer, and major scope changes which must be approved by the director of transportation planning and the director of project development. These scope changes are summarized in Subsections 1-02.5(1)(a) and 1-02.5(1)(b).

1-02.5 (1) (a) NON-MAJOR SCOPE CHANGES REQUIRING APPROVAL BY THE DISTRICT ENGINEER.

1. Any changes to the elements or limits of a project resulting in a maximum increase or decrease of $5,000,000 or up to 10% of the estimated cost of the project.

2. Any change(s) to the elements or limits of a project that delay the delivery of a project in the STIP by a quarter within the same state-fiscal year. (Note: After a scope change approval, the district must follow the STIP amendment policy in order to have the project's letting / award date changed in the program.)

The details of the proposed scope change, the reasons why the change is necessary, and the projected impacts to the project's budget and delivery schedule should be included in the form of a letter from the project manager and addressed to the district engineer. A signature line for approval by the district engineer should also be included.

1-02.5 (1) (b) MAJOR SCOPE CHANGES REQUIRING APPROVAL BY THE DIRECTOR OF TRANSPORTATION PLANNING AND THE DIRECTOR OF PROJECT DEVELOPMENT.

1. Any changes to the elements or limits of a project resulting in an increase or decrease of greater than $5,000,000 or greater than 10 % of the estimated cost of the project.

2. Any change(s) to the elements or limits of a project that delay the delivery of a project in the STIP by one state-fiscal year. (Note: After a scope change approval, the district must follow the STIP amendment policy in order to have the project's letting / award date changed in the program.)

The details of the proposed scope change, the reasons why the change is necessary, and the projected impacts to the project's budget and delivery schedule should be included in the form of a letter from the district engineer and addressed to the directors of project development and transportation planning. A signature line for approval by the both director should also be included.

1-02.6 REVIEW OF ESTIMATES. Estimates shall be reviewed and updated at least annually or at the following stages of project development: project initialization, conceptual plan/location study completion, preliminary plan completion, and right of way plan completion. The estimate shall be submitted to GHQ Transportation Planning annually or at the above noted project development stages with a PATS form (see Figure 1-02.2).

If, after review of the previous estimate, it is determined that no change is necessary, documentation should be included in the folder indicating the previous estimate remains valid.

If the project is to be awarded during the current year, the programmed amount will not be allowed to be revised once the annual program is finalized. In order to confirm that GHQ Transportation Planning has incorporated a submitted PATS form into the annual program, districts should check to ensure that the PATS form has been labeled "GHQ Transportation Planning Reviewed" and then also check the "Tentative" tab of the Approach file **PROGRAM.APR**.

All estimated costs shall be submitted in current dollars. Any inflation adjustment will be made by GHQ Transportation Planning, when required. Estimate revisions will be used to calculate the current cost of the program, but not be used to determine any changes in the district funding distribution.

It is important to the department that annual estimate updates be performed. These updates provide greater responsiveness to our customers and are necessary to address MoDOT's accountability issue.

1-02.7 ESTIMATE TRACKING. An inflation rate of 3% will be used for projects with a completion date within the five-year program. The updated estimate is compared to the programmed amount from the time the project first entered the five-year program. The future inflation factor will be computed by GHQ. If any project estimate exceeds the previous estimate by an amount greater than the 3% per year inflation factor (or a factor determined by GHQ), it will be assumed the scope of the project has grown. An explanation citing the reasons why a project has experienced growth shall be submitted by the district to GHQ Transportation Planning when the PATS form is submitted.

1-02.8 ESTIMATE OVERRUNS. Any district project estimate, submitted with final plans, having a magnitude greater than 3% per year above the program estimates will be investigated. Projects can reach the bid opening stage even if the district's final estimate shows the job is well above its programmed estimate. Dramatic increases in property values, discovery of hazardous waste, or other situations may warrant an estimate increase.

Estimate overruns and underruns will count toward the district's annual allocation for transportation management areas, rural preservation and rural regional funding. Corridor projects should also stay within the 3% inflation rate limit. If the final district estimate for an individual project is above its programmed estimate, the following must be accomplished before a project may reach the bid opening stage:

1. The district identifies the major cost variation(s).
2. The district takes all practical steps needed to reduce cost, including any assistance from divisions.
3. The district engineer makes a recommendation of how to proceed with the project.
4. The recommendation will be reviewed by GHQ Transportation Planning, Design, Bridge, Right of Way and Construction and Materials.

If approved, the project will be processed for bid opening. However, the cost overrun must be accounted for in the district's current Right of Way & Construction Program funding. Projects may be delayed in order to stay within the district's annual allocation.

Districts will be required to review and justify their project's final scope and estimate as detailed in Subsection 1-02.5 Additionally, the district shall provide a proposed method to ensure all projects are completed as scheduled and within annual budget limitations.

Right of way overruns will also be investigated. If the final right of way estimate is over the programmed right of way estimate, the project or other projects must be evaluated to reduce costs or scope to balance the district program budget. Right of way overruns shall be documented.

1-02.9 ESTIMATING PROCESS CHECKLIST. The scope of work shall be identified as accurately as possible at each project stage.

The project description shall identify the stage of project development and include an accurate and complete description of the scope of work involved, (i.e. grading, paving, drainage, bridge, widening, resurfacing, relocation, signals, etc.).

The following considerations are guidelines and should not be considered a complete list of items needed on a project. The district shall use the best resources available in creating an estimate. It is the responsibility of the estimator to provide an accurate and complete cost estimate. The estimator and others involved should visit the project location, if appropriate.

1-02.9 (1) DESIGN CONSIDERATIONS. Below is a partial list of design items. Other items may be considered and included in the estimate, as necessary. Possible resources for estimating prices are historical bid prices on similar projects, district refined cost-per-mile [km] prices, actual quantities with unit bid prices, construction price indices, etc.

- Grading (light, medium, or heavy) - Class A, Class C Excavation, Borrow
- Pavement - heavy, medium or light duty - include curb and gutter if applicable
- Drainage - stream crossings, closed systems, open channel
- Shoulder widening
- Resurfacing
- Signals, lighting, signing (include temporary signals)
- Temporary by-pass
- Traffic control, detours, etc.
- Pavement edge treatment
- Guardrail items
- Urban contingencies (i.e. enhancements, landscaping, etc.)
- Erosion control (seed and mulch, rock ditch liner, paved ditch, rock blanket)
- Temporary erosion control
- Mobilization
- Detention storage basins

Preliminary engineering cost estimates shall be based upon historical data for projects from the same work type (add lanes, high type resurfacing, etc.). The total of construction engineering costs (comprised of construction engineering and construction contingency) shall be 10% of construction costs. Construction engineering and construction contingency should be 7% and 3%, respectively.

1-02.9 (2) RIGHT OF WAY CONSIDERATIONS. If right of way acquisition is involved, a written request for an estimate should be made to the district right of way manager with the following information:

- Location layout (i.e. aerial photos, quad map, microfilm plans, right of way plans, etc.)
- Average right of way width and land area taken
- Proposed access controls
- Anticipated improvements to be taken
- Proposed borrow areas, parklands, wetlands

The project estimator shall obtain a right of way estimate from district Right of Way personnel, which has been developed according to the guidelines and policies of the Right of Way Manual.

1-02.9 (3) ENVIRONMENTAL CONSIDERATIONS. If environmental issues are involved, the district shall

consult GHQ Design – Environmental Studies for assistance in determining any cost.

The district shall furnish GHQ Design – Environmental Studies with the following applicable items:

- Request for Environmental Services (RES) form (see Subsection 2-03.2)
- Location layout of structures, suspected wetlands and unusual features (i.e. aerial photos, quad map, microfilm plans, right of way plans, etc.)
- Photographs

GHQ Design – Environmental Studies shall give consideration to the following items:

- Parklands
- Wetlands
- Historic structures
- Hazardous waste sites
- Threatened and endangered species
- Archeological sites
- Noise mitigation
- Socio-economic impacts

1-02.9 (4) UTILITIES CONSIDERATIONS. The designer should furnish the district utility engineer the following applicable items:

- Location layout (i.e. aerial photos, quad map, microfilm plans, right of way plans, etc.)
- Photographs

The district utility engineer shall consider the following in developing an estimate:

- Known major utilities
- Railroad crossings
- Determine if existing utilities are on existing highway right of way or private easement
- Coordinate with appropriate utility companies

1-02.9 (5) BRIDGE CONSIDERATIONS. GHQ Bridge will furnish the districts with square foot [square meter] cost estimates for the various routine structure types based on the geographic location within the state. GHQ Bridge should be contacted for assistance in estimating non-routine structures.

For early stages of a project (prior to a preliminary bridge layout), the following items shall be considered by the district design team:

- Number of major stream crossings
- Flood plain proximity to crossing location
- Earthquake design necessity
- Nearby structures that are similar
- Number of bridge rehabilitations
- Clearance requirements

CHAPTER II
PRELIMINARY DESIGN

SECTION 2-01 CONCEPTUAL STUDY

2-01.1 PURPOSE. A conceptual study is used to coordinate department thinking on the improvements to be included in a project and to obtain approval as required. The approved study is then used as the basis for further design. A conceptual study is prepared for each project in the program. The format of the study is dependent on the proposed improvements.

A conceptual study consists of a written report as a 3R conceptual study report or a 4R pavement rehabilitation analysis and conceptual study report or a location study/environmental report. Location study/environmental reports are discussed in Section 2-02.

2-01.2 CONCEPTUAL STUDY REPORT. A conceptual study report, using the format given in Figure 2-01.1, is prepared by the district for projects of the following nature:

- Relatively small projects providing specific improvements such as signalization, lighting, signing, or minor geometric revisions.
- Projects such as bridge replacements on rural low volume roads where it is obvious that the only practical corridor location is the existing or adjacent to the existing corridor.
- Projects environmentally classified as categorical exclusions (CE).
- Projects pending classification as a categorical exclusion (CE2) must have the justification approved by FHWA, which results in a CE determination, prior to preparation of the conceptual study report. The CE2 form is available on the LAN. (If the CE2 is determined by FHWA to be an EA, a location study/environmental report is required. See Section 2-02.)

For projects such as signalization projects, the conceptual study and preliminary signal layout may be combined in one submittal. Projects that primarily consist of improvements to the driving surface and shoulders, with limited geometric improvements, require the preparation of a specialized conceptual study in the form of a 3R or 4R report.

There may be some CE or CE2 projects for which it is advisable to prepare a location study report rather than a conceptual study report. This should be considered in the case of a highly controversial project, or one in which two or more alternatives is being considered that would have different impacts on the community, such as locating an interchange. This process is detailed in Subsection 2-02.3 (1). In this case, for a CE2 project, the location study report is prepared concurrently with the CE2 form to aid in FHWA determination for a CE or an EA classification.

Approximately 2 months prior to preparing a conceptual study report, the district sends two copies of a written request for environmental services to GHQ Design requesting project scoping, screening, and early constraint identification. A form for this use (see Figure 2-02.2) can be found in the Environmental/Cultural Resources category of the Design forms on the computer system. Preliminary scoping may have been completed in order to obtain a CE classification from a CE2, however, it is necessary to request more detailed scoping to complete the conceptual study report.

The conceptual study report describes the project purpose and need, location and proposed improvements, explains any variations from the approved program, and identifies existing and proposed features of simple bridge replacements or other minor road construction projects. In a few instances, a project that uses a conceptual study report format will have alternates being considered. In this case, all alternates considered should be documented in the conceptual study report in a manner similar to a location study report.

Accident data and safety enhancements should be discussed in the report. The accident data is obtained from the Transportation Management System (TMS). The calculation for the project accident rate is shown in Subsection 2-01.5. The accident data is carefully analyzed by the designer. Any unusual circumstances are noted and recommendations for correction are proposed. Safety enhancements such as guardrail or bridge modification and the need for bicycle/pedestrian facilities are also discussed.

The conceptual study report should also discuss the disposition of the existing route. This discussion should document the anticipated disposition of all sections of the existing route in a manner similar to a location study report. A description of the

available options for disposition is listed in Subsection 2-02.4 (6) (c).

If the current estimated cost is different than the programmed cost, the difference is explained in the remarks section of the report.

All environmental work completed prior to the conceptual study report is summarized and included in the conceptual study report. The conceptual study report then discusses any unusual features or anticipated difficulties to be encountered with the project, such as known archaeological sites, historic bridges, wetlands, Section 4(f) or Section 6(f) lands, hazardous waste sites, or other environmental issues as provided by GHQ Design. Current cost estimates, borrow information when required, and any other pertinent information to the project that is not covered elsewhere are also provided under the remarks section of the report.

A location sketch, existing and proposed typical sections and other documents as necessary, are attached to show the proposed improvement.

Following the signature of the preparer, a section is included for the recommendations or comments of the District Engineer. If necessary to add more detail, the District Engineer's comments may be submitted with a separate letter. Following that, signature and date lines are included to indicate the District Engineer's approval of the study.

Minimum design standards are given in Figures 4-04.1 and 4-07.1. Justification for varying from these standards must be submitted on a Design Exception Information form, as discussed in Subsection 2-01.8, to GHQ Design for approval.

Approval and submittal of the conceptual study report is detailed in Subsection 2-01.9

2-01.3 PAVEMENT REHABILITATION PROJECTS – NON-FREEWAY ROADWAYS. A 3R conceptual study report form, as shown in Figure 2-01.2, is prepared by the district for all Resurfacing, Restoration and Rehabilitation (3R) on non-freeway roadways. All 3R projects are designed to meet or exceed minimum design standards as given in Figures 2-01.3 and 2-01.4 for rural highways and Figure 2-01.5 for urban highways. The values shown in Figure 2-01.5 apply to any portion of a 3R project located within the limits of a city or town. Justification for varying from these standards must be submitted on a Design Exception Information form, as discussed in Subsection 2-01.8, to GHQ Design for approval.

Approval and submittal of the 3R conceptual study report are detailed in Subsection 2-01.9.

2-01.3 (1) PROJECT INFORMATION. Any difference in the project information from that programmed is explained in the letter of transmittal.

2-01.3 (2) TRAFFIC DATA. The designer requests traffic data from GHQ Transportation Planning or the TMS database. The data needed is shown on Figure 2-01.2.

2-01.3 (3) PAVEMENT DATA. The district recommends the rehabilitation method. Any difference in the proposed pavement or shoulder structure from that shown in Section 6-04 and Section 6-05 is explained in the letter of transmittal.

The Strategic Highway Research Program manual titled "Distress Identifications Manual for the Long-Term Pavement Performance Project" is used to describe the pavement distress. The cause of the distress, such as inadequate pavement structure or moisture related damage, is noted if known. An estimated amount of pavement repair is given (see Subsection 6-05.4). It should be noted that all pavement repairs must be doweled or tied into adjoining pavement to be eligible for federal funds. Badly deteriorated concrete pavement may need to be replaced in its entirety.

If the distresses are such that the district is unsure what the rehabilitation strategy should be for a given project, a written request should be submitted to GHQ Project Operations to conduct a pavement evaluation. Accompanying the written request should be, at minimum, the information required in Part 1 of a 4R Pavement Rehabilitation Analysis Data and Conceptual Study Report, with the exception a straight-line profile of the existing pavement for each direction of roadway is not required. The designer should allot 4 to 6 weeks for the evaluation to be completed and recommendations to be returned to the district.

2-01.3 (4) GEOMETRIC DATA. The horizontal alignment, vertical alignment, and other features of the highway section are compared to adjoining sections. Any items within the clear zone are listed. The design exceptions reflect the minimum distance to objects in the clear zone.

2-01.3 (5) ACCIDENT DATA AND SAFETY ENHANCEMENTS. The accident data is obtained from the TMS database. The calculation for the project accident rate is shown in Subsection 2-01.5. The accident data is carefully analyzed by the designer. Any unusual circumstances are noted and recommendations for correction are proposed. Safety enhancements such as guardrail or bridge modification, and the need for bicycle/pedestrian facilities are also discussed.

2-01.3 (6) PROJECT COST DATA. If the current estimated cost is different than the programmed cost, the difference is explained in the letter of transmittal.

2-01.4 PAVEMENT REHABILITATION PROJECTS FOR FREEWAYS. A 4R pavement rehabilitation analysis and conceptual study report form, as shown in Figure 2-01.6, is prepared by the district for all Resurfacing, Restoration, Rehabilitation and Reconstruction 4R projects on interstates and freeways. For these roadways the additional option of reconstructing the pavement must be evaluated. Part I of the form is filled out and submitted to GHQ Project Operations, with a copy to GHQ Design, in order to initiate the pavement rehabilitation analysis. If only one pavement rehabilitation method seems appropriate or a method is preferred by the district, supporting information should be provided with Part I of the 4R report. The rehabilitation analysis by GHQ Project Operations will not be conducted until the project is in the third year of the program, and is preferred to be conducted when the project is in the second year of the program.

Once the rehabilitation analysis has been conducted and returned to the district, Part II of the form is completed and non-paving costs are prepared for each alternate provided in the rehabilitation analysis. Part II and the non-paving costs are submitted to GHQ Project Operations, with a copy to GHQ Design. All 4R projects are designed to meet or exceed minimum design standards as given in Figure 4-04.1. Justification for varying from these standards must be submitted on a Design Exception Information form, as discussed in Subsection 2-01.8, to GHQ Design for approval.

After review of the information and approval of the requested design exceptions, GHQ Project Operations will submit Parts I and II of the 4R report, the rehabilitation analysis, and all costs (paving and non-paving) to FHWA for approval. GHQ Design will submit the approved Design Exception Information form to FHWA for approval. Upon approval by FHWA, copies of the approval letter will be sent to the district by GHQ Project Operations, and GHQ Design in the case of a design exception, with copies of the approved documents.

2-01.4 (1) PROJECT INFORMATION. Any difference in the project information from that programmed is explained in the letter of transmittal.

2-01.4 (2) TRAFFIC DATA. The designer requests traffic data from the Office of Transportation Management Systems. The data needed is shown on Figure 2-01.6.

2-01.4 (3) EXISTING PAVEMENT DATA. The Strategic Highway Research Program manual titled "Distress Identifications Manual for the Long-Term Pavement Performance Project" is used to describe the pavement distress. The cause of the distress, such as inadequate pavement structure or moisture related damage, is noted if known. An estimated amount of pavement repair is given (see Subsection 6-05.4). It should be noted that all pavement repairs must be doweled or tied into adjoining pavement to be eligible for federal funds. Badly deteriorated concrete pavement may need to be replaced in its entirety.

Any items that might restrict the addition of pavement thickness to the existing traveled way are noted. These might include drainage structures, curbing, median barriers, right of way restrictions, or other special conditions.

The straight line profile identifies the location of all bridges, including overpasses, by log mile and station, and indicates at each location the field measured vertical clearances. It also states if the bridge is to be used in place, rehabilitated or reconstructed. Figure 2-01.7 gives an example of a straight line profile.
An example of a sketch showing existing lanes, additional lanes proposed under the project, and additional lanes programmed in the future is shown in Figure 2-01.8. The width of the median and location of existing bridges, including overpasses, is also shown on this sketch. The location of each item is identified by log mile.

2-01.4 (4) PROPOSED PAVEMENT DATA. The proposed pavement data is submitted by the district after the rehabilitation method has been determined by GHQ Project Operations. If the proposed pavement rehabilitation method is different than the one recommended by GHQ Project Operations, justification must be provided.

2-01.4 (5) GEOMETRIC DATA. The horizontal alignment, vertical alignment, and other features of the highway section are

compared to adjoining sections. Any items within the clear zone are listed. The design exceptions reflect the minimum distance to objects in the clear zone.

2-01.4 (6) ACCIDENT DATA AND SAFETY ENHANCEMENTS. The accident data is obtained from the TMS database. The calculation for the project accident rate is shown in Subsection 2-01.5. The accident data included in Part II is used to determine whether a special surface needs to be applied to reduce the accident rate. The accident data is carefully analyzed by the designer. Any unusual circumstances are noted and recommendations for correction made. Safety enhancements such as guardrail or bridge modification, and the need for bicycle/pedestrian facilities are also discussed.

2-01.4 (7) PROJECT COST DATA. If the current estimated cost is different than the programmed cost, the difference is explained in the letter of transmittal.

2-01.5 ACCIDENT RATE CALCULATION. An accident rate is calculated for each project and included in the conceptual study.

The formula for the accident rate is as follows:

- accident rate = $\frac{\text{no. of accidents x 100,000,000}}{\text{no. of yrs. x 365 x weighted ave. ADT x length in miles}}$

- accident rate (5 year) = $\frac{\text{5 yr. total accidents x 54,794.52}}{\text{weighted ave. ADT x length in miles}}$

The accident rate yields a result in accidents per hundred million vehicle miles traveled (HMVMT). The number of accidents is the total number of accidents in the study period. For conceptual reports a five year study period is used, utilizing the last five full years of traffic accidents. The ADT and accident data is obtained from the TMS database maintained by GHQ Transportation Planning. The calculated accident rate is compared to the five year average statewide rate for a similar class of highway as obtained from GHQ Transportation Planning or found in the Traffic Accident Statistics Manual from GHQ Transportation Planning.

2-01.6 BASIC LIGHTING. Basic lighting is provided along the major road at any interchange within the limits of a 3R or 4R project that meets the warrants given in Section 8-01. If warranted, basic lighting is shown as part of the scope of the project and included on the Project Initialization / Estimate Form.

2-01.7 GUARDRAIL. Criteria for upgrading guardrail are given in Subsection 4-09.7 (2).

2-01.8 DOCUMENTATION OF DESIGN EXCEPTIONS. Documentation of design exceptions is necessary for the department to be able to defend itself from litigation. Litigation may take place many years after the actual construction and permanent documentation is necessary to determine the justification for design exceptions.

Design exceptions consist of items that vary from the "Project Development Manual". In most cases the need for design exceptions are the result of the inability to reasonably meet the minimum design standards or criteria specified in this document. However, there are occasions where the improvements will greatly exceed the normal standards recommended for that type of improvement. These variations must also be documented through the design exception process. When there is doubt if a design exception is required, the Project Development Liaison Engineer should be consulted.

The request for traveled way design exceptions must be initiated and signed by the project manager in charge of the project. If the project is being designed by a consultant, the consultant's project manager should initiate the request and sign the design exceptions form first. All consultant design exceptions are reviewed by the district and signed by the district's project manager prior to submittal to GHQ Design. Design exceptions for bridge items initiated by GHQ Bridge should adhere to the following process:

1. GHQ Bridge prepares the design exception information form (see Figure 2-01.9). NOTE: GHQ Bridge project managers do not sign this form.
2. GHQ Bridge project managers should transmit, electronically if possible, the design exception information form to the district project managers for review and signature.
3. District project managers will submit the design exception information form to GHQ Design for final processing.
4. GHQ Design will be responsible for obtaining approval signatures as necessary and furnish the district and GHQ Bridge with copies of the final approved document.

Requests for design exceptions are made when the need first arises; specifically at submittal of the conceptual study, preliminary plan, right of way certification, or plans, specifications, and estimate (PS&E).

The Design Exception Information form shown in Figure 2-01.9 is used to request design exceptions. Additional supplemental sheets may be attached as needed. Whenever minimum design standards cannot be met, data for only those substandard items is listed. This data includes the existing feature (if applicable), the minimum design standard for that feature, the proposed feature, and the location of that feature. The column shown for existing features is not applicable to new construction. The appropriate values for minimum design standards are shown in the second column. The design standards for new construction on rural highways and 4R projects are given in General Design Data Notes (Figure 4-04.1). Design standards for construction of new urban highways are given in Figure 4-07.1. The minimum rural design standards for 3R projects are given in Figures 2-01.3 and 2-01.4, and the minimum urban design standards for 3R projects are given in Figure 2-01.5. On urban projects, turning lane width and whether the pavement is curbed or uncurbed are noted on this form. A Design Exception Information form is not required if all minimum design criteria are followed.

All requests must contain reasons to justify the exceptions. It is imperative that the justification be sufficiently complete to clearly reflect that reasonable care was exercised by the designer in the selection of a particular highway design. It should be kept in mind when writing the justification that design exceptions arise because it is impractical or impossible to reasonably meet a specific design standard. If the standard can be reasonably met, then the item in question should be built to standard. The justification may include appropriate economic analysis, discussion of applicable accident location and type or discussion of avoidance of Section 4(f) or Section 6(f) lands. The justification should support the concept that maximum service and safety benefits were realized for the cost invested. Engineering judgment should be used when balancing the economic and engineering reasons for the justification. A design exception is based on sound engineering judgment rather than an attempt to save cost.

All requests are submitted to GHQ Design, where the Project Development Liaison Engineer reviews and forwards them to the State Design Engineer. After approval by the State Design Engineer (or the State Bridge Engineer for bridge items only), the Project Development Liaison Engineer notifies the District and/or GHQ Bridge. Design exceptions on “non exempt” projects (interstate, major bridge and other special projects) are also required to be approved by FHWA. The Project Development Liaison Engineer will submit the approved design exceptions to FHWA when required.

Changes in project scope, design criteria, standards, or general design policy could result in changes to design exceptions previously submitted. In this case, an amended Design Exception Information form must be submitted to GHQ Design for approval. The amended form should include all exceptions previously approved. The letter of transmittal indicates if prior design exception approval was given.

GHQ Design maintains the design exceptions in a permanent project file. A copy of the form is also kept in the district file.

2-01.9 CONCEPTUAL STUDY REPORT APPROVAL AND SUBMITTAL. The District Engineer has the authority to approve all project specific details as contained in the right of way and construction program for projects that meet the requirements to use a conceptual study report, 3R conceptual study report or 4R conceptual study report. For projects requiring a location study/environmental report, the approval and submittal requirements are described in Section 2-02. This approval by the District Engineer is contingent upon the approval of any design exceptions by the State Design Engineer or approval by the FHWA as described below.

All "non-exempt" projects (interstate, major bridge or certain special projects) require federal oversight and require the additional approval of the conceptual study report by the FHWA. For these projects, the conceptual study report, 3R conceptual study report, or 4R conceptual study report and any requested design exceptions are submitted to GHQ Design. GHQ Design, upon approval of the design exceptions, will send a transmittal letter and necessary information to FHWA for review and approval. Upon receipt of FHWA approval, GHQ Design will inform the district to proceed with the design of the project and forward with a copy of the approval action.

"Exempt" projects (all other projects) do not require direct federal oversight and will therefore not be submitted to FHWA for approval. The District Engineer may approve the conceptual study report, 3R conceptual study report, or 4R conceptual study report for these projects as long as MoDOT design criteria established in this document are followed. A copy of these reports should be forwarded to GHQ Design. For those projects where a design exception is required the District Engineer’s approval of the report is contingent upon approval of the requested design exceptions. The district should submit the request for design exceptions to GHQ Design with a copy of the report. Upon approval of the design exception, the district shall

have authority to proceed with the design of the project.

In both of these situations, the district will provide GHQ Design and Project Operations a copy of the approved conceptual study report.

2-01.10 AIRPORTS. If a highway improvement is located within 2 miles [3 km] of an existing airport, a letter should be submitted to GHQ Design as directed in Subsection 2-06.8.

2-01.11 SEMA FLOOD BUYOUT PROGRAM. The State Emergency Management Agency (SEMA) has the ability to place permanent deed restrictions on lands located in floodplains. These restrictions require open space land usage only, no structures, roadways or fills are allowed. Figure 2-01.10 contains a list of cities and counties which have SEMA buyout properties. If a project encroaches on any of these jurisdictions, an official with the city or county must be contacted to identify the exact location of the deed restricted properties.

2-01.12 PROJECT SCOPING CHECKLISTS. In order to ensure the scope of a project is as fully defined as possible prior to programming right-of-way and construction funds, a Project Scoping Checklist is to be completed. The checklist should be filled out as completely as possible at the initial scoping meeting. As project development progresses the project manager and project core team should continue the scoping process. Remaining items on the checklist will be addressed as project development progresses. Space is provided on the checklist to document progress or completion of items. The Project Scoping Checklists can be found in the Project Scoping category of the design forms.

Each member of the project core team should maintain their respective Project Scoping Checklist relative to their functional unit. The project manager maintains the overall Project Scoping Checklist. The project manager may use the checklists of the core team to aid them in completing the overall Project Scoping Checklist.

The checklist should be available to district and General Headquarters management to serve as practical documentation of the scoping of the project. The project manager should be readily able to produce the checklist upon request. The project manager should retain copies of all the checklists as part of the project documentation file.

2-01.13 DRAFT PROJECT SCOPING MEMORANDUM FOR MAJOR PROJECTS. Following approval of the conceptual plan for Major Projects, the Draft Project Scoping Memorandum should be completed by the project manager and submitted to the project development liaison engineer (PDLE) for review and comment. The Draft Project Scoping Memorandum can be found in the Project Scoping category of the design forms.

The memorandum summarizes the pertinent information of the project and certifies the scope is as complete as possible at that time. It also serves as an initial point of concurrence between the district and the General Headquarters.

After the PDLE has reviewed and commented upon the memo, the project manager will submit the memorandum to the district engineer for approval. Following the district engineer's approval, the project manager will forward the memorandum to the PDLE for approval by the Directors of Planning and Project Development.

CHAPTER II
PRELIMINARY DESIGN

SECTION 2-06 PRELIMINARY PLANS

2-06.1 PURPOSE. A preliminary 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.

The preliminary plan is a design tool and is prepared to develop and convey basic design criteria, basic geometric details and recommendations on which the detail plans are to be developed.

2-06.2 PROCEDURE. Preliminary plans are prepared for all projects by the district. The preliminary plan should be prepared once horizontal and vertical alignment and tentative right of way limits have been established. Where the horizontal alignment is to tie into existing roadways or alignments, the tie location should be based on field survey measures and verifications. The districts should obtain property ownerships at the earliest possible date and if possible the ownership should be obtained while the preliminary plan is being prepared. The soil survey should be started as soon as possible so as not to delay the completion of the preliminary plan. This should be done with a minimum of field survey staking until the preliminary plan has been completed. Basic design criteria and major geometric details shown on the preliminary plan are not changed during the development of detail plans without coordination with General Headquarters Design. Completion of the preliminary plan allows the district to proceed with the public hearing.

A preliminary plan showing topographic features, including major overhead and underground utilities, basic design criteria, proposed horizontal and vertical alignment, proposed geometric details including interchanges, intersections, bypasses, geological features that have a significant effect on location or design, major drainage features, traffic data and proposed typical sections are prepared. For conventional surveys, the survey centerline and profile is shown on the preliminary plans. On photogrammetric surveys the proposed centerline is drawn on the preliminary plan utilizing targets or existing topography. The centerline is not precisely computed or staked in the field until after approval of the preliminary plan. For photogrammetric surveys, preliminary plan profiles are taken from the digital map models.

Property lines and owners, soils information, and other required details are also shown. If limited access or fully limited access right of way is involved, points of access are shown. Points of access should be developed in coordination with district Right of Way and Legal staff. For fully limited access right of way projects where construction will be staged and the ultimate facility will not be completed for a number of years, careful consideration is given to providing temporary access points for the initial project. For urban projects more detail including proposed width and percent grade for entrances may be desirable.

Minimum design standards are given in Figures 4-04.1 and 4-07.1. For variances from design standards, a Design Exception Information form must be prepared and submitted as discussed in Subsection 2-01.8.

2-06.2 (1) COORDINATION. Project Development Liaison Engineers and other General Headquarters Design personnel are available to review, advise and assist the district during the preparation of the preliminary plan.

2-06.2 (2) TRAFFIC OPERATIONS. Close liaison with the District Traffic is extremely important for traffic considerations. Throughout the development of the preliminary plan and the design plans, the district traffic engineering personnel are consulted to ensure proper traffic operations. Careful consideration is given to the recommendations made by traffic personnel and those recommendations agreed upon are incorporated into the design plans.

2-06.3 PREPARATION. The preliminary plans may be prepared in plan sheet format (22" x 34" [560 mm x 865 mm]) or on roll plan profile tracings plotted to a scale of 1" = 200' [1:2000] for rural areas, and 1" = 100' [1:1000] or 1" = 50' [1:500] for urban areas. A vertical scale of 1" = 10' [1:100] or 1" = 20' [1:200] is used for the profile of both urban and rural areas. The length of roll plans should be held to a maximum length of 30 ft. [9 m]. If a project requires a longer preliminary plan, the plan should be broken into two sections. When a photogrammetric survey is made, the district will be furnished a plan and profile tracing or a reproducible base map to the proper scale along with the

electronic model data to be used in preparing the preliminary plan. For short projects, such as bridge replacements, the use of plan sheets is recommended for the preliminary plan.

2-06.3 (1) METHODS. The plotting of alignment and profiles is planned to minimize the number of breaks. Sufficient room is reserved at the beginning and end of the preliminary plan for title, typical sections and basic design criteria. CADD generated preliminary plans should be developed when feasible. Neatness is encouraged and good legibility is required.

2-06.3 (2) TOPOGRAPHY. All important topographic features are indicated so that alignment controls are evident in reviewing the preliminary plan. Cemeteries, Section 4(f) or 6(f) land, major utilities (underground and overhead), buildings, quarries and other such features are indicated along with the meander and direction of flow of streams, creeks and lesser draws. Land lines and descriptions are indicated along with village and city limits.

2-06.3 (3) NORTH POINTS AND PROFILE ELEVATION DATUM. North points properly orientated to the centerline are indicated on each sheet, or at the beginning and end of the preliminary plan, at approximately one-mile [one-kilometer] intervals, and adjacent to all breaks in the centerline. The elevation datum on which the profile is plotted is also indicated on each sheet, or at the beginning and end of the preliminary plan, at approximately one-kilometer (one-mile) intervals, and in both directions at all breaks in the profile.

2-06.3 (4) RIGHT OF WAY. Tentative right of way lines are included on the preliminary plan, along with property owners and property lines. The right of way lines are approximations of those which will be required to construct the improvement in accord with the details recommended on the preliminary plan. The following note is placed near the typical section on the preliminary plan: "**THE DESIGN GUIDE FOR THE WIDTH OF RIGHT OF WAY FOR THIS PROJECT WILL BE _____ FEET [METERS]. MORE OR LESS RIGHT OF WAY MAY BE SECURED TO SATISFY THE REQUIREMENTS OF THE DESIGN FEATURES OF THIS HIGHWAY.**" When controlled access right of way is to be acquired, the note shall include the statement: "**CONTROLLED ACCESS RIGHT OF WAY IS TO BE ACQUIRED FOR THIS PROJECT**" or "**PARTIAL CONTROLLED ACCESS RIGHT OF WAY IS TO BE ACQUIRED FOR THIS PROJECT**". When fully controlled access right of way is to be acquired, the note shall include the statement: "**FULLY CONTROLLED ACCESS RIGHT OF WAY IS TO BE ACQUIRED FOR THIS PROJECT**".

2-06.3 (5) TYPICAL SECTIONS. The typical section for the main line roadway should be shown at the beginning of the preliminary plan. A typical section showing a superelevated section will not be necessary. The typical section is drawn to scale and in sufficient detail to plainly indicate the standard to which the roadway is being planned. Where more than one typical section is required, the limits to which each section is applicable is plainly indicated. The typical sections are complete except for surface and base types and thicknesses. This information is determined in accordance with methods outlined in Chapter VI. The district may recommend a surface type and type of stabilized shoulder (see Subsection 2-06.3 (13)), but notations on the preliminary plan are restricted to light, medium or heavy duty.

Typical sections for other than the main line roadway, such as ramps, crossroads, supplementary routes, service roads, outer roadways, bypasses, etc., should be shown on the preliminary plan in the vicinity of the proposed road or ramp.

2-06.3 (6) TITLE. The preliminary plan is properly titled on the title sheet if prepared on plan sheets, or at both ends if prepared on a roll. If the preliminary plan includes revisions or modifications to a previously approved preliminary plan, it should be marked and titled "Revised". The design speed, design traffic data and functional classification are indicated adjacent to the title.

2-06.3 (7) GRADES. The tentative grade line is indicated on the profile section. Those topographic features and improvements which establish elevation controls are taken into consideration. The grade line should provide balanced earthwork insofar as it is practical to estimate a balanced grade line with the profile information and a knowledge of the location. In general, no attempt is made to establish precisely a balanced grade line, such as by measuring the areas between the profile and the proposed grade. Where the complexity of the work requires, the earthwork may be processed through the computer for use in establishing the tentative grade line, and the typical section is used without modification for special ditches, cut classification, etc. The vertical P.I. stations and elevations, as well as the rates of grade, are indicated. The length of all vertical curves, stopping sight distance at crest, and the "K" value at sag vertical curves are included. Grade and vertical alignment controls are given in Chapter IV. Passing sight distance controls and data are given in the letter of transmittal and are not noted or indicated on the preliminary plan.

2-06.3 (8) INTERSECTED ROADS. All intersected road-ways are shown, and those that are to remain open as grade intersections, separations, or interchanges are represented by centerline and profile. The stationing of the crossroad proceeds from left to right unless the crossroad is a state route on which the stationing has already been established.

Schematic details are included for all intersections in sufficient detail to indicate generally the plan for developing the intersection. The crossroad profile is plotted on the profile section of the map, and the proposed grade is shown. Grade controls for intersected roads are given in Chapter IV. The type of surface, surface width, and roadway width for the existing road are shown. The same information for proposed replacement is necessary for all intersected roads which are to remain open.

2-06.3 (9) RAILROADS. Paralleling railroads are shown where the survey is close enough that a common right of way line will be used, or where the proposed work will encroach upon the railroad right of way. Where the survey crosses a railroad, the location of the railroad, the railroad profile and railroad stationing are shown.

2-06.3 (10) INTERCHANGES. A schematic drawing showing general details for all interchanges is included. Ramp profiles and tentative grades are shown on the profile portion of the preliminary plan, or may be shown on supplemental profile sheets. The location of ramp base lines and the direction of ramp stationing are given in Chapters III and IV. The proper identification of ramps is given in Chapter IV. Preliminary plans include geometric details for all diamond interchanges. For other interchange types, additional details may be necessary as covered in Section 4-06. Acceptable preliminary plan details for interchanges are illustrated on Figure 2-06.1. Precise computation of ramp base lines and ramp stationing is not required at the preliminary plan stage. The central angles for ramp curvature are scaled from the drawings, as is the ramp stationing.

2-06.3 (11) DESIGN TRAFFIC. In addition to the main roadway design traffic volume required with the preliminary plan title, design traffic volumes are shown for interchanges and for all at-grade intersections if either or both of the crossroads have over 400 average daily traffic (ADT). If design traffic volumes indicate auxiliary turning lanes may be warranted, the district will request design turning movements from the Office of Transportation Management Systems. Discretion should be used in requesting design turning movements. Design traffic movements (ADT) and design hourly volume (DHV), or percentage of ADT for peak hour volume, are shown as a schematic diagram on the interchange layout or intersection layout.

When the preliminary plan is completed, the district requests from the Office of Transportation Management Systems the flexible and rigid equivalent single axle loads (ESAL's) for the mainline and any other roadways associated with the project requiring a pavement structural design. The request should include instructions to furnish General Headquarters Design and Materials a copy of the traffic information.

2-06.3 (12) SOILS INFORMATION. A soils survey should be requested from the district geologist as soon as the roadway template, alignment and tentative grades have been established with a reasonable degree of certainty during development of the preliminary plan.

2-06.3 (13) PAVEMENT TYPE SELECTION. A pavement type selection request should be submitted on all applicable jobs to General Headquarters Project Operations immediately after the preliminary plan has been approved. The request should be submitted in a separate letter. See Subsection 6-03.2 for details of pavement type selection requests.

2-06.3 (14) HANDLING TRAFFIC. Consideration is given to the manner of handling traffic during construction, particularly at the ends of the project or where the location crosses more important existing roads. The locations of necessary bypasses and proposed profiles are indicated on the preliminary plan.

2-06.3 (15) HIGH WATER DATA. The design high water elevation at major stream crossings is indicated on the preliminary plan since this elevation will usually control the grade in the area of the stream crossing.

2-06.3 (16) SOIL TYPES AND CUT CLASSIFICATION. The soil types are indicated by note at the top of the profile portion of the preliminary plan. The approximate strata of various cut classifications are also shown on the profile portion.

2-06.3 (17) TERMINI CONTROLS. The alignment and profile of the existing road at each end of the proposed improvement are indicated for a sufficient distance, generally at least 1000 ft. [300 m] from the ends of the improvement, to allow a proper review of the connecting alignment and grade.

2-06.3 (18) EXAMPLES. Examples showing necessary details and methods for showing details on preliminary plans are shown on Figure 2-06.1.

2-06.4 PROJECT LIMITS. It is desirable to designate limits on federal aid projects eligible for 100% federal funding and for

"Bridge Fund" limits at the preliminary plan stage. Project items eligible for 100% federal funding include highway-railroad grade separations, traffic signals, highway signing, highway lighting, guardrail and impact attenuators. Costs for guardrail and impact attenuators should total $25,000 or more to be eligible for 100% federal funding. At the time of preliminary plan approval the district establishes these project limits. These limits should be indicated as approximate because final determination of grade line can result in minor adjustments.

2-06.5 FIELD CHECKS. When a trial grade line has been roughed in on the preliminary plan, the designer should make a field check to familiarize themselves with the job and to visually check the data displayed on the preliminary plan. Other necessary field checks should be made as design progresses.

A preliminary field check should be made by the project manager and the design team (including the district right of way agent) prior to completion of the preliminary plan. The purpose of this preliminary field check is to ensure that the preliminary plan reports the district's recommended design and conforms with the environmental document.

2-06.6 APPROVAL OF PRELIMINARY PLAN. All "non-exempt" projects (interstate, bridges over 1000' [300 m] or certain special projects) require federal oversight. For these projects, the preliminary plan is required to be submitted to and approved by the FHWA. The district should submit the preliminary plan directly to the FHWA for approval. The district should provide General Headquarters Design with a copy of the transmittal letter. Attach an updated cost estimate of the project to the transmittal letter and request the FHWA to provide both General Headquarters Design with a copy of the approval letter.

For "exempt" projects (all other projects), the District Engineer may approve the preliminary plan for these projects, as long as design standards and policy established by the division are followed.

In both situations, the district will provide General Headquarters Design with three (3) copies of the approved preliminary plan.

Two copies of a written request for environmental services should be submitted with the approved preliminary plan. A form for this use (see Figure 2-02.2) can be found in the Environmental/Cultural Resources category of the Design forms on the computer system. Submission of a request for environmental services at this stage will enable earlier initiation of cultural resource compliance procedures and possibly prevent future delays.

The letter of transmittal shall contain the following information:

- Passing sight distance controls and data.
- Existing pavement type with thicknesses of surfacing and base at the connecting ends of the project.
- Brief statements on borrow or waste requirements.
- Utility concerns.
- Results of capacity studies.
- Ideas for traffic control.
- Any information necessary to explain items not self-explanatory on the preliminary plan itself.

2-06.7 DISTRIBUTION OF PRELIMINARY PLANS. Prints of preliminary plans, which are furnished by the district, are to be stamped "PRELIMINARY PLANS - SUBJECT TO CHANGE." Originals of approved preliminary plans are retained in the district. Neither reproducibles or originals shall be loaned out for printing by others. Complete preliminary plan prints are released only to local government. There is no charge for a reasonable number of prints for use by these agencies. Prints are furnished to anyone desiring coverage of individual properties, including isolated tracts at interchange areas. This includes oil companies and possible land speculators, but it is not our intent to supply them with prints of entire preliminary plans. The charge for prints to other than local subdivisions of government will be in accordance with established pricing information.

2-06.8 AIRPORTS. If a highway improvement is located within 2 miles [3 km] of an existing airport, a letter should be submitted to General Headquarters Design after preliminary plan approval. If the direction of the runways, or the elevations of the surrounding terrain, indicate there is obviously no conflict with the glide clearance (see Figure 2-06.3) at the highway crossing, a statement to this effect should be made in the letter. No further information will be required to handle the matter

with the proper authorities. However, if the direction of the runways, the proximity of the airport to the highway or the elevations of the surrounding terrain are such that the glide clearance (see Figure 2-06.3) at the highway crossing is questionable, a section of a county map of scale 1" = 2 miles [1:50 000] showing the location of the airport in relation to the limits of the proposed highway improvement (see Figure 2-06.2) should be submitted with the letter. Particular attention should be given to overhead signs and light poles. This sketch does require the signature of the airport manager. The names and locations of civil and private airports in Missouri can be obtained from the "Missouri Aeronautical Chart" available from Multimodal Operations.

2-06.9 PROJECT SCOPING MEMORANDUM. Following approval of the preliminary plan and the public meeting/hearing the Project Scoping Memorandum should be completed by the project manager and submitted to the project development liaison engineer (PDLE) for review and comment. The Project Scoping Memorandum can be found in the Project Scoping category of the design forms.

The memorandum summarizes the pertinent information of the project and certifies the scope is as complete as possible at that time. Upon approval of the memorandum, right-of-way and construction funds may be included in the Statewide Transportation Improvement Plan (STIP) with a high level of confidence that neither the scope, budget nor schedule will change appreciably. Scope changes after the approval of the Project Scoping Memorandum are subject to approval as described in Section 1-02.5, Scope Changes.

After the PDLE has reviewed and commented upon the memo, the project manager will submit the memorandum to the district engineer for approval. On Major Projects, following the district engineer's approval, the project manager will forward the memorandum to the PDLE for approval by the directors of Planning and Project Development.

APPENDIX C

PROJECT SCOPING CHECKLIST
AND
CORE TEAM MEMBER CHECKLISTS

County_____

Route _____

Job Number _____

Project Manager_____

PROJECT SCOPING CHECKLIST

(New 1-1-03)

(Add additional notes as required)

Design
- ☐ Purpose and need
- ☐ Standards
- ☐ Existing conditions
- ☐ Traffic handling
- ☐ Accident and safety issues
- ☐ Surveying and mapping
- ☐ Value Engineering study
- ☐ Design exceptions
- ☐ Public involvement
- ☐ Consider signing, signals & lighting
- ☐ Consider FHWA oversight
- ☐ Outsourcing design

Planning
- ☐ Needs
- ☐ Multimodal
- ☐ Urgency/Funding availability/Sources
- ☐ Project coordination

Environmental
- ☐ NEPA
- ☐ Parks, Public Lands, and Section 4(f)
- ☐ Noise
- ☐ Farmland
- ☐ Floodplain
- ☐ Hazardous waste
- ☐ Wetlands and other waters of the U.S.
- ☐ Threatened and endangered species
- ☐ Socioeconomic considerations
- ☐ Cultural resources considerations

Cultural Resources
- ☐ National Register eligibility
- ☐ Archeological sites

Bridge
- ☐ Rehabilitation vs. Replacement
- ☐ Outsourcing design
- ☐ Bridge type
- ☐ Bridge size
- ☐ Permits
- ☐ Traffic handling
- ☐ Retaining walls
- ☐ Box culverts

Railroads
- ☐ Type of crossing
- ☐ Temporary crossing
- ☐ Crossing upgrades

Maintenance
- ☐ Long term maintenance needs
- ☐ Existing maintenance problems
- ☐ Maintainability of new project
- ☐ Roadway maintenance
- ☐ Shoulders & approaches
- ☐ Drainage considerations
- ☐ Roadsides
- ☐ Bridge maintenance
- ☐ Snow and ice control
- ☐ Traffic control
- ☐ Safety issues

Traffic
- ☐ Urgency
- ☐ Safety/Operational issues
- ☐ Signals
- ☐ Signing
- ☐ Lighting
- ☐ Striping
- ☐ Access management
- ☐ Work zone
- ☐ ITS

Construction

- ☐ Resources
- ☐ Development in project area
- ☐ Constructibility
- ☐ Project administration
- ☐ Earthwork
- ☐ Bases & Aggregate surfaces
- ☐ Flexible pavement issues
- ☐ Rigid pavement issues
- ☐ Incidental construction issues
- ☐ Structures
- ☐ Roadside development
- ☐ Traffic control
- ☐ Minimization of construction time

Public Information and Outreach

- ☐ Develop Public Involvement Plan
- ☐ Public hearings
- ☐ Communication plan
- ☐ Ensure the steps of the PIP are Completed

Utilities

- ☐ Conceptual study
- ☐ Preliminary plan
- ☐ Right of Way plans
- ☐ Utility construction work
- ☐ Public Affairs
- ☐ Utilities
- ☐ Materials
- ☐ Legal
- ☐ Right of Way

Materials

- ☐ Slope parameters
- ☐ Borrow material
- ☐ Pavement type selection

Legal

- ☐ Adjacent impacts
- ☐ Condemnation

R/W

- ☐ Land use
- ☐ Improvements
- ☐ Relocations
- ☐ Minimization of impact
- ☐ Adequate negotiation time
- ☐ Public facilities
- ☐ Access management
- ☐ Billboards
- ☐ Estimation of Easements

For questions, comments, or suggested revisions to this checklist, please contact a Project Development Liaison Engineer

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

PROJECT DEVELOPMENT LIAISON SCOPING CHECKLIST

(Add additional notes as required)

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. While an accurate project scope is difficult to identify early in development, a careful, multidisciplinary examination of the purpose and need will produce a solid foundation upon which project development can occur.

This checklist is designed to stimulate thought on those project parameters that are sometimes overlooked and whose omission can jeopardize the integrity of the scope. At the initial scoping meeting, the appropriate core team member should fill out the checklist as completely as possible. As project development progresses, the core team member should continue to update the checklist and coordinate with the project manager. In this manner, potential changes to the project scope can be dealt with as they emerge and the scope represented by the preliminary plan will be as accurate as possible.

- ☐ Review NEPA document (ROD, FONSI, etc.) to ensure any commitments or mitigation efforts are included in the scope.
- ☐ Determine appropriate level of FHWA oversight.
- ☐ Ensure adequate and proper core team usage.
- ☐ Review conceptual study report to ensure the scope is consistent with the purpose and need.
- ☐ Review conceptual study report to ensure the scope is consistent MoDOT's long-range transportation direction. A programming exception may be required.
- ☐ Review and comment upon draft project scoping memorandum.
- ☐ Ensure the correct design criteria from Fig. 4-04.1, Fig. 2-01.3, Fig. 2-01.5, or Fig 4-07.1 of the PDM has been used to the extent possible.
- ☐ Ensure design exceptions have been approved for all criteria not meeting the appropriate standards of the PDM.
- ☐ Review preliminary plans to ensure the scope is consistent with the purpose and need.
- ☐ Review preliminary plans to ensure the scope is consistent MoDOT's long-range transportation direction.
- ☐ Review and comment upon final project scoping memorandum.

Environmental

- ☐ Determine required environmental classification. (CE, EA, EIS)
- ☐ Determine status of environmental document. (If the environmental document was approved more than three years previous, and the project remained inactive, there is a need to reevaluate the document for scope changes or changes in proposed mitigation.
- ☐ Review and approve Cultural Resource/Section 106 documentation.

Bridge

- ☐ Review and comment on Type, Size and Location (TS&L) report.
- ☐ Determine eligibility for the Highway Bridge Replacement and Rehabilitation Program.
- ☐ Verify vertical clearance with Military Traffic Management Command (MTMC).
- ☐ Consider necessary Coast Guard or Corps of Engineers permits.

Design/Roadway

- ☐ Evaluate Access Modifications to the Interstate system. (May require an Access Justification Report – see FHWA August 17, 2001 letter)
- ☐ Consider the Pavement Type Selection or pavement rehabilitation strategy.
- ☐ Check project for Proprietary/Public Interest Finding/Buy America items.
- ☐ Ensure environmental commitments from Environmental Document are included in the project.
- ☐ Check Railroad operations.
- ☐ Check Traffic Control Plan.
- ☐ Check Bicycle and Pedestrian accommodation.
- ☐ Check for ADA compliance.

Traffic

- ☐ Determine if safety upgrades are included in the project.
- ☐ Ensure accident/operational analysis has been performed.
- ☐ Ensure the project is in compliance with the Manual on Uniform Traffic Control Devices (MUTCD).
- ☐ Consider any Intelligent Transportation Systems (ITS) elements included in the project.
- ☐ Ensure the project is in conformity with the ITS National Architecture.
- ☐ Ensure the project utilizes FHWA adopted ITS Standards.
- ☐ Ensure the Conformity Documentation Checklist has been completed.

Right-of-way

- ☐ Advise MoDOT how Airspace Agreements, Functional Replacements, Hardship/Protective Purchase Acquisitions, Federal Land Transfers, and License Agreements may affect the scope of the project.

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

DESIGN SCOPING CHECKLIST

(Add additional notes as required)

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. While an accurate project scope is difficult to identify early in development, a careful, multidisciplinary examination of the purpose and need will produce a solid foundation upon which project development can occur.

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- ☐ Ensure the purpose and need of the project is being addressed.
- ☐ Verify current project data (i.e., functional classification, pavement condition, bridge condition, design criteria for existing conditions, traffic numbers, accident numbers)
- ☐ Verify current design standards information.
- ☐ Consider context sensitive design.
- ☐ Consider traffic handling.
- ☐ Ensure pubic input is considered in development of the scope.
- ☐ Examine standard design criteria vs. need for design exceptions.
- ☐ Consider signing, signals and lighting warrants.
- ☐ Consider pavement type selection.
- ☐ Evaluate need for bicycle/pedestrian facilities.
- ☐ Review ADA requirements.
- ☐ Safety Enhancements.

For questions, comments, or suggested revisions to this checklist, please contact the State Design Engineer.

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

ENVIRONMENTAL SCOPING CHECKLIST

(Add additional notes as required)

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. While an accurate project scope is difficult to identify early in development, a careful, multidisciplinary examination of the purpose and need will produce a solid foundation upon which project development can occur.

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National Environmental Policy Act (NEPA) and project timelines: The NEPA documentation required, and thus the time needed to complete the NEPA process, depends on appropriate environmental classification of the project. A project involving a four-lane relocation, major bridges, or that is controversial may require an EIS. A two-lane relocation or an add-a-lane project on new right of way may require an EA. A project with lesser impacts than those just listed may be classified as a CE.

- ☐ Consider Information that leads to an alternative analysis (see details below for each topic)
- ☐ Consider approximate timelines required for NEPA compliance (three to seven years to complete an EIS for a project expected to have a significant environmental impact, two to five years to complete an EA for a project expected to have no significant environmental impacts)

Parks, public lands, and Section 4(f): Impacts to parklands, wildlife refuges, or other publicly owned areas may qualify for Section 4(f) protection for environmental analysis and regulatory clearance. Approximate time required for conversion of public land varies greatly - check with environmental specialist.

- ☐ Is there any evidence of publicly owned land (such as recreation facilities, signage, public ownership, or easement indicated on assessor's maps) in the project area?

(The environmental specialist can conduct a limited public lands records search to find any recorded publicly owned lands).

- ☐ Were any affected public lands purchased or improved with Land and Water Conservation Fund Act, Pittman Robertson Act, or other federal grant monies?
- ☐ Can the project avoid the identified public lands? (If we impact land protected by Section 4(f), we must address avoidance and measures to minimize harm).
- ☐ What additional approvals and mitigation will be required if avoidance is not possible?

Noise: Noise analysis is performed for the final selected alternatives with noise receptors for environmental analysis and regulatory clearance.

- ☐ Are there any noise sensitive receptors (e.g., houses, schools, churches, hospitals, nursing homes, or libraries) within the project area?
- ☐ Can impacts to these receptors be avoided?
- ☐ What are the traffic counts?
- ☐ Will the project change either the horizontal or vertical alignment or the number of through traffic lanes or roadway capacity?
- ☐ Will mitigation be needed for the project?

Farmland: Farmland conversion analysis is performed for activities on farmland for environmental analysis and regulatory clearance. Approximate time required for farmland conversion analysis is four to six months.

- ☐ Does the project take any right of way, temporary, or permanent easements (does not apply to land within city limits)?
- ☐ Can impacts to farmland be avoided?
- ☐ Approximate time required for farmland conversion analysis is four to six months.

Floodplain: Floodplain impacts are identified for environmental analysis and regulatory clearance.

- ☐ Does the project impact 100-year (base) floodplain or regulatory floodway? (The environmental specialist can conduct a FEMA Flood Hazard Map search).
- ☐ Can the project avoid 100-year floodplain and/or regulatory floodway?
- ☐ Will permits from SEMA or mitigation be necessary?
- ☐ Are flood-buyout properties present? (Development of these areas are restricted to open-space preservation, compatible recreation, and/or wetland mitigation).

Hazardous Waste: Hazardous waste sites are identified for environmental analysis, regulatory clearance, and avoidance of legal liability and clean up cost.

- ☐ Are there any gasoline stations, waste sites, solid waste dumps, or industrial sites within or near the project area? (The environmental specialist can conduct a records search to identify known or potential hazardous waste locations).
- ☐ Can the project avoid any identified sites?
- ☐ What types of remediation, clean up, and/or monitoring will be needed for the project?
- ☐ **Wetlands and other Waters of the U.S.:** Waters of the U.S. are identified for environmental analysis and regulatory clearance. Approximate timelines required for Section 404 and 401 permits processing are six months for a nationwide permit and one year for an individual permit.

- ☐ Does the project area have any streams, rivers, lakes, ponds, springs, or areas that hold water for several weeks' even years? (The environmental specialist can conduct a preliminary records search to find recorded waters of the U.S.)
- ☐ Can the project avoid the identified resources?
- ☐ Will mitigation be needed for impacts to wetlands or streams?

Threatened and Endangered Species: Threatened and endangered plant and/or animal species are identified for environmental analysis and regulatory clearance.

- ☐ Are there any known threatened or endangered species and/or habitat for such species? (The environmental specialist can conduct a preliminary records search to find recorded threatened or endangered species near the project).
- ☐ Can the project avoid any identified species and/or habitat?
- ☐ Will mitigation be needed?

Socioeconomic considerations: The number of displacements, the effect on pedestrian and bicycle traffic, the secondary and cumulative impacts, and other social and economic impacts are to be determined for environmental analysis and regulatory clearance.

- ☐ How many residential and commercial properties may be displaced?
- ☐ Could the project potentially affect pedestrian or bicycle access?
- ☐ Are there any pedestrian or bicycle access opportunities with this project?
- ☐ What are the population characteristics (e.g., low-income, minority, elderly, or disadvantaged groups) within the project area? (The environmental specialist can conduct a records search to identify population characteristics within the project area).
- ☐ Are there any schools or emergency services within the project area?
- ☐ Is there community support for the project?
- ☐ Can residential and commercial properties and low-income, minority, elderly, or disadvantaged group be avoided and pedestrian or bicycle traffic be accommodated? (We must involve the affected community members in determining ways to avoid and minimize adverse impacts).

Cultural Resources Considerations: Project impacts to archaeological sites, architectural resources, bridges and culverts, and historically significant locations require Section 106 review by state and sometimes federal regulatory agencies. Certain impacts to significant resources may require Section 4(f) evaluations, historical and photographic documentation, relocation or marketing for reuse of bridges and buildings, archaeological mitigation, and possible consultant of Native American tribes. The time lines for these actions vary but may take up to a year.

- ☐ Will the project involve the structural modification or removal of any bridges or culverts?
- ☐ Do project activities include ground-disturbing activities in portions of existing ROW that have not been disturbed by previous construction activities?
- ☐ Will the project require new ROW?
- ☐ If the project requires new ROW, when will an A-date be requested? (Project A-dates should not be authorized until it has been determined that the project will not adversely affect a Section 4(f) cultural resource. This assessment usually requires an architectural historian's recon-level field review of impacted and adjacent buildings or their review of photographs of affected buildings.)
- ☐ Will the project require the demolition of any buildings?
- ☐ When will MoDOT acquire ownership of any new ROW needed by the project? (Certain cultural resources field investigations should take place only after MoDOT owns the property being investigated)
- ☐ Will the project require any new ROW through or in the immediate vicinity of a cemetery? (MoDOT Chief Council should be contacted if human burials will have to be exhumed and reburied.)

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

BRIDGE
SCOPING CHECKLIST

(Add additional notes as required)

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MINOR BRIDGE

Existing Bridges

- ☐ Review Bridge Maintenance Reports and Structure Inventory & Appraisal sheets (SI&A).
- ☐ Check with Historical Bridge Coordinator when replacing a bridge.
- ☐ Review existing bridge plans (existing bridge foundation considered in anticipating new foundation type).
- ☐ Review existing geotechnical soundings.
- ☐ Review seismic design of existing bridge.
- ☐ Do bridge curbs, guardrail transitions, and shoulder widths meet current safety standards?
- ☐ Consider bridge rehabilitation, deck replacement and bridge replacement.
- ☐ Obtain Bridge Rehab checklist from District.
- ☐ Check FEMA maps for flood insurance status.
- ☐ Consider possible hydraulic concerns (drift accumulation, erosion at bridge site, flooding of bridge deck or bridge approach).
- ☐ Review existing vertical and horizontal clearances.
- ☐ Consider overlay and deck repair strategies. Is a deck test needed?
- ☐ Request proper survey data for widenings (deck elevations, beam cap elevations, valley sections, etc.).

- ☐ Investigate load carrying capacity of existing bridge when adding overlays, curbs, widening, etc.

Setting the Profile Grade – Grade Separations

- ☐ Consider bridge deck drainage (flat grades on bridges over railroads and other roadways create drainage problems).
- ☐ Review District field elevations of existing roadway below bridge and consider overlay thickness on existing roadway for vertical clearance.
- ☐ Consider clear zones when estimating span lengths and superstructure depths.
- ☐ Provide standard vertical and horizontal clearances.
- ☐ Review Preliminary Geotechnical Report (spill slope recommendation for end fills, preliminary soundings for anticipating foundation type, and special geotechnical considerations such as caves, mines, springs, etc.) prior to determining bridge length.
- ☐ If bridge is over a railroad, review railroad requirements including possible future tracks, maintenance roads and special curbs and/or fencing on the bridge and include ample timeline for railroad review and approvals.

Setting the Profile Grade – Stream Crossings

- ☐ District obtains overtopping information from local maintenance shed records.
- ☐ Check FEMA maps for Flood Insurance Status.
- ☐ Meet standard hydraulic criteria.
- ☐ Consider drift and scour problems when determining span lengths.
- ☐ Consider relationship of profile grade to flooding problems and/or possible backwater and bridge opening.
- ☐ Include freeboard and superstructure depth when setting the profile grade.
- ☐ Review Preliminary Geotechnical Report (spill slope recommendation for end fills, preliminary soundings for anticipating foundation type, and special geotechnical considerations such as caves, mines, springs, etc.) prior to determining bridge length.

Miscellaneous Items

- ☐ Review traffic handling issues (temporary bridge, close road, new alignment, staging, companion structure, school route).
- ☐ Consider Design Exceptions as soon as possible.
- ☐ Review current and projected traffic data.
- ☐ Consider stream mitigation and bank stabilization.
- ☐ Determine appropriate superstructure type for required main span.
- ☐ Include seismic performance category, bridge removal, bridge approach slab, tight construction site, large skews and horizontal curvature in cost estimating.
- ☐ Consider environmental impacts (endangered species, lead paint, 409 issues, etc.).
- ☐ Consider context sensitive design needs (aesthetic considerations, etc.).
- ☐ Check for utilities (existing and proposed) and improvements in the area.
- ☐ Evaluate necessity of horizontal curves and superelevation transition bridges.
- ☐ Consider sidewalks and/or bike paths.
- ☐ Consider retaining wall/right of way issues.

MAJOR BRIDGES

New Construction

- ☐ Review Environmental Impact Statement and Location Study.
- ☐ Review District field elevations of existing roadway below bridge and consider overlay thickness on existing roadway for vertical clearance.
- ☐ Consider clear zones when estimating span lengths and superstructure depths.
- ☐ Review Preliminary Geotechnical Report (spill slope recommendation for end fills).
- ☐ Evaluate necessity for additional borings.
- ☐ If bridge is over a railroad, review railroad requirements including possible future tracks, maintenance roads and special curbs and/or fencing on the bridge and include ample timeline for railroad review and approvals.
- ☐ Check FEMA maps for Flood Insurance Status.
- ☐ Evaluate hydraulic requirements.
- ☐ Review river hydrographs and streambed profiles.
- ☐ Consider barge impact.
- ☐ Review current and projected traffic data and traffic handling issues (consider substructures capable of handling future superstructure widenings, such as 4-lane substructure with 2-lane superstructure for future traffic needs).
- ☐ Coordinate with United States Coast Guard for navigational requirements.
- ☐ Determine appropriate superstructure type for required main span.
- ☐ Consider environmental impacts (endangered species, 409 issues, etc.).
- ☐ Consider context sensitive design needs (aesthetic considerations, bridge lighting, etc.).
- ☐ Check for utilities (existing and proposed) and improvements in the area.
- ☐ Consider sidewalks and/or bike paths.
- ☐ Review deck drainage options (contained or free fall from structure).
- ☐ Consider retaining wall/right of way issues.
- ☐ Address new bridge instrumentation.
- ☐ Consider ITS applications.
- ☐ Coordinate with Federal Aviation Administration for aerial lighting requirements.
- ☐ Consider disposition of existing bridge.

Seismic Rehabs

- ☐ Review Bridge Maintenance Reports and Structure Inventory & Appraisal sheets (SI&A).
- ☐ Review existing bridge plans.
- ☐ Review seismic design of existing bridge.
- ☐ Determine Seismic Importance Category.
- ☐ Review existing vertical and horizontal clearances.
- ☐ Obtain proper survey data (deck elevations, beam cap elevations, etc.).
- ☐ Investigate load carrying capacity of existing bridge.
- ☐ Investigate seismic instrumentation.
- ☐ Investigate and determine scope or extent of seismic retrofit (also investigate seismic retrofit versus bridge replacement).

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

FEDERAL HIGHWAY ADMINISTRATION (FHWA) SCOPING CHECKLIST

(Add additional notes as required)

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. While an accurate project scope is difficult to identify early in development, a careful, multidisciplinary examination of the purpose and need will produce a solid foundation upon which project development can occur.

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Federal Eligibility

- ☐ Determine Federal-aid status.
- ☐ Determine level of FHWA oversight. (See the Oversight Agreement and Oversight Manual.)
- ☐ Ensure the Federal-aid requirements are met for all Federal-aid projects, regardless of the source of Federal funding used or the agency responsible for oversight. (See the Oversight Agreement and Oversight Manual.)

Planning

- ☐ Ensure the identified need is included in the Long Range Plan.
- ☐ Ensure the identified need is included in the TIP and/or STIP.
- ☐ Ensure Title VI requirements have been met for pubic involvement.
- ☐ Determine applicable Air Quality Conformity requirements.
- ☐ Determine mega-project eligibility. (Over $1 billion construction cost – Financial plan required)
- ☐ Consider Value Engineering requirements for projects $25 million or more.

Environmental

- ☐ Determine required environmental classification. (CE, EA, EIS)
- ☐ Determine status of environmental document. (If the environmental document was approved more than three years previous, and the project remained inactive, there is a need to reevaluate the document for scope changes or changes in proposed mitigation.
- ☐ Review and approve Cultural Resource/Section 106 documentation.

Bridge

- ☐ Review and comment on Type, Size and Location (TS&L) report.
- ☐ Determine eligibility for the Highway Bridge Replacement and Rehabilitation Program.
- ☐ Verify vertical clearance with Military Traffic Management Command (MTMC).
- ☐ Consider necessary Coast Guard or Corps of Engineers permits.

Design/Roadway

- ☐ Evaluate Access Modifications to the Interstate system. (May require an Access Justification Report – see FHWA August 17, 2001 letter)
- ☐ Consider the Pavement Type Selection or pavement rehabilitation strategy.
- ☐ Check project for Proprietary/Public Interest Finding/Buy America items.
- ☐ Ensure environmental commitments from Environmental Document are included in the project.
- ☐ Check Railroad operations.
- ☐ Check Traffic Control Plan.
- ☐ Check Bicycle and Pedestrian accommodation.
- ☐ Check for ADA compliance.

Traffic

- ☐ Determine if safety upgrades are included in the project.
- ☐ Ensure accident/operational analysis has been performed.
- ☐ Ensure the project is in compliance with the Manual on Uniform Traffic Control Devices (MUTCD).
- ☐ Consider any Intelligent Transportation Systems (ITS) elements included in the project.
- ☐ Ensure the project is in conformity with the ITS National Architecture.
- ☐ Ensure the project utilizes FHWA adopted ITS Standards.
- ☐ Ensure the Conformity Documentation Checklist has been completed.

Right-of-way

- ☐ Advise MoDOT how Airspace Agreements, Functional Replacements, Hardship/Protective Purchase Acquisitions, Federal Land Transfers, and License Agreements may affect the scope of the project.

County_____

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(New 1-1-03)

MAINTENANCE
SCOPING CHECKLIST

(Add additional notes as required)

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General Considerations

- ☐ Consider long-term maintenance needs (i.e. flat slopes, drainage, vegetation, etc).
- ☐ Identify items that have created maintenance problems in the past.
- ☐ Consider the interest of the local community. Ensure their needs been addressed.
- ☐ Does the proposed project address the current short-term and long-term "needs" at the location?
- ☐ Consider maintainability of project (i.e. steep slopes, seeding type and rate, drainage)

Roadway Maintenance

- ☐ Identify and consider all pavement issues.
- ☐ Consider necessary pavement markings (epoxy, thermoplastic, and pavement markers often preferred).
- ☐ Consider median island and curbing needs.
- ☐ Identify and consider adjacent problems that should be included in the project (i.e. ramps, islands, crossovers, commuter parking lots).
- ☐ Identify and consider all existing safety concerns are identified and addressed with project (i.e. unsafe headwalls, extraneous guardrail, turn-down guardrail sections, etc.).

Shoulders & Approaches

- ☐ Identify all existing shoulder issues.
- ☐ Identify entrance issues for approaches over which MoDOT has responsibility.
- ☐ Consider Access Management principles.
- ☐ Consider edge drop-off issues.
- ☐ Consider pavement underdrainage.

Drainage Considerations

- ☐ Ensure drainage issues are addressed (i.e. backwater heights, flow velocity downstream, has flow quantity increased).
- ☐ Consider potential maintenance problems caused by drainage.
- ☐ Consider existing drainage problems (severity and frequency of water over the roadway, water on private property, etc.).

Roadsides

- ☐ Consider planting issues (seeding mixtures, rates of application, need for trees or shrubs, mowable side slopes, etc.).
- ☐ Ensure the seeding/plantings are consistent with direction of vegetation management.
- ☐ Ensure slope stabilization measures are both functional and aesthetically pleasing. (Retaining wall systems vs. riprap or gabions)
- ☐ Consider any existing roadside maintenance problems.

Bridge Maintenance

- ☐ Ensure the areas around bridges are maintainable (i.e. don't want slopes steeper than 3:1 without consideration given to maintaining the area).
- ☐ Consider any existing bridge maintenance problems.

Snow & Ice Control

- ☐ Consider effect of temporary construction staging on snow and ice removal operations.
- ☐ Consider effect of design on snow and ice removal operations.

Traffic Control

- ☐ Ensure that temporary construction staging effect on area maintenance issues are addressed.
- ☐ Consider potential conflicts between project duration and detours and existing traffic flow patterns.
- ☐ Consider replacement of existing nonstandard guardrail or guardcable.
- ☐ Consider future traffic control items such as conduit under pavement.

For questions, comments, or suggested revisions to this checklist, please contact the State Maintenance Engineer

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

PLANNING
SCOPING CHECKLIST

(Add additional notes as required)

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Needs:

- ☐ What is the need?
- ☐ Input from the Metropolitan Planning Organizations and Regional Planning Organizations
  - ☐ Was this project a priority to the local planning organizations?
- ☐ Outside Core Team Planning Members
  - ☐ Will there be a benefit to the project to use outside planning staff as core team members?
- ☐ Provide the current Functional Classification of the roadway.
  - ☐ The functional classification affects the design standards.
- ☐ TMS Data
  - ☐ Traffic Volumes
  - ☐ Safety/Accident History
  - ☐ Congestion/LOS
  - ☐ Bridge Condition
  - ☐ Pavement Condition/ ARAN Data
- ☐ Urban Boundaries
  - ☐ Design standards may change within urban boundaries. May require additional coordination with MPO.
- ☐ Congressional Action/Law
  - ☐ Was this project funded as a Congressional high priority project?
  - ☐ Does any special funding create timing restrictions?
- ☐ Political Action

- ☐ Has this project received any strong political support?
- ☐ Have affected politicians been notified of any changes in the project, especially timing or funding?

☐ Economic Analysis/Regional Development Analysis
- ☐ Population Changes
- ☐ Job Trends
- ☐ Population analyses as related to environmental justice (may be covered by environmental or inspection general's departments)
- ☐ Language Proficiency-Research to determine needs for providing communications in languages other than English

☐ Land Use
- ☐ Does this project affect adjacent or nearby land use plans?
- ☐ Are future land uses being considered as a part of selecting the appropriate design?

☐ Long Range Transportation Direction
- ☐ Is this project being designed in accordance with the MoDOT Long Range Transportation Direction?
- ☐ Is this project part of an MPO/RPC Long Range Plan?

☐ Is this project included in Tier 1, 2 or 3? (For system expansion project only)

Multimodal:

☐ Origin/Destination Studies-Determine how all modes interact with each other in the project area
☐ Do bicycle and pedestrian facilities need to be provided?
☐ Is this part of a statewide or local bicycle plan?
☐ Is this part of a statewide or local pedestrian plan? Bicycle Plan
☐ Identify what modes are impacted. Does this project provide or affect intermodal connections?
☐ Funding availability for other modes and eligibility
☐ Ports
☐ Connectivity to road system and each other
☐ Airports – Clearance
☐ Transit/Bus Turnouts
☐ University Transitways
☐ Identify all Partners
☐ Ferries
☐ These items may be addressed by the Multimodal section or the Bike and Pedestrian Coordinator.
☐

Urgency/Funding Availability/Sources:

☐ Anticipated earliest program year
☐ Program Agreements – Is there a deadline to spend funding?
☐ Funding maximums – Interim solutions, ultimate solutions
☐ Discuss how scope creep affects budget
☐ Urgency – Economic/Safety/Political Priorities/Transportation Improvement Program
☐ Identify funding sources and explain uses

- ☐ Funding/letting date vs. project schedule-this may be a project development function in some districts
- ☐ Local Funds included? – When are these submitted to MoDOT?
- ☐ Award of Project/Concurrence from local agency
- ☐ Long term value of alternate solutions-is this the correct solution for the long term with the money available today?

Project Coordination:

- ☐ MPO/RPC Input
- ☐ Communicate need and determine what is or is not part of the project
- ☐ Review for access management applicability
- ☐ Assist w/Focus groups
- ☐ How does project fit with other projects in same area (traffic control, RE construction work load, type of improvement, project distribution), letting in combination
- ☐ Use other meetings to also provide project information
- ☐ The duplication of this section and the needs sections acts as a reminder to continue to consider these items throughout the project.

For questions, comments, or suggested revisions to this checklist, please contact the Transportation Planning Director.

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

CONSTRUCTION and MATERIALS SCOPING CHECKLIST

(Add additional notes as required)

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General Constructability Issues

- ☐ Evaluate the construction impacts of rapid commercial development in the project area.
- ☐ Evaluate construction staging to ensure minimal impact to the motorist.
- ☐ Consider availability of material staging areas.
- ☐ Consider work zone signing requirements.
- ☐ Evaluate necessary temporary construction easement sites.

Project Administration Issues – Division 100

- ☐ Evaluate potential utility conflicts.
- ☐ Ensure the project completion is reasonable for the work involved and the department's needs. (Should workdays, completion date, or a combination of the two be specified? Is an incentive/disincentive clause needed to ensure timely completion? Should workdays and liquidated damages be counted between December 15 and March 15?)
- ☐ Evaluate the impact of project on other ongoing projects in the area.

Earthwork Issues – Division 200

- ☐ Consider need for any soil stability for high plastic soils.

- ☐ Evaluate the existence of any possible hazardous wastes (e.g. underground storage tanks, buildings with asbestos, railroad ties, rubber tires, etc.; or any buildings or structures with footings or foundations that may interfere with the new project?)
- ☐ Ensure the assumed soil shrinkage factors are reasonable, based upon local soil types and other area projects.
- ☐ Evaluate the ability for soils to be easily classified. If not, consider using 'Unclassified Excavation'.
- ☐ Evaluate the disposition of excess material. (Can it be used within project limits or on adjacent projects?)
- ☐ Evaluate the existence of stable rock on the project.
- ☐ Consider undergrading in areas such as old ponds or creek beds.
- ☐ Consider effects of edge drop-offs created by the project.

Bases & Aggregate Surface Issues – Division 300

- ☐ Consider appropriate stabilization of bypasses and shoulders that will be used to carry traffic during staged construction.
- ☐ Consider permeable asphalt base or concrete base if applicable.

Flexible Pavement Issues – Division 400

- ☐ Ensure consideration is given to matching the existing conditions (e.g. existing cross slope, existing entrances, existing curbing).

Rigid Pavement Issues – Division 500

- ☐ Consider the use of high early strength concrete in critical locations to eliminate cure time and accelerate the project?

Incidental Construction Issues – Division 600

- ☐ Evaluate the traffic control plan to ensure it reflects construction staging.
- ☐ Ensure the roadway cross-sections are of adequate width for guardrail and end terminal installation.
- ☐ Consider bringing existing guardrail up to standard rail height.
- ☐ Ensure the correct type and locations are identified for fencing.
- ☐ Ensure construction personnel make an updated survey of the pavement repair areas on the project and the quantities are included.

Roadside Development Issues – Division 800

- ☐ Ensure erosion control is adequate for adjacent terrain and for type of work. Consider past experience with the DNR inspector for a particular area.

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Job Number _____

Core Team Member_____

(New 1-1-03)

PUBLIC INFORMATION AND OUTREACH SCOPING CHECKLIST

(Add additional notes as required)

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- ☐ Ensure the public and other stakeholders have given input as to their perception of the problem and its solutions?
- ☐ Identify all the "Potentially Affected Interests," as well as the issues that are likely to arise.
- ☐ Identify organized groups/individuals in the community who could affect this project and any special effort be required to deal with their concerns.

For questions, comments, or suggested revisions to this checklist, please contact the Public Information and Outreach Director

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

RAILROAD
SCOPING CHECKLIST

(Add additional notes as required)

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- ☐ Determine railroad involvement.
- ☐ Identify which railroad is impacted.
- ☐ Determine current status of railroad (active or inactive).
- ☐ Determine daily volume of trains and speed of operation.
- ☐ Identify future plans to abandon the line or close the crossing.

For questions, comments, or suggested revisions to this checklist, please contact the Railroad Liaison Engineer

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

RIGHT OF WAY
SCOPING CHECKLIST

(Add additional notes as required)

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- ☐ Identify number of tracts impacted.
- ☐ Identify severances and uneconomic remnants.
- ☐ Estimate number of people and business requiring relocation.
- ☐ Estimate number of improvements acquired.
- ☐ Identify potential value changes associated with impending improvements to parcel.
- ☐ Identify potential value changes associated with zoning changes or development.
- ☐ Consider impacts of access management practices.
- ☐ Consider billboard site elimination impacts.
- ☐ Identify all subdivision plats currently on record.
- ☐ Identify impacts of temporary bypasses and road closures.
- ☐ Evaluate likelihood of purchasing borrow sites by cubic yards as opposed to easements.
- ☐ Consider impacts of acquiring public facilities.
- ☐ Identify family cemetery plots not identified on plans or maps.
- ☐ Consider the project development schedule. Ambitious schedules may increase the right of way costs with larger negotiated settlements and increased condemnation.
- ☐ Consider the possibility mediation impact the project schedule or increase settlements.

For questions, comments, or suggested revisions to this checklist, please contact the State Right of Way Manager

County_____

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Job Number _____

Core Team Member_____

(New 1-1-03)

TRAFFIC
SCOPING CHECKLIST

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- ☐ Consider traffic signal needs to ensure conformance with MoDOT criteria and needs at the location. (Does it meet warrants, is interconnect needed, are pedestrian signals needed?)
- ☐ Consider pavement marking needs to ensure conformance with MoDOT criteria and needs of the user.
- ☐ Consider lighting needs for conformance to MoDOT criteria (including warrants) and needs of the motorist.
- ☐ Consider work zone needs to ensure MoDOT is addressing the "get in/get out" philosophy and that proper safety considerations have been addressed.
- ☐ Consider access management principles.
- ☐ Evaluate remedies for existing high accident locations.
- ☐ Consider Intelligent Transportation System issues.
- ☐ Review operational needs to ensure they are met. (Does the project solve the problem?)
- ☐ Review the project to see if it addresses needs identified through the Safety Audit.

For questions, comments, or suggested revisions to this checklist, please contact the State Traffic Engineer

County_____

Route _____

Job Number _____

Core Team Member_____

(New 1-1-03)

UTILITIES
SCOPING CHECKLIST

(Add additional notes as required)

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Conceptual Study

- ☐ Coordinate with utility for any project specific information.
- ☐ Identify potential "natural" conflicts such as hazardous waste sites, underground storage tanks, cisterns, wells, and ponds.
- ☐ Consider candidacy for Subsurface Utility Engineering (SUE)

Preliminary Plan

- ☐ Perform field check.
- ☐ Consider potential conflicts at bridges, retaining walls, pile driving, crane operations, excavation, embankment, muck removal, channel cleanout, borrow areas, paving, signalization, lighting, signing, buildings, (asbestos removal), merchantable timber (will utility's removal of timber conflict with deals made by right of way office or legal? etc.)
- ☐ Identify easements utility may request MoDOT to acquire.
- ☐ Consider seasonal restrictions the utility may have for relocating facilities.
- ☐ Evaluate whether or not utility can use common trench with other utilities.
- ☐ Consider necessary staging with other utilities.
- ☐ Consider the need for a 10' corridor to accommodate utilities.
- ☐ Consider relocation of utilities by the roadway contractor.
- ☐ Consider necessary environmental clearances beyond original survey scope if roadway contractor is relocating utilities.

- ☐ Consider utilities attached to bridges.
- ☐ Evaluate need to relocate facilities after some of the roadway contractor's work.
- ☐ Investigate service connections to MoDOT's signals, rest area, etc.
- ☐ Consider roadway and bridge design alternatives to minimize or avoid utility conflicts.

Right of Way Plan

- ☐ Identify the project's utility affected parcels and inform the right of way office.
- ☐ Acquire service connection letter from utility for MoDOT's signals, rest area, etc.
- ☐ Review preliminary cross sections to determine impacts on utilities.
- ☐ Consider the impact of abrupt changes in right of way.