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State of Arizona
Office of the Auditor General

PERFORMANCE AUDIT OF THE ARIZONA DEPARTMENT OF TRANSPORTATION'S URBAN HIGHWAYS PROGRAM FOR MARICOPA COUNTY

Final Report
August 1991

DOUGLAS R. NORTON, CPA
AUDITOR GENERAL

STATE OF ARIZONA
OFFICE OF THE
AUDITOR GENERAL

September 9, 1991

Members of the Arizona Legislature

The Honorable Fife Symington, Governor

Mr. Charles Cowan, Director
Arizona Department of Transportation

Transmitted herewith is the report A Performance Audit of the Arizona Department of Transportation's Urban Highways Program For Maricopa County. This audit was conducted by the consulting firm KPMG Peat Marwick under contract with the Auditor General and was in response to a May 13, 1991 resolution of the Joint Legislative Budget Committee.

A response to the audit from the Department of Transportation follows the Executive Summary.

This report will be released to the public on September 10 at 9:00 a.m.

Sincerely,

Douglas R. Norton
Auditor General

DRN:lmn

Enclosure

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August 30, 1991

Mr. Douglas Norton
Auditor General
Office of the Auditor General
2700 N. Central Avenue
Suite 700
Phoenix, Arizona 85004

Dear Mr. Norton:

KPMG Peat Marwick, in association with Dewberry & Davis and Linderlake Corporation, is pleased to submit our final report for the *Performance Audit of the Arizona Department of Transportation's Urban Highways Program for Maricopa County.* This report assesses ADOT's management performance in carrying out the MAG Urban Highways Program under original Program conditions, and recommends ways to improve ADOT's efficiency and effectiveness in fulfilling its future overall Program responsibilities. The performance audit responds to questions raised concerning ADOT's administration of the MAG Program relative to the following five issue areas:

- Original and current excise tax revenue forecasting processes
- Original and current program cost estimates
- Priority programming process
- Program management practices
- Right-of-way acquisition practices

This report presents the findings, conclusions, and recommendations resulting from the analysis of questions comprising these issue areas.

Mr. Douglas Norton
Office of the Auditor General
August 30, 1991
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We appreciate the opportunity to have assisted you and your staff in the conduct of this performance audit. We also appreciate the cooperation we received from all those who participated in the fact-finding portions of the performance audit effort.

Very truly yours,

KPMG Peat Marwick

KPMG Peat Marwick

PERFORMANCE AUDIT OF THE ARIZONA DEPARTMENT OF TRANSPORTATION'S URBAN HIGHWAYS PROGRAM FOR MARICOPA COUNTY FINAL REPORT

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EXECUTIVE SUMMARY

This executive summary presents the objective, approach, and key conclusions and recommendations for the *Performance Audit of the Arizona Department of Transportation's Urban Highways Program for Maricopa County.*

Background

In 1985, the Arizona State Legislature enacted House Bill 2306 authorizing Maricopa County voters to approve up to a ten percent increase in existing excise taxes designated as a transportation excise tax (commonly referred to as a one-half (1/2) cent sales tax). The law enabled County residents to set aside excise tax revenue for the design and construction of a metropolitan highway system. An urban highway plan for metropolitan Phoenix was developed by the Maricopa Association of Governments (MAG). The MAG Program called for development of 233.5 miles of freeways and expressways to supplement the 86.5 miles of completed or under-construction highways in the region over the period 1986 to 2006.

The additional excise tax to finance the MAG Program was overwhelmingly approved by the voters in October 1985. The proceeds of the excise tax are to be used to design, acquire right of way for, and construct freeways, expressways, and parkways in the MAG plan. The 233.5-mile MAG Program is the largest urban freeway/expressway development program currently underway in the nation.

In December 1990, ADOT released a five-year progress report on the Maricopa County transportation excise tax entitled, *Maricopa County Transportation Excise Tax Review, 1986-1990.* This report noted that over $3 billion in additional revenue will be needed to complete the MAG Program. This revenue shortfall coupled with other concerns about Arizona Department of Transportation's (ADOT's) management of the program resulted in the Arizona State Legislature directing the State's Office of the Auditor General to procure an independent performance audit of ADOT's Urban Highways Program.

Objective and scope of the performance audit

The purpose of the performance audit is to assess ADOT's management performance in carrying out the MAG Urban Highways Program under original Program conditions, and to recommend ways to improve ADOT's efficiency and effectiveness in fulfilling its future overall Program responsibilities.

The Office of the Auditor General directed that the scope of the performance audit include a review of ADOT's administration of the MAG Urban Highways Program relative to the following five issue areas:

- Original and current excise tax revenue forecasting processes
- Original and current program cost estimates
- Priority programming process
- Program management practices
- Right-of-way acquisition practices

A total of 46 specific questions were detailed in the five areas listed above by the Office of the Auditor General for analysis in the performance audit. This executive summary presents the major conclusions and applicable recommendations from the analysis of these questions.

The scope of the performance audit did not include a financial audit of the MAG Program. The scope also did not include a detailed preparation of long-range traffic projections or development of Program revenue and cost projections, or underlying assumptions.

The performance audit used extensive data and estimates developed by ADOT. Such data and estimates were reviewed for reasonableness, but not verified by the audit team.

Approach

Our approach included:

- Numerous fact-finding interviews with MAG and ADOT managers directly responsible for the MAG Program and its implementation
- Interviews with current and former State and local elected officials, representatives of the business community groups that have expressed concerns with MAG Program management, and selected others knowledgeable of the overall MAG Program
- Compilation and reviews of extensive ADOT and MAG reports, manuals, and working papers
- Contacts with selected other state and local agencies responsible for similar highway and financing programs

The work plan was performed by a competitively selected project team composed of performance audit, highway engineering, right-of-way acquisition, and financial analysis and management specialists.

Conclusions and recommendations

Sections 3 through 7 of the report present detailed analyses, conclusions, and applicable recommendations for each of the five areas of focus of the performance audit. This part of the executive summary highlights the major conclusions and recommendations resulting from the analysis of the 46 questions concerning these five areas.

Excise tax revenue forecasting procedures

Conclusions

Original excise tax revenue estimates for the MAG Program were developed at the planning level of detail by an ad hoc committee, that included ADOT, MAG, legislative, and Phoenix Chamber of Commerce Staffs. Inflation factors prepared for cost estimation purposes were used to develop current dollar estimates of excise tax revenues over a twenty-year timeframe. This caused the original revenue estimates to be high. Lower, more realistic and conservative estimates of inflation should have been used for revenue estimation.

The original revenue estimation process was adequate for internal planning purposes, but not for serving as the sole financial basis for a public tax referendum. Legislative staff should have used a more rigorous approach to excise tax revenue forecasting, and should have thoroughly qualified the estimates as to their level of diligence, assumptions, and achievability within the voters' pamphlet.

The econometric model used by ADOT to forecast excise tax revenues appears reasonably structured. However, the model's input variables lagged the local economic downturn in the early years of the MAG Program, resulting in consistently high forecasts compared with actual collections. ADOT began to recognize in 1987 that its forecasts of MAG Program excise tax revenues were optimistic. In 1989, the Department publicly issued an estimate of excise tax revenues that was one-third less than its estimate of 1986. In 1990, the Department began to reflect local economic conditions in its official excise tax revenue forecasts to produce lower, even more realistic and conservative results, particularly in the short term.

ADOT has adequately managed the bonding process for the existing half-cent excise tax, given the high level of bonding directed by the MAG Regional Council. As a result, the bonds issued by ADOT for the MAG Program enjoy high ratings from the major bond

rating agencies which enable the Department to receive very favorable interest rates on its MAG Program bonds.

Adequate revenues are expected to be available to satisfy the covenants and debt service requirements associated with currently outstanding Regional Area Road Fund (RARF) bonds.

Current planning estimates for total MAG Program revenues are expected to cover only about half of the total costs of the Program as currently defined.

Recommendations

ADOT should continue to implement the improved short-term revenue forecasting process and develop its official revenue forecasts, based on adjustments to independent data variables which reflect local economic conditions.

ADOT should include a disclosure statement with all estimates, projections, and forecasts of MAG Program revenues and costs, indicating the level of diligence, assumptions, achievability, and intended use associated with the resulting figures.

ADOT should prepare an official annual revenue forecast issuance package for public dissemination which includes the ADOT Director's approval of the updated revenue forecasts for the MAG Program.

Program costs estimates

Conclusions

Initial MAG Program cost estimates were developed by MAGTPO staff, ADOT staff, and outside consulting engineers. These initial cost estimates were based largely on areawide planning studies, utilizing generalized per-mile costs for construction, design, and right-of-way acquisition. Due to a lack of specificity regarding design features and alignment, these initial MAG Program cost estimates did not represent reliable costs bases for the MAG Program.

Significant expansion of the scope of the MAG Program contributed to the escalation of Program costs, particularly during the early formative years when the corridor location and design concept studies were being developed. The following changes in MAG Program characteristics and features contributed to half of the cost increases associated with the MAG Program, not including debt service costs. The other half of the increase in Program costs was due to: rising costs for real estate, design work, and construction activities; costs for mitigation measures (such as noise walls, drainage features, asbestos abatement, and

hazardous waste site management); demolition and relocation; and additional access at interchanges.

MAG Program Features	1985	1991
Right-of-way acres	8,500	12,947
Total lane-miles	1,171	1,333
Expressway lane-miles	250	22
Freeway lane-miles	921	1,311
Traffic interchanges	127	156
Fully directional interchanges	0	14
Miles of depressed freeways	13	55.6

The number of lanes per corridor appear reasonable based in traffic forecasts to the design year of 2015 for all corridors on the MAG Program, except the Estrella Freeway, unless this corridor remains a 2-lane road.

Initial per-mile cost estimates for MAG Program right-of-way acquisition and construction were based on historical information from similar projects in Maricopa county. However, these cost factors were understated since they were not inflated to the timeframe of the MAG Program. In addition, certain difficult to estimate costs were not included in these unit costs (such as drainage, tunnels, interchange right-of-way, demolition, asbestos abatement, and hazardous waste site management).

As the MAG Program evolved from the planning to the design stage of development, the nature of corridor design features and location of alignment became more firmly established. In most cases, the resulting design features followed standard design practices and procedures. However, in several instances higher level design features (such as the depressed interchange between the Outer Loop and Superstition Freeways, various depressed freeway sections, and modular signing along freeways in Tempe) were incorporated by ADOT based on local community concerns regarding access and mitigation of visual, noise, and drainage impacts of the new freeways.

Since 1985, MAG Program cost estimates have increased from $3 billion to over $7 billion, in uninflated constant dollars. The Department's first major revision to the MAG Program costs was produced in mid-1988, as part of a report to the State Transportation Board, based on the completion of location and design concept studies for many of the corridors making up the Program. Current MAG Program cost estimates are much more realistic, based on completion of all corridor location and design concept studies, completion of construction plans for selected segments, and performance of project-specific right-of-way acquisition and construction activities. However, further increases in MAG Program cost are expected during the next fifteen years as additional corridors and sections are further developed and as inflation drives up the costs of right-of-way acquisition and construction.

Since 1989, ADOT has began to institute a number of cost saving strategies to help control the escalating costs of MAG Program projects. Those include:

- Performing value engineering of project designs to identify lower cost design strategies to address geometric, functional, and safety requirements

- Staging construction activities so that partial projects which are adequate in the short-term can be implemented within constrained budgets

- Encouraging joint-funding arrangements with local communities and developers to expedite projects schedules

Environmental impact mitigation requirements impacted the MAG Program (particularly the East Papago corridor, due to the presence of a hazardous waste site in the original alignment). However, these impacts did not represent major contributors to the cost increases affecting the MAG Program.

While the Department's current reporting procedures and systems permit the timely reporting of significant MAG Program cost changes, both within ADOT and MAG, the Department and MAG continue to lack proactive, effective mechanisms to convey this information to the general public. Prior releases of information by ADOT to the public and the press on the status of Program cost estimates and their potential for achievement were not sufficiently frequent or consistently conveyed by Department management.

Recommendations

ADOT should base its estimates of MAG Program cost on historical and current information derived from actual projects and plans, that is adjusted to a consistent constant or current dollar basis, depending on the intended use of the information.

ADOT should continually re-evaluate the MAG Program system needs based upon updated estimates of regional growth. Design features should then be reassessed to determine their adequacy, based on minimum design standards, updated traffic forecasts, local concerns, and Program budget constraints.

ADOT and MAG should provide more timely, consistent, and comprehensive information to the public regarding the MAG Program, including progress, status, and changes to revenues and costs.

Any significant program changes which have major priority or fiscal implications need to be resolved through the involvement of the MAG Regional Council.

Priority programming process

Conclusions

Both MAG and the Transportation Board have statutory authority to prioritize corridors for construction in the MAG Freeway/Expressway Plan. While the Transportation Board has the ultimate statutory authority to approve roads for inclusion in the State Highway System, to prioritize and program highway construction activities, and to administer the bonding process relative to MAG Program funds, MAG has the final authority to define which roads are included in the MAG Regional Freeway/Expressway Plan, and therefore, are eligible for excise tax funding. MAG also has statutory authority to establish the priorities for MAG Program corridors and to suggest construction schedules for MAG Program projects. This provides MAG with significant leverage over the project programming of MAG Program corridors and projects.

The current statutory roles of MAG, ADOT, and the Transportation Board regarding the priority programming of the MAG Program appear reasonable and provide a useful check and balance mechanism for ensuring consideration of local concerns and requirements within the context of the State's overall highway program. Three fundamental limitations in the current priority programming process as it is applied by ADOT and MAG to the MAG Program are:

- Lack of long-term perspective to guide short-term priority programming decisionmaking
- Inadequate public involvement/notification regarding yearly priority programming deliberations by MAG
- Lack of accountability of the MAG Regional Council for its authority and influence over the MAG Program

Original corridor priorities were set by MAG for the MAG Program, based on documented analyses and recommendations from MAGTPO, and incorporated into ADOT's five-year highway construction programs by the Transportation Board. The MAG Regional Council, based on technical support provided by MAGTPO, used generally representative and reasonable criteria for prioritizing the design, right-of-way acquisition, and construction of MAG Program corridors over the 20-year life of the excise tax funding mechanism. These criteria included:

- Traffic conditions
- Cost effectiveness

- Project readiness
- Outer Loop completion
- System continuity
- Geographic balance

There has been limited public involvement in or exposure to the priority setting process for the MAG Program. The process is primarily controlled by MAGTPO, ADOT, and MAG, with public involvement limited to public hearings on ADOT's five-year highway construction program and open meetings of the MAG Management Committee, MAG Regional Council, Transportation Board, and ADOT Priority Planning Committee.

In preparing five-year highway construction programs starting with fiscal years 1987 through 1991, the Department followed the original MAG program priorities, with only five significant exceptions agreed to by MAG:

- Agua Fria - Northern Avenue to I-10
- Sky Harbor Expressway
- Grand Avenue
- Estrella Freeway (interim road construction)
- Hohokam Extension

In most cases, changes to MAG Program priorities were adequately justified and documented. However, in two of the five cases studied (Agua Fria and Sky Harbor Expressway), priority changes lack supporting documentation.

Programming actions to address the accumulating shortfall in MAG Program revenue growth were not taken by ADOT until 1990. This delay was caused by a number of factors, including: the front-loading of funds during the first five years of the Program made possible by the high bonding of MAG Program revenues; continued optimistic forecasts of excise tax revenues; and ADOT, MAG, and RPTA concerns about the impact of MAG Program cutbacks on the 1989 public referendum concerning the VALTRANS excise tax proposition (which was subsequently defeated in February 1989). Once the total Program revenue picture was better understood and the VALTRANS excise tax proposition removed from the public agenda, the Department began to take decisive steps to curtail the programming of MAG Program projects, as well as reducing the planned level of future

bonding. Projects were deferred in the schedule while others were staged to allow completion of only those portions required during the short-term. To facilitate and guide this adjustment process, the MAG Regional Council revised its MAG Program priorities, whereby the sequencing of project functional activities are laid out without commitment to fixed completion schedules.

The Department's priority programming process is oriented to a maximum five-year time horizon. However, the MAG Program extends to the year 2005 in terms of excise tax funding. By limiting its primary focus to the next five-year period, the Department and consequently MAG may be making program adjustments which reflect primarily short-term considerations instead of the full, long-term objectives of the MAG Program.

The allocation of MAG Program funds to preliminary engineering, right-of-way acquisition, construction, and debt service has reflected the policy and priority programming guidance of MAG, which called for expedited construction schedules, consistent with its stated corridor priorities and an aggressive bonding program. To expedite construction schedules meant performing preliminary engineering and right-of-way acquisition as early and rapidly as possible, consistent with funding availability. As a result, relatively higher percentages of MAG Program funds were spent on these functions in the first five years of the Program.

In the remaining years of the MAG Program, the past percentage allocation of funds for construction is expected to more than double, while right-of-way acquisition is expected to consume a significantly smaller percentage of Program resources. However, debt service costs are expected to represent almost 20 percent of the remaining costs to complete the MAG Program.

In the early years of the Program, preliminary engineering and right-of-way acquisition costs for segments were often programmed together, which allowed such costs to be applied to each activity as it evolved. In more recent years, design and right-of-way costs are programmed separately in order to better control the use of MAG Program funds relative to their intended allocation.

Recommendations

Both ADOT and MAG should consider the full MAG Program in terms of its revenues, costs, scope, and schedule when developing priority programming decisions and adjustments to be reflected in the annual updates to the Department's five-year highway construction program.

ADOT should continue and expand its matching program for encouraging local government and private sector funding participation in return for expediting project programming, in order to leverage existing MAG Program revenues.

The Transportation Board and the MAG Regional Council should retain their dual statutory authority over the priority programming of the MAG Program.

MAG Regional Council should be held accountable for its role in defining the MAG Freeway/Expressway Plan, developing section priorities, and programming/scoping projects. Public accountability can be established through the conduct of public hearings and the issuance of an annual fiscal status report on the MAG Program.

The MAG Regional Council should take a stronger role in coordinating the efforts of member communities to influence the MAG Program in order to resolve conflicts, improve consistency, and better control the number and extent of changes/enhancements being requested.

ADOT should retain its statutory authority to carry out and administer the preliminary engineering, right-of-way acquisition, and construction of the MAG Program.

MAG should formally recognize the priority-setting criteria: extent of local public and private funding participation, in its priority-setting process for the MAG Program. This criteria should continue to be used by ADOT to expedite projects which might not otherwise receive timely programmed funding, provided they satisfy other important criteria as well.

MAG should expand its priority-setting criteria for the MAG Program to include social and community impacts on neighborhoods affected by the siting and subsequent construction of new freeways. Accounting for these impacts during the priority programming process would enable the MAG Regional Council and State Transportation Board to either accelerate or defer projects with sensitive social and community implications in order to better address the concerns of affected residents and business owners.

ADOT and MAG should maintain a more detailed and consistent set of documentation regarding proposed and actual changes to MAG Program project/section priorities, including all correspondence, meeting notes, memoranda, and studies which describe the basis, source, participants, deliberations, outcome, and rationale for the resulting decisions and actions.

Program management practices and procedures

Conclusions

ADOT lacks budgetary controls for the MAG Program at the program, corridor, and section levels. The only budgetary controls for the MAG Program exist at the project level, based on the Department's five-year highway construction program. In addition, the covenants associated with the revenue bonds issued by ADOT for the MAG Program provide controls

over the level of MAG Program project costs programmed in the Department's five-year programs.

The lack of budgetary controls at the program, corridor, and section levels indicates a weakness in the adequacy of program-level oversight and management control. This reflects on both ADOT, which is responsible for administering the design, right-of-way acquisition, construction, and financing of the MAG Program, and MAG, which is responsible for developing and updating the MAG Regional Transportation Plan and setting the priorities to guide the scheduling of MAG Program activities. This weakness has resulted in the Department and MAG ultimately committing to a program that cannot be funded within the constraints imposed by the original authorizing legislation for Proposition 300. However, this has not impeded ADOT's ability to ensure adequate revenue coverage to satisfy the covenants of outstanding MAG Program bonds.

During the early years of the MAG Program (1985-1989), the Department lacked adequate internal controls over changes in MAG Program costs. This contributed to the escalation of Program costs in the first three years of the MAG Program. Since 1989, after the Department recognized that the MAG Program costs would likely significantly exceed available revenues, the Department began to institute a wide variety of procedures, directives, forms, and reporting systems designed to control changes to the MAG Program project budgets contained in the Department's five-year program. They also provide effective controls to ensure the Department complies with the covenants associated with outstanding MAG Program bonds. However, the absence of overall Program budgets at the program, corridor, and section levels of detail preclude proper monitoring and control of program, corridor, or project changes which relate to those portions of the MAG Program beyond the latest five-year program.

The MAG Program is managed on a day-to-day basis by the Urban Highways Section relative to project design activity, the Right-of-Way Section and Urban Highways Section relative to right-of-way acquisition activity, the Construction Section relative to construction activity, and the Administrative Service Division relative to funding and bonding activities. In addition, management oversight is provided by the Deputy State Engineers for Development and Operations, the State Engineer, and the Director of the Transportation Planning Division. The current allocation of responsibilities among ADOT units managing the MAG Program appears reasonable.

Urban Highways Section staff coordinate and oversee the work of location and design concept consultants, design consultants, and corridor management consultants, who in turn manage individual section design consultants who prepare the actual construction plans. Each group has well defined authority and responsibilities for their respective functions. Recent changes in the responsibilities of the Urban Highways Section to help control the programming of right-of-way acquisitions related to the MAG Program and to coordinate

ADOT efforts to better manage the parcel condemnation process represent effective strategies for better controlling the cost of right-of-way acquisition for the MAG Program.

Significant pressures have been applied to ADOT throughout the last six years by local officials, private interests, and local community groups requesting changes or enhancements to the scope of MAG Program corridors and sections. Most have involved mitigation or access issues. In the early years of the program, ADOT top management became quite involved in resolving these issues, often agreeing to requests to maintain local consensus and support for the Program. In recent years, the slowdown in the MAG Program and the decline in estimated available Program revenues has reduced these requests and in some cases encouraged local-match funding of projects to expedite their schedules. Earlier commitments increased MAG Program costs, contributing to the current budget imbalance.

With most major location and design concept issues already resolved for the corridors comprising the MAG Program, the Department has several important buffers in place to effectively control outside pressures on the Program through the five-year program update process. These buffers include the Urban Highways Section Engineer, Priority Planning Committee, and the State Transportation Board. However, the effectiveness of these buffers could be significantly improved if they had a realistic overall Program budget to gauge the fiscal impacts of requested changes proposed by outside influences. This is based on the notion that the most effective buffer for the MAG Program to control outside influences is a widely perceived, constrained budget.

Existing State statutes provide sufficient control over possible conflicts of interest situations involving officers and staff of ADOT and MAG, as they relate to the MAG Program. However, these statutes are not adequately reflected in administrative procedures manuals for either ADOT or MAG.

Recommendations

Budgetary controls need to be established at the program, corridor, and section levels for the overall MAG Program, including management forms, procedures, and reports which track actual, programmed, and not-yet-programmed activity in terms of revenues by source, costs by category, scope, and time frame. Project scope and costs should be managed within the resulting revenue-constrained budget. The budget should be reviewed every six months and updated annually.

ADOT should submit local requests for major MAG Program changes and enhancements which would materially increase the cost of the Program to the full MAG Regional Council via the MAG Program Fiscal Analysis Unit for review and internal MAG resolution prior to final action by the Priority Planning Committee and State Transportation Board.

MAG should establish a one- to two-person MAG Program Fiscal Analysis Unit to monitor and assess the fiscal status of the overall MAG Program, and to advise the MAG Regional Council and MAG Management Committee regarding the consequences of major revenue, financing, cost, scope, and schedule changes to the MAG Program.

The proposed MAG Program Fiscal Analysis Unit should prepare and issue for public dissemination an annual report on the relative status of the MAG Program, in terms of revenues, costs, scope, and schedule, indicating accomplishments, programmed activities, and unprogrammed efforts needed to complete the Program. This will provide quicker, more independent reporting to the public of the fiscal status and progress of the MAG Program. This report should be followed up by MAG-sponsored public hearings, whose results can serve as input to ADOT/Transportation Board efforts to update the Department's five-year highway construction program.

When describing the financial/fiscal status of the MAG Program for internal and external purposes, ADOT and MAG should be consistent in the use of either constant or current (inflated) dollars for both revenues and costs, noting explicitly which basis is used.

ADOT and the MAG Regional Council should annually reassess the MAG Program budget, scope, schedule, and financing strategies and adjust them to maintain the fiscal integrity of the overall Program, consistent with the covenants of outstanding MAG Program bonds. When appropriate, this should include reassessing prior location and design features to determine if more cost-effective alternatives can be substituted. Such a process should include consideration of:

- Corridor deletion or realignment
- Reduced number of lanes per corridor or segment consistent with realistic traffic forecasts
- Reduction of the frequency of RARF-funded traffic interchanges and crossroads (to every two to three miles)
- Reduction in the miles of depressed freeways
- Application of lower design standards which equal or exceed minimum urban design guidelines
- Increased staging of MAG Program facilities to include freeway-to-freeway interchanges
- Reduced crossroad lane widths to be consistent with adjacent local roads

- Local funding of all lighting beyond that required for minimum safety standards
- Reduce local access to freeway-to-freeway interchanges
- Local funding of right-of-way acquisitions

The MAG Regional Council and State Transportation Board should consider more moderate bonding strategies which would enable the Department to develop and maintain a more balanced program over the life of the available funding sources.

ADOT and MAG should provide their staffs with administrative procedures that more fully explain what is allowed and what is prohibited under applicable conflict of interest laws.

Right-of-way acquisition laws and practices

Conclusions

ADOT's right-of-way acquisition policies and procedures are consistent with those of most states and FHWA, with the major difference being the inability of Arizona agencies to allow property enhancement in value to offset all or part of the purchase price for partial takes. At least 24 states and all Federal agencies permit this practice, known as the "before and after" method of appraising property.

Based upon the audit team's experience and research, we believe that current Arizona laws strongly favor the interests of the property owner. A better balance should be provided by allowing ADOT to apply the "before and after" appraisal method. Our experience and research suggest that the "before and after" law fairly compensates property owners and provides the needed protection to the State from excessive awards.

The ability of the Transportation Division staff in the Attorney General's Office to represent ADOT in right-of-way condemnation cases has been limited by the defensibility of the appraisals that are prepared for the properties. Past deficiencies in the ability of the Attorney General's Office Transportation Division to represent ADOT resulted primarily from insufficient coordination between ADOT and the Transportation Division and limited staff resources within the Transportation Division.

During the past year, ADOT has attempted to improve coordination with the Transportation Division by establishing a Condemnation Support Team to help coordinate technical support for potential or pending condemnation cases; establishing a condemnation tracking report system to help the Department monitor the status and progress of right-of-way condemnation cases and workload; and having the Urban Highways Section serve as the conduit for all condemnation cases being forwarded to the State Attorney General's Office.

The Right-of-Way Section appears to have proper controls over all the necessary phases of negotiation and appraisal, based on our review of ADOT policy manuals and our investigation of interoffice memos and reports. While the Department has developed proper controls over the right-of-way acquisition function, deficiencies such as those cited in the full audit report suggest that further diligence be applied to ensure that these controls are properly and consistently applied. In recent years, the Highway Department Group has instituted a variety of procedures aimed at improving the control of right-of-way activities. These include:

- Establishment of a condemnation support team in March 1990 to ensure proper internal review and support of property acquisition cases which are likely or actual candidates for condemnation proceedings

- Provision of Urban Highways Section involvement in authorizing the Right-of-Way Section to proceed with property acquisition consistent with the five-year program

- Institution of quarterly funding allocations to the Right-of-Way Section by the Administrative Services Division, in order to better control right-of-way expenditures relative to the five-year program budget

- Implementation in early 1991 of a condemnation tracking system and monthly condemnation status report

- Development of the "red letter process" to facilitate communication and coordination between ADOT and local zoning/code enforcement agencies regarding prospective development in MAG Program corridor alignments

ADOT has not reimbursed the RARF fund for the office rental savings resulting from the Department's use of property acquired with RARF monies. This is not consistent with the Department's treatment of private or commercial use of these kinds of properties. However, the Department has stated it was informally advised by the Attorney General's Office that there is no legal requirement to reimburse the RARF fund for its use of such properties.

Since the start of the MAG Program, estimates of the cost to acquire all right-of-way required to complete the Program have grown by $1.1 billion, more than doubling the original estimate. Design and scope changes that have occurred since the MAG Program was started have driven up the acreage of right-of-way needed, increasing the overall cost by an estimated $350 million. Condemnation awards and the general increases in property values which had occurred between the time when the historical acquisitions were made (upon which the preliminary MAG Program cost estimates were based) and the time when ADOT began acquiring property for the MAG Program have resulted in an additional estimated $750 million increase in the cost for MAG Program right-of-way.

Only about one-third of the required acreage for the MAG Program has been acquired to date by ADOT. Unless significant additional funding sources are found or major portions of the MAG Program are curtailed in scope or deleted, less than half of the total right-of-way needed for the MAG Program will be able to acquired before the Program runs out of available funds.

Recommendations

ADOT should continue to consider the full costs and risks of taking a condemnation case to court versus accepting a negotiated settlement in determining the most cost-effective strategy to handling right-of-way acquisition cases.

ADOT should avoid accelerated acquisition schedules, regardless of the size or funding status of the MAG Program. ADOT should program its right-of-way acquisition efforts to avoid "second takes," "double moves" for relocated businesses, and uncertainty on the part of land owners by establishing a steady pace of right-of-way acquisition and thereby controlling the time frame between funding authorization and actual acquisition.

ADOT should extend the Advanced Acquisition Program, consistent with budgetary and priority programming constraints, and avoid advanced acquisition of properties which would need to be condemned, except for demonstrated hardship cases.

ADOT should be joined by MAG, RSET, the local business community, and residents interested in completing the MAG Program in the most fiscally prudent manner in promoting legislative changes to permit the "before and after" appraisal method, while avoiding cumbersome provisions such as those that would require State payment of attorney's fees, loss of business damages, or proximity damages.

ADOT should reimburse the RARF fund for the Department's use of property acquired with RARF monies.

ADOT should assess the staffing requirement of the Transportation Division of the Attorney General's Office, given the projected work load from the Department, and authorize/fund sufficient full-time or contract staff in a timely manner. Legal staff required by the MAG Program should be funded out of the MAG Program funds, since they perform a direct function in support of the acquisition of right-of-way for the MAG Program.

ADOT should continue its recent initiative to provide a condemnation support team to assist the Office of the Attorney General in preparing for impending cases, and to seek alternative alignments or design changes which could significantly mitigate the need to proceed with condemnation prior to submitting cases to the Office of the Attorney General.

ADOT should continue to pursue land donations and third-party funding arrangements with private developers, businesses, and local jurisdictions to lower the costs of right-of-way acquisition and to increase its available funding. To facilitate this, ADOT should significantly increase its local matching program for expediting projects in the Department's five-year program.

ADOT's Right-of-Way Section should consistently document all actions/agreements involving the appraisal, negotiation, settlement, and acquisition of property for the MAG Program, and update its Right-of-Way Parcel Status Report database in a more timely manner to facilitate up-to-date management reporting.

ADOT Right-of-Way Section staff and top management should continue to strive to comply with the policies and procedures for guiding and controlling the Department's right-of-way acquisition process. This will require periodic/random management reviews of documentation to ensure compliance by staff.

Conclusions of the audit report

Problems and opportunities for improvement have been identified in each of the five areas of focus of the performance audit. Many recommendations have been made to improve the efficiency and effectiveness of ADOT's and MAG's management of the Program. Some of these problems could have and should have been avoided by both ADOT and MAG while some problems were very difficult to foresee, such as the significant economic downturn in Maricopa County. In some cases, the problems were beyond the control of ADOT or MAG, such as changing State laws concerning right of way acquisition, which is the responsibility of the State Legislature.

In assessing the conclusions and recommendations in this performance audit, the following should be kept in mind:

- The MAG Program, which is intended to add about 230 miles of freeways and expressways to the existing Maricopa County highway system, is the largest current urban freeway and expressway program in the nation. This program is an enormous undertaking by any standards.

- The program is unique in terms of its being funded by local revenues and in terms of ADOT's and MAG's institutional relationships and roles in the Program.

- Virtually all urban highway and public transportation construction programs nationally have encountered citizen concern and opposition because of real and perceived impacts on neighborhoods , parks,businesses, and other land uses. Many of these programs have also encountered schedule delays and, in certain cases, significant cost escalation

because of expanded design requirements; inflation in materials, labor, and right of way costs; and schedule slippage.

- Despite the many years of transportation planning for Maricopa County, the approval by the Legislature and ultimately by the voters of the half-cent excise tax for the MAG Program occurred over a relatively short period of time. An aggressive implementation program was adopted by MAG and this required ADOT, which was heavily focused on rural highway construction programs, to quickly initiate a large-scale urban highway design, right-of-way acquisition, and construction program in Maricopa County.

- The original revenue and cost estimates for the MAG Program at the time of the Proposition 300 vote were essentially planning level estimates that were not based on detailed engineering studies or on sophisticated econometric analyses. These are some of the reasons why revenue forecasts have been overly optimistic and costs have increased beyond the original estimates. The dramatic and essentially unforseen slowdown in the County's, the State's and the nation's economy also had a significant impact on MAG Program revenues and costs.

This report contains many recommendations to correct known Program problems; to improve existing ADOT and MAG policies, procedures, and practices; and to develop and implement new procedures to enhance the efficiency and effectiveness of the MAG Program in the future. The thrusts of the recommendations are to:

- Promote greater public accountability of both ADOT and MAG in terms of financial management, revenue estimation,cost control, and schedule adherence and to recognize MAG's important plan development, priority setting, and financial policy roles in the Program

- Promote and facilitate public involvement in and familiarity with the status and future priorities of the Program through MAG's preparing an annual report for the Program and holding a annual public hearing(s) on the status, future priorities, and costs and revenue requirements of the Program, as well as by the Transportation Board and ADOT improving the timeliness, clarity, and consistency of communications with the public, elected officials, local governments, and other interests

- Improve ADOT's revenue estimation, priority setting , and program management practices to fully account for overall Program revenue and schedule constraints and commitments, and not just focus on the next five-year highway program

- Implement a budget-based monitoring, reporting, and control process for the overall MAG Program so that short-term decisions regarding scope, financing, and scheduling are not permitted to undermine the long-term viability of the Program.

- Seek legislative approval of the "before" and "after" method of right-of-way acquisition which is intended to control costs and more equitably balance property owner and State interests in the right-of-way acquisition process

- Control right-of-way costs by avoiding accelerated right-of-way acquisition and advanced acquisition in cases of condemnation

- Encourage MAG and the Transportation Board to consider more moderate bonding strategies for the MAG Program which would enable the Department to develop and maintain a more balanced program over the life of the available funding sources.

The specific recommendations presented in the report build upon the many improvements ADOT has made in its policies, procedures, and practices,particularly in the last two to three years. The recommendations, in our judgment, are feasible to implement with the support of MAG and the Legislature. These recommendations should be implemented regardless of whether additional revenues are approved to complete the balance of the MAG Program. However, it is especially important that the audit's recommendations be implemented if additional Program revenues are authorized. The implementation of and adherence to the recommended program management procedures is a key to ADOT's and MAG's controlling local government and citizen requests for project enhancements if additional funds become available to the MAG Program.

The MAG Program is scheduled to be complete in the year 2005 if adequate funding is available. It must be recognized that forecasts of population, development, revenues, and costs over such a long period are subject to many uncertainties. Well designed and implemented financial management and program management procedures and systems will help anticipate and respond to unforeseeable demographic and economic changes that will inevitably occur over time.

ARIZONA DEPARTMENT OF TRANSPORTATION

206 South Seventeenth Avenue - Phoenix, Arizona 85007-3213
Phone: (602) 255-7226 - FAX: (602) 255-6941

FIFE SYMINGTON
Governor

CHARLES E. COWAN
Director

September 6, 1991

Douglas R. Norton
Auditor General of Arizona
2700 North Central Avenue, Suite 700
Phoenix, Arizona 85004

Dear Mr. Norton:

Thank you for the opportunity to comment on the performance audit conducted on the Arizona Department of Transportation's Urban Highway Program by your consultant, Peat Marwick. First, I would like to compliment your staff and those of Peat Marwick on the professional manner in which they carried out this audit. Their willingness to openly discuss and present all sides of issues in the final report is to be commended.

The Department accepts the findings as constructive in nature, and we are already moving to implement recommendations. If you have followup questions or comments in the upcoming weeks, I will be glad to meet with you to discuss in more detail the implementation process.

Sincerely,

Charles E. Cowan

CEC:vn

1. INTRODUCTION

This section provides the background for and presents the objective, scope, and approach for the *Performance Audit of the Arizona Department of Transportation's Urban Highways Program for Maricopa County.*

Background

In 1985, the Arizona State Legislature enacted House Bill 2306 authorizing Maricopa County voters to approve up to a ten percent increase in existing excise taxes designated as a transportation excise tax (commonly referred to as a one-half (1/2) cent sales tax). The law enabled County residents to set aside excise tax revenue for the design and construction of a metropolitan highway system. An urban highway plan for metropolitan Phoenix was developed by the Maricopa Association of Governments (MAG). The MAG Program called for development of 233.5 miles of freeways and expressways to supplement the 86.5 miles of completed or under-construction highway in the region over the period 1986 to 2006.

The additional excise tax to finance the MAG Program was overwhelmingly approved by the voters in October 1985. The proceeds of the excise tax are to be used to design, acquire right of way for, and construct freeways, expressways, and parkways in the MAG plan. The 233.5-mile MAG Program is the largest urban freeway/expressway development program currently underway in the nation. The Program is also unique in that:

- It is locally funded by Maricopa taxpayers as opposed to state or federally funded like most other urban highway programs

- The 230-mile plan and associated implementation priorities are approved by MAG with Arizona Department of Transportation (ADOT) having responsibility for implementing the Program

- The primary funding source has a limited, fixed duration

In December 1990, ADOT released a five-year progress report on the Maricopa County transportation excise tax titled, *Maricopa County Transportation Excise Tax Review, 1986-1990.* This report noted that over $3 billion in additional revenue will be needed to complete the MAG Program. This revenue shortfall coupled with other concerns about ADOT's management of the program resulted in the Arizona State Legislature directing the State's Office of the Auditor General to procure an independent performance audit of ADOT's Urban Highways Program.

Objective and scope of the performance audit

The purpose of the performance audit is to assess ADOT's management performance in carrying out the MAG Urban Highways Program under original Program conditions, and to recommend ways to improve ADOT's efficiency and effectiveness in fulfilling its future overall Program responsibilities.

The Office of the Auditor General directed that the scope of the performance audit include a review of ADOT's administration of the MAG Urban Highways Program relative to the following five issues areas:

- Original and current excise tax revenue forecasting processes
- Original and current program cost estimates
- Priority programming process
- Program management practices
- Right-of-way acquisition practices

A total of 46 specific questions were detailed in the five areas listed above by the Office of the Auditor General for analysis in the performance audit. These questions are listed in Appendix A. This report presents the findings and applicable recommendations from the analysis of each of these questions.

The scope of the performance audit did not include a financial audit of the MAG Program. The scope also did not include a detailed preparation of long-range traffic projections or development of Program revenue and cost projections, or underlying assumptions.

The performance audit used extensive data and estimates developed by ADOT. Such data and estimates were reviewed for reasonableness, but not verified by the audit team.

Approach

In order to meet the objectives of the performance audit, a work plan consisting of the following six tasks was performed:

- Task 1 - Review Revenue Estimates
- Task 2 - Evaluate Estimates of Program Costs

- Task 3 - Assess Priority Programming Practices
- Task 4 - Evaluate Program Management Practices
- Task 5 - Assess Right of Way Practices
- Task 6 - Prepare Final Report and Present Findings

Our approach included:

- Numerous fact-finding interviews with MAG and ADOT managers directly responsible for the MAG Program and its implementation (Appendix B contains a list of these individuals)
- Interviews with current and former State and local elected officials, representatives of the business community groups that have expressed concerns with MAG Program management, and selected others knowledgeable of the overall MAG Program (Appendix B contains a list of these individuals)
- Compilation and reviews of extensive ADOT and MAG reports, manuals, and working papers
- Contacts with selected other state and local agencies responsible for similar highway and financing programs

The work plan was performed by a competitively selected project team composed of performance audit, highway engineering, right-of-way acquisition, and financial analysis and management specialists.

Organization of report

Following the introduction, Section 2 presents an overview and a brief status summary of the MAG Program. This section provides useful background for readers that are not familiar with the Program as well as the context for the detailed analyses documented in other sections of the report.

Sections 3 through 7 document the analyses, conclusions, and applicable recommendations for the five areas of focus of the performance audit. Each of the 46 questions in the performance audit's scope is addressed in these sections. It is important to note that our response is fully documented for each question with very limited cross-referencing to other questions. This keeps the reader from having to make extensive cross-references to other

questions or sections of the report and also minimizes the potential for misinterpreting conclusions and recommendations.

Section 8 summarizes the overall conclusions of the performance audit and identifies important considerations for improving the efficiency and effectiveness of ADOT's and MAG's management of the MAG Urban Highways Program in the future.

2. OVERVIEW AND STATUS OF MAG REGIONAL FREEWAY/EXPRESSWAY PROGRAM

This section presents an overview of the MAG freeway/expressway plan and priorities, agency roles and responsibilities, the forecasted revenues and costs of the MAG Program, and the Program's status as of July 1991. This overview and status report is intended to provide readers with background information for evaluating the findings and recommendations presented in Sections 3 through 8 of this report.

MAG plan and priorities

As required by federal law, an urban transportation planning program has existed in the Phoenix urban area since the 1960s. The Maricopa Association of Governments (MAG) is the designated metropolitan planning organization (MPO) for Maricopa County and is responsible for directing the ongoing urban transportation planning program. Staff jointly funded by MAG and ADOT perform the technical analyses for the urban transportation planning program. The staff are in the MAG Transportation Planning Office (MAGTPO) and consist primarily of ADOT employees.

On July 25, 1985, MAG adopted its Regional Transportation Plan for Maricopa County. This plan was approved by MAG elected officials and was based on transportation studies of the East Valley, Central Phoenix, and the West Valley. The plan recommended 233.5 additional miles of freeway and expressway corridor to the 86.5 miles of completed or under-construction freeways. Exhibit 2-1 presents the MAG Regional Transportation Plan.

The corridors included in the plan were broadly defined. Interchange spacing was generalized and drainage, right of way, and selected other requirements could not be detailed because of the generalized alignments and designs. The final alignment and design of the facilities were the subject of engineering and environmental studies, public hearings, and adoption by the State Transportation Board.

In January 1986, MAG adopted freeway/expressway priorities for the MAG Program. Exhibit 2-2 summarizes these priorities by five-year period between 1986 and 2006. ADOT's recent five-year progress report on the MAG Program noted that the original dates for MAG priorities are no longer valid because of increased costs and revenue shortfalls.

EXHIBIT 2-1

MAG REGIONAL TRANSPORTATION PLAN

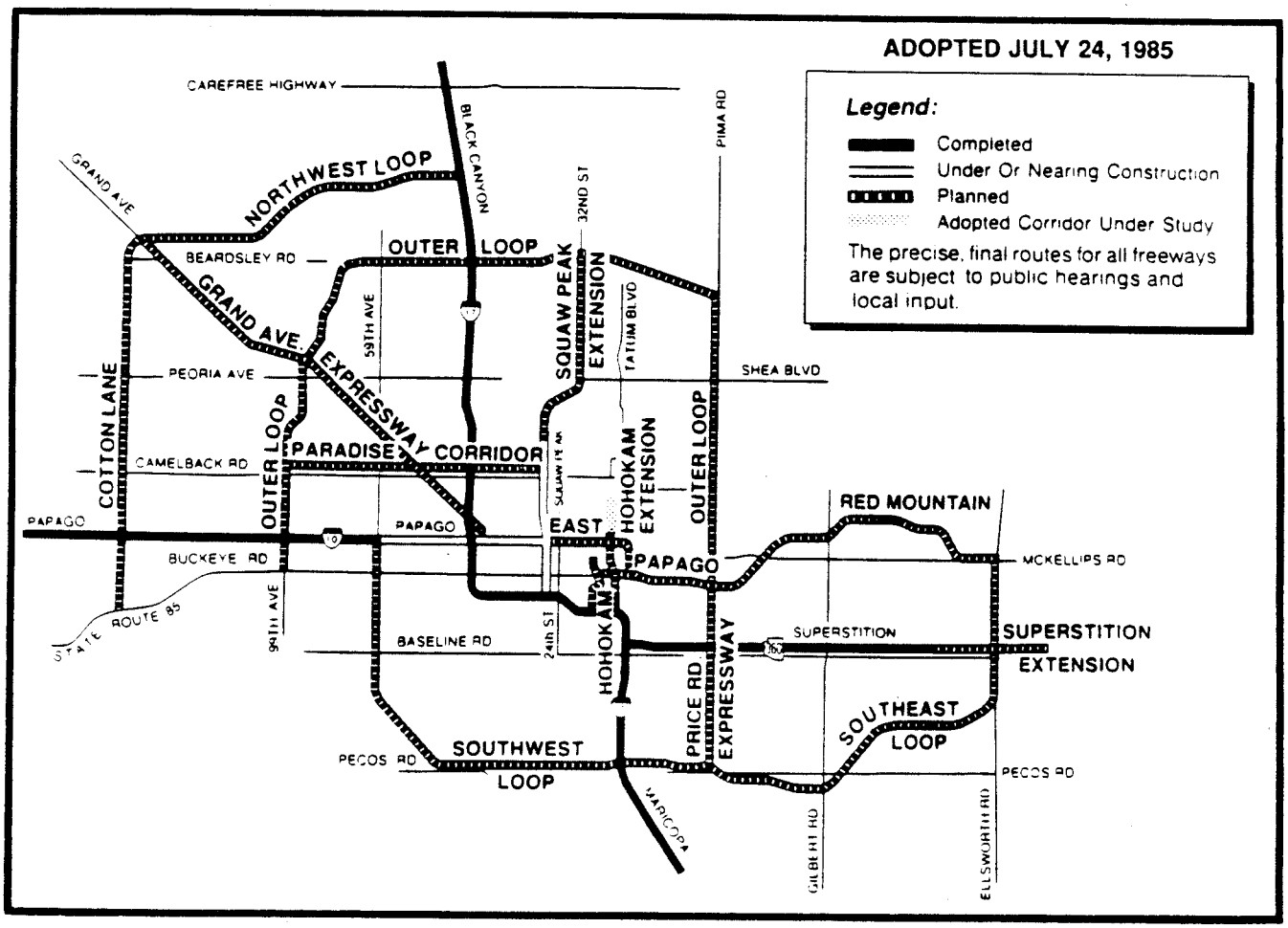


EXHIBIT 2-2

FREEWAY/EXPRESSWAY PRIORITIES FOR EXCISE TAX AND 15% REVENUES ADOPTED BY MAG REGIONAL COUNCIL JANUARY 29, 1986

SECTIONS	1986-MID-1990	MID-1990 - MID-1995	MID-1995 - MID-2000	MID-2000 - 2005
AGUA FRIA FREEWAY				
Buckeye Rd.-Papago Freeway	E/R	C		
Papago Freeway-Northern Ave.	E/R-AC	C		
Northern Ave.-Bell Rd.	C			
Bell Rd.-Black Canyon Freeway	E/R	C		
ESTRELLA FREEWAY				
S.R. 85-Grand Expressway	E/R	E/R	E/R	C**
Grand Expressway-Black Canyon Freeway	E/R	E/R	E/R	C**
GRAND EXPRESSWAY				
McDowell Rd.-Paradise Parkway	E/R	C		
Paradise Parkway-Agua Fria Freeway	E/R	C		
Agua Fria Freeway-Dysart Rd.	S	E/R	E/R	C
Dysart Rd.-Cotton Lane	S	E/R	E/R	C
HOHOKAM EXPRESSWAY				
McDowell Rd.-University Dr.	E/R-AC	C		
PAPAGO FREEWAY (EAST)				
I-10-Hohokam Expressway	C			
Hohokam Expressway-Pima Freeway	E/R-AC			
PARADISE PARKWAY				
Squaw Peak Parkway-Black Canyon Freeway	E/R	C		
Black Canyon Freeway-51st Ave.	E/R			
51st Ave.-Agua Fria Freeway	E/R	E/R	C	
PIMA FREEWAY				
Black Canyon Freeway-Squaw Peak Freeway	E/R	C		
Squaw Peak Parkway-Scottsdale Rd.	E/R	S*	E/R	C
Scottsdale Rd.-Shea Blvd.	E/R	C		
Shea Blvd.-Papago Freeway	E/R	C		
Papago Freeway-Superstition Freeway	C			
PRICE PARKWAY				
Superstition Freeway-Santan Freeway	E/R	C		
RED MOUNTAIN FREEWAY				
Pima Freeway-Country Club Rd.	E/R	C		
Country Club Rd.-Gilbert Rd.	E/R	C		
Gilbert Rd.-Bush Highway	E/R	E/R	C	
Bush Highway-Ellsworth Rd.	E/R	E/R	C	
McKellips Rd.-Superstition Freeway	E/R	E/R	C	
SANTAN FREEWAY				
I-10-Price Parkway	E/R	C		
Price Parkway-Gilbert Rd.	E/R	E/R	C	
Gilbert Rd.-Power Rd.	E/R	E/R	E/R	C
Power Rd.-Superstition Freeway	E/R	E/R	E/R	C
SKY HARBOR ACCESS FACILITIES				
Sky Harbor Expressway (Sky Harbor-I-10)	C			
Sky Harbor Blvd. (44th-56th Streets)	E/R-AC	C		
SOUTH MOUNTAIN PARKWAY				
Papago Freeway-Baseline Rd.	E/R	S	E/R	C
Baseline Rd.-7th St.	E/R	S	E/R	C
7th St.-Maricopa Freeway	E/R	S	C	
SQUAW PEAK PARKWAY (EXTENSION)				
Glendale Ave.-Thunderbird Rd.	E/R	C		
Thunderbird Rd.-Pima Freeway	E/R	E/R	C	

E/R Preliminary engineering and right-of-way purchase
AC Accelerated construction started
C Final construction completed
S Staged construction completed
* Full construction by 1995 if funds available
** Lowest construction priority

Source: MAG

EXHIBIT 2-3

PRIORITIES FOR MAG EXCISE TAX AND 15% REVENUES ADOPTED BY MAG REGIONAL COUNCIL OCTOBER 24, 1990

SECTION	LEVEL I*	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
AGUA FRIA FREEWAY					
Buckeye Rd.-Papago Freeway	C				
Papago Freeway-Northern Ave.	E/R	C			
Northern Ave.-Bell Rd.	C				
Bell Rd.-Black Canyon Freeway	C				
EAST PAPAGO FREEWAY					
Papago Freeway-Hohokam Expressway	C				
Hohokam Expressway-Pima Freeway	C				
ESTRELLA FREEWAY					
Buckeye Road-Papago Freeway	E/R	E/R	E/R	E/R	S
Papago Freeway-Grand Expressway	S				
Grand Expressway-Black Canyon Freeway	E/R	E/R	E/R	E/R	S
GRAND EXPRESSWAY					
McDowell Rd.-Paradise Parkway	E/R	C			
Paradise Parkway-Agua Fria Freeway	E/R	C			
Agua Fria Freeway-Dysart Road	S	E/R	E/R	C	
Dysart Road-Cotton Lane	S	E/R	E/R	C	
HOHOKAM EXPRESSWAY/PARKWAY					
University Drive-McDowell Road	C				
McDowell Road-Thomas Road	E/R	E/R	C		
PARADISE PARKWAY					
Squaw Peak Parkway-Black Canyon Freeway	E/R	C			
Black Canyon Freeway-59th Avenue	E/R	C			
59th Ave.-Agua Fria Freeway	E/R	E/R	C		
PIMA FREEWAY					
Black Canyon Freeway-Squaw Peak Freeway	E/R	C			
Squaw Peak Parkway-Scottsdale Road	E/R	S	E/R	C	
Scottsdale Road-Shea Boulevard	E/R	C			
Shea Boulevard-East Papago Freeway	C				
East Papago Freeway-Superstition Freeway	C				
PRICE PARKWAY					
Superstition Freeway-Santan Freeway	E/R	C*			
RED MOUNTAIN FREEWAY					
Pima Freeway-Country Club Road	E/R	C*			
Country Club Road-Gilbert Road	E/R	C			
Gilbert Road-Bush Highway	E/R	E/R	C		
Bush Highway-Superstition Freeway	E/R	E/R	C		
SANTAN FREEWAY					
Maricopa Freeway-Price Parkway	E/R	C			
Price Parkway-Gilbert Road	E/R	E/R	C		
Gilbert Road-Power Road	E/R	E/R	E/R	C	
Power Road-Superstition Freeway	E/R	E/R	E/R	C	
SKY HARBOR ACCESS FACILITIES					
Sky Harbor Expressway (Sky Harbor-I-10)	E/R	C			
Sky Harbor Boulevard (44th-56th Streets)	C				
SOUTH MOUNTAIN PARKWAY					
Papago Freeway-Baseline Road	E/R	S	E/R	C	
Baseline Road-7th Street	E/R	S	E/R	C	
7th Street-Maricopa Freeway	E/R	S	E/R	C	
SQUAW PEAK PARKWAY (EXTENSION)					
Glendale Avenue-Thunderbird Road	C				
Thunderbird Road-Bell Road	E/R	S	C		
Bell-Road-Pima Freeway	E/R	E/R	C		

E/R Preliminary engineering and right-of-way purchase
C Final construction completed
S Staged construction completed
* The portion of Price Parkway between the Superstition Freeway and Guadalupe Road, as well as the portion of the Red Mountain Freeway between the Pima Freeway and Dobson Road, are included in Level I. Also, staged construction of the Price Freeway between Pacos Road and Galveston Road, as well as staged construction of the Pima Freeway between Bell Road and Scottsdale Road, are included in Level 1.

Source: MAG

MAG adopted revised priorities for the program in October 1990 and Exhibit 2-3 summarizes the priorities. The definitions of the revised priority categories are as follows:

- *Level I:* Completed segments and projects programmed in the ADOT FY 1991-95 highway construction program, including those identified in the program for construction in FY 1996 and FY 1997.

- *Level II:* Unprogrammed original 1990 and 1995 priorities.

- *Level III:* Original 2000 priority projects.

- *Level IV:* Original 2005 priority projects.

- *Level V:* Staged construction on the portions of the Estrella Freeway not programmed to date.

Since the adoption of the MAG Plan and priorities in 1986, ADOT has conducted location and design concept studies for all corridors and prepared detailed designs in many corridors. These studies, which included extensive public involvement, generally resulted in expanded design requirements (e.g., type of facility (freeway versus expressway), grade of facility (depressed versus at-grade or above grade), number of lanes, number and types of interchanges, right-of-way requirements, and environmental impact mitigation measures). Factors contributing to this include:

- Higher year 2005 population and employment forecasts for Maricopa County than were used in original MAG planning studies

- Significantly higher year 2005 traffic projections for the MAG study area

- Citizen and local government requests and requirements to develop corridor alignments and designs that are compatible with adjacent development and mitigate environmental and related impacts

- Engineering requirements to meet ADOT's design standards and topographic, environmental, and development conditions in each corridor

ADOT's report, *Maricopa County Transportation Excise Tax Review, 1986-1990*, presents detailed assessments of how the geometric, operational, and right-of-way requirements in each corridor changed based on the above factors during ADOT's ongoing design of the Program.

MAG Program funding

The MAG Program is funded from two primary sources. The major funding source is the transportation excise tax authorized pursuant to HB 2306 and approved by the Maricopa County electorate on October 8, 1985. This tax equates to 10 percent of the state's transaction privilege tax rate as of January 1986 on 16 separate classes of business activity within Maricopa County. The revenues from this transportation excise tax are deposited in the Maricopa County Regional Area Road Fund (RARF) and can only be used for:

1. Payment of bond-related expenses and obligations.

2. The funding of reserve accounts for the repayment of bonds.

3. The design, right-of-way purchase, or construction of controlled-access highways which are in the MAG plan and on the State Highway System.

4. Related grade separations of controlled-access highways which are included in the MAG Plan.

In addition to RARF revenues, the MAG Program is also financed with MAG 15 percent revenues, which represent a 15 percent share of ADOT's 50 percent allocation of the Arizona Highway User Revenue Fund (HURF). Approximately 83 percent of the 15 percent revenues allocated to fund the MAG Program are statutorily dedicated. The balance (special 15 percent revenues) are allocated in accordance with ADOT policy. One of the primary funding strategies recommended by the MAG Regional Council was to use revenue bonds to be repaid from HURF and RARF funds to the extent possible. High bonding levels in the early years of the MAG plan would accelerate construction of facilities at the earliest possible date. The State Transportation Board has followed this recommendation and has implemented an aggressive bonding program since 1986.

Other sources used to fund the MAG Plan include federal aid funds to pay for improvements where MAG corridors intersect with federal aid-supported interstate highways, third-party contributions from local communities and developers, and interest income from unexpended bond moneys.

As discussed in Section 3 of this report, the actual excise tax collections have fallen short of collections forecasted by ADOT each year since FY 1986. ADOT's latest 20-year revenue forecasts are substantially below the legislative estimates originally developed in 1985. For example, ADOT's July 1991 *MAG Freeway/Expressway System Status Report* notes that the original 20-year excise tax revenue forecast was $5.858 billion based on the 1985 legislative analysis, while its 1990 estimate is $3.834 billion. Considering 1991 revenues collections, ADOT's latest RARF trend revenue estimate is $3.410 billion.

Factors contributing to lower excise tax collections and forecasts are presented in Section 3 of this report. A major contributing factor has been the significant economic slowdown in Maricopa County, the State, and the nation which began close to the time the Program was initiated.

MAG Program costs

The projected costs to complete the MAG Program have increased significantly since 1985. The latest ADOT total cost estimate to complete the Program is $7.1 billion (in 1991 dollars) as compared to the $3.0 billion (in 1985 dollars) estimate developed in 1985. The cost increases have occurred for many reasons including:

- The completion of detailed corridor location studies in all corridors
- Expanded geometric, operational, and impact mitigation requirements
- Significantly greater right-of-way requirements and costs than originally estimated
- Inflation in material, labor, and related costs

Section 4 assesses the factors that have contributed to projected MAG Program cost increases.

MAG Program status

Based on ADOT reports and estimates, the status of the MAG Program as of September 1990 was:

- 14 miles of freeway/expressways have been opened since 1985
- 29 miles of freeways/expressways are currently under construction
- Location studies have been completed in all MAG corridors
- Approximately 26 percent of design work has been completed
- Approximately 36 percent of required right of way acreage has been acquired
- Approximately 8 percent of program construction has been completed
- The overall program is estimated to be 21 percent complete

3. REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

This portion of the performance audit addresses questions regarding the reasonableness of forecasting and estimation procedures used for the excise tax increase enacted by Maricopa County voters in 1985. For the purposes of this performance audit, we respond to inquiries concerning:

- Sources of original revenue estimates
- Appropriateness of revenue estimation methods and assumptions
- Adequacy of revenue forecast documentation
- Timeliness of revenue forecast updates
- Reasonableness of current revenue forecasting processes
- Adequacy of ADOT's management of the RARF bonding process
- Sufficiency of excise tax revenues to meet debt services requirements of outstanding RARF bonds

The following pages present the findings, conclusions, and, where appropriate, recommendations resulting from the audit team's assessment of ADOT's excise tax revenue forecasting procedures.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.1 What entities were involved in developing original revenue forecasts? How were original revenue estimates determined?

Background

In 1985, the Arizona State Legislature enacted House Bill 2306 authorizing an increase of 1/2 cent to Maricopa County's (County) excise tax to support the design and construction of a metropolitan highway system. This legislative authorization was followed in the same year by a County-wide special election in which residents approved the levy of the additional excise tax for the MAG Program. While the initiative approved by voters authorized the collection of the increased excise tax and its expenditure on the MAG Program, initial legislative planning also considered that a portion of the Program would be funded from gasoline taxes.

Integral to the decision to utilize an excise tax increase as the primary funding mechanism for the MAG Urban Highways Program, was estimation of the amount of funds that an excise tax increase could potentially provide over the 20-year life of the Program. The earliest public estimates of the additional excise tax that could be collected were printed in the voters pamphlet of the special election. These estimates are shown in Exhibit 3-1.

EXHIBIT 3-1

ESTIMATE OF THE ANNUAL AMOUNT OF TRANSPORTATION EXCISE TAX REVENUES TO BE RAISED
(Millions of dollars)

1986	$ 99	1991	$162	1996	$262	2001	$422
1987	$109	1992	$178	1997	$288	2002	$465
1988	$120	1993	$196	1998	$317	2003	$511
1989	$133	1994	$217	1999	$349	2004	$562
1990	$147	1995	$238	2000	$384	2005	$618

Source: Special Election Voters Pamphlet, Maricopa County Board of Supervisors, October 8, 1985

The description of the estimates in the voters pamphlet stated that:

> "Based upon population growth, inflation and other economic factors, legislative staff estimates that the Transportation Excise Tax will produce $5.8 billion over the twenty-year duration of the tax."

The voters pamphlet consistently used the term "estimate" to describe the future excise tax revenues that may be collected. While frequently used interchangeably, an "estimate" has a different definition than either a "forecast" or a "projection." It is widely recognized that a "forecast" is the most definitive statement an economist will make about future information. A forecast is typically characterized by assumptions which have a reasonable basis and have been evaluated under a rigorous methodology. The term "projection" is typically used if one or more of the underlying assumptions cannot be reasonably approximated, making a projection somewhat hypothetical in nature. An "estimate" is typically supported by an even less comprehensive, and correspondingly less precise, set of assumptions and process. Due to their nature, many organizations restrict the use of estimates and projections to specified or internal uses only.

Whether a forecast, projection, or estimate, it must be recognized that all future information is subject to change as actual events occur. As the public does not typically distinguish between the various levels of effort and confidence underlying future information, it is generally necessary to clearly qualify future information with a statement regarding its achievability.

No discussion of the achievability of the initial excise tax estimates, or the impact to the Program if estimates were not reached, was provided to the public in the voters pamphlet.

The original excise tax revenue estimates were prepared by an ad hoc committee that was composed of the following members:

- Terry Trost, Phoenix Chamber of Commerce
- Dennis Smith, MAG Staff Coordinator
- Roger Herzog, MAG Transportation Planning Office (MAGTPO)/ADOT
- Robert Lockwood, House Research Staff
- Charlie Miller, ADOT Director
- Owen Ford, ADOT State Engineer

- Chuck Rider, ADOT
- Ron McReady, ADOT
- Suzanne Sale, ADOT Administrative Services Division Director
- John Semmens, ADOT
- Robert Mickelson, ADOT Deputy State Engineer
- Harry Reed, ADOT Transportation Planning Division Director

The majority of the committee was made up of staff with government finance, revenue analysis, budgeting and legislative analysis experience. Some members also had experience in economic forecasting and sales tax projections.

The committee was convened in November 1984 to develop a data base of information that could be used to support planning for major transportation legislation that was expected to be introduced in the 1985 Legislative Session. A part of the committee's charge was reviewing appropriate funding alternatives for a major transportation program. This entailed the review and compilation of estimates of future revenues from various funding sources, including excise taxes. Developing official public forecasts for these potential funding sources was not part of the committee's objectives.

The committee reviewed a number of alternatives for funding the Program, including property taxes, gasoline taxes, and excise taxes. Due to the amount of funds that were required based on very preliminary estimates of potential costs by ADOT, the Committee determined that an excise tax increase provided the best alternative for collecting the required funds.

The committee developed initial excise tax estimates for both a 1/4 cent and 1/2 cent tax increase. Preliminary work on the revenue estimates indicated that a 1/4 cent excise tax would not be enough to fund the Program, and further analysis of the 1/2 cent tax was performed. The methodology used to develop the initial 1/2 cent excise tax estimates was proposed by the Joint Legislative Budget Committee and reviewed and adopted by the committee. ADOT representatives have stated that the Executive Budget Office and the Department of Revenue also participated in the review of excise tax revenue estimates.

The methodology used by the committee to develop the initial estimates was based on increasing the County's estimated excise tax collections for 1985-86 by forecasted inflation and the expected increase in real personal income over the life of the Program. Annual inflation forecasts were obtained from DRI/McGraw-Hill (DRI), a well recognized,

econometric forecasting firm, and appear to have been developed based on the Producer Price Index for Producer Finished Goods. The forecasts of the percentage increase in real personal income were obtained from the Arizona Department of Economic Security (DES). These two factors were averaged for the first five years of the Program, second five years, and final ten years.

The factors used in the excise tax growth estimate are shown in Exhibit 3-2. The actual average annual growth rate for the period 1985-1989 was 8.6 percent, which was comprised of an annual average inflation rate of 3.8 percent and an average annual increase in real personal income of 4.8 percent.

EXHIBIT 3-2

EXCISE TAX GROWTH ASSUMPTIONS

	Inflation Forecast[1]	Real Personal Income Forecast[2]	Excise Tax Growth Forecast
First Five Years			
FY 1985-1986 through FY 1989-1990	5.2%	5.3%	10.5%
Second Five Years			
FY 1990-1991 through FY 1994-1995	6.1%	4.1%	10.2%
Final Ten Years			
FY 1995-1996 through FY 2004-2005	6.2%	3.8%	10.0%

Sources:

[1] DRI/McGraw-Hill
[2] Arizona Department of Economic Security

Based on discussions with ADOT, the original estimates of excise tax revenues were developed by the committee for legislative planning purposes only. The inclusion of the estimates in a public document like the voters pamphlet was not considered by the committee as the estimates were being developed.

The voters pamphlet was drafted by MAG staff and Bob Lockwood of the House Research Staff, reviewed by the Legislative Counsel's Office, and printed by the County. The committee's estimates were converted to a calendar year basis and included in the voters pamphlet as "legislative staff" estimates.

Criteria

The criteria used for evaluating the reasonableness of the initial estimation process considered that the estimates were used for a public purpose and likely influenced voter decisions to some extent. Therefore, a more comprehensive set of criteria was used to review the estimates than would be necessary had the estimates been limited to internal or legislative use only. Further, considering that these estimates were prepared by public agency staff, assumptions should consider the risks of overstatement by being somewhat conservative.

The criteria include the following:

- The estimates should be developed through a rigorous process which considers various alternatives to estimating future information
- The estimates should be based on reasonable and sound econometric methods and should consider the relative achievability of key assumptions
- The estimates should be based on realistic but conservative long-term economic assumptions
- The estimates should be adequately qualified and assumptions disclosed to allow voters to understand the nature and strength of the estimation process

In effect, since the estimates were used in a public document and impacted voter decisions, they required the type of diligence of process used for economic forecasts.

Analysis

Using the process described earlier, the committee developed an excise tax revenue estimate for the Program which grew at an average annual rate of 10.17 percent over the 20-year life of the Program. This rate was comprised of equal parts inflation and real income growth in the first five years. In the second five years, the inflation component of the growth rate was 6.0 percent and grew to 6.2 percent in the last ten years of the Program. This illustrates that the initial excise tax estimates were highly dependant on actual inflation occurring as forecasted.

DRI, like many other econometric forecasting firms, provides base case forecasts using its best assessment of future economic activity. High and low forecasts are also produced by adjusting the base case to general more optimistic and conservative forecasts. Importantly, inflation is normally considered in the context of increasing costs and therefore high

inflation estimates are considered conservative. In the case of revenue estimates, however, high inflation is not a conservative assumption.

In 1983 to 1985, actual inflation nationwide for consumer prices was between 3 and 4 percent per year, while producer price inflation was much lower. However, in late 1984 DRI was forecasting inflation for consumer prices to be 5 to 6.5 percent for the years 1986 to 1995. The committee used these high base case estimates of inflation for all years of the estimates, even though:

- Short-term trends pointed to lower inflation levels
- High inflation is not a conservative assumption for a revenue forecast

Had a more conservative assumption for inflation been adopted, the initial revenue estimates would have been closer to actual collections.

This conservatism may have been introduced to the committee's process had an external review of the revenue estimates been performed by econometricians before they were issued publicly. Alternatively, the public could have been made aware of the impact of a potential overstatement of revenues through adequate disclosure in the voters pamphlet.

One argument that has been made related to the importance of the inflation assumption, is that since it impacts both costs and revenues equally, its importance is minimized. However, as described later in the report, revenues and costs were not analyzed together and the total revenue figure, which included a high inflation estimate, became a benchmark for the Program.

Finally, it is not clear how or if the estimates would have changed had the committee used a more rigorous process and considered other economic indicators and variables. Trend analysis based on inflation and real income growth is a relatively simple method of estimating excise tax revenue and it is not clear that other, more comprehensive approaches would have yielded substantially different results. Due to the importance and manner in which this information was presented to the public, several approaches should have been considered and the most conservative and supportable method adopted.

This more rigorous approach should have been considered before the legislative staff chose to print the estimates in the text of the voters pamphlet.

Conclusions

Considering that the initial objective of the committee's efforts was to develop internal planning estimates, the committee followed a generally reasonable estimation approach based on trend analysis. The committee did not use a conservative assumption for inflation, which accounted for much of the difference between the estimated revenues and actual revenues to date. Considering the Committee's initial objective, other assumptions appear to have been reasonable.

When the decision was made to include the information in a public document, a more rigorous process should have been considered. Alternatively, the estimates should have been clearly qualified as to their achievability in the voters pamphlet.

Recommendations

ADOT should develop a standard disclosure statement to accompany all estimates, projections, or forecasts when the Department or its staff have been associated with their development.

To ensure that internal estimates or projections are not used for public purposes in the future without adequate disclosure, ADOT should adopt a policy of clearly labeling and qualifying all estimates, projections, and forecasts of future information when they have been associated with the development of the estimates, projections, or forecasts. This qualification should include:

- A statement regarding the level of diligence associated with each type of information
- Specific description of the intended use of the information
- A statement acknowledging that forecasts, projections, and estimates will likely vary from actual results

By adding this standard statement to all future information using a stamp or a standard form, ADOT will reduce the risk that other parties will place unwarranted reliance on information ADOT has been associated with without appropriate understanding of the information.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.2 Were estimation methods and assumptions appropriate? How did assumptions compare to those used in other forecast at the time?

Background

In 1985, House Bill 2306 amended the Arizona Revised Statutes Title 28 (Transportation Law) to allow Counties to authorize the collection of additional excise taxes to be used for regional transportation purposes. By law, funds collected for these purposes are to be deposited by the State Treasurer in a regional area road fund for the benefit of the County from which the funds are collected. Transportation Law Article 3.1 Section 28-1594.01 describes the use of excise taxes and specifies that "...the director (of ADOT) shall administer monies deposited in the regional area road fund."

After the passage of Maricopa County's 1/2 cent excise tax in October 1985, ADOT determined that a more comprehensive and rigorous approach to revenue forecasting than that used by the ad hoc committee was needed for planning and management of Program funds. Revenue forecasts were considered critical to establishing the MAG Program portion of the Department's five-year highway construction program and also necessary for illustrating the viability of the Program's revenue stream for bond offerings.

To this end, ADOT issued a request for quotes (RFQ) in December 1985 to retain a consultant to develop forecasting techniques for the 1/2 cent excise tax increase. The RFQ specified that the consultant must gather data, develop forecasting approaches, recommend software, develop initial forecasts and provide a forecast model. The consultant was given three months to complete the project and funding was limited to $10,000. The project was awarded to Dennis Hoffman, Ph.D. and Don Schlagenhauf, Ph.D., economists associated with Arizona State University (ASU).

The model developed by the consultant team is a structural econometric model that generates forecasts of taxable business activity over the twenty-year life of the program. The model is organized to independently forecast 10 of the 16 taxable activities covered by the tax increase legislation. Five of the activities--retail excise, contracting, rental of real property, utilities, and restaurants and bars--historically account for over 90 percent of the excise tax collections and therefore make up the most important components in the model.

Each of the components in the model is forecasted using a separate equation encompassing specific relationships to the model's major economic and demographic variables. The model calculates excise tax revenues by applying the appropriate tax rate to each forecast of taxable activity. This structure will allow continued use of the model should tax rates change in the future.

Consistent with structural econometric models, the ADOT model forecasts economic activity based on time-series regression techniques. This approach determines the historical relationship of the economic activity to be forecasted to other types of economic and demographic information called variables. By combining the historical relationships with forecasts of the economic and demographic variables, forecasts of the economic activity can be developed. Similar to other econometric models, the ADOT model utilizes each successive year of actual data to refine the relationships between variables and economic activities.

The major economic and demographic variable forecasts on which the ADOT model relies are:

- Total personal income of Maricopa County residents
- Total Maricopa County population
- Number of passenger arrivals at Sky Harbor Airport
- Dollar volume of building permits in the County

Exhibit 3-3 on the following page describes the model's major economic activities that are forecasted, the percentage of excise tax attributable to each activity, and the primary economic or demographic variables which are used to forecast the activity.

The ADOT model was first used to develop official revenue forecasts for the Program when the initial MAG Program Regional Area Road Fund revenue bond offering was developed in July 1986. This initial forecast relied on the following values for the key economic and demographic variables:

- **Personal income** - Personal income was derived by adjusting upward the Eggert Economic Enterprises, Inc. forecast of real personal income for Arizona by the inflation factor used by DRI/McGraw-Hill, Inc., combined with the historical growth difference between Arizona personal income and County personal income. The forecasted personal income growth rate was 10.8 percent which was the sum of a 6.2 percent annual growth rate in personal income and a 4.6 percent annual rate of inflation.
- **Population** - The County population forecast was issued by the Arizona Department of Economic Security in May, 1986. The forecasted growth was 3.5 percent per year.
- **Passenger Arrivals** - Passenger arrivals at Sky Harbor Airport were estimated by ADOT at 9.3 percent per year, which was within the range of City of Phoenix estimates.

EXHIBIT 3-3

ADOT FORECASTING MODEL
MAJOR ECONOMIC AND DEMOGRAPHIC VARIABLES

Taxable Activity	Percent of Total Collections	Major Determinants of Activity
Retail Sales	50.36%	Population, Income
Contracting	11.99%	Retail Sales, Building Permits
Rental of Real Property (including hotels and motels)	9.75%	Income
Utilities	9.64%	Income
Restaurants and Bars	8.38%	Income, Air Arrivals
Other	9.88%	Miscellaneous
	100.00%	

Source: Arizona Department of Revenue

- **Building Permits** - Forecasted building permit activity was determined by ADOT based on historical trends. A forecast of 13.8 percent annual growth in the dollar volume of building permits was used in the initial forecasts.

The first official forecasts issued by ADOT in July 1986 are provided in Exhibit 3-4. Also shown are the original estimates used by legislative staff in support of HB2306. For this comparison, legislative staff estimates were adjusted by ADOT to a fiscal year basis and are therefore slightly different than the calendar year estimates provided in the voters pamphlet and shown earlier in the response to Question 3.1 of this section.

Total revenues over the life of the Program were estimated at $5,858.4 million by Legislative staff in 1985, while ADOT initially forecasted $6,006.3 million in 1986 using its newly-developed excise tax revenue forecasting model.

EXHIBIT 3-4

INITIAL LEGISLATIVE STAFF ESTIMATES AND INITIAL ADOT FORECASTS OF EXCISE TAX REVENUES
(Millions of dollars)

Legislative 1986	Legislative Staff	ADOT July 1986		ADOT Staff	ADOT July
1986	$ 49.1	$ 37.3	1996	$ 250.8	$ 242.8
1987	104.0	97.3	1997	275.8	270.5
1988	114.9	106.8	1998	303.4	301.4
1989	126.9	117.5	1999	333.8	336.3
1990	140.3	129.5	2000	367.2	375.6
1991	154.6	143.3	2001	403.8	419.9
1992	170.3	159.0	2002	444.2	469.7
1993	187.7	176.7	2003	488.6	526.4
1994	206.9	196.4	2004	537.5	589.7
1995	228.0	218.2	2005	591.3	660.5
			2006	379.4	431.5
Total				5,858.4	6,006.3

*Partial Year's Revenues in Fiscal Years 1986 and 2006.

Source: Arizona Department of Transportation

Criteria

The criteria for evaluating the appropriateness of the excise tax revenue forecasting methods and assumptions include:

- Use of standard, econometric forecasting techniques
- Use of recognized data sources

- Overall reasonableness of assumptions and data
- Realistic but conservative approach in use of data

The use of standard, econometric forecasting techniques dictates that the model be able to predict historical economic performance (assuming historical relationships are valid), should react to changing economic conditions, and should have long-term capabilities.

Analysis

This section describes the analysis procedures performed to evaluate whether estimation methods and assumptions were appropriate. It is organized in the following subsections:

- Use of forecasts
- Forecast methodology
- Input data sources and assumptions
- Procedures used by other agencies

Use of forecasts

Prior to analyzing the specific methodologies used to forecast excise tax revenues, it is important to understand how the revenue forecasts relate to the Program.

The early revenue forecasts were used for two primary purposes: illustrating the strength of the Program's revenue stream in the initial bond offering; and developing the five-year program. The initial bond issuance covenants required that actual historical revenues be in excess of expected debt service by 30 percent. Therefore, while rating agencies were likely interested in the forecasts from a Program management perspective, they were likely much more concerned about historical performance than the actual forecasts themselves.

The development of the five-year program was the other major reason for revenue forecasts. Since the five-year program is a rolling plan that changes from year to year, early variances in forecasts could be somewhat mitigated by changing priorities or revising bond issuance schedules. Therefore, the five-year program is also not particularly impacted by forecast inaccuracies.

The real risk to the Program of forecast variances is on the overall Program management and the ability to complete the entire Program on time. Recent forecasts, which are discussed in later questions, show that the relatively optimistic forecasts in the early years

combined with high growth rates in future years resulted in a significant overestimation of Program revenues. As Program costs were not similarly reduced or constrained, a significant shortfall for the overall Program is now anticipated.

Due to the compounding affect of growth on successive years of excise taxes, early forecasts are critical to determining overall Program viability. Based on an ADOT analysis prepared for this performance audit, the first five years of actual collections were lower than forecasts by $71 million, or approximately 11 percent. While this may not seem particularly significant when compared to a $5.8 billion Program, these initial years form the base on which future growth is calculated.

Using the initial forecast's growth rates for the remaining 15 years, ADOT's analysis shows that this early $71 million difference compounds to a difference of over $1.15 billion over the 20-year life of the Program. This compounding is one of the major reasons for currently projected Program shortfalls. Due to the compounding, reliable short- and long-term forecasts are equally important to Program management.

Forecast methodology

The excise tax is actually a tax on 16 separate classes of business activity, and the ADOT model forecasts the individual business activities, not the tax revenue. The classes of taxable activity are very different, suggesting that the underlying determinants of economic behavior and their effects for each taxable activity will vary. For example, economic behavior that generates retail sales is likely to be different than the economic forces that result in construction or contracting activity. Therefore the model was designed to desegregate and separately estimate these classes for forecasting purposes.

Once the taxable activities are estimated, the model calculates the tax revenue for that activity class by multiplying the total business activity by the appropriate tax rate. The total tax revenue forecast is the sum of the individual activity tax forecasts. Assuming that the appropriate indicators of each economic activity were selected, this methodology is reasonable and consistent with the structure of the Program.

To evaluate whether the appropriate underlying variables were selected to predict each class of activity, the regression statistics of the model were reviewed. Based on this review, it appears that the relationships between input variables and the classes of activity are appropriate.

It is important to remember that econometric models have limitations and cannot be expected to predict structural changes or major events in an economy. The model is a tool to be used by experienced economists who must incorporate their knowledge and experience in both the application of input data and the interpretation of the model results.

This aspect of developing the forecasts is critical to ADOT because there have been several major unanticipated economic events in the last five years and there have been signs of some structural change in the regional economy. Since the original model was driven primarily by historical performance, it did not react well to short-term changes. Considering the compounding impact of short-term variances discussed earlier, this presents a significant risk to the forecast process and therefore careful management and interpretation of results is very important.

Input data sources and assumptions

While the overall methodology for the model appears appropriate, the selection of data for the underlying variables has been somewhat problematic since the initial forecasts. This appears primarily due to the recession, Tax Reform Act of 1986, building slump, and savings and loan failures which have significantly impacted the growth of the local economy in the last five years. Most regional and national economists failed to predict the magnitude of these downturns in the Arizona economy.

The four major input variables to the RARF revenue forecasting model included personal income, population, air arrivals, and building permit value. The growth rates associated with these variables, as used in the 1986 forecast of excise tax revenues and based on the actual historical trends over the prior 25-year period (1961-1985) are shown below.

Excise Tax Revenue Forecast Model Variable	1986 Forecast	Historical 1961-1985 Average
Personal Income	10.8%	12.2%
Population	3.5%	4.5%
Air Arrivals	9.3%	11.2%
Building Permit Value	13.8%	20.2%

Even though the growth factors initially used for the input variables of the RARF revenue forecasting model were lower than the averages associated with the prior 25-year period, 1961-1985 (as shown above), these growth rates did not reflect an adequately conservative outlook when considering the higher base in 1986, the 20-year forecast period, and the lower inflation rates of the years immediately preceding the start of the MAG Program.

Of the four major input variables to the original forecast, each had a different level of accuracy when compared to actual history and each contributed to a greater or lesser degree to the difference between forecasted and actual results. Each variable is discussed below.

Personal income

Assumptions regarding personal income are perhaps the most important in the model. Analysis performed by ADOT for this performance audit shows that adjusting the initial personal income growth forecast of 10.8 percent per year to the actual personal income growth for the first five years of approximately 8.6 percent per year, accounts for 86 percent of the difference between the original forecasts and what the original forecasts would have been if all variables were accurately forecasted for the first five years.

The compounded affect of this data difference is estimated by ADOT at $1.3 billion over the 20-year life of the Program. Adding this difference to the $0.7 billion forecast decrease caused by ADOT's current, more conservative growth expectation for excise taxes in the next 15 years, explains the majority of the $2.2 billion difference between ADOT's original Program forecast of $6 billion over 20 years and the latest official 1990 forecast of $3.8 billion. Preliminary 1991 forecasts reflect continued conservative income growth, with the 20-year total amounting to $3.4 billion.

The original forecast of Arizona personal income growth of 6.2 percent was taken from Eggert Enterprise Inc., a firm providing consensus estimates for major national and regional economic variables. These estimates are developed by combining estimates independently developed by nationally recognized economists.

The original forecast of inflation of 4.6 percent was developed by using the DRI price deflator (inflation factor) and adjusting it for the historical relationship between inflation for the State and the County. In the years immediately preceding the original forecast, consumer price inflation had been in the 3 percent to 4 percent range. When used for revenue estimation, high inflation is not a conservative assumption. Weighing recent history to have a greater impact on short-term inflation rates would have been a more conservative position.

Population

The population variable is also important to the forecasting process because the rate of population growth in the County is a primary determinant of economic activity. The forecasts of regional population growth were developed by the Department of Economic Security (DES).

DES's forecasts were quite accurate when the impact of the population variable on the forecasts is evaluated. ADOT analysis suggests that if the original forecasts of population growth in 1986 were adjusted to actual population statistics and forecasts made in 1990, the original excise tax forecast would have changed by less than 1/4 of 1 percent.

Important to the data analysis is an understanding that population growth also influences personal income growth. However, each of these variables is used in the model independently. It is therefore important if at all possible that these variables be developed in a consistent manner.

As discussed above, the population projections were obtained from DES, and the personal income projections obtained from an independent source. It is quite possible therefore that the two variables do not use similar approaches or assumptions. While the impact of this difference may not be material at this time, it is not possible to determine if this will always be the case. This is an area that warrants further review by ADOT in the future.

Air passenger arrivals

Air passenger arrivals are used as a proxy for the level of tourism in the County. This variable is used in the forecast of the restaurant and bar taxable business activity. While reasonably difficult to forecast in the long term, a review of the regression coefficients for air passenger arrivals shows that this variable does not impact the overall forecasts to a significant degree. ADOT has used official City of Phoenix and Federal Aviation Administration (FAA) forecasts for this variable.

Building permits

The dollar value of building permits has the most fluctuation over time of any of the variables, making it the hardest to predict. Further, no source of forecasts for this data are available, requiring ADOT to develop forecasts for this variable internally.

The original forecasts incorporated a 13.8 percent annual growth rate, which was 32 percent below the 25-year historical average of 20.2 percent. Building permit activity actually declined over the last five years making this assumption account for an additional 28 percent difference between the original forecast and what the forecasts would have been if accurate data had been used in the initial five years. (Note that the 86 percent decrease caused by personal income plus the 28 percent decrease caused by building permits are offset by a 14 percent increase because of tax changes in the law that actually increased collections over the forecast assumptions.)

A 13.8 percent growth rate may reflect somewhat the dramatic growth in building that occurred in the County in the early 1980s. However, sustaining that level of growth over 20 years was not a realistic and conservative assumption. A 13.8 percent compounded growth over 20 years would make annual building permit activity grow from $3.8 billion in 1985 to $57.5 billion in 2006. However, seven times in the previous 20 years, building permit activity has actually declined in the County. Given the 1986 Tax Reform Act and

other unforeseen events, the results of the last six years confirmed the optimism of the initial growth rates assumed for building activity in Maricopa County.

Procedures used by other agencies

To review forecasting procedures used by other agencies, we interviewed representatives from:

- Phoenix Regional Public Transportation Authority
- San Bernardino Association of Governments
- San Diego Association of Governments
- Santa Clara County Traffic Authority

Each of these is discussed separately below.

Phoenix Regional Public Transportation Authority (RPTA)

The RPTA developed excise tax revenue projections in conjunction with the preparation of the regional public transportation plan that was defeated by Maricopa County voters in February 1989. The RPTA projections were developed at a less detailed level than the ADOT projections. The principal underlying the RPTA methodology is that there are three variables that significantly affect future revenues:

- Population growth
- Real per capita tax base growth
- Inflation

Population growth uses the official MAG population forecast, for both resident and non-resident components of population. The per capita tax base is represented by real dollar per capita taxable transactions and is grown by an annual rate of 0.85 percent, for both resident and non-resident contributions to the tax base. The real dollar total taxable transactions were then calculated and a weighted average of the individual tax rates was applied to derive the revenue projection in real dollars.

Inflation is applied to translate the real dollar projection into a current dollar projection. In this way, RPTA can evaluate the projection under alternative inflation assumptions.

In effect, the RPTA methodology is a much simplified form of the ADOT model, since both take into the account the same economic and demographic forces that affect the revenue stream. Both use population, inflation, and taxable expenditures to estimate revenues.

San Bernardino Association of Governments (SANBAG)

In 1989, San Bernardino County voters passed a one-half cent sales tax rate increase to finance public transportation and transit system improvements in the County. The County expects to soon issue bond anticipation notes in anticipation of a major bond offering in the Spring of 1992.

The County has determined that they will rely on outside parties to develop forecasts. SANBAG contracted with a local university economist to develop forecasts for the voter information literature for the 1989 referendum. SANBAG has tasked their financial advisor for the bond offering with the responsibility for overseeing the development of the forecasts, which will likely be performed by an economic consultant.

San Diego Association of Governments (SANDAG)

SANDAG has an economic input-output model that simulates the San Diego County economy as an interrelated component of the national economy. This model incorporates significantly more detail in the variables used to generate sales tax revenue forecasts than do most other agencies with similar responsibilities. In the SANDAG model, employment is the primary determinant of economic activity. The employment data used by the model is at a detailed industry sector level which contributes to a greater degree of accuracy in the forecasts. Using this comprehensive approach, SANDAG's model has been slightly under-estimating actual retail sales over the past five years.

Input-output models of this nature and complexity are very expensive to develop and maintain. The original SANDAG model was developed under a government grant at a cost in excess of $500,000. The model is updated every five years and requires almost a full person-year for update and analysis.

Santa Clara County Traffic Authority

Santa Clara County voters passed a one-half cent sales tax rate increase to finance the construction or upgrade of three County freeways. The County created the Santa Clara County Traffic Authority to oversee all aspects of this ten-year program. In 1987, the Authority issued $200 million in bonds which were then refunded by a $274 million bond issued in 1990. The forecasts used in the preparation of the bonds were prepared in conjunction with the County's own economic forecast and based on an arithmetic increase

over the prior year's taxable business activity. These forecasts are tracked and updated monthly based on actual monthly revenues. Forecasts have been within 5.5 percent of actual results.

Conclusions

Conclusions based on the analysis are as follows:

- The model's early development, while constrained by funding and time frame commitments, is reasonable and consistent with econometric techniques.

- The major variable in the model is personal income and in retrospect the initial estimate of personal income growth provided by a well-recognized independent source did not accurately anticipate continued low inflation.

- The population variable was accurately forecasted by a well-recognized source.

- The air arrival variable is forecast by the City of Phoenix and the FAA but has little impact on the revenue forecast.

- The building permit variable, while lower than historical trends, was not conservatively estimated in retrospect when considering the compounding affect of a 13.8 percent growth rate and the large amount of building activity that compounding eventually suggests.

- While other more expensive approaches have been used successfully by other agencies, the modeling level for ADOT appears appropriate.

- Overall, the use of external data sources, which did not fully recognize regional factors such as recent decreases in inflation or anticipate future decreases, contributed to a general lack of conservatism in the forecasts in the early years of the MAG Program.

Importantly, ADOT staff recognized many of these factors in the early years of the Program and, as discussed in Question 3.4, updated later forecasts to reflect many of these points.

Recommendations

ADOT should continue the refinement of its forecasting procedures and continue to apply subjective judgment in a rigorous, orderly manner based on knowledge of local economic conditions in reviewing and using forecasted independent data variables to ensure that conservatism is present in forecasts of excise taxes.

The primary area where the original economic forecasting process could have been improved was more conservative selection of values for personal income and building permit activity growth. These areas require that the economist responsible for preparing the forecast carefully evaluate data sources and variable forecasts and, recognizing the sensitivity of the forecasts to each assumption and the Program's needs for conservative revenue forecasts, adjust as necessary each assumption, as is now being done by ADOT.

Use of external data forecasts developed by outside parties for non-specific purposes should be documented as it is performed and carefully disclosed with the forecasts whenever they are published.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.3 Was the forecasting process adequately documented and subject to appropriate review and approval?

Background

ADOT's process for preparing the initial revenue forecasts was described in the response to Question 3.2 of this section. The documentation supporting this process includes:

- Request for Quotes for obtaining a consultant to develop a forecasting model
- Proposal responses from potential consultants
- Consultants final report on development of forecasting model with model documentation
- Historical data series and sources of data used to develop initial variable relationships
- Input data values, data sources, and description of other assumptions
- Complete model equations and resulting coefficients for each forecast series and annual updates
- Resulting forecasts
- Comparison of variable and excise tax forecasts to actual experience for the first five years of the Program

Criteria

The criteria for evaluating the adequacy of the review and approval process include:

- Senior management review, approval, and sign-off prior to the issuance of forecast
- Formal issuance of forecasts complete with assumptions and necessary qualifications

Analysis

ADOT's forecast development process calls for Administrative Services staff to compile latest historical data, develop assumptions, and prepare forecasts during the summer of each year. Documentation of these activities is maintained. Final forecasts are presented to the Director of the Administrative Services Division for review and approval. Once approved,

forecasts are presented to the Department Director. Formal sign-off for approval of forecasts is not performed.

Conclusions

ADOT's procedure for updating revenue forecasts is well documented from a forecast development standpoint. However, the review, approval, and issuance process is not formalized in written procedures.

In the past, revenue forecasts have been approved by ADOT and issued as part of each succeeding revenue bond official statement. A more formal issuance, which incorporates an analysis of changes to major assumptions for review by the public, would provide more visibility to the forecasting process. This would also allow ADOT an opportunity to clearly qualify and explain forecasts to the public and others.

Formal sign-off by the ADOT Director should be part of that process.

Recommendations

ADOT should prepare an official revenue forecast issuance package which includes the ADOT Director's approval.

The official revenue forecast should include:

- A cover letter signed by the Department Director specifically describing the intended use of the revenue forecasts
- ADOT's standard qualification statement regarding the achievability of the revenue forecasts (see response to Question 3.1)
- A description of all key assumptions
- Analysis of changes in major assumptions
- Sensitivity analysis of the impacts on the revenue forecast of under and over-forecasting key independent variables

This approach will allow the Department's approval to be more formally documented, and provide a package with complete documentation of the forecasting process for review by the public and others.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.4 Were the forecasts updated in an appropriate and timely manner? Were appropriate and timely adjustments made in the program in response to the updated forecasts?

Background

Excise tax revenue forecast updates impact the Program in two important areas: issuance of bonds and Program planning and management. Forecast updates are generated by ADOT Administrative Services Division staff in July and August of each year. These forecasts are prepared soon after final sales tax revenue data are made available from the Arizona Department of Revenue for the prior year. The forecast update process takes several weeks to complete.

Annual forecast updates were prepared for 1987, 1988, 1989, and 1990. The forecast update process for 1991 was underway at the time of our review.

Throughout the four years of updates, ADOT staff closely monitored and compared actual experience with the forecasts of excise taxes and the key model variables. Exhibit 3-5 on the following page shows a comparison of the revenue forecasts from 1986 to 1990, and the actual revenues collected by the Program.

Criteria

The criteria for evaluating the appropriateness and timeliness of excise tax revenue forecast updates include:

- Use of standard, econometric forecasting techniques
- Use of recognized data sources
- Overall reasonableness of assumptions, data, and adjustments
- Realism and conservatism in overall approach and use of data
- Regular updates which correspond to Program needs

EXHIBIT 3-5

TOTAL MARICOPA COUNTY
EXCISE TAX REVENUES - ACTUAL REVENUES AND FORECASTS
(Millions of Dollars)

Fiscal Year	Actual Revenues	July 86 Forecast	July 87 Forecast	July 88 Forecast	July 89 Forecast	July 90 Forecast
1986	$ 37.0	$ 37.3	-	-	-	-
1987	94.8	97.3	$ 94.8	-	-	-
1988	99.2	106.8	103.1	$ 99.2	-	-
1989	106.3	117.5	113.7	107.2	$106.3	-
1990	110.8	129.5	126.4	121.0	114.9	$110.8
1991	113.3	143.3	140.4	132.9	123.1	117.0
1992	-	159.0	155.2	144.8	132.7	125.0
1993	-	176.7	171.5	157.9	143.1	137.0
1994	-	196.4	189.8	172.1	154.4	150.0
1995	-	218.2	210.5	188.0	166.5	162.0
1996	-	242.8	234.3	206.3	180.0	174.0
1997	-	270.5	261.6	226.9	195.0	188.0
1998	-	301.4	291.3	249.0	210.7	202.0
1999	-	336.3	322.8	275.7	228.3	218.0
2000	-	375.6	358.5	305.9	247.3	234.0
2001	-	419.9	399.8	341.1	267.8	252.0
2002	-	469.7	447.2	381.4	290.0	271.0
2003	-	526.4	498.5	425.1	314.2	292.0
2004	-	589.7	553.8	472.2	340.6	314.0
2005	-	660.5	617.5	526.5	369.3	338.0
2006	-	431.5	402.7	193.3	233.8	212.3

Source: Arizona Department of Transportation

Analysis

Beginning with the initial forecasts in 1986, ADOT staff identified that forecasts were generally high when compared to the actual excise tax collections. This was primarily thought to be the result of economic downturns that affected the personal income and

building permit variables. Analysis showed that population and air passenger arrival forecasted inputs were having little affect on the growing shortfall in forecasted excise tax revenues.

In the period from 1986 to 1990, ADOT continued to use the Blue Chip Panel (previously Eggert Enterprises, Inc.) economists consensus measure for real personal income and adjust it for inflation forecasted by DRI. Inflation was also adjusted in relationship to historical differences between national and regional inflation levels. However, this measure of personal income continued to produce results that were somewhat higher than actual for the years 1986-1990.

Exhibit 3-6 on the following page shows the comparison over time.

Analysis performed by ADOT staff suggest that these data differences were the primary reason for differences between actual and forecasted excise tax collections.

The second data concern involved the internal forecasts that ADOT prepared for building permits. Again, due to the building slump, Tax Reform Act of 1986, savings and loan failures, and general economic downturn, forecasts of building permit activity were forecasted too high. Exhibit 3-7 shows the forecasts over the period 1986-1990.

In response to revenues and key forecast variables not meeting expectations, ADOT determined in 1988 that more fundamental and lasting changes in the economy may be occurring which necessitated review of the underlying data relationships and overall modeling approach. The model was still very capable of forecasting history, however, it was showing a consistent weakness in quickly responding to the major short-term changes that the Arizona economy was experiencing. Considering the initial long-term focus of the model, this was to be expected.

The first effort at improving the modeling process was a re-analysis of the current forecasting model. This was conducted in the Fall of 1989 by Dennis Hoffman, Ph.D. of ASU, one of the authors of the original model. This analysis developed procedures to correct for serial correlation of the error terms in the forecasting process. It was thought that minimizing the error terms would produce more accurate forecasts. However, this adjusted model actually produced higher revenue forecasts than the original model, and was therefore not used by ADOT.

In 1990 ADOT again initiated efforts to improve forecasting capabilities by seeking a method which would produce more accurate short-term forecasts while incorporating its long-term forecasts. In this effort, ADOT contracted with The Hickling Corporation to conduct a study of these effects. This study resulted in the report: "Risk Analysis of Expected Revenues from the Transportation Excise Tax, Maricopa County: 1990-2006."

EXHIBIT 3-6

TOTAL MARICOPA COUNTY PERSONAL INCOME FORECASTS COMPARED WITH ACTUAL INCOME
(Millions of Dollars)

Year	* Adjusted Actual Income	July 86 Forecast	July 87 Forecast	July 88 Forecast	July 89 Forecast	July 90 Forecast
1986	$ 27,805	$26,404	-	-	-	-
1987	30,312	28,754	$28,210	-	-	-
1988	32,676	31,715	30,495	$31,798	-	-
1989	35,198	35,109	33,971	34,513	$34,873	-
1990	37,693	38,901	38,081	38,500	37,598	$37,274

*Actual income is adjusted to convert from calendar year to fiscal year data.

Source: Arizona Department of Transportation

The risk analysis process refines the forecasting process by incorporating independent ranges of value for the input variables, by measuring the probability or "odds" that an outcome will actually occur. This is accomplished by attaching ranges (probability distributions) to the forecasts of each input variable. The approach allows all inputs to be varied simultaneously within their distributions. This approach recognizes interrelationships between variables and their associated probability distributions.

The result of a risk analysis is both a forecast and the quantification of the probability that the forecast will be achieved. The risk analysis process also involved an outside panel of experts in evaluating the forecast assumptions and the estimated probabilities associated with their accuracy.

EXHIBIT 3-7

TOTAL MARICOPA COUNTY DOLLAR VOLUME OF BUILDING PERMIT FORECASTS COMPARED WITH ACTUAL BUILDING PERMITS
(Millions of Dollars)

Year	Actual Value of Permits	July 86 Forecast	July 87 Forecast	July 88 Forecast	July 89 Forecast	July 90 Forecast
1986	$ 3,964	$4,337	$3,964	-	-	-
1987	3,882	4,935	4,511	$3,848	-	-
1988	3,631	5,616	5,134	3,887	$3,631	-
1989	3,037	6,391	5,842	3,926	3,414	$3,037
1990	2,477	7,273	6,649	4,083	3,323	2,502

Source: Arizona Department of Transportation

Based on discussions with ADOT staff, this approach confirmed the official forecast using the Department's excise tax revenue forecasting model, but is still significantly higher than the internal planning estimates ADOT uses for their five-year program.

As described earlier, ADOT uses revenue forecasts for bond offerings and five-year program development. Due to the difficulty in forecasting short-term revenues, ADOT used internal "planning forecasts" for the five-year planning process in 1990. These forecasts were more conservative than the long-term forecast generated by the model and were based on higher confidence levels derived through the risk analysis process.

Conclusions

The differences between actual and forecasted values were primarily the result of the difficulty in forecasting the variables for personal income and building permits (as discussed in the response to Question 3.2 of this section), attributed to the severity of the economic

downturn. Due to its long-term focus, the ADOT model was not capable of quickly reacting to the short-term downturn in the economy.

Even though subsequent updates of the excise tax revenue forecasts declined somewhat due to the lower growth rates associated with the model's input variables, ADOT staff did not further adjust downward important forecast assumptions based on subjective review of recent history, even though the model continues to have difficulty with short-term forecasts. Due to the compounding effect of lower than expected collections, accurate short-term forecasts are critical to the Program.

More conservative revenue forecasts were incorporated into the 1990 update of the Department's five-year program for FY 1991-95. In the latest update being prepared, short-term forecasts have again been reduced to those levels that management is using for internal purposes. Recognizing that accurate economic forecasting in the midst of a recessionary economy is difficult, this degree of conservatism appears appropriate.

The more significant concern is that updates to the revenue forecasts do not impact the level of costs associated with the overall MAG Program. Both costs and revenues are controlled in independent systems and revenue changes primarily impact Program decisions only through the updating of the five-year program.

During the first four years of the MAG Program, revenue forecasts remained higher than actual results, due to the deepening local economic downturn and the lag in the independent variables accounting for this turnaround in local economic activity. During the last two years, the Department has taken a more conservative approach to adjusting the forecasted MAG Program revenues to reflect regional, short-term economic activity. This has been prompted by the Department's recognition of the significance of the gap between Program revenues and costs and the importance of controlling Program expenditures to ensure compliance with coverage ratio requirements associated with RARF and HURF revenue bond covenants. This also reflects the Department's concern that future consideration of MAG Program funding requirements reflects the full extent of revenue needs.

Prior to 1989, the prospects for a public referendum on the VALTRANS funding proposition provided a strong incentive for ADOT top management to downplay the extent of the MAG Program overall fiscal shortfall. In contrast, the current aspects for a public referendum on extending and/or adding to the current MAG Program excise tax increment is providing a strong incentive for ADOT top management to recognize the full extent of the additional funding requirements for the MAG Program, as well as the extent of the original Program which can be completed using already available and committed revenues.

During the last two years, the MAG Program portion of the Department's five-year program has been scaled back significantly, due to lower forecasts of excise tax and 15 percent

revenues. This has resulted in projects being deferred later in the schedule, the MAG Program priority plan being revised by the MAG Regional Council, more programming of staged or interim projects, and greater ADOT efforts to seek third-party funding of MAG Program projects. These program adjustments are discussed further in the response to Questions 5.5, 5.6, and 5.7.

Recommendations

Continue to implement refined short-term forecasting methodology

Implementing improved short-term forecasting approaches is an important step which ADOT has recognized. Forecasting in this economic time and environment is extremely difficult, and close attention to short-term trend and performance should provide for more accurate short-term results.

Continue to use updated revenue forecasts to prepare and, if necessary, adjust long-range construction plans

As discussed later in the report, an overall program management system which requires that revenue updates balance with cost estimates should be implemented. This level of analysis should be prepared at least annually and formally presented to MAG, using a consistent current or constant dollar basis.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.5 Are current revenue forecasts (for both the existing one-half cent sales tax and proposed additional one-half cent sales tax) appropriate and reasonable, and based on sound and defensible forecasting methods?

Background

The current excise tax revenue forecasts were prepared in July 1990 as part of the annual update process which takes place when new data are available for forecasts. This process is described in the response to Question 3.4 of this section. As a result of the current recessionary economy, as well as lower revenues than were originally forecasted, current excise tax revenue forecasts reflect more conservative economic growth assumptions than earlier forecasts. The annual rate of tax revenue growth observed from 1986 through 1990 is compared with the forecasted growth rate from each forecast update from 1986 through 1990 in Exhibit 3-8.

EXHIBIT 3-8

ANNUAL RATE OF EXCISE TAX REVENUE GROWTH COMPARED WITH FORECASTED GROWTH RATE

	Actual Revenue	1986 Forecast	1987 Forecast	1988 Forecast	1989 Forecast	1990 Forecast
1988	4.64%	9.76%	8.76%	-	-	-
1989	7.16	10.02	10.28	8.06%	-	-
1990	4.23	10.21	11.17	12.87	8.09%	-
1991	-	10.66	11.08	9.83	7.14	5.60%
1992	-	10.96	10.54	8.95	7.80	6.84
1993	-	11.13	10.50	9.05	7.84	9.60
1994	-	11.15	10.67	8.99	7.90	9.49
1995	-	11.10	10.91	9.24	7.84	8.00
1996	-	11.27	11.31	9.73	8.11	7.41
1997	-	11.41	11.65	9.99	8.33	8.05
1998	-	11.42	11.35	9.74	8.05	7.45
1999	-	11.58	10.81	10.72	8.35	7.92
2000	-	11.69	11.06	10.95	8.32	7.34
2001	-	11.79	11.52	11.51	8.29	7.69
2002	-	11.86	11.86	11.81	8.29	7.54
2003	-	12.07	11.47	11.46	8.34	7.75
2004	-	12.03	11.09	11.08	8.40	7.53
2005	-	12.01	11.50	11.50	8.43	7.64

Source: Arizona Department of Transportation

Criteria

The criteria for evaluating whether the forecasting methods are appropriate and reasonable and based on sound and defensible forecasting methods include:

- Use of recognized data sources
- Use of standard econometric techniques
- Are consistent with prior trends
- Are appropriately realistic and conservative

In addition, the forecasting model should be able to closely predict actual historical revenues based on historical economic conditions, should react to economic changes, and it should have a long-term focus similar to other successful models.

Analysis

In view of the modest levels of economic growth currently exhibited at both the national and local levels, a decision was made to utilize a very conservative planning forecast for updating the Department's five-year program. As a result of this decision, the 1990 updated forecasts were not used in the five-year program update process. Instead, ADOT generated forecasts through the risk analysis process based on more restrictive probabilities of forecast achievement. These revenue forecasts are shown in Exhibit 3-9 on the following page.

This new forecasting process used for preparing the five-year program results in a forecast with a 5.11 percent compounded annual growth rate over the four-year period 1991 to 1995. This is a significantly more conservative assumption than the annual forecast update process generates and appears more in line with recent excise tax revenue collection experience.

Conclusions

The official excise tax revenue forecast update, which is currently being prepared for 1991 appears to respond better to current economic conditions and forecasts annual revenue growth at the most conservative rate of any forecast prepared for the Program to date. This approach appears to provide results that are similar to ADOT's conservative internal planning estimates. Overall, the use of standard econometric methods and the recently more conservative independent data variable forecasts appears sound and defensible.

Various revenue forecast scenarios developed by the Office of Fiscal Planning for MAGTPO earlier this year provide high, medium, and low estimates for the amount of

revenues which might be produced by extending and/or adding to the current excise tax for the MAG Program. The low, short-term trend-based estimates are the most conservative and are consistent with the planning estimates now being used by the Department for developing its five-year program updates. Overall, the broad range of estimates provided by the scenarios developed in May 1991 reflects the uncertainty inherent in forecasting excise tax revenues over a 35-year period.

EXHIBIT 3-9

ADOT PLANNING FORECAST OF EXCISE TAX REVENUES FOR FY 1991-95 PROGRAM

Fiscal Year	ADOT Planning Forecast
1991	$114.7
1992	119.1
1993	125.3
1994	133.7
1995	140.0

Source: Arizona Department of Transportation

Recommendations

Considering the Department's need to reliably and conservatively forecast revenues for short-term planning in addition to the long-term life of the Program, the Department should continue to incorporate the newly developed short-term forecast methodology improvements into the official excise tax revenue forecast update process.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.6 Has ADOT adequately managed the bonding process for the existing one-half cent sales tax? What changes, if any, will ADOT need to make in its management of the bonding process if the proposed additional one-half cent sales tax is enacted?

Background

In an effort to provide the County with the greatest amount of freeway mileage in the shortest time possible, the Department and MAG elected to pursue a strategy whereby the excise tax revenues for the Program were used to secure significant up-front financing with bonds. This scenario is in contrast to a pay-as-you-go scenario whereby freeway construction would be constrained by the amount of money raised each year. Instead, under the maximum bonding scenario, excise tax revenues have been used to leverage funds to the earlier years of the Program in an effort to open highways as soon as possible.

Criteria

The criteria for evaluating whether ADOT has adequately managed the bonding process include:

- Bonding decisions should be made based on cash flow and pricing
- Financing team members should be chosen on a competitive basis to keep costs down

Analysis

The question of whether ADOT adequately managed the bonding process deals with several issues, including:

- Selection of financing team members, including financial advisor, underwriter, bond counsel, and underwriter's counsel
- Timing of bond issuances
- Management of receipts and disbursements for program planning

Each of these is discussed below.

Selection of financing team members

The procedures used by ADOT to select financing team members for bond issuances are similar to those used in other public agencies with similar responsibilities. ADOT's financial advisor is Phoenix-based Rauscher Pierce Refsnes, Inc.

Underwriter, Bond Counsel, financial advisor, and paying agent selection are based on a formal procurement process. The selection of Underwriter's Counsel is made by the Underwriter upon recommendation of the State Transportation Board from a pool of pre-qualified firms. The State Treasurer's Office performs certain trustee responsibilities.

Timing of bond issuances

Current Department procedures for the timing of bond issuances consider cash flow needs as well as expected interest rates in the marketplace. ADOT sells bonds when current cash flows are at a level which will support additional debt service payments and program expenditures require an infusion of cash. These considerations are weighed against expected market conditions so the Department can obtain the lowest cost financing available.

ADOT has sold bonds on both a competitive and negotiated basis. The Department's most recent bond offering was sold competitively.

Management of receipts and disbursements

ADOT does not utilize an overall system for managing revenues, expenditures, and cash flow over the 20-year life of the Program. ADOT uses funding availability to plan and schedule the construction of the system, using a five-year programming horizon. This system allows Program priorities to be adjusted to match available revenues instead of basing decisions on costs.

Conclusions

The current "maximum bonding" strategy under which the Department has issued bonds to date allows the Department to respond to the mandate of providing the most freeway in the least time. While this strategy constrains future financing options by accumulating debt service obligations for the fund, current bond covenants are designed to ensure that there are enough revenues to cover future debt service costs. This fact enables ADOT to achieve an A1/A+ rating on its senior lien RARF bonds, an AAA rating on its insured subordinate lien RARF bonds, and an AA/AAA rating on its HURF bonds. These ratings are indicative of an adequately managed bonding process.

REVIEW OF EXCISE TAX REVENUE FORECASTING PROCEDURES

3.7 By how much will the revenues from the existing one-half cent sales tax exceed the debt service requirements for existing bonds?

Background

To date ADOT has issued $890,857,875 in bonds for the Maricopa County Regional Area Road Fund (RARF). The breakdown of these bond issues is shown in Exhibit 3-10.

EXHIBIT 3-10

MARICOPA COUNTY RARF BONDS ISSUED TO DATE

Bond Issue	Principal Amount
1986 Series A	$ 182,430,000
1987 Series A	170,000,000
1988 Series A	124,997,875
1989 Series A	360,000,000
1991 Series A	53,430,000
Total Maricopa County RARF Bonds Issued	$ 890,857,875

Source: Arizona Department of Transportation

Analysis

Total debt service payments over the life of the Program for all bonds will be $1.57 billion. Through fiscal year 1991, ADOT has made debt service payments totaling $261 million.

Total debt service to be paid in Fiscal Years 1992 through 2005, when all existing bonds will be retired, is $1.3 billion. Total debt service payments for fiscal year 1992 will be $93 million. Forecasted excise tax revenues for 1992 are about $120 million.

Total excise tax revenues collected for the Program are currently forecasted at $3.4 billion, based on a mid-1991 preliminary trend forecast. This breakdown of debt service and current revenue forecasts are shown in Exhibit 3-11, which shows both debt service payments and program revenues to date, and for the total RARF program.

EXHIBIT 3-11

MARICOPA COUNTY RARF
DEBT SERVICE AND EXCISE TAX REVENUES
(Millions of Current Dollars)

	Principal Payments	Interest Payments	Total Debt Service Payments	RARF Excise Tax Revenues[1]
FY 1986 through FY 1991 (Scheduled)	$ 87	$ 174	$ 261	$ 569
FY 1992 through FY 2005 (Forecasted)	804	505	1,309	2,841
Program Total	$ 891	$ 679	$ 1,570	$ 3,410

[1] Based on Mid-1991 preliminary trend forecast of excise tax revenues.

Source: Arizona Department of Transportation

Conclusions

Using current ADOT projections, the revenues from the existing one-half cent sales tax exceed the debt service requirements for existing bonds by $1.53 billion over the remaining years of the program. This is based on:

$ 2.84 billion in revenue projected for fiscal years 1992 through 2006, less
1.31 billion in remaining debt service on the currently existing bonds

$ 1.53 billion

In order to issue additional bonds, ADOT must satisfy bond covenants on the existing debt.

Bond covenants require a coverage ratio of 1.3 (revenues greater than or equal to 130 percent of debt service in any future year) for revenues in any 12 consecutive months out of the 18 months immediately preceding the issuance of additional Senior Lien Bonds. Senior Lien Bonds are the Maricopa RARF bonds issued in 1986, 1987, 1988, and 1991. The bonds issued in 1989 are subordinated to the Senior Lien Bonds. Bond covenants on the subordinated debt require a coverage ratio of 1.15 for all debt.

Debt service requirements on existing Senior Lien Bonds are scheduled to vary between $55.5 million to $56.0 million each year from 1992 through 2005. During the same period, total annual excise tax revenues are forecasted to grow from about $120 million to $293 million. The coverage ratio, therefore, is projected to be 2.16 at its lowest point (1992). This is in excess of the 1.3 required in the bond covenants.

Debt service requirements on existing subordinated bonds are schedule to vary between $37.3 million and $38.2 million each year from 1992 through 2005. Adding this debt to the Senior Lien debt generates annual debt service requirements between $93.0 million and $93.8 million. Excise tax revenues were $112.7 million in the 12 months from June 1990 to May 1991, which is the lowest 12 consecutive month total in the preceding 18 months. This represents an historical coverage ratio of 1.20, which satisfies the bond covenant for subordinated debt.

Total projected excise tax revenues for fiscal year 1992 equal about $120 million. This exceeds the fiscal year 1992 debt service payments of $93 million by $21 million (1.29 coverage).

4. REVIEW OF PROGRAM COST ESTIMATES

This portion of the performance audit addresses questions regarding the original and current cost estimates for design, right-of-way acquisition, and construction of MAG Program corridors and sections. For the purposes of this performance audit, we respond to inquiries concerning:

- Who developed the original Program cost estimates
- Assumptions underlying the original Program cost estimates
- Changes to the Program and their impact on Program costs
- Appropriateness and reasonableness of current Program cost estimates

The following pages present the findings, conclusions, and, where appropriate, recommendations resulting from the audit team's review and assessment of MAG Program cost estimates.

REVIEW OF PROGRAM COST ESTIMATES

4.1 What entities were responsible for developing original estimates of Program costs, including costs for right-of-way acquisition and construction?

Background

A county-wide transportation plan was first developed in 1960 by the consulting engineering firm of Wilbur Smith and Associates. This *Major Street and Highway Plan for the Phoenix Urban Area* was approved by the Arizona State Highway Commission, the Maricopa County Board of Supervisors, and the cities of Phoenix and Glendale. A county-wide expressway and freeway plan was a major element of the plan. This expressway and freeway plan included 441.6 miles of highways, of which approximately 215 miles were within the current boundaries of the Phoenix urban area.

Regional cooperation in transportation planning continued and was strengthened with the organization of the Valley Area Traffic and Transportation Study (VATTS) in 1965. This study was initiated to carry out and ensure compliance with Federal law requiring a continuing, comprehensive, and cooperative transportation planning process. Membership in the VATTS included the U.S. Bureau of Public Roads, the Arizona Highway Department, and the 16 jurisdictions in Maricopa County at the time.

Two years later, in 1967, 10 cities and towns in Maricopa County formed an area-wide association to discuss policies and formulate long-range plans for the region. This organization was called the Maricopa Association of Governments (MAG). VATTS was incorporated into MAG to provide the transportation planning function for the Phoenix urban area. MAG was designated as the official metropolitan planning organization by the Governor of Arizona, thereby assigning responsibility for long-range transportation planning in Maricopa County to MAG.

In 1985, the Arizona State Legislature enacted House Bill 2306 authorizing the use of an excise tax to support the implementation of a county's highway system. This legislative authorization was followed in the same year by a county-wide special election in Maricopa County, known as Proposition 300, in which residents approved the levy of an additional 1/2 cent excise tax for the design, right-of-way acquisition, and construction of the Maricopa Association of Governments (MAG) Regional Transportation Plan. This plan identified transportation corridors where the freeways, expressways, and parkways were intended to be constructed.

Analysis

All the transportation planning efforts in Maricopa County since 1960 have included estimates of costs to implement the recommended regional transportation plan. While MAG has the responsibility for the development and approval of a long-range transportation plan for the region, it has relied on the following sources for developing system and corridor plans and cost estimates:

- MAG Transportation Planning Office (MAGTPO) staff
- Consultant engineering firms
- ADOT staff engineers

For the development of the original MAG freeway/expressway cost estimates, all three sources were utilized.

MAGTPO is staffed primarily by planners from ADOT's Transportation Planning Division. These planners provide a dual role of reporting both to MAG and to ADOT. In most urban areas in the nation, separate staffs perform similar planning functions for the MPO and the state transportation department. The organization of MAGTPO was set up to eliminate duplication of administration, data development, and modelling, as well as staffing.

In an October 19, 1984 memo from Terry Johnson to Roger Herzog, MAGTPO Program Manager, cost estimates were identified for candidate corridors for an expanded MAG Transportation Plan, based in part on historical project cost data for urban freeway projects being designed and constructed in Maricopa County in the early 1980s. These estimates were reviewed by ADOT's Assistant Engineer of Highway Plans Service. In addition, MAG had contracted with engineering consultants to perform three areawide transportation analyses: West Area Transportation Analysis, Central Area Transportation Study, and Eastside Transportation Analysis. Alternative corridors were evaluated and planning cost estimates for project implementation were developed by these consulting engineering firms.

Conclusions

MAG has the responsibility for developing long-range transportation plans for the Maricopa County region. As such, they were responsible for establishing original cost estimates for the MAG Program. To develop these estimates they used MAGTPO staff, ADOT staff, and outside consulting engineers.

REVIEW OF PROGRAM COST ESTIMATES

4.2 How many miles of highway were assumed in original cost estimates? How many miles were assumed in the estimates presented to the voters in 1985? What adjustments were made to the original number of miles? Were corresponding adjustments made in cost estimates?

Analysis

As discussed in the prior question of this section, the original freeway and expressway plan for the urban area of Maricopa County was established by the 1960 Wilbur Smith and Associates plan. This plan included approximately 215 miles of highway in the urban area. It included interstate highway routes and other proposed freeways and expressways. The estimated cost, at the time, to construct the system was $76.7 million in 1960 dollars, as identified in Table 21 of the Wilbur Smith and Associates' report.

The Valley Area Traffic and Transportation Study (VATTS) of 1965 required some modification to the Wilbur Smith Plan, but these revisions were consistent with the original plan concept.

In 1975, MAG initiated a major re-evaluation of the regional transportation plan. Two advisory committees were appointed to direct the study: the Regional Advisory Committee consisting of 18 elected officials and citizen representatives and a Technical Advisory Committee consisting of transportation and planning staff representatives from each of the MAG member agencies and selected state agencies. Public hearings, meetings, questionnaires, and various other contacts with the general public were employed to obtain a broad spectrum of input concerning plan options. On January 4, 1978, the MAG Regional Council adopted the *Guide for Regional Development, Transportation, and Housing*. The freeway/expressway element of the guide identified the major planned corridors including the Outer Loop, Squaw Peak, Paradise, East Papago, I-10/Papago, Superstition, and Hohokam corridors. The number of miles of freeway/expressway in the plan was not clearly identified because broad corridors (up to seven miles wide for the Outer Loop) were identified, rather than specific locations. A cost of $1.4 billion dollars was estimated to implement the system in 1977 dollars. Assuming the Outer Loop would be located in the middle of the corridor band, the estimated system mileage would be 160 miles.

The MAG regional transportation plan remained essentially unchanged until 1984/85. When an expanded system was being considered, MAGTPO identified candidate corridors in the previously referenced October 19, 1984 memo. These 160 miles of candidate corridors, when added to a listing of 85 miles identified as committed corridors, represented a total

system of 245 miles. The cost to implement the candidate corridors was estimated to be $2.3 billion in 1984 dollars.

During late 1984 and early 1985, information was being developed for what would later become Proposition 300. At this same time, the results of the three areawide consulting studies were being finalized. Consequently, the adopted system was revised on March 27, 1985, and on July 24, 1985, to include a total of 320 miles of freeway/expressway. These actions covered the candidate corridors noted above, as well as the Hokokam Freeway Extension, Grand Avenue, and Cotton Lane (later called the Estrella Freeway). The cost estimate for the system was $3.0 billion in 1985 dollars. This was the basis for mileage figures presented to the voters in Proposition 300 in 1985, which amounted to 233.5 miles for the MAG Program to be funded by the excise tax-supported regional area road fund (RARF). The remaining 86.5 miles consisted of 70.5 miles of existing freeways and 16.5 miles of freeways either nearing completion or under construction at the time of the Proposition 300 vote.

Since 1985, the total system has remained at 320 miles, but cost estimates to complete the system have increased, as will be discussed in responses to other questions of this section.

Exhibit 4-1 summarizes the major system changes that have occurred since 1960. This exhibit shows that the total number of miles in the MAG freeway/expressway system has changed from 215 to 160 to 245 and finally to 320. Each time the mileage of the system was changed, a planning-based cost estimate to implement the system was developed. The second column of miles represent the portion of the system requiring additional funding sources to complete.

Conclusions

Significant changes in the size and cost of early, original plans for the regional freeway/expressway system in Maricopa County reflected the very dynamic nature of development in Maricopa County and the resulting highway transportation planning in the Phoenix area between 1960 and 1985. By the time the plan was submitted to the voters of Maricopa County to approve a local increment to the excise tax, the portion of total mileage to be funded by local funds had increased by 43 percent while the costs for this portion had increased by a factor of 39 over the period 1960 to 1985.

EXHIBIT 4-1

EARLY ESTIMATES OF REGIONAL TRANSPORTATION PLAN MILEAGE AND COSTS

Year	Total Miles	Miles Requiring Other Funding	Cost to Complete (billions)
1960	215	163	$0.1 (1960 $)
1977	160	115	$1.4 (1977 $)
1984/85	245	160	$2.3 (1984 $)
1985	320	233.5	$3.0 (1985 $)

Source: MAGTPO Files

REVIEW OF PROGRAM COST ESTIMATES

4.3 How many acres of right-of-way were assumed in original cost estimates? What adjustments were made to original estimates and costs?

Analysis

In each of the freeway/expressway plans developed since 1960, an estimate of cost was included. These estimates were reported to include all costs that would be required to implement the various systems. However, the 1960 plan and the 1977 plan did not identify separate estimates for right-of-way costs.

The program that was developed in late 1984 and approved by MAG for a 160-mile system included $676 million for right-of-way costs. This was a planning estimate documented by the MAGTPO October 19, 1984 memo and ADOT internal analyses. However, no estimate of the number of acres of right-of-way was identified to support this estimate.

The program that was presented to the voters in Proposition 300 also had an associated internal estimate of costs for right-of-way. This estimate was also a planning estimate and did not identify the number of acres of required right-of-way. The MAGTPO estimate of right-of-way costs for the Proposition 300 Plan was $744 million as of July 1985.

After the passage of Proposition 300, ADOT's Urban Highways Section (UHS) re-evaluated the estimate of costs for the MAG freeway/expressway system. This total system estimate included $992.5 million for right-of-way as of November 1985.

Planning estimates for right-of-way are typically developed based on a cost/mile of a similar facility. This type of estimate does not normally specify the number of acres of required right-of-way. However, to establish a common basis of comparison based on average conditions, the acres of required right-of-way were estimated by ADOT personnel in November 1985. Based on an assumed corridor right-of-way width of 300 feet, 8,500 acres of right-of-way were estimated to be required for the 233.5-mile system.

This assumption was consistent with the assumptions being used by the areawide study consultants which used the following right-of-way widths for 4- to 8-lane freeways or expressways:

Facility Type	Right-of-Way Width
■ At-grade	250 feet
■ Elevated roadway	300 feet

- Depressed roadway 400 feet
- Interchange at arterial 500 feet

These assumptions were used by the areawide study consultants for generalized cost estimates, primarily for comparison of alternatives.

Exhibit 4-2 summarizes the cost of right-of-way for the various systems. Review of right-of-way costs since 1985 will be discussed in response to later questions of this section of the audit.

EXHIBIT 4-2

REGIONAL TRANSPORTATION PLAN RIGHT-OF-WAY COST ESTIMATES

Plan Date	Right-of-Way Cost Estimate
1960	N/A
1977	N/A
1984/85	$676 million
July 1985 - MAGTPO	$744 million
November 1985 - ADOT UHS	$906 million

Source: ADOT Urban Highways Section and MAGTPO

Conclusions

Original cost estimates associated with various pre-Proposition 300 plans for the Maricopa County regional transportation program did not include an identification of acres in the right-of-way estimates. However, an estimate by ADOT's Urban Highways Section after passage of Proposition 300 identified 8,500 acres as a base condition for the MAG freeway/expressway plan.

Adjustments to original right-of-way cost estimates were made as the regional transportation program changed in number of miles. The right-of-way estimate increased from $676 million for a 160-mile program in 1984 to $906 million for the 233.5-mile Proposition 300

Program as estimated by ADOT Urban Highways Section personnel in November 1985, after passage of Proposition 300. The resulting corridor-based estimates did not address the additional right-of-way requirements associated with traffic interchanges or depressed freeway sections, or the costs associated with relocation, demolition, asbestos abatement, or hazardous waste removal because so little development work had been done to more fully delineate the specific features, location, and scope of the MAG Program corridors prior to 1986. Therefore, these estimates were likely to be low, even before the effects of property value increases and program scope expansions were accounted for.

REVIEW OF PROGRAM COST ESTIMATES

4.4 What design features (e.g., number of interchanges, miles of roadway below grade, number of lanes, etc.) were assumed in developing original cost estimates? What design features were assumed for the program as presented to the voters in 1985? Were these assumptions appropriate and realistic given traffic volume projections and other factors which would normally be considered in designing an urban highway system?

Background

During the 1984/85 time frame, three areawide transportation and traffic studies were being conducted for the Phoenix urban area. The purpose of these studies was to evaluate long-range transportation needs on an areawide basis. The studies were based on the approved transportation plan that was adopted by MAG on January 12, 1983. Traffic volumes were projected for the Year 2005, deficiencies were noted, options were evaluated, and recommendations were presented. As mentioned previously, these studies confirmed the need for the corridors that ultimately became the MAG Freeway/Expressway Plan of Proposition 300.

Traffic volume projections were based on land use forecasts prepared for MAGTPO by Mountain West Research, with the cooperation of all the cities and towns in Maricopa County. Appropriate input was utilized in the MAG transportation modeling system and future traffic volumes were forecast. The traditional 20-year design period was selected for the analysis -- Year 2005. Exhibit 4-3 identifies the results of early pre-Proposition 300 forecasts for 1985 and 2005. These data were used by the consulting engineering firms for the areawide studies and provided the basis of the Proposition 300 program.

Analysis

Two different regional freeway/expressway plans were approved by MAG in 1985. The first plan, entitled Pre-Vote Plan, included 245 miles of expressway and freeway (160 miles in addition to the existing or under-construction system). The second 1985 plan was expanded to 320 miles by adding several corridors as a result of the completion of the three areawide studies. Neither plan included a description of design features except general location of the corridor, center line length in miles, and the type of facility being proposed. However, ADOT's Urban Highways Section was able to expand upon the assumptions and preliminary cost estimates to develop a somewhat more refined description and cost

EXHIBIT 4-3

PRE-PROPOSITION 300 TRANSPORTATION AND POPULATION PROJECTIONS

Data Item	1985	2005	% Change
Population	1,865,739	3,342,376	79%
Vehicle trips	4,750,850	8,584,675	81%
VMT	30,540,366	65,649,940	115%
Average Network Speed	17.98	20.21	12%

VMT = Vehicle Miles of Travel
Source: MAGTPO, 1985

estimate for the Proposition 300 plan in November of 1985. Exhibits 4-4 and 4-5 summarize the major design features for the Pre-Vote Plan and the Proposition 300 Plan, as perceived by the Urban Highways Section in November 1985.

After the areawide studies were completed and the MAG Regional Freeway/Expressway Plan defined for Proposition 300, updated traffic volume data and new population data became available that necessitated a rerun of the MAGTPO transportation planning model. This was completed and new traffic forecasts were developed in 1986. The revised forecasts are shown in Exhibit 4-6. This 1986 application of the MAGTPO transportation planning model resulted in a 42 percent increase in daily VMT (vehicle miles of travel) for the year 2005 for the entire MAG urban highway system. The VMT increased by approximately 70 percent for the 233.5 mile portion of the MAG system eligible for RARF funding due to the ability of these planned freeways to attract travel off the region's arterial road system. A subsequent run of the transportation planning model in 1988 by MAGTPO confirmed the 1986 forecasts.

In 1990, a recalibration of MAGTPO'S transportation planning model was performed, based on new traffic counts and a recent household travel survey. Additional design year forecasts were developed for the years 2010 and 2015. A summary of the model results for

EXHIBIT 4-4

ORIGINAL DESIGN FEATURES ESTABLISHED FOR MAG FREEWAY/ EXPRESSWAY PLAN BY MAGTPO IN EARLY 1985

Corridor	Mileage	Facility Type	Number Lanes	Elevated or Depressed	TI	FFI	Special Features
Outer Loop: Buckeye Road to Superstition	53	F&E	4/6	Elevated	30	0	NI
Hokokam Extension: Washington to East Papago	1.0	P	NI	NI	0	0	NI
Papago East: Hohokam to Outer Loop	7.5	F	6	Elevated	6	1	NI
Paradise Parkway: Squaw Peak to Outer Loop	13.0	P	NI	Depressed	13	0	NI
Price: Supersition to Santan	6.5	E	6	At-grade	0	0	NI
Red Mountain: Pima to Superstition	20	P	6	Elevated	3	1	NI
Southeast Loop (Santan): I-10 to Superstition	25.0	F	4/6	Elevated	24	0	NI
Southwest Loop: Papago (I-10) to Maricopa (I-40)	22.0	F	4/6	Elevated	11	0	NI
Squaw Peak Extension: Shea to Outer Loop	6.0	F	8/8	Elevated	5	0	NI
Superstition: Power to Meridian	6.0	F	6/8	Elevated	13	0	NI
Totals	160				95	2	

F, E, P = Freeway, Expressway, Parkway
TI = Traffic Interchange
FFI = Freeway-to-Freeway Fully Directional Interchange
NI = Not Identified

Source: MAG Information

EXHIBIT 4-5

ORIGINAL DESIGN FEATURES ESTABLISHED FOR PROPOSITION 300 PLAN BY ADOT URBAN HIGHWAYS SECTION IN NOVEMBER 1985

Corridor	Mileage	Facility Type	Number Lanes	Elevated or Depressed	TI	FFI	Special Features
Outer Loop: Buckeye Road to Superstition	55	F&E	4/6/8	Elevated	30	0	Salt River Bridge
Estrella: SR 85 - Black Superstition	36.0	F	4/8	Elevated	20	0	Agua Fria River Bridge
Grand Avenue: McDowell to Estrella	24.0	E	6/6	At-grade	8	0	NI
Hohokam: University to McDowell	2.5	F	6/8	Elevated	2	0	Salt River Bridge
Hokokam Extension: McDowell to Indian School	2.0	NI	NI	NI	0	0	NI
Papago East: I-10 to Pima	10.0	F	6/8	Elevated	7	0	NI
Paradise Parkway: Squaw Peak to Outer Loop	13.0	F	8/10	Depressed	13	0	NI
Price: Superstition to Santan	6.5	E	6	At-grade	0	0	NI
Red Mountain: Pima to Superstition	21.5	F	4/8	Elevated	13	0	NI
Santan: I-10 to Superstition	23.5	F	4/8	Elevated	15	0	NI
Sky Harbor Access: Sky Arbor Blvd. to Maricopa	1.5	E	6/6	Elevated	2	0	NI
South Mountain: Popago (I-10) to Maricopa (I-40)	22.0	F	4/8	Elevated	11	0	NI
Squaw Peak: Glendale to Pima	10.0	F	8/8	Elevated	7	0	NI
Superstition: Power to Meridian	6.0	F	6/8	Elevated	5	0	NI
Totals	233.5				133	0	

F, E, P = Freeway, Expressway, Parkway
TI = Traffic Interchange
FFI = Freeway-to-Freeway Fully Directional Interchange
NI = Not Identified

Source: ADOT, Urban Highways Section, November 1985

EXHIBIT 4-6

POST-PROPOSITION 300 TRANSPORTATION AND POPULATION PROJECTIONS

Data Item	1985	2005	% Change
Population	1,927,712	3,842,821	99%
Vehicle trips	5,833,087	11,448,395	96%
VMT	38,196,301	92,985,251	143%
Average Network Speed	11.74	15.38	31%

VMT = Vehicle Miles of Travel
Source: MAGTPO, 1986

population and total system VMT by design year is shown in Exhibit 4-7. The 1990 re-calibration of MAGTPO's transportation planning model shows the effects of the economic downturn in the region. An approximate 10 percent reduction in VMT is projected for the design years 2010 and 2015, relative to the 1986 model run.

MAGTPO's transportation planning model provides a variety of output that can be used by planners and engineers. Average daily traffic volumes (ADT) are estimated for each roadway link in the system. Exhibit 4-8, shows a summary of the range of ADTs for each corridor of the MAG Program. This information is included for the initial 1985 traffic forecast for the year 2005, and for the more recent 1990 runs for design years 2010 and 2015.

The MAG Freeway/Expressway Plan was developed and approved based on traffic projections for a planning horizon of 2005. A planning horizon year and a design year may not be the same. It is standard practice to design a freeway facility for a 20-year design life. The intent of this criteria is to provide 20 years of useful life for the facility; therefore the design life begins after the facility is completely constructed and open to traffic.

In complying with these standard practices, ADOT subsequently developed design years of 2010 and 2015 for freeway/expressway projects under design. Using methods in the Highway Capacity Manual, analyses of traffic volumes and resulting levels of service (LOS)

EXHIBIT 4-7

MAG FREEWAY/EXPRESSWAY SYSTEM
POPULATION AND VMT COMPARISONS BY DESIGN YEAR
(Millions)

Design year/Item	1985 Model	1986 Model	1990 Model
2005			
Population	3.34	3.84	3.30
VMT	65.6	93.0	83.3
2010			
Population	--	4.27	3.68
VMT		108.1	96.5
2015			
Population	--	4.69	4.08
VMT		122.7	109.8

VMT = Vehicle Miles of Travel
Source: MAGTPO

can be developed for an expressway and a freeway. Exhibit 4-9 provides ranges of daily traffic volumes for expressways and freeways at level of service LOS C and D (representing medium to moderate levels of congestion). These daily traffic volumes were developed by the consulting firm of Howard, Needles, Tammen and Bergendorff (HNTB) in conjunction with a study of MAG Program corridors performed for ADOT in 1987.

Design of freeways and expressways are based on design hour volumes (DHV) rather than ADTs. The daily traffic volume ranges shown in Exhibit 4-9 must therefore be used with caution. Other factors also need to be considered in designing facilities, such as system continuity.

EXHIBIT 4-8

**FORECASTED AVERAGE DAILY TRAFFIC VOLUMES
FOR MAG FREEWAY/EXPRESSWAY PLAN
BY CORRIDOR AND DESIGN YEAR**

Corridor	Mileage	Initial Traffic Forecast-7/85 2005	Current Forecast-1990 2010	Current Forecast-1990 2015
Agua Fria: Buckeye Rd to Black Canyon	23.0	30,000 - 89,000	72,000 - 113,000	79,000 - 127,000
Estrella: SR 85 to Black Canyon	36.0	3,000 - 12,000	5,000 - 13,000	7,000 - 24,000
Grand Avenue: McDowell to Estrella	24.0	26,000 - 65,000	19,000 - 196,000	26,000 - 204,000
Hohokam: Univ. to McDowell	2.5	30,000 - 60,000	88,000 - 109,000	107,000 - 129,000
Hohokam Ext.: McDowell to Indian School	2.0	36,000 - 58,000	45,000 - 59,000	54,000 - 65,000
Papago East: I-10 to Pima	10.0	106,000 - 180,000	143,000 - 225,000	156,000 - 243,000
Paradise Parkway: Squaw Peak to Outer Loop	13.0	46,000 - 146,000	61,000 - 194,000	73,000 - 210,000
Pima: Black Canyon to Superstition	32.0	21,000 - 112,000	82,000 - 203,000	99,000 - 214,000
Price: Superstition to Santan	6.5	22,000 - 60,000	81,000 - 156,000	82,000 - 172,000
Red Mountain: Pima to Superstition	21.5	12,000 - 111,000	30,000 - 143,000	37,000 - 159,000
Santan: I-10 to Superstition	23.5	15,000 - 63,000	35,000 - 115,000	46,000 - 157,000
Sky Harbor Access: Sky Blvd to Maricopa	1.5	30,000 - 38,000	20,000 - 35,000	17,000 - 46,000
South Mountain: Papago (I-10) to Maricopa (I-10)	22.0	30,000 - 53,000	52,000 - 86,000	60,000 - 117,000
Squaw Peak: Glendale to Pima	10.0	27,000 - 169,000	37,000 - 234,000	64,000 - 247,000
Supersition: Power to Meridian	6.0	33,000 - 61,000	61,000 - 85,000	67,000 - 91,000
Totals	233.5			

Source: MAGTPO

EXHIBIT 4-9

PEAK DAILY TRAFFIC VOLUMES BY TYPE AND SIZE OF HIGHWAY

Number of Lanes	Expressway (LOS C/D)	Freeway (LOS C/D)
4	22000/27000	69,000/78,000
6	33,000/39,000	98,999/116,000
8	43,000/57,000	12900/155,000

Source: Howard, Needles, Tammen, and Bergendorff, 1987

Exhibit 4-10 identifies a rough approximation of the number of lanes that would be required to service Year 2005 forecasted traffic for MAG Program corridors, based on the traffic volume criteria shown in Exhibit 4-9. As discussed previously, this is not a valid design year for a 20-year implementation program starting in 1986. Therefore, each of the peak daily traffic volume ranges from Exhibit 4-8 for Years 2010 and 2015 are also re-evaluated in Exhibit 4-10 relative to the traffic volume criteria show in Exhibit 4-9.

As shown in Exhibit 4-10, the planned number of lanes in the 1985 version of the MAG Plan exceeded the number of lanes required by the traffic forecast for the 2005 design year for the Estrella, Grand Avenue, and Hohokam corridors. However, when the 2015 design year traffic forecast is used, only the Estrella corridor has more lanes planned than will be required. For the 2015 forecast, significant increases in traffic volumes justify the type of facility and the number of lanes on the MAG Program, except for the Estrella, which still only requires two lanes in the Year 2015.

EXHIBIT 4-10

COMPARISON OF FREEWAY/EXPRESSWAY LANES PLANNED VERSUS LANES REQUIRED BY CORRIDOR

Corridor	Lanes Required			Lanes Planned[1]	
	2005*	2010*	2015*	1985**	1991**
Agua Fria	6	6	6/8	4/6/8	6/8
Estrella	2	2	2	4/8†	4/8†
Grand Avenue	4	4/10	4/10	6†	6
Hohokam	4	6	6/8	6/8†	6/8
Papago East	8/10	8/10	8/10	6/8	6/8/10
Paradise Parkway	4/8	4/10	6/10	8/10	6/8
Pima	4/6	6/10	6/10	4/6/8	6/8
Price	4	6/8	6/10	6	6
Red Mountain	4/6	4/8	4/8	4/8	6/8
Santan	4	4/6	4/8	4/8	6/8
Sky Harbor	6	4/6	4/8	6	6
South Mountain	4	4/6	4/6	4/8	6/8
Squaw Peak	4/10	4/10	4/10	8	6/8/10

* Design year for traffic projections
** Year in which design features were defined
† Number of lanes planned is more than needed
[1] ADOT Urban Highways Section

Conclusions

The design features assumed by the Pre-Vote Plan and the Proposition 300 Plan were appropriate for the Year 2005 forecasts when consideration is given to the 20-year design life of the facility, thereby justifying a design year of 2010 or 2015. This is the case

because the highest corridor volumes were used to establish the number of lanes. There may be sections within a corridor that could operate at acceptable levels of service with fewer freeway lanes. All corridors have appropriate general design features in terms of size (number of lanes) and type of facility for the 2015 design year traffic volume forecast, except the Estrella Freeway, which only needs to be two lanes by the design year of 2015.

The wide range in forecasted corridor traffic over the next 25 years suggests the opportunity to develop interim/staged facilities. This is possible where the full design capacity of a facility will not be required for many years. This is currently being planned and implemented by the Department to stretch limited MAG Program funds over more corridors of the MAG Program.

REVIEW OF PROGRAM COST ESTIMATES

4.5 On what basis were cost/mile right-of-way and construction estimates developed? How did these estimates compare with actual costs of right-of-way and construction of freeways previously constructed in Maricopa County and with costs experienced nationally? Did the estimates include all costs normally associated with right-of-way or construction costs?

Background

Original cost estimates for MAG Program corridors were developed by applying an average cost per mile times the length of the corridor. In the previously referenced internal MAGTPO October 19, 1984 memo, the average costs per mile were identified. The overall system average cost per mile was $14 million per mile: $5 million per mile for right-of-way and $9 million per mile for construction. The range of cost for each category is shown in Exhibit 4-11.

EXHIBIT 4-11

PER MILE COSTS OF URBAN HIGHWAY RIGHT-OF-WAY AND CONSTRUCTION

Item	Range of costs/mile	Average cost/mile
Right-of-way	$2 - 20 million	$5 million
Construction	$6 - 40 million	$9 million
Total Cost Per Mile	$8 - 60 million	$14 million

Source: MAGTPO, October 19, 1984

In addition, average costs/mile were utilized by the consultants for the three areawide studies. Varying costs/mile were utilized depending on the scope and location of the facility. The cost/mile figures used by these consultants were based on projects in Arizona and their experience with similar projects in other parts of the country.

The following sources were used for the preliminary cost estimates and cost/mile determinations for the MAG Program. These sources were identified in the MAGTPO October 19, 1984 Memo.

- East Papago - Used costs from *ADOT's Five-Year Transportation Construction Program: Fiscal Year 1984/88*, Right-of-way costs were proportioned from the report *24th Street - 44th Street East Papago State Route 217*, ADOT 1983.

- Squaw Peak - Used costs from *City of Phoenix Public Hearing on the Squaw Peak Corridor Transportation Alternatives*, 1983.

- Hohokam Extension - Used costs from MAG Report, *Hohokam/Papago Connection Traffic Analysis*.

- East Papago Extension - Used Squaw Peak Parkway costs/mile plus additional costs for bridges and freeway-to-freeway interchange ($40 million).

- Southeast Loop - Used costs from the *Eastside Transportation Analysis*, 1984.

- Southwest Loop - Used costs from MAG Report, *Southwest Loop Corridor Study*, 1984.

- Outer Loop - Used costs from ADOT estimate documented in 8/29/84 memo.

- Paradise - Used Squaw Peak Parkway per mile costs for the inner 7 miles and Southeast Loop mile costs for the outer 6 miles.

- Red Mountain - Used $1.5 million per mile for right-of-way and $3.5 million per mile for construction, plus additions for bridges, freeway-to-freeway interchange ($40 million), traffic interchanges (3), and acquisition of 37 houses.

- Cotton Lane/Northwest Loop (Estrella) - Used costs from MAG Report, *Westside Transportation Study*, 1985.

Analysis

ADOT's experience with urban freeway construction in 1985, at the beginning of the MAG Program, was based on the construction of I-10 through Phoenix and the Superstition Freeway, and the City of Phoenix's construction of the Squaw Peak Parkway.

A deficiency in the original cost estimates for the MAG Program was that by relying on historical cost information from the late 1970s and early 1980s as the base for developing unit costs for right-of-way and construction, the 1985 MAG Program cost estimates did not

reflect the inflationary cost increases which were occurring during the intervening years. As a result, the original MAG Program costs were understated. The extent of this understatement is difficult to assess. However, if one assumes a cost base of 1982 and an average annual inflation rate of 5 percent, a 16 percent understatement of costs would result by 1985. Costs based on 1980 conditions would be understated by almost 30 percent by 1985. To correct this deficiency, ADOT and MAGTPO should have converted all unit cost factors to 1985 dollars before developing cost estimates for the MAG Program.

To provide an independent analysis of the derivation of cost per mile estimates used to develop original MAG Program cost estimates, a section of the I-10 Freeway in Phoenix was analyzed. The portion of I-10 was selected from 27th Avenue to 55th Avenue. This is a 6-lane freeway with a cross-section similar to the proposed cross-section of the freeways in the MAG Program. Right-of-way was initiated in the late 1960's, then put on hold until 1982. Construction took place in the 1983/84 time period. The project is about 4.5 miles long. As shown in Exhibit 4-12, the actual per mile costs for a portion of the I-10 Freeway in Phoenix are somewhat lower for right-of-way and higher for construction relative to the average unit costs initially used by MAGTPO to develop planning estimates of corridor right-of-way and construction costs for the MAG Program. Overall, this example suggests the original MAG Program unit costs may have understated project costs by about 16 percent.

The Federal Highway Administration (FHWA) was contacted by the audit team to review costs of urban freeways (interstate) in other urban areas of the country. The FHWA does not keep these types of records, but FHWA personnel indicated that costs for urban freeways and expressways vary considerably depending on geographic conditions, extent of structures, amount of retaining walls, environmental conditions, and type and amount of right-of-way. They cautioned against the use of any national averages. Several states were also contacted, including Illinois, Texas, Pennsylvania, Maryland, and Virginia. While some projects were identified in the 1984/85 time frame, their costs varied so much that they could not provide any meaningful basis for comparison.

The cost estimates for the MAG Program included the major features that are normally included in planning estimates, with one exception. The Squaw Peak Parkway cost/mile estimates that were used for a number of other corridors understated the real costs of drainage for this facility. Squaw Peak Parkway per mile costs were developed from the public hearing documents developed by the City of Phoenix. The City of Phoenix designed and constructed the drainage improvements under a separate contract. Therefore, major drainage items were not in the Squaw Peak cost/mile estimates. This oversight affected the estimates for the East Papago Extension, Squaw Peak Extension, and the Paradise Parkway.

EXHIBIT 4-12

SAMPLE UNIT COSTS FOR URBAN FREEWAY RIGHT-OF-WAY AND CONSTRUCTION

Sample Project: I-10 (27th - 55th)

R/W costs (420 parels, 169.68 acres)	
acquisition pre-1969	$ 5.98 million
inflation adjustment	2.51 million
acquisition after 1982	9.33 million
relocation costs	1.89 million
Total R/W Cost	$19.71 million

R/W costs/mile = $4.38 million/mile

Construction Costs
4 construction contracts
$53.0 million

Construction cost/mile = $11.8 million/mile

Total Cost = $72.2 million

Total Cost/mile $16.2 million/mile

Source: ADOT

Conclusions

Original cost/mile estimates for construction and right-of-way associated with the MAG Program were developed from corridor or areawide reports that were developed during 1983-1985. If a corridor planning report had not been done, cost/mile estimates based on the actual historical costs for a similar actual facility were used.

The cost/mile estimates compared favorably with actual historical costs experienced in Maricopa County. However, because ADOT and MAGTPO did not adjust the historically-based unit costs to a 1985 dollars base to estimate the costs of the MAG Program, there was an inherent understatement of the original cost estimate for the Program.

The estimates essentially included those items normally associated with planning estimates, based on the scope of the project known at the time. However major drainage-related costs were excluded from some of the corridors because they were not included in the Squaw Peak Parkway construction costs. These costs formed part of the unit cost basis for original estimates of the costs for the East Papago Extension, Squaw Peak Extension, and the Paradise Parkway.

Recommendations

ADOT should base its estimates of MAG Program costs on historical and current information derived from actual projects and plans, that is adjusted to a consistent constant or current dollar basis, depending on the intended use of the information.

REVIEW OF PROGRAM COST ESTIMATES

4.6 What impact did changes in original design features have on original estimated costs for right-of-way and construction?

Background

As discussed previously, specific design features were not identified in the Proposition 300 legislation or ballot. The preliminary design features that are attributed to MAG Program corridor shortly after enactment of Proposition 300 are shown in Exhibit 4-4. Since 1985, significant changes and enhancements to the design features of these corridors have been made, based upon the completion of location and design concept studies for all MAG Program corridors and advancement of construction plans for selected corridor sections. Exhibit 4-13 summarizes the current 1991 design features of MAG Program corridors.

ADOT developed a report on the status of the MAG Program in December 1990. This report, entitled: *Maricopa County Transportation Excise Tax Review 1986-1990,* identified changes in terms of number of interchanges, type of facility, and number of lanes that were made between 1985 and 1990 in broad design features for each MAG Program corridor. A summary of these design feature changes is shown in Exhibit 4-14. Also shown are the resulting increases in miles of depressed freeway, systemwide lane-miles, and right-of-way acreage required.

Analysis

Exhibit 4-14 shows a substantial increase in the number of traffic interchanges, including 14 new freeway-to-freeway fully directional interchanges. The number of traffic interchanges increased in response to local requests for increased access to the MAG Program freeways. The freeway-to-freeway fully directional interchanges were added to accommodate the higher volume of traffic projected for the MAG Freeway/Expressway System. However, these are very expensive facilities, costing from $60 to $100 million, compared to $15 to $20 million for urban traffic interchanges. In addition, they require more than twice the acreage of right-of-way required by the typical urban traffic interchange, as illustrated in Exhibit 4-15.

Exhibit 4-14 shows that the MAG Program system also was upgraded by converting 41 miles of the 45 miles originally planned as expressways to freeways. The number of lanes per corridor also gradually increased by 14 percent (162 additional lane-miles systemwide), due to traffic growth projections.

EXHIBIT 4-13

1991 DESIGN FEATURES FOR MAG FREEWAY/EXPRESSWAY PROGRAM CORRIDORS

Corridor	Mileage	Facility Type	Number Lanes	Depressed Miles	TI	FFI	Special Features
Outer Loop: Buckeye Road to Superstition	55	F	6/8	15.4	43	4	Salt River Bridge
Estrella: SR 85 to Black Canyon	36.0	F	4/8	0	21	0	Agua Fria River Bridge
Grand Avenue: McDowell to Estrella	24.0	E/F	6/6	0	12	0	NI
Hohokam: University to McDowell	2.5	F	6/8	0	2	0	Salt River Bridge
Hokokam Extension: McDowell to Indian School	2.0	F	NI	0	1	0	NI
Papago East: I-10 to Pima	10.0	F	6/8/10	0	7	1	NI
Paradise Parkway: Squaw Peak to Outer Loop	13.0	F	6/8	9.1	12	4	NI
Price: Superstition to Santan	6.5	F	6	5.5	6	0	NI
Red Mountain: Pima to Superstition	21.5	F	6/8	7.4	13	1	NI
Santan: I-10 to Superstition	23.5	E	6/8	12.0	17	1	NI
Sky Harbor Access: Sky Arbor Blvd. to Maricopa	1.5	E	6/6	0	2	0	NI
South Mountain: Papago (I-10) to Maricopa (I-40)	22.0	F	6/8	0	12	2	NI
Squaw Peak: Glendale to Pima	10.0	F	6/8/10	6.2	10	1	NI
Superstition: Power to Meridian	6.0	F	6/8	0	5	0	NI
Totals	233.5			55.6	16	14	

F, E, P = Freeway, Expressway, Parkway
TI = Traffic Interchange
FFI = Freeway-to-Freeway Fully Directional Interchange
NI = Not Identified

Source: ADOT, Urban Highways Section

EXHIBIT 4-14

CHANGES IN DESIGN FEATURES FOR MAG FREEWAY/EXPRESSWAY PLAN

	Original 1985 Plan	1990 Plan	Change
Number of Full Interchanges	121	145	+24
Number of Half Interchanges	6	11	+5
Freeway-to-Freeway Interchanges	0	14	+14
4-lane Expressway Miles	10	1	-9
6-lane Expressway Miles	35	3	-32
4-lane Freeway Miles	99	36	-63
6-lane Freeway Miles	67.5	164	+96.5
8-lane Freeway Miles	15	16	+1
10-lane Freeway Miles	0	5.5	+5.5
Miles of Depressed Freeway[1]	13	55.6	+42.6
Total Lane Miles	1,171	1,333	+162
Right-of-Way Acres[2]	8,500	+12,947	+4,447

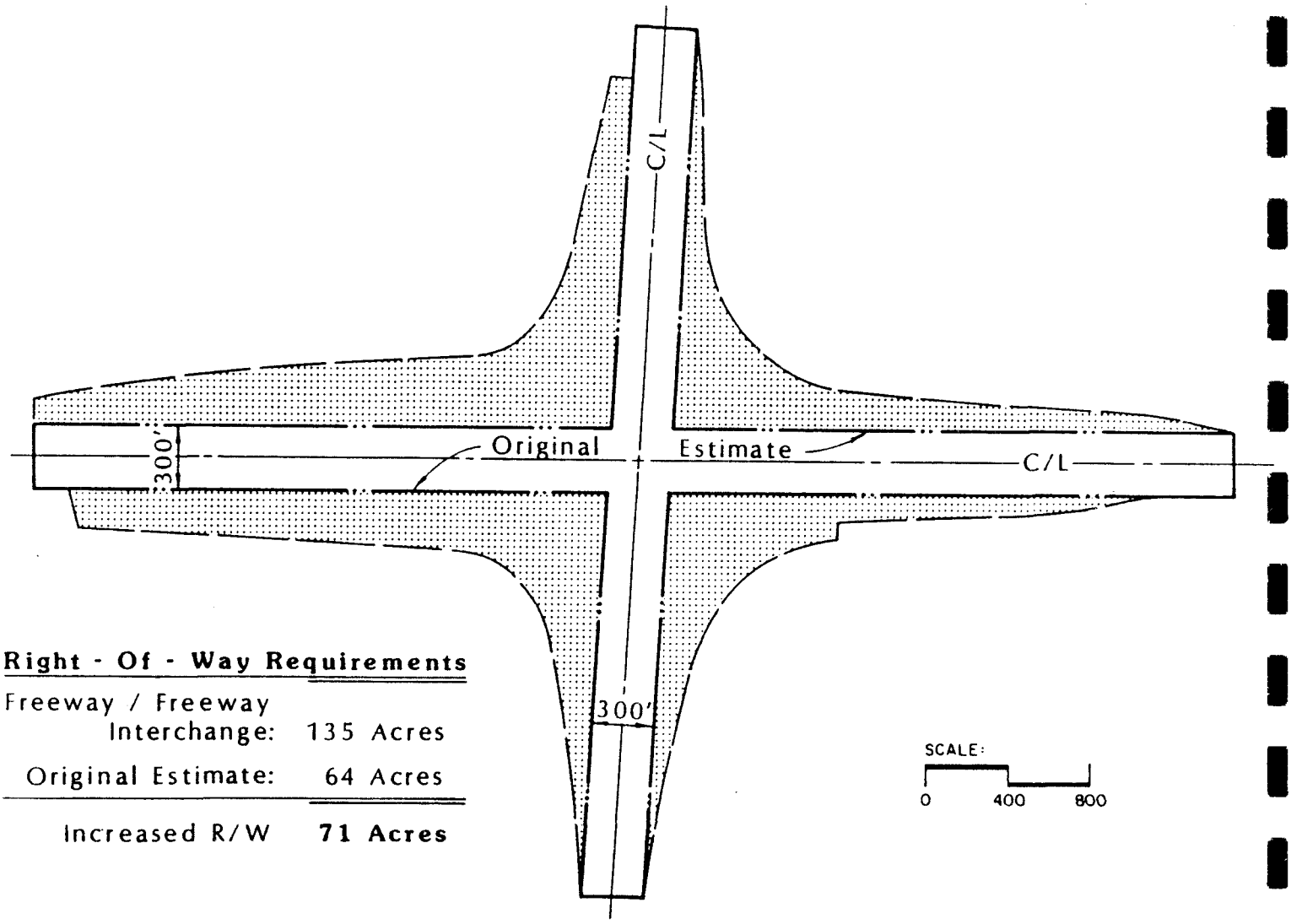
Source: *Maricopa County Transportation Excise Tax Review 1986-1990,* ADOT, December 1990, Pg. 21.

[1] ADOT Urban Highways Section
[2] ADOT Right-of-Way Section

Proposition 300 did not specify whether a freeway would be elevated, at-grade, or depressed. However, the Urban Highways Section's preliminary cost estimate for the MAG Program developed in November 1985 established the initial estimate of the number of lanes, facility type, and grade level for each section comprising the MAG Program. In its May 6, 1988 Report to the Transportation Board on the MAG Program, ADOT identified

EXHIBIT 4-15

ADDITIONAL ACREAGE FOR FREEWAY-TO-FREEWAY INTERCHANGES



Right - Of - Way Requirements

Freeway / Freeway Interchange:	135 Acres
Original Estimate:	64 Acres
Increased R/W	**71 Acres**

Source: ADOT

55.6 miles of depressed freeway being proposed for the overall system. This represented an increase of 42.6 miles of depressed freeways relative to the original Program concept design of November 1985. Depressing freeways usually results in cost increases, due in part to such factors as additional drainage requirements and pump stations, utility relocation costs, earthwork imbalance, and additional right-of-way cost. DeLeuw Cather & Company estimated approximately $3 million per mile additional cost to depress a freeway.

The Price Corridor is an example of corridor upgrading. Proposition 300 specifically identified the Price Corridor as a 6.5 mile long, 6-lane expressway. Current design calls for a 6.5 mile long, 6-lane freeway, and 5.5 miles of the 6.5 mile length will be depressed.

As a result of recommending additional lanes, interchanges, and/or depressed facilities for many of the corridors, a 52 percent increase in right-of-way is currently estimated to be required for the MAG Program relative to 1985 estimates as shown in Exhibit 4-14.

In 1990, MAGTPO estimated the additional costs of these various design upgrades in 1990 dollars. Over $1.2 billion in added costs were attributed to these upgrades, broken down as follows:

- Additional right-of-way costs due to design upgrades = $ 350 million

- Additional construction costs

  More lanes and interchanges = $ 516 million

  Expressway to freeway upgrades = $ 316 million

- Total design upgrades cost = $1,182 million (1990$)

In addition, the 1990 MAGTPO analysis indicated additional MAG Program cost increases of $750 million due to the rise in real estate prices and $443 million due to the rise in construction prices relative to the cost bases used to produce the original cost estimates for the MAG Program. When combined with the design upgrade costs, the resulting total cost increase was estimated to be $2.39 billion in 1990 dollars.

The cost estimates will likely continue to increase, as project designs are advanced to the final stage prior to advertising for construction bids, and due to the continuing effects of inflation on unit prices of construction. The future costs for right-of-way remaining to be acquired for the MAG Program are subject to great variation, depending on the strength of

the local real estate market, the kinds of statutory relief which the Legislature can provide to the Department to better balance the interests of the public and the State in the area of eminent domain, and degree to which local governments and the private sector donate land to expedite projects in the Department's five-year program.

To control project costs, ADOT has instituted a number of cost saving strategies, including:

- Performing value engineering on all projects at the 30 percent stage of design
- Encouraging joint-funding arrangements with local communities and developers to expedite project schedules, share costs, and reduce external pressures for design feature upgrades
- Staging the implementation of projects
- Avoiding advanced acquisition of right-of-way except for documented hardship cases

Conclusions

Current design of MAG Program corridors and sections have been significantly upgraded from the original program as established by Proposition 300 and ADOT in late 1985. ADOT has estimated these upgrades to cost approximately $1.2 billion, including an increase in required right-of-way of 4,447 acres. Design upgrades to the MAG Program are estimated to represent half of the total growth in costs for the overall MAG Program. The other $1.2 billion increase is attributed to significantly higher costs for right-of-way, and more modest increases in costs for construction.

Further cost increases are likely before the MAG Program is completed, due to: (1) scope refinements associated with the completion of designs and construction plans for a variety of corridors and segments throughout the MAG Program system (e.g., Santan, Red Mountain, South Mountain, Paradise, and Grand Avenue, as well as segments of most other MAG Program corridors); (2) inflationary effects on unit prices for construction; and (3) expanding regulatory requirements and constraints. Changes in right-of-way costs are difficult to predict, given the uncertainty in the real estate market and the number of external factors which could significantly influence these costs. However, further refinement of design plans and the experience gained from projects due to be completed in the near term provide ADOT with the basis for reviewing and, if appropriate, updating its MAG Program cost estimates.

Recommendations

ADOT should continually re-evaluate the design features of MAG Program corridors and sections relative to budget constraints, minimum design standards, traffic projections, and service level implications.

REVIEW OF PROGRAM COST ESTIMATES

4.7 Were appropriate and timely adjustments made in program cost estimates in response to design level changes on individual segments of the system?

Background

Initial planning cost estimates for the Proposition 300 Plan were developed by MAGTPO in July 1985 for the MAG Regional Council. ADOT's Urban Highways Section developed an independent estimate of the MAG freeway/expressway plan in November 1985. This ADOT estimate provided corridor and section cost estimates for design, right-of-way acquisition, and construction. It was approximately $3.0 billion or 4 percent higher than the December 1985 MAGTPO estimate, assuming: right-of-way acquisition only for the Estrella corridor; State funds used for two-thirds of the Grand Avenue corridor; and no RARF funds used for the Superstition corridor. A comparison of the ADOT and MAGTPO estimates is shown in Exhibit 4-16.

Criteria

ADOT, by statute (ARS 28-104, Subsection B, 3) has the responsibility to plan, design, and implement roadway projects on the state system. ADOT also is responsible to develop an annually updated 5-year construction program (ARS 28-104, Subsection B, 2). In each instance cost accountability is required.

Analysis

The initial step of the design phase was to develop corridor location and design concept studies to establish the scope and location of the MAG Program corridors. Estimates of cost were a part of this process and were presented at public hearings held at the completion of selected corridor location and/or design concept studies. As modifications or changes to projects took place, appropriate changes were made to the cost estimates for these projects.

The design process utilized by ADOT for the MAG Program is in conformance with the ADOT Urban Highways Design Procedures Manual. The key milestones at which project cost estimates are updated during the preliminary engineering phase are as follows:

- Corridor/Location and Design Concept Study
- General Plan Development

EXHIBIT 4-16

COMPARISON OF MAGTPO AND ADOT COST ESTIMATES FOR MAG FREEWAY/EXPRESSWAY PROGRAM
(Millions of Dollars)

		MAGTPO Estimate (12/85)			ADOT Estimate (11/85)			
Corridor	Mileage	Right-of-Way	Construction	Total	Right-of-Way	Design	Construction	Total
Outer Loop: Buckeye Road to Superstition	55	$210.0	$626.5	$836.5	$131.8	$37.6	$626.5	$795.9
Estrella: SR 85 - Black Superstition	36.0	69.0	0.0	69.0	43.5	0.0	0.0	43.5
Grand Avenue: McDowell to Estrella	24.0	8.0	67.0	75.0	43.1	3.6	60.0	106.7
Hohokam: University to McDowell	2.5	26.0	74.0	100.0	29.9	2.9	48.1	80.9
Hohokam Extension: McDowell to Indian School	2.0	NI	NI	NI	NI	NI	NI	NI
Papago East: I-10 to Pima	10.0	94.3	152.0	246.3	33.4	8.7	162.0	204.1
Paradise Parkway: Squaw Peak to Outer Loop	13.0	104.0	363.0	467.0	244.1	19.7	328.5	592.3
Price: Superstition to Santan	6.5	35.0	50.0	85.0	43.3	1.9	32.3	77.5
Red Mountain: Pima to Superstition	21.5	77.0	220.0	297.0	97.7	14.4	172.5	284.6
Santan: (SE Loop) I-10 to Superstition	23.5	88.0	235.0	323.0	57.4	14.6	243.9	315.9
Sky Harbor Access: Sky Arbor Blvd. to Maricopa	1.5	NI	NI	NI	50.1	2.3	37.6	90.0
South Mountain (SW Loop): Papago (I-10) to Maricopa (I-40)	22.0	45.0	183.0	228.0	66.8	9.9	164.2	240.9
Squaw Peak: Glendale to Pima	10.0	55.0	138.0	193.0	65.3	7.8	128.7	201.8
Superstition: Power to Meridian	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals	233.5	$811.3	$2,108.5	$2,919.8	$906.4	$123.4	$2,004.3	$3,034.1

NI = Not Indicated

Source: ADOT, MAGTPO

- 30% Design Submission
- 60% Design Submission
- 90% Design Submission
- 100% Design Submission
- Construction Design Submission

ADOT utilizes design consultants to assist with design. After the pre-design phase is complete (corridor location and design concept study and general plan development), design consultants are hired to perform design for individual corridor sections. A corridor management consultant is typically hired to prepare the general plan and oversee the entire corridor design effort, acting as a extension of ADOT staff. The management consultant acts as a liaison through which all communications and coordination are carried out with the section design consultants, various governmental and regulatory agencies, utilities, and other involved parties. The management consultant provides a monthly status report to ADOT. A part of this status report is a current estimate of corridor and section costs. Any cost changes are identified and a revised corridor estimate is provided.

An initial comprehensive cost estimate for the MAG Program was published in Phoenix-area newspapers in June of 1987 (June 15, 1987, *The Phoenix Gazette,* and June 10, 1987, *The Arizona Republic*). These articles identified estimated cost increases that were occurring on most of the MAG Program corridors under development. The total system cost was estimated by ADOT and MAGTPO to be between $3.9 billion and $6.3 billion in 1987 dollars. The actual cost was suggested by ADOT to be nearer the lower end of this range. However, many of the corridor location and design concept studies were not scheduled to be completed until December 1987 or later.

In early 1988, DeLeuw Cather and Company prepared a summary of construction cost estimates for the MAG freeway/expressway corridors. A report was presented to ADOT on March 31, 1988, providing a corridor-by-corridor cost and design features analysis. This report showed that the total program construction cost estimate had increased from $2.1 billion (MAGTPO original construction estimate) to $3.3 billion, or a 57 percent increase in just two years. A similar evaluation of right-of-way acquisition costs produced a revised estimate which ranged between $2.0 to $2.3 billion, compared to the original MAG estimate of slightly over $800 million. Higher estimates of total MAG Program costs were widely reported by the newspapers. The Arizona Republic reported the cost of the MAG Program to be projected at $4.4 to $6.4 billion in 1988 dollars in their Sunday, April 24, 1988 edition.

On May 6, 1988, ADOT presented a report to the State Transportation Board entitled *A Comparison of 1985 and 1988 System Development Levels and Construction and Right-of-Way Cost Estimates.* A newspaper article subsequently appeared in The Arizona Republic on May 7, 1988 identifying the estimated cost of the total system to range from $5.3 billion to $6.4 billion in 1988 dollars.

In June 1988, ADOT developed and released an interim report on the status of the MAG Program. The report was entitled *Report on the Status of the MAG Freeway/Expressway System.* The report was made available for public use, but not widely distributed. It provided a report of specific events completed, changes in growth forecasts, changes in system design and their consequences, and objectives for the next five-year program. The cost of the entire system was identified as being in the $5 billion range. The major focus of this "status" report was to summarize the programmed activities for the MAG Program contained in the 1988-1993 five-year highway construction program.

Various other reports have been provided periodically by ADOT, that report on adjustments to MAG Program cost estimates. These reports include:

- ADOT annual update of the five-year highway construction program
- *Urban Freeways and Expressways* status report on the MAG Program, produced periodically by ADOT since Fall 1986
- Individual corridor status reports prepared by the corridor management consultants on a monthly basis
- *Cost and Revenue Update* report on MAG Program issued by MAGTPO in June of 1990
- *Valley Freeways* publication in newspaper format on the status and accomplishments of the MAG Program, issued by ADOT in the Spring of 1991 with wide public distribution

Conclusions

ADOT has made appropriate and timely adjustments of its estimates of MAG Program costs as information has been developed which provides a more definitive basis for these estimates. These cost estimate updates result from the advancement of location and design plans, as well as actual right-of-way acquisition and construction cost experience. The resulting updated cost information is entered into the Department's cost accounting system (TRACS) for actual costs and the Urban Highways Section's Strategic Planning Model for both actual and estimated costs. This information is subsequently used to adjust the

Department's five-year highway construction program, if need be, or to help prepare the next annual update.

This information becomes the basis for MAG Program status reports and briefings both within the Department and to the Transportation Board, MAG Regional Council, and MAG Management Committee, as well as selected groups outside of ADOT or MAG.

While the Department's current reporting procedures and systems permit the timely reporting of significant MAG Program cost changes, both within ADOT and to MAG, the Department and MAG continue to lack proactive, effective mechanisms to convey this information to the general public. Past history suggests an approach in releasing information to the public and the press on the status of Program cost estimates and their potential for achievement which was not sufficiently frequent or on a regularly scheduled basis.

Recommendations

ADOT should provide more timely, consistent, and comprehensive information to the public regarding the MAG Program, including progress, status, and changes to revenues and costs.

MAG should issue an annual report to the public concerning the status of the overall MAG Program, its total costs by corridor and segment, its scope by corridor and segment, its revenue forecasts by general source, and the expected time frame for completion by segment and corridor, based on the most current information available from ADOT. This report should note significant changes to the MAG Program, in terms of scope, cost, revenue, and schedule. The report should be the subject of subsequent public hearings to promote public understanding and comment.

REVIEW OF PROGRAM COST ESTIMATES

4.8 How, if at all, did new or unforeseen regulatory requirements impact program costs?

Background

When the initial estimates of cost for the implementation of the MAG Program were developed, specific types and locations of environmental concerns, and the costs associated with environmental protection could not have been known since the exact scope and location of the projects were not known. The initial phase of the design effort identified, the location of the freeway/expressway corridors. An environmental evaluation was conducted as part of this process to establish the extent of environmental involvement.

Once the corridor locations and general plan development were finalized, design details could then be developed for sections of MAG Program corridors. During the design process, work items involving environmental mitigation or avoidance became known. The costs associated with these work items became part of the project costs.

Criteria

The Congress of the United States and the Legislature of the State of Arizona have the authority and responsibility to enact laws to protect the health and welfare of its citizens and protect and preserve the environment. Agencies within each of these governments develop regulations to carry out these laws. The MAG Program must comply with all appropriate regulations, including the following:

- National Environmental Policy Act
- Protection of Historical and Cultural Properties
- Endangered Species Act
- Protection of Wetlands
- Floodplain Management
- Preservation of Public Use Land
- Wild and Scenic Rivers Act

- Clean Water Act
- Farmland Protection
- Safe Drinking Waters Act
- Eligibility for inclusion in the National Register of Historic Places
- Clean Air Act

Analysis

In many cases, regulations and the interpretation by agencies concerning the implementation of regulations continue to evolve. This evolution has strengthened the requirements for environmental protection. For example, Executive Order 11990 provides requirements for the protection of wetlands, but when they cannot be avoided it establishes the concept of providing replacement areas. The amount or extent of wetlands replacement areas is determined by local Corp of Engineer's officials. When mandated, the costs of locating, acquiring, and constructing wetlands replacement areas become part of the project cost.

The following provide some examples of environmental concerns that were unforseen or their involvement underestimated in the preparation of early cost estimates for the MAG Program:

- Mitigation of the Superfund site on the original alignment of the East Papago Freeway
- Archeological investigation and recordation for the East Papago and Hohokam Corridors
- Extensive noise mitigation throughout the MAG system
- Floodplain protection
- Asbestos abatement

After the passage of Proposition 300 and the initiation of design, a change in legislation occurred concerning utilities and "prior rights." Essentially, it had been the responsibility of utility companies to move their utilities at their cost unless the utility had a "prior right", such as purchased right-of-way or easement. Many public utilities (water, sewer, and storm sewer) were within the public right-of-way. When the right-of-way for the MAG freeway and expressway system became State-owned, these public utilities would have to be relocated at the expenses of the municipality that originally owned the right-of-way. However, the passage of Senate Bill 1019 in April 1989 permitted the State to pay for all

costs associated with the relocation of these public utilities. This law applied to the MAG Freeway/Expressway Program and added considerable costs to the State-funded portion of the project. These costs were included in early estimates.

Conclusions

Regulatory requirements, particularly environmental requirements have impacted program costs. The extent of these costs could not have been known at the planning level. These requirements added millions of dollars to the Program, but these impacts did not represent major contributors to the $1.2 to $1.5 billion Program cost increases estimated to date by MAGTPO.

Recommendations

Both ADOT and MAG should reflect the expected cost impacts of regulatory compliance in the MAG Program budget.

Current and future regulatory requirements will likely further increase the costs to complete the MAG Program. The probable cost impacts on the MAG Program budget due to regulatory requirements need to be promptly reflected in both the Department's and MAG's updates of MAG Program budgets and cost estimates. This will help ensure that the fiscal implications of regulatory compliance are conveyed to decisionmakers within both ADOT and MAG, so that appropriate budgetary, programming, scoping, and funding actions can be taken to protect the fiscal and legal integrity of the Program.

REVIEW OF PROGRAM COST ESTIMATES

4.9 Are current program cost estimates appropriate and reasonable, including estimates for remaining right-of-way and construction?

Background

Changes to MAG Program costs can result from a wide variety of causes, including:

- Changes in corridor/section location or alignment
- Changes in corridor/section design features
- Changes in regulatory requirements
- Changes in the unit price of project inputs (right-of-way, construction, design) due to inflation
- Consultant/contractor changes orders
- Staging of projects

When cost changes occur on a project, the corridor management consultant reports the cost changes to ADOT in their monthly report. The Urban Highways Section tracks these cost changes through the Strategic Planning Model.

The strategic planning model incorporates both historical and estimated future costs for the MAG Program to facilitate proper programming of projects by phase and year. A computer run of the Strategic Planning Model was made on July 31, 1991 to identify the current budget for each corridor. This budgeted corridor cost is comprised of:

- Expenditures to 7/1/91 through TRACS
- Obligations prior to 7/1/91
- Estimated costs from the five year program (92-96)
- Estimated costs beyond the five year program (after 7/1/96)

This budget estimate utilizes 1991 costs for all future costs, but uses actual costs for past or current expenditures and obligations. Exhibit 4-17 identifies the estimated cost of the MAG

Freeway/Expressway Program by corridor and function, based on the Urban Highway Section's Strategic Planning Model.

EXHIBIT 4-17

CURRENT COST ESTIMATES FOR MAG PROGRAM BY CORRIDOR AND FUNCTION[1]

(Millions of dollars, 1991 dollars for current and future costs and actual dollars for past costs)

Corridor	Design	Right-of-Way	Construction	Total
Aqua Fria	$ 51,122	$ 251,895	$313,251	$ 616,268
East Papago	27,648	155,109	204,246	387,003
Estrella	11,471	70,252	71,814	153,547
Grand Avenue	27,618	282,325	185,112	495,055
Hohokam	21,562	66,806	99,596	187,964
Paradise	50,008	338,788	457,164	845,961
Pima	74,059	444,600	607,300	1,125,960
Price	33,866	53,503	193,888	281,258
Red Mountain	27,079	107,024	220,800	354,903
Santan	61,619	183,662	416,900	662,181
Sky Harbor	7,435	8,970	33,678	50,083
South Mountain	41,614	75,182	245,400	362,197
Squaw Peak	32,350	163,484	235,507	431,342
Total	$467,450	$2,201,613	$3,284,658	$5,953,721

[1] Does not include debt service costs associated with the RARF and HURF bonds issued for the MAG Program.

Source: ADOT Urban Highways Section, July 31, 1991.

Analysis

The determination of the appropriateness and reasonableness of the remaining cost for the MAG Program is extremely difficult to determine. A number of factors affect this determination.

Design Status

Each of the corridors are in different stages of design. All corridors have completed the corridor location and design concept phase, but are in various stages of the final construction design phase. A summary of the design status of MAG Program corridors and sections as of July 1991, is shown in Exhibit 4-18. The closer a corridor is to 100 percent design completion, generally the more reliable is the estimate of construction cost.

Schedule of Construction

The further into the future construction begins, the more opportunity there is for costs to increase. Since current year costs are used for estimates of cost for the system, costs will increase as a result of inflation. For example, a project that will not be built for 10 years would increase in cost by 63 percent if the inflation rate were 5 percent per year for the 10-year period. Over time, opportunities may occur for other changes to take place, such as changes in design standards or regulatory changes. Changes to right-of-way costs can be more dramatic than changes in construction costs. Right-of-way costs are more closely tied to the economic conditions and are susceptible to development conditions in specific corridors.

Methodology of Estimating

Highway construction projects utilize two approaches for establishing a cost estimate: 1) a summary of quantities, such as the number of square feet of concrete pavement, and 2) a lump sum estimate for a specific type of work, such as the cost to construct a bridge superstructure. Unit costs for work items are normally very predictable. However these unit costs depend on the economic situation regarding the relative demand for the item, the amount of competition available for providing the item, and the size of the quantity required or contract amount.

As more and more urban freeway and expressway projects enter the construction phase, the data base of cost information increases. With this increase in data, a more stable and reliable construction estimate can be developed. ADOT has developed the means to utilize this historical data through the annual issuance of the *Construction Cost* catalog. Similar items of work are summarized and an average cost per unit is developed. The ability to develop a realistic estimate at the plans, specification, and estimate (PS&E) stage of design (100 percent complete) is documented in the July 1991 MAGTPO Status Report on the MAG Program. Exhibit 4-19 identifies 11 projects that were awarded in Fiscal Year 1991, for a total cost of $90.08 million. The total amount award was $5.08 million less than ADOTs estimate, which represents a 5 percent difference. During fiscal year 1991, eight

EXHIBIT 4-18

MAG FREEWAY/EXPRESSWAY PROGRAM DESIGN STATUS
AS OF JUNE 20, 1991

CORRIDOR	SEGMENT	DESIGN % COMPLETE
Agua Fria	I-10 to Camelback	100%
	Camelback to Northern	0%
	Northern to 31st Avenue	100%
	I-17 TI	60%
East Papago	McClintock to Pima Freeway	95%
	I-10 to McClintock	100%
Estrella	Thomas to Grand Avenue (Interim)	100%
Grand Avenue	TSM	95%
	Agua Fria Bridges	60%
	Widening-Thunderbird-Beardsley	95%
Hohokam	N/A	100%
Paradise	N/A	0%
Pima	19th Avenue to 90th Street	0%
	90th Street to Chaparral	60%
	Via de Ventura to McKellips (Bridges)	100%
	Red Mountain TI	30%
	University to Baseline	100%
Price	N/A	0%
Red Mountain	N/A	0%
Santan	N/A	0%
Sky Harbor	Sky Harbor Boulevard to SPRR	100%
	University to Sky Harbor Boulevard	95%
	I-10 to University	0%
South Mountain	N/A	0%
Squaw Peak	Glendale to Northern	100%
	Northern to Shea	100%
	Shea Bridge	60%
	Shea to Pima Freeway	0%

Source: ADT Status Report - MAG Freeway/Expressway System, July 1991, page 3.

EXHIBIT 4-19

MAG FREEWAY/EXPRESSWAY PROGRAM CONSTRUCTION CONTRACTS AWARDED IN FISCAL YEAR 1991

CORRIDOR	STATE ESTIMATE	BID AMOUNT	BID AWARD	DIFF. (under)
Pima: Via De Ventura-McDonald (Structures)	$3,826,525	$3,481,191	7/20/90	$(345,334)
Squaw Peak: Phoenix Mountain Preserve (Landscaping)	86,476	76,518	9/21/90	(9,958)
Hohokam Expressway: Washington Street-SPRR (Landscaping)	181,768	157,789	9/21/90	(23,979)
Pima: Pima Tunnel & Channel Outfall North of University (Structures)	9,049,812	4,658,042	10/19/90	(4,391,770)
Sky Harbor: Sky Harbor-44th St. (Structures)	9,485,642	9,813,028	10/19/90	327,386
East Papago: Priest Dr-Indian Bend Wash (Grading/Draining/ Structures)	31,861,139	32,108,964	11/16/90	247,825
Estrella: I-10 Glendale Ave (Construction)	1,922,631	1,853,933	11/16/90	(68,698)
Pima: Ehrardt Park & Desert Samaritan Hospital (Landscaping)	168,102	173,561	2/15/91	5,459
East Papago: 48th St-Priest Dr (Construction)	29,515,335	29,460,683	2/15/91	(54,652)
Estrella: Glendale Ave-Cactus Rd (Construction)	2,109,846	2,019,523	5/17/91	(90,323)
Agua Fria: Agua Fria-Rose Garden II (Construction)	6,958,666	6,280,905	6/21/91	(677,761)
TOTAL	$95,165,942	$90,084,137		$(5,081,805)

Source: ADOT Status Report - MAG Freeway/Expressway System, July 1991, Pg. 5.

projects had awarded construction costs under the ADOT estimate, with three projects over the ADOT estimate. This 5 percent difference reflects the favorable market conditions as a result of the economic slowdown and the significant competition among contractors.

To help evaluate a test for reasonableness of estimated costs, a historical review of the cost estimate of the Aqua Fria Freeway was conducted. The Aqua Fria is part of the Outer Loop that was identified in the MAG Freeway/Expressway Plan in Proposition 300. The original estimated cost for the Outer Loop was $795.9 million, as shown in Exhibit 4-16. The estimate of construction cost for the Aqua Fria represented $199.3 million of the total for the Outer Loop (ADOT estimate of November 13, 1985). This included construction from I-10 to I-17. Exhibit 4-20 shows the evolving construction cost estimates and the approximate level of design based on status reports from the corridor management consultant for the Outer Loop.

EXHIBIT 4-20

SUCCEEDING CONSTRUCTION COST ESTIMATES FOR AGUA FRIA FREEWAY CORRIDOR

Date	Construction Estimate	Approximate Design
11/13/85	$199.3 million	Planning Estimate
3/5/86	$260.9 million	Corridor Location and Design Concept Phase
7/17/87	$336.1 million	General/Plan Development
8/16/88	$346.9 million	30% Design
6/91	$329.3 million	60 - 90% Design

Source: DeLeuw Cather & Company.

The design levels listed in Exhibit 4-20 are approximate. For example, the 11/13/85 estimate was a planning estimate developed by ADOT staff, but significant corridor location

work had already taken place prior to 1985. However, the following observations can be made for the Agua Fria Freeway corridor based on Exhibit 4-20:

- Planning estimate to 90% design - 65% increase
- Corridor location and design concept estimate to 90% design - 26% increase
- General plan development to 90% design - 0% increase
- 30% design to 90% design - decrease

These declining percentages support the point that corridor estimates become much more accurate as the design work progresses to completion.

All of the MAG Program corridors have advanced through the corridor location and design concept stage. However, the following corridors have not completed the first phase of design (30%) as indicated in Exhibit 4-18:

- Paradise
- Price
- Red Mountain
- Santan
- South Mountain
- Approximately 50% of the Pima
- Approximately 50% of the Estrella
- Approximately 70% of the Grand Avenue
- Approximately 50% of the Squaw Peak Extension

The estimates for right-of-way costs, as with construction costs, are based upon historical records and current economic conditions. The data base used by the Right-of-Way Section has been improved significantly over the last several years. Their ability to utilize this information is significantly better in 1991 than in 1985. However, the cost of right-of-way acquisition is tied very closely to the economic conditions and the local development patterns. Right-of-way costs are much more susceptible to change than construction costs.

Conclusions

The methods and the data used by ADOT to estimate construction costs and right-of-way costs are current and consistent with those used by similar transportation agencies. ADOT's cost estimates for the MAG Program appear reasonable and appropriate, given the current stage of design of MAG Program corridors and the prevailing prices for construction services and real estate. However since all projects will not be built in 1991, cost escalation will likely increase the costs of corridors to be constructed in future years. In addition, as the level of design is increased, the ability to improve cost estimating increases. Since a number of corridors have not yet advanced to the 30 percent design stage, estimates of construction costs can be expected to increase, based on the experience of the Aqua Fria Freeway Corridor design development process, as demonstrated in Exhibit 4-19.

Recommendations

Budgets for the MAG Program should not be open-ended but constrained by estimated revenue limits. All costs of the 20-year Program should be included and estimated to the maximum degree of accuracy, based on past and current information on completed, programmed, and yet-to-be programmed projects. Project scope and costs should be managed within the resulting revenue-constrained budget. This should be done at the Program and corridor levels, using current or constant dollar figures for both costs and revenues on a consistent basis.

Any significant program changes which have major priority or fiscal implications need to be resolved through the involvement of the MAG Regional Council. This body of elected officials can and should provide a valuable forum for assessing and guiding decisions regarding the scope, timing, and financing of the MAG Program at the program and corridor levels.

MAG Program facilities and projects should be periodically reassessed in conjunction with fiscal status reviews of the overall Program. Cost reductions beyond value engineering need to be considered that provide an acceptable level of service and safety while minimizing project costs. Items to be considered are:

- **Reducing the number of lanes on some corridors or portions of corridors based on expected traffic volumes**
- **Providing at-grade or elevated facilities on selected sections rather than depressed freeways**
- **Reducing the extent of overhead lighting planned for each corridor that is to be funded by RARF and HURF monies**

- **Reducing the frequency of traffic interchanges and crossover roads funded by RARF and HURF monies**

- **Possible realignment or even elimination of corridors**

5. REVIEW OF PRIORITY PROGRAMMING PROCESS

This portion of the performance audit addresses questions regarding the process used by MAG and ADOT to prioritize and program design, right-of-way acquisition, and construction of segments comprising the MAG Program. For the purposes of this performance audit, we respond to inquiries concerning:

- Statutory authority for prioritizing and programming MAG Program project activity
- Nature of priority setting criteria applied to the MAG Program
- Openness of priority setting process
- Nature and basis of changes to priority programming decisions
- Allocation of program funds among preliminary engineering, right-of-way allocation, and construction

The following pages present the findings, conclusions, and, where appropriate, recommendations resulting from the audit team's assessment of MAG and ADOT's priority programming process as applied to the MAG Program.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.1 What are the statutory roles of the Maricopa Association of Governments (MAG) Regional Council, ADOT, and the Transportation Board in setting corridor priorities and programming construction activity?

Background

The passage of Proposition 300 established the funding mechanism for providing monies to the Regional Area Road Fund (RARF) in order to pay for the design, right-of-way acquisition, and construction of freeways, expressways, and parkways contained in the MAG Regional Freeway/Expressway Plan. The authorizing legislation (H.B. 2306) for this urban area transportation excise tax specified that the regional planning agency be responsible to: develop and update the regional transportation plan, establish and revise transportation corridor priorities, and provide a suggested construction schedule for the transportation corridors contained in the plan (A.R.S. 28-1594.01, Subsection K).

Criteria

The Arizona Revised Statutes (A.R.S. Title 28 Sections 106, 108, and 111) outline the statutory roles of the Arizona Department of Transportation and the State Transportation Board in setting corridor priorities and programming construction activities. Title 28 (Section 1594.01) also outlines the role of MAG in establishing corridor priorities and construction schedules for projects in the regional freeway/expressway plan that are funded with regional area road funds.

Analysis

State statutes authorize both the State Transportation Board and the Maricopa Association of Governments, as the regional planning agency for Maricopa County, to establish priorities and program the construction of corridors comprising the MAG Regional Freeway/Expressway Plan. These statutes are described below.

State Transportation Board/ADOT

According to A.R.S. 28-106, the statutory power to establish project priorities for highways accepted into the State Highway System rests with the State Transportation Board. The State Transportation Board is composed of seven members from the six transportation districts and one at-large member. Members of the Transportation Board are appointed by the Governor to serve a six-year term. A.R.S. 28-106 Subsection C stipulates that the Board "shall establish the policies and the relative weights given to criteria to guide the development or modification for the five-year transportation facilities construction program."

The Board is also given the authority to award all construction contracts for transportation facilities, to monitor the status of construction projects, and to determine priority program planning with respect to transportation facilities.

The "Priority Programming Law," A.R.S. 28-111, defines the criteria which are to be used in establishing construction project priorities for ADOT. These criteria include:

- Sufficiency rating and safety factors
- User benefits
- Continuity of improvements
- Social factors
- Land use
- Aesthetic factors
- Conservation factors
- Life expectancy
- Recreational factors
- Availability of State and federal funds

The Arizona Department of Transportation (ADOT) is responsible for the design and construction of transportation facilities in accordance with the established priority plan (A.R.S. 28-103). The Department is responsible for developing the five-year highway construction program in accordance with the policies established by the Transportation Board. The Priority Planning Committee (PPC), a committee appointed by the ADOT Director consisting of ADOT Division directors and representatives of the Department of Commerce and the Joint Legislative Budget Committee, assists the Transportation Board in establishing "priority recommendations for the construction and development of transportation facilities" (A.R.S. 28-111-B.1). The PPC is also given the responsibility to review priority changes in or introduction of new projects to a proposed or adopted five-year program requested by the Transportation Board. Recommendations by the PPC are to be documented in a written report to the Transportation Board.

Maricopa Association of Governments

The Maricopa Association of Governments (MAG) was formed in 1967 as a voluntary organization of elected officials within the urban area of Maricopa County and the 24 cities and towns in the County. The governing body of MAG is the Regional Council, while the administrative body of MAG is the Management Committee. The MAG Regional Council consists of one elected official from each of the cities and towns in Maricopa County, one representative from Maricopa County, and one representative from the Arizona Department of Transportation. Each member of the Regional Council has one vote. The representative from the Arizona Department of Transportation has voting privileges only for transportation-related issues. The MAG Management Committee consists of the city and town managers for municipalities located within the County, the Maricopa County manager, and the Director, or a designated representative, from the Arizona Department of Transportation. Each member of the MAG Management Committee has one vote (Resolution Number 3053, December 19, 1966). MAG provides a forum for discussion and study of area-wide problems of mutual interest and concern to the member local governments and facilitates the development of policy and recommendations of an advisory nature for the solution of problems.

Under the 1966 Federal Demonstration Cities and Metropolitan Development Act, Section 204 stipulates that in order for metropolitan areas to be eligible for certain federal development project funds there must be a regional body representing local governments which would comment on the relationship of federal grant requests to area-wide programs and area-wide planning. In accordance with U.S. Department of Transportation requirements, MAG is the Metropolitan Planning Organization (MPO) for the Phoenix metropolitan area as designated by the Governor.

MAG regional highway-related transportation planning responsibilities include:

- Preparing and updating the Regional Freeway/Expressway Plan for Maricopa County, as originally required by the Federal Government
- Initiating regional highway studies to identify new freeway/expressway routes
- Recommending priorities for use of funds dedicated to regional freeway/expressway construction (A.R.S. 28-1594.01, Subsection K)
- Preparing the Regional Transportation Improvement Program (TIP) which serves as a five-year regional guide for preservation, management, and expansion of the transportation services provided in the area. The TIP contains summaries and project descriptions for highways, public transit, and airports. The updated TIP is adopted yearly by the MAG Regional Council.

The MAG Regional Council is responsible for developing freeway funding strategies and construction priorities for the region. Based on these funding strategies and priorities, ADOT is responsible for programming and coordinating the design, right-of-way purchase, and construction of freeways in the State Highway System. In relation to projects funded with Regional Area Road Funds (RARF), MAG is required to list transportation corridors by priority in the regional transportation plan, and may also provide a suggested construction schedule for the transportation corridors contained in the plan (A.R.S. 28-1594).

The transportation planning staff of MAG, known as MAGTPO (Maricopa Association of Governments Transportation Planning Office), is primarily composed of ADOT employees of the Transportation Planning Division of ADOT. The MAGTPO provides administrative and technical assistance to MAG in developing its regional transportation plan and integrating this plan into the State Highway Plan.

Conclusions

Title 28 of the Arizona Revised Statutes assigns responsibilities to the State Transportation Board and to the Arizona Department of Transportation, permissively through the Priority Planning Committee, for establishing corridor priorities and programming construction activities for the State. Furthermore, Title 28 assigns MAG statutory responsibilities to develop and update a regional transportation plan which lists the corridors by priority for all projects funded with transportation excise taxes, specifically projects funded with Regional Area Road Funds, and for suggesting a construction schedule for transportation corridors contained in the plan.

The State Transportation Board and the MAG Regional Council each have authority in formulating the projects which will be incorporated into the State's five-year highway construction program. Ultimate authority in establishing State transportation construction priorities and programming transportation facility construction activities rests with the State Transportation Board. While the MAG Regional Council has the authority to establish regional corridor priorities and recommend construction schedules for projects in the regional highway plan, those projects which are to be programmed in the State's five-year highway construction program must first be designated as a State Highway and second, be approved for inclusion in the State's five-year highway construction program by the Transportation Board. The State Transportation Board has the final authority in deciding which projects will be included in the five-year highway construction program and which projects will ultimately get built. However, the MAG Regional Council has the final authority in deciding which projects will be included in the MAG Regional Freeway/Expressway Plan and which projects will be funded with Regional Area Road Funds.

Over the past six years the relationship between the MAG Regional Council, ADOT, and the State Transportation Board has been cooperative in that each agency has been in agreement, with a few exceptions, with the original priorities established in the MAG Freeway/Expressway Plan. However, if MAG and the Transportation Board could not agree on the priorities or programming related to the MAG Program, either group could cause projects to be removed from the State's five-year program. While the Transportation Board has ultimate priority-setting and programming authority, MAG has the ultimate authority over which corridors can receive RARF funding. This provides MAG with significant leverage over the priority programming of MAG Program corridors and projects.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.2 How were original corridor priorities set for the program? What were the roles of the MAG Regional Council, ADOT, and the Transportation Board?

Analysis

Priorities for construction of the original MAG Freeway/Expressway Plan were first adopted by the MAG Regional Council in January of 1986. MAGTPO staff developed the initial set of priorities, which were transmitted to the MAG Management Committee in December of 1985. Original corridor priorities, as established by MAGTPO staff, were based on technical criteria and ratings as well as subjective rankings. The original corridors and associated segments were "ranked" by technical criteria such as current and projected traffic volumes, congestion factors, and the cost-effectiveness of the project.

In developing the original MAG Program priorities, MAGTPO divided the MAG Freeway/Expressway Plan into 15 corridors and 38 sections. MAGTPO staff then used the following set of prioritization factors to determine the recommended original program priorities:

- Traffic conditions - facilities in congested, high demand corridors would be built early. Factors used to evaluate traffic conditions included:

  Future traffic served

  Existing levels of traffic congestion in the corridor

  Facility costs compared to traffic served

  Future travel time savings

- Project readiness - an important factor in the early years of the 20 year program

- Complete Outer Loop in ten years - an important early target for the MAG Program

- System continuity - avoidance of isolated or unconnected links and bridging of gaps between major traffic-carrying components of the system

- Geographic balance - system improvements and additions spread throughout the region

These prioritization factors were used to evaluate the "general reasonableness of the recommendations rather than be applied in a numerical grading system" according to MAGTPO.

Plan segments were then prioritized into four phases based on estimated construction completion dates:

- Phase One - Mid FY 1986 - FY 1990
- Phase Two - FY 1991 - FY 1995
- Phase Three - FY 1996 - FY 2000
- Phase Four - FY 2001 - FY 2006

Three bonding scenarios (high bonding, medium bonding, and no bonding) were also evaluated. Under the three bonding alternatives, different levels of funding would be available throughout the 20-year span of the Program. Each bonding alternative also implied a different level of construction activity over the 20 years of the Program. The high bonding alternative was recommended by MAGTPO staff, and approved by the MAG Management Committee and Regional Council, so that an accelerated construction schedule could be accomplished in the early years of the Program to more quickly meet freeway needs throughout the County. Under the high bonding alternative more funds would be available in the early years of the 20-year Program for preserving right-of-way and for pursuing an aggressive construction schedule, with only an estimated ten percent loss in constant dollar purchasing power over the life of the Program according to MAGTPO.

On January 15, 1986, the MAG Management Committee adopted staff priority recommendations with certain changes. The MAG Regional Council adopted the recommended priorities of the MAG Management Committee and MAGTPO staff on January 29, 1986.

The adopted MAG Plan was presented to ADOT at the Transportation Board on March 21, 1986. The Transportation Board accepted the MAG Program plan "in concept" with the understanding that "details may change from time to time." The Transportation Board also stipulated that its acceptance of the MAG Program plan concept was not to be construed as acceptance of a definitive funding plan for the MAG Program plan.

The adopted MAG Program plan was subsequently transmitted to the Priority Planning Committee to be incorporated into the tentative FY 1987-1991 five-year highway construction program.

The adopted priorities, illustrated in Exhibit 5-1, assumed a high level of bonding, which would permit more projects to be built in the first ten years of the Program. Under the high bonding scenario, approximately 75 percent of all preliminary engineering and 73 percent of all right-of-way acquisition would be complete in the first five year segment of the 20-year Program (mid FY 1986 -FY 1990). (Note: According to the Department's recent five-year review of the MAG Program, only about 36 percent of all preliminary engineering and about 36 percent of all right-of-way acquisition were completed in the first five years of the Program.) The high bonding scenario also projected that about two-thirds of the MAG Program system would be built and open to traffic by 1995.

Conclusions

The original MAG Program corridor and section priorities were established based on the application of a variety of quantitative and subjective measures. While the documentation presented to the public (i.e., MAG meetings, staff recommendation report on the original priorities, etc.) do not portray the extensive and rigorous analysis undertaken to select the original sections and to develop the priorities for constructing these sections, the MAGTPO staff files which were reviewed during the audit contain adequate documentation of technical rankings and explanations as to why specific sections were chosen. Local jurisdictions were also given the opportunity to comment on the criteria used in setting the original priorities and the tentative list of priority sections/corridors.

EXHIBIT 5-1

FREEWAY/EXPRESSWAY PRIORITIES FOR EXCISE TAX AND 15% REVENUES
ADOPTED BY MAG REGIONAL COUNCIL JANUARY 29, 1986

SECTIONS	1986-MID-1990	MID-1990 - MID-1995	MID-1995 - MID-2000	MID-2000 - 2005
AGUA FRIA FREEWAY				
Buckeye Rd.-Papago Freeway	E/R	C		
Papago Freeway-Northern Ave.	E/R-AC	C		
Northern Ave.-Bell Rd.	C			
Bell Rd.-Black Canyon Freeway	E/R	C		
ESTRELLA FREEWAY				
S.R. 85-Grand Expressway	E/R	E/R	E/R	C**
Grand Expressway-Black Canyon Freeway	E/R	E/R	E/R	C**
GRAND EXPRESSWAY				
McDowell Rd.-Paradise Parkway	E/R	C		
Paradise Parkway-Agua Fria Freeway	E/R	C		
Agua Fria Freeway-Dysart Rd.	S	E/R	E/R	C
Dysart Rd.-Cotton Lane	S	E/R	E/R	C
HOHOKAM EXPRESSWAY				
McDowell Rd.-University Dr.	E/R-AC	C		
PAPAGO FREEWAY (EAST)				
I-10-Hohokam Expressway	C			
Hohokam Expressway-Pima Freeway	E/R-AC			
PARADISE PARKWAY				
Squaw Peak Parkway-Black Canyon Freeway	E/R	C		
Black Canyon Freeway-51st Ave.	E/R			
51st Ave.-Agua Fria Freeway	E/R	E/R	C	
PIMA FREEWAY				
Black Canyon Freeway-Squaw Peak Freeway	E/R	C		
Squaw Peak Parkway-Scottsdale Rd.	E/R	S*	E/R	C
Scottsdale Rd.-Shea Blvd.	E/R	C		
Shea Blvd.-Papago Freeway	E/R	C		
Papago Freeway-Superstition Freeway	C			
PRICE PARKWAY				
Superstition Freeway-Santan Freeway	E/R	C		
RED MOUNTAIN FREEWAY				
Pima Freeway-Country Club Rd.	E/R	C		
Country Club Rd.-Gilbert Rd.	E/R	C		
Gilbert Rd.-Bush Highway	E/R	E/R	C	
Bush Highway-Ellsworth Rd.	E/R	E/R	C	
McKellips Rd.-Superstition Freeway	E/R	E/R	C	
SANTAN FREEWAY				
I-10-Price Parkway	E/R	C		
Price Parkway-Gilbert Rd.	E/R	E/R	C	
Gilbert Rd.-Power Rd.	E/R	E/R	E/R	C
Power Rd.-Superstition Freeway	E/R	E/R	E/R	C
SKY HARBOR ACCESS FACILITIES				
Sky Harbor Expressway (Sky Harbor-I-10)	C			
Sky Harbor Blvd. (44th-56th Streets)	E/R-AC	C		
SOUTH MOUNTAIN PARKWAY				
Papago Freeway-Baseline Rd.	E/R	S	E/R	C
Baseline Rd.-7th St.	E/R	S	E/R	C
7th St.-Maricopa Freeway	E/R	S	C	
SQUAW PEAK PARKWAY (EXTENSION)				
Glendale Ave.-Thunderbird Rd.	E/R	C		
Thunderbird Rd.-Pima Freeway	E/R	E/R	C	

E/R Preliminary engineering and right-of-way purchase
AC Accelerated construction started
C Final construction completed
S Staged construction completed
* Full construction by 1995 if funds available
** Lowest construction priority

Source: MAG

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.3 Was the priority setting process sufficiently open and accessible to the public? Was the process adequately documented?

Background

The setting of corridor and segment priorities for the MAG Program in 1986 set the pattern for how RARF funds, HURF funds, and applicable RARF and HURF bond proceeds would be allocated by corridor, segment, and function for the next five years. This process had a significant impact on the way the Transportation Board and ADOT programmed and coordinated the activities of the MAG Program.

Criteria

Section 38 of the Arizona Revised Statutes (A.R.S 38-431-431.09) stipulates that "meetings held by government bodies should be open to the public, including the legislature, all boards and commissions of political sub-divisions, all multi-member government bodies of departments, agencies, institutions, and instrumentalities of the State or political subdivisions, including without limitation, all corporations and other instrumentalities whose boards of directors are appointed or elected by the State or political subdivision. Public body includes all quasi-judicial bodies and all standing, special, or advisory committees or sub-committees of, or appointed by, such public body.

The open meeting law provides that meetings be public and all persons deciding to attend shall be permitted to attend and listen to the deliberations and proceedings.

Notice of all meetings, including executive sessions must be given to the public. The procedure for giving public notice entails:

- Filing by the public body of a disclosure statement identifying where public notices of its meetings will be posted

- Give notice of each of its meetings by posting a copy of the notice in the public place identified in the disclosure statement and by giving such additional public notice as is reasonable and practicable to all meetings

Various public bodies fulfill this obligation to provide "additional" notice by providing news releases to the news media concerning proposed meetings, by mailing notices to those asking to be informed of meetings, and by including the date and time of such meetings in their newsletters and other publications. Notice shall include the public body, date, time

and place of the meeting. Notice has to be given at least 24 hours in advance of the meeting.

Analysis

The setting of corridor and segment priorities for the MAG Program in late 1985 and early 1986 was handled by MAGTPO, the MAG Management Committee, and the MAG Regional Council. No public hearings or public meetings were held to alert the public or facilitate their review and comment on the initial priorities established for the MAG Program. However, the meetings of the MAG Management Committee and MAG Regional Council to discuss MAG Program corridor/segment priorities and bonding scenarios were open to the public, in compliance with Arizona's open meeting laws.

State statutes (A.R.S. 28-1825, Subsection B) mandate the holding of public hearings by the Transportation Board concerning the proposed State five-year transportation facilities construction program and project priorities. The locations and dates of these public hearings are established in January of each year when the Transportation Board sets its annual meeting schedule. In compliance with these requirements, the Transportation Board held the first public hearing on the MAG Program in Phoenix on April 18, 1986, due to its inclusion in the tentative five-year highway construction program for 1987-1991. At this public hearing, a citizen voiced concern over not fully understanding the process utilized in developing the five-year program. At the May 16, 1986 Transportation Board meeting, this citizen voiced criticism over the limited role of the public in formulating the five-year program. Specific issues raised by this citizen included:

- Insufficient information available to the public prior to public hearings
- Insufficient explanation of MAG priorities
- Lack of definition of sales tax/HURF funds
- Jurisdiction of ADOT over the freeway/expressway system

MAGTPO files contain adequate documentation regarding the original formulation of priorities. The information contained in these files include documentation such as:

- Color-coded maps depicting the staging of segments
- Written report documenting the prioritization factors and the reasons as to why particular segments where chosen, project status, and which projects were currently programmed

- Tables showing the numerical ranking of segments according to the following criteria:

  Traffic volume

  Intersections/mile

  Travel time index (congestion)

  Cost effectiveness

- Other information on each segment (i.e., miles per segment, 2005 design year traffic volume, right-of-way and construction cost for each segment)

- The costs and traffic congestion under the various bonding assumptions (low, medium, high)

- Comments received from the City of Phoenix regarding the priority listing and the prioritization criteria

Conclusions

The intent of the Arizona open meeting law is to allow the general public access to the proceedings of government decision-making. This laws applies to the meetings conducted by the State Transportation Board, the Arizona Department of Transportation Priority Planning Committee, as well as the MAG Regional Council and MAG Management Committee. The meeting minute notes of each of these agencies document the changes within the MAG Regional Freeway/Expressway Plan, as well as any discussions of these changes and general public comment on the plan.

ADOT has a formal process for conducting public hearings and collecting public comments on the tentative five-year highway construction program. The Department also conducts public hearings on the location and design of projects throughout the State. The public is able to comment on the MAG Program at the public hearings for the tentative five-year highway construction program and the location and/or design concept studies, when held for specific projects. Written comments regarding the tentative five-year program are also accepted.

Formal public hearings or workshops were not held when establishing original corridor priorities for the MAG Program. The general public was afforded the opportunity to be informed of the original priorities through the meetings of the MAG Regional Council and the MAG Management Committee, in which corridor priorities were discussed and adopted. The general composition of the MAG Regional Council is intended to ensure a certain level

of public participation in that representatives serving on MAG are elected representatives and officials from throughout the County. In addition, local jurisdictions were given the opportunity to comment on the prioritization criteria and the list of priority segments chosen by MAGTPO staff. The MAGTPO files contain written comments from the City of Phoenix regarding the priority list and the prioritization criteria.

Documentation regarding the basis for MAG Program corridor/segment priorities are contained in working paper files at MAGTPO.

Recommendations

MAG should conduct annual public hearings to discuss the status of the MAG Program, changes to the Regional Freeway/Expressway Plan, changes to the corridor/segment priorities, and programming/financing plans and options, following issuance of an annual fiscal status report on the MAG Program.

In order to assure public support for and confidence in the programming and implementation of the MAG Program, MAG should conduct annual public hearings on the MAG Program. These public hearings would be separate from the annual public hearings conducted by ADOT and the Transportation Board in conjunction with the tentative five-year highway construction program. The public hearings would enable County residents to be brought up-to-date on the status of the overall MAG Freeway/Expressway Plan, to review any future changes in corridor/segment priorities before they are finalized and approved by the MAG Regional Council, and to comment on the Plan and Program in general.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.4 What criteria were used in setting the original corridor priorities? Did the programming process follow these priorities? Are these acceptable criteria and priorities in the transportation industry?

Background

When Maricopa County voters were asked to decide whether to support Proposition 300 on October 8, 1985, there were no priorities assigned to any of the corridors comprising the MAG Regional Freeway/Expressway Plan. The only programming distinction between corridors of the Plan was the characterization of both the Paradise Corridor and Hohokam Extension as being subject to further study. The initial priorities for the MAG Program were developed by MAGTPO staff in December of 1985, and subsequently reviewed and revised by the MAG Management Committee and adopted by the MAG Regional Council in January of 1986.

Analysis

Recommended priorities were originally developed by MAGTPO for 38 sections of the MAG Regional Freeway/Expressway Plan using the following set of criteria:

- Traffic Conditions - facilities in congested, high demand corridors would be built earlier. Factors used to evaluate traffic conditions included:

  Future traffic served

  Existing levels of traffic congestion in the corridor

  Facility costs compared to traffic served

  Future travel time savings

- Project Readiness - in terms of the completeness of location and design studies and right-of-way acquisition

- Complete Outer Loop in Ten Years - reflecting the importance of this set of corridors to the overall MAG program

- System Continuity - avoidance of isolated or unconnected links and bridging of gaps between major traffic-carrying components of the system

- Geographic Balance - system improvements and additions spread throughout the region

These criteria differ somewhat from the priority programming criteria specified by A.R.S. 28-111, Subsection B.1, which requires ADOT to prioritize projects for inclusion in the State's five-year highway construction program based on the following criteria:

- Sufficiency rating and safety factors
- User benefits
- Continuity of improvements
- Social factors
- Land use
- Aesthetic factors
- Conservation factors
- Life expectancy
- Recreational factors
- Availability of State and federal funds

The Department's criteria are broader in scope and provide for the explicit consideration of funding availability, user benefits, facility condition, and local impacts (social, aesthetic, land use, and recreation). However the Statute permits the Department to use other relevant criteria in the development of project priority recommendations, such as those adopted by the MAG Regional Council for the MAG Program in 1986.

Based upon a review of highway construction project priority-setting criteria used in such states as California and Florida for programming urban highway projects and numerous special reports issued over the years by the Transportation Research Board (Special Reports Number 48, 84, 157, and 1124) concerning priority programming criteria and procedures, the audit team found that the five criteria used by the MAG Regional Council to set MAG Program priorities are representative and appropriate. Other factors which are also generally used by others to prioritize and program highway construction projects include:

- Extent of local public and private funding participation

- Overall funding availability
- Cost-effectiveness of the project
- Physical condition of facility
- Safety

Less frequently used criteria are:

- Environmental impacts (air, water, noise, visual)
- Ability to operate and maintain
- Social and community impacts
- Economic impacts

In most situations nationwide, priority-setting criteria for programming highway construction projects are used as guidelines to help reflect and reconcile competing local objectives within the constraints of available resources. Most state transportation agencies significantly defer to local decisionmakers in developing priorities for local projects. This is particularly so where the primary funding sources are local in nature.

In applying the aforementioned criteria to prioritize the MAG Program in 1986, the MAG Regional Council divided the MAG Program into the following four five-year periods over the 20-year life of the RARF funding:

- Phase One - Mid FY 1986 - FY 1990
- Phase Two - FY 1991 - FY 1995
- Phase Three - FY 1996 - FY 2000
- Phase Four - FY 2001 - FY 2006

An integral part of the original priorities included the recommendation for a high level of bonding which permitted the protection of right-of-way for all corridors in the MAG Plan during Phase One. The high bonding alternative also permitted a more aggressive construction schedule to take place in the early years of the 20-year Program. It was envisioned that under the high bonding alternative approximately two thirds of the planned freeway/expressway system would be built and open to traffic by 1995.

The original MAG Freeway/Expressway Plan, as adopted in July of 1985, was first incorporated in the ADOT five-year highway construction program for FY 1987-1991. The FY 1987-1991 five-year program generally followed established MAG priorities for projects funded by RARF and 15 percent HURF funds. Right-of-way and preliminary engineering activities were programmed for all corridors.

In the early years of the MAG Program, selected segments of the Agua Fria, Pima, and Squaw Peak corridors were programmed in successive five-year programs to receive construction funds, even though they were not listed in the MAG priority schedule for construction funding until after 1991. These segments included:

- Portions of the Agua Fria Corridor between Bell Road and I-17
- Portions of the Pima Corridor between East Papago and Shea Boulevard
- Portions of the Squaws Peak Extension between Glendale Avenue and Thunderbird Road

These were minor deviations which reflected the generally high priorities assigned to projects along the Outer Loop and Squaw Peak Extension.

Major exceptions to the original priority of MAG Program projects are described in response to the next question.

Conclusions

The MAG Regional Council, based on technical support provided by MAGTPO, used generally representative and reasonable criteria for prioritizing the design, right-of-way acquisition, and construction of MAG Program corridors over the 20-year life of the RARF funding mechanism. In preparing five-year highway construction programs starting with fiscal years 1987 through 1991, the Department followed the original MAG program priorities, unless an exception had prior concurrence of the MAG Regional Council for incorporation into the five-year programs. These exceptions were based on generally representative and reasonable criteria, as described in the response to Question 5.5 The following pages address questions regarding changes made to original segment priorities and the 1990 change in MAG Program priorities resulting from the reduced funding levels and higher costs of the Program.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.5 What adjustments were made to original corridor segment priorities? When were the adjustments made? Who initiated adjustments? How were adjustments reviewed and approved? What was MAG's role? What was ADOT's and the Transportation Board's role?

Analysis

During the past five-and-one-half years, MAG priorities were generally followed by the Department as it prepared its updates of the State's five-year highway construction program. Except for selected accelerated construction on portions of the Aqua Fria, Pima, and Squaw Peak Extension corridors, the Department's five-year plan faithfully pursued the original MAG Program priorities, with only a handful of notable exceptions. These exceptions and the rationale for them are summarized below.

- Estrella Freeway: I-10 to Grand Avenue (interim road in exchange for ROW dedication)

  In the original set of priorities the Estrella Freeway was given the lowest priority. Landowners submitted a proposal to ADOT and the Transportation Board on March 31, 1988. This proposal outlined provisions for landowners to donate over 95 percent of the right-of-way along the mid-section alignment of the Estrella Corridor in exchange for an interim two-lane limited access roadway. ADOT staff first presented the right-of-way resolution for the Estrella Corridor at the April 14, 1988 meeting of the Transportation Board. Members of the Transportation Board expressed concern that the proposal represented an advancement of MAG priorities. Therefore, the Transportation Board sought MAG Regional Council input and recommendations before it would take action at its May meeting.

  An overview of the proposal was sent to MAG Regional Council members on April 20, 1988 and contained information regarding costs and right-of-way donors. The proposal for the Estrella Freeway was presented by the ADOT Director at the April 27, 1988 MAG Regional Council meeting. The MAG Regional Council approved the proposal with the stipulation that the $2.9 million needed to complete the project be funded with ADOT funds, not RARF monies.

  The advancement of the Estrella from a Phase Four level of priority (the lowest priority) to the first five years of the program was based on primarily financial reasons, gives the low volume of traffic forecasted for the corridor. Originally funding was programmed for right-of-way protection for the Estrella in the first five years of the program. Based on the proposal from landowners in the Estrella corridor to dedicate approximately 95 percent of the six-mile right-of-way needed for the project, funds were shifted from

right-of-way activity to construction of the interim facility in the FY 88-93 program. ADOT estimated that the donated right-of-way would save the Department roughly $53 million if it were purchased in 1988 versus 2003 as planned.

This example demonstrates the application of the priority-setting criteria: extent of local public and private funding participation, to expedite a project which would not likely have been programmed until much later in the schedule, if at all.

- Sky Harbor Expressway: I-10 to University Drive

This project was originally designated a Phase One project but has not been programmed based on ADOT's reasoning that 40th Street currently has adequate capacity on an interim basis to serve as the connection to I-10. The Hohokam Expressway will also provide access to Sky Harbor Boulevard on an interim basis. ADOT initiated the change to the FY 90-94 tentative five-year highway construction program. This change reflected ADOT's growing realization that MAG Program funding would not keep pace with the original programming objectives and higher costs of the MAG Program. The objective of this priority change was to free up funding resources for other corridors, such as the Squaw Peak Extension or Paradise Parkway.

Documentation of this priority programming change is limited to corridor management consultant memoranda and meeting notes concerning phasing options for the corridor and the impacts of deferral on the project budget and scope.

- Aqua Fria: I-10 to Northern Avenue

All Phase Two projects identified by MAG for accelerated construction were fully programmed and under design in the FY 90-94 program. One exception to the Phase Two priorities is the Aqua Fria section from I-10 to Northern Avenue, which was programmed for an interim facility rather than full freeway construction.

This change resulted from MAG member efforts to focus Agua Fria Corridor funding on the Bell Road to 75th Avenue section instead of the I-10 to Northern Avenue section. Westside communities wanted the priority shifted to the northern segment. In response to comments from the City of Glendale, ADOT focused funding on the Bell Road to 75th Ave. segment as opposed to the Camelback to Northern section. The Camelback Road to Northern Avenue section was a Phase Two accelerated construction project. As such, its deferral to Phase Two was not a significant change to the MAG Program priorities.

This change in priorities was initiated by MAG. However the meeting minutes and files reviewed do not fully document the process or basis for this change in priority.

- Hohokam Extension: McDowell Road to Thomas Road

  The Hohokam Extension was originally included in the MAG Program plan as an adopted corridor under study between McDowell Road and Indian School Road. On June 17, 1987 the MAGTPO Staff recommended that the MAG Regional Council revise the MAG Program to designate the Hohokam Extension as an expressway from McDowell Road to Thomas Road. The revision request was proposed by the City of Phoenix, which had completed a study of the corridor and approved a project concept and alignment. Technical analysis on a number of alternative improvements was performed by a consultant to the City. The Phoenix City Council recommended that the facility should be a four-lane limited access parkway along the Old Cross Cut Canal.

  The MAG Management Committee endorsed the revision request on June 10, 1987. On June 24, 1987 the MAG Regional Council recommended the Hohokam Extension to ADOT and the Transportation Board for inclusion on the State Highway System.

  At the September 18, 1987 meeting of the Transportation Board, the Board approved the establishment of the preliminary transportation corridor for a four-lane parkway between McDowell Road and Thomas Road to be funded with RARF funds, and a two-lane parkway between Thomas Road and Indian School Road to be funded by the City of Phoenix. The original set of priorities only included the construction of the Hohokam Expressway from University Drive to McDowell Road.

- Grand Avenue: McDowell Road to Aqua Fria Freeway

  The programming of funds for Grand Avenue in the Department's five-year highway construction programs has reflected a funding level of about 30 percent from ADOT Funds, other than MAG RARF or HURF moneys. To be consistent with MAG stipulations that the State provide two-thirds of the funds for this corridor, higher levels of State funding for this corridor will be required to achieve the MAG goal of one-third RARF/HURF monies and two-thirds State monies.

  In addition, the sections from McDowell Road to the Aqua Fria Freeway which were originally programmed for the FY 1986 to 1990 time frame were deferred, due to local community opposition to the project as originally designed. This project deferral was agreed to by MAG to provide time to resolve the differences and reconstitute the projects. The projects are now scheduled for FY 1992 and 1993.

In 1990, both MAG and ADOT began to recognize the difficulty of trying to meet the deadlines implied by the original MAG Program priorities, given the containing shortfall in projected RARF revenue growth and escalated Program costs. As a result of this dilemma, MAGTPO developed and the MAG Regional Council approved a major revision to the

MAG Program priority process and results. Instead of four time-specific five-year intervals, MAG established five levels of priority which suggest the sequence but not the specific time frame for the performance of functional activities programmed for each corridor section. These five priority levels are summarized below:

- Level I: Completed sections and projects programmed in the ADOT five-year highway construction program for FY 1991-95, including those identified in the program for construction in the two years beyond the last year of the program
- Level II: Unprogrammed original section priorities for the periods 1986-1990 and 1991-1995
- Level III: Original priority projects for the period 1996-2000
- Level IV: Original priority projects for the period 2001-2005
- Level V: Staged contraction on the portions of the Estrella Freeway not programmed to date

Those projects contained in the FY 1991-95 program reflected the original MAG Program priorities, as adjusted. However, those remaining unprogrammed corridor sections were quantitatively assessed by MAGTPO using the following criteria:

- Traffic demand projected for 2005
- Congestion relief in terms of congested intersections by 2005 within two miles of a corridor
- Cost effectiveness in terms of vehicle miles of travel in 2005 divided by remaining, unprogrammed costs to complete

Other evaluation criteria which were qualitatively assessed included:

- Outer Loop completion
- System continuity
- Geographic balance

The resulting revised priorities for the MAG Program, as adopted by the MAG Regional Council on October 24, 1990, are shown in Exhibit 5-2. These priorities form the basis for

EXHIBIT 5-2

PRIORITIES FOR MAG EXCISE TAX AND 15% REVENUES
ADOPTED BY MAG REGIONAL COUNCIL OCTOBER 24, 1990

SECTION	LEVEL I*	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
AGUA FRIA FREEWAY					
Buckeye Rd.-Papago Freeway	C				
Papago Freeway-Northern Ave.	E/R	C			
Northern Ave.-Bell Rd.	C				
Bell Rd.-Black Canyon Freeway	C				
EAST PAPAGO FREEWAY					
Papago Freeway-Hohokam Expressway	C				
Hohokam Expressway-Pima Freeway	C				
ESTRELLA FREEWAY					
Buckeye Road-Papago Freeway	E/R	E/R	E/R	E/R	S
Papago Freeway-Grand Expressway	S				
Grand Expressway-Black Canyon Freeway	E/R	E/R	E/R	E/R	S
GRAND EXPRESSWAY					
McDowell Rd.-Paradise Parkway	E/R	C			
Paradise Parkway-Agua Fria Freeway	E/R	C			
Agua Fria Freeway-Dysart Road	S	E/R	E/R	C	
Dysart Road-Cotton Lane	S	E/R	E/R	C	
HOHOKAM EXPRESSWAY/PARKWAY					
University Drive-McDowell Road	C				
McDowell Road-Thomas Road	E/R	E/R	C		
PARADISE PARKWAY					
Squaw Peak Parkway-Black Canyon Freeway	E/R	C			
Black Canyon Freeway-59th Avenue	E/R	C			
59th Ave.-Agua Fria Freeway	E/R	E/R	C		
PIMA FREEWAY					
Black Canyon Freeway-Squaw Peak Freeway	E/R	C			
Squaw Peak Parkway-Scottsdale Road	E/R	S	E/R	C	
Scottsdale Road-Shea Boulevard	E/R	C			
Shea Boulevard-East Papago Freeway	C				
East Papago Freeway-Superstition Freeway	C				
PRICE PARKWAY					
Superstition Freeway-Santan Freeway	E/R	C*			
RED MOUNTAIN FREEWAY					
Pima Freeway-Country Club Road	E/R	C*			
Country Club Road-Gilbert Road	E/R	C			
Gilbert Road-Bush Highway	E/R	E/R	C		
Bush Highway-Superstition Freeway	E/R	E/R	C		
SANTAN FREEWAY					
Maricopa Freeway-Price Parkway	E/R	C			
Price Parkway-Gilbert Road	E/R	E/R	C		
Gilbert Road-Power Road	E/R	E/R	E/R	C	
Power Road-Superstition Freeway	E/R	E/R	E/R	C	
SKY HARBOR ACCESS FACILITIES					
Sky Harbor Expressway (Sky Harbor-I-10)	E/R	C			
Sky Harbor Boulevard (44th-56th Streets)	C				
SOUTH MOUNTAIN PARKWAY					
Papago Freeway-Baseline Road	E/R	S	E/R	C	
Baseline Road-7th Street	E/R	S	E/R	C	
7th Street-Maricopa Freeway	E/R	S	E/R	C	
SQUAW PEAK PARKWAY (EXTENSION)					
Glendale Avenue-Thunderbird Road	C				
Thunderbird Road-Bell Road	E/R	S	C		
Bell-Road-Pima Freeway	E/R	E/R	C		

E/R Preliminary engineering and right-of-way purchase
C Final construction completed
S Staged construction completed
* The portion of Price Parkway between the Superstition Freeway and Guadalupe Road, as well as the portion of the Red Mountain Freeway between the Pima Freeway and Dobson Road, are included in Level I. Also, staged construction of the Price Freeway between Pacos Road and Galveston Road, as well as staged construction of the Pima Freeway between Bell Road and Scottsdale Road, are included in Level 1.

Source: MAG

subsequent updates of the State's five-year highway construction program relative to the MAG Program.

The introduction of costs effectiveness as a priority-setting criteria is consistent with national practice and demonstrates the recognition by MAG that the MAG Program is resource constrained.

Conclusions

Most changes to the original MAG Program priorities were handled through the annual five-year highway construction program update process. In several instances (Hohokam Extension and Estrella Freeway), significant adjustments to the MAG Program were reviewed by MAGTPO staff who presented the changes to the MAG Management Committee and Regional Council. Regardless of which agency initiated the change (ADOT or MAG), changes were presented to MAG in a written report format and discussed and approved at MAG meetings. Only then were changes made to the priorities and transmitted to ADOT and the Transportation Board. The processes used for the Sky Harbor and Agua Fria Freeway sections were less well documented.

The adjustments made to section priorities reflect the changing conditions of the MAG Program over the past five and half years. The optimism of the early years of the MAG Program resulted in the accelerated programming of construction funds. The changing attitudes of local communities, as the reality of freeway construction became more apparent, resulted in some switching of corridor segments in the five-year program schedules. Finally, the financial pragmatism of more recent years, as program financial resources have become increasingly constrained, has resulted in more significant changes to the MAG Program priority process and ADOT's five-year highway construction program. As a consequence, projects are being deferred later in the schedule, there is more programming of staged or interim projects, and the Department is seeking greater opportunities for cost sharing. This later strategy, as evidenced by the right-of-way donation on the Estrella Freeway corridor and the private-public funding match provided by the City of Chandler and the local private sector to expedite the construction of the Price corridor, is consistent with the frequently used priority-setting criteria which recognizes local public and private funding participation in setting project programming priorities and expediting projects.

Recommendations

MAG should formally recognize the priority-setting criteria: extent of local public and private funding participation, in its priority-setting process for the MAG Program. This criteria should continue to be used by ADOT to expedite projects which might not otherwise receive timely programmed funding, provided they satisfy other important criteria as well.

MAG should expand its priority-setting criteria to include social and community impacts.

MAG should explicitly recognize the sensitive, local concerns of residents whose neighborhoods are affected by the siting and subsequent construction of new freeways. In an urbanized area such as Phoenix, with high levels and density of development, the timing of right-of-way acquisition and construction for a new freeway can have profound effects on the lives of people who live in these neighborhoods. Accounting for these impacts during the priority programming process would enable the MAG Regional Council and State Transportation Board to either accelerate or defer projects with sensitive social and community implications in order to better address these concerns. Inclusion of this criterion would also be consistent with the "social factors" criterion already used by the State Transportation Board when prioritizng projects for the Statewide five-year highway construction program.

MAG should conduct annual public hearings on the status of the MAG Program as well as to discuss the MAG Program priorities, recent adjustments to these priorities, and opportunities for further change. Such meetings would provide timely opportunities to gain public input to the priority programming of MAG Program projects and to increase the public's understanding of how the RARF moneys are being programmed and spent.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.6 What was the basis for the adjustments of original programming decisions? Were modifications made for sound financial or technical reasons? Were justifications of the modifications adequately documented?

Analysis

The responses to the prior question discussed the various adjustments made by ADOT and MAG, collectively, to the priority programming decisions for the MAG Program. These responses also described the bases for these decisions, and the documentation associated with these cases.

Conclusions

In most cases, adjustments to original MAG Program priorities were based on sound financial or technical reasons. In recent years, more substantial changes are reflecting ADOT's and MAG's recognition that the current level of Program funding is constrained and is insufficient to achieve the Program's full objectives by 2005. As financial considerations have become more important, greater efforts are being made to stage or defer projects, or to identify local funding match to expedite projects. In this way, the priority programming process is being used to help address the financial constraints which are restricting the Department's ability to program projects in a more timely fashion.

A review of available documentation concerning priority programming changes revealed excellent and thorough documentation in all but two of the five cases studied (e.g., Sky Harbor Expressway and Agua Fria Freeway). For these two cases, there was little or no documentation found.

Recommendations

ADOT and MAG should maintain a more detailed and consistent set of documentation regarding proposed and actual changes to MAG Program project/section priorities, including all correspondence, meeting notes, memoranda, and studies which describe the basis, source, participants, deliberations, outcome, and rationale for the resulting decisions and actions.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.7 Were appropriate and timely program adjustments made in response to declining revenues?

Background

Throughout the life of the MAG Program, the programming of projects has been administered through the internal priority programming process of ADOT. This process centers on the annual update of the Department's five-year transportation facilities construction program. Separate elements of this program cover highways and airports. Based on guiding policies set by the Transportation Board and proposed by the MAG Regional Council, the Department, through the Priority Planning Committee, formulates a list of design, right-of-way, construction projects for the MAG Program to be funded by RARF and HURF funds. These projects reflect the priorities of the MAG Regional Council and are scheduled over the five-year horizon of the Department's highway construction program.

Early in the MAG Program, the Department was quite aggressive in programming projects for the MAG Program. The FY 1987-91 program had the highest volume of MAG Program projects scheduled for implementation ($1.6 million) of any five-year program developed since then (see Exhibit 5-3 for a listing of MAG Statewide and MAG Program funds budgeting by five-year program since FY 1987). This was prompted by the policy direction of the MAG Regional Council to rapidly proceed with the MAG Program. It was enabled by the aggressive bonding approach suggested by the MAG Regional Council to develop the maximum amount of funds to pay for projects as soon as possible.

Within the first three years of the MAG Program, the Department had implemented a number of management tools to facilitate the priority-programming process relative to the MAG Program. These included completion of a Strategic Planning Model in late 1987 to help the Urban Highways Section schedule and review all MAG Program projects in the Department's five-year program, as well as future unprogrammed project activity. Output from this model was then provided to the Administrative Services Division, to be incorporated into a Cash Flow Forecasting System developed for the MAG Program in 1986. This system enables the Department to determine the optimal sequencing of MAG Program projects based upon the timing and levels of available funds (RARF, HURF, and others). The Cash Flow Forecasting System is very sensitive to the levels of projected revenues.

Since the Department manages the MAG Program on a cash flow basis instead of an obligation basis, and due to strict coverage requirements regarding the payment of debt service principal and interest associated with RARF and HURF bonds issued by the

EXHIBIT 5-3

COMPARISON OF MAG PROGRAM TO STATEWIDE FIVE-YEAR HIGHWAY CONSTRUCTION PROGRAM BUDGETS

(Millions of Dollars)

5-Year Program	Statewide Total	MAG Program	%
1986-1990 (Pre-Proposition 300)	$1,250	$ 123	10%
1987-1991	2,900	1,600	55%
1988-1992	2,940	1,500	51%
1989-1993	2,781	1,300	47%
1990-1994	2,804	1,300	46%
1991-1995	2,445	864	35%
1992-1996	2,148	610	28%

Source: ADOT Five-Year Transportation Facilities Construction Programs

Department for the MAG Program, great emphasis is placed on keeping project costs within the levels which can be supported on a cash flow basis by available revenues.

Since the MAG Program began, the estimates of MAG Program revenues (in current dollars) have declined from a high of $6.5 billion (including both RARF and HURF revenues) in 1985 to the current estimate of $4.7 billion (including RARF, HURF, interest, Federal aid, and other revenues). Each year, the Department's forecasts of RARF revenues, the primary source of funding for the MAG Program, have exceeded actual collections. However, the programming effects of the drop in revenue growth were delayed by the availability of over a billion dollars in RARF and HURF bond proceeds between 1987 and 1991.

While several reports suggested that Program revenues and costs were becoming increasingly imbalanced during the early years of the MAG Program, mixed signals were sent to the public by top management of ADOT regarding the extent or implications of this imbalance. With a public referendum scheduled for February 1989 concerning a further half-cent excise tax increment for public transportation in Maricopa County (VALTRANS Proposition), there was concern within MAG and ADOT regarding the effects on the

output of the VALTRANS referendum of acknowledging too candidly the possible fiscal shortfall facing the MAG Program, particularly since the Program still had 17 or more years left to recover.

Analysis

The five-year program is adjusted each year based on updated estimates of program revenues and project costs. The first major adjustments to the programming of MAG Program projects by ADOT due to the slower than expected growth in RARF revenues were made in 1990 to the FY 1990-94 program already underway. Selected projects, such as the Sky Harbor Expressway, were deferred in order to preserve available revenues for other more pressing requirements.

Having recognized the seriousness of the revenue growth shortfall and being obligated by covenants to maintain payment of bond-related debt service, the Department sharply reduced its FY 1991-95 program for the MAG Program by 34 percent from the prior five-year program (from $1.3 billion to $864 million, as shown in Exhibit 5-3). This was accomplished by deferring numerous projects and staging other projects. With continuing sluggishness in the growth of RARF and even HURF revenues, the Department further cut the size of the MAG Program reflected in the latest FY 1992-96 program down to $610 million. Meanwhile, $740 million in additional MAG Program revenues must be used to pay for debt service associated with RARF and HURF which are outstanding or planned to be issued during this five-year period.

Conclusions

Programming actions to address the accumulating shortfall in MAG Program revenue growth were delayed until 1990 due to the front-loading of funds during the first five years of the Program made possible by the high bonding of RARF and HURF revenues, continued optimistic forecasts of excise tax revenues, and concerns about the impact of MAG Program cutback on the 1989 public referendum concerning the VALTRANS excise tax proposition (which was defeated in February 1989). Once the Total Program revenue picture was better understood and the VALTRANS excise tax proposition removed from the public agenda, the Department took decisive steps to curtail the programming of MAG Program projects, as well as reducing the planned level of future bonding. Projects were deferred in the schedule while others were staged to allow completion of only those portions required during the short-term. To facilitate and guide this adjustment process, the MAG Regional Council revised its MAG Program priorities, whereby the sequencing of project functional activities are laid out without commitment to fixed completion schedules. Through this process, the Department and MAG are now taking appropriate and timely actions to adjust their programming of MAG Program projects relative to changes in Program funding levels. In addition, the Department has established a matching fund program, which sets aside up to $10 million a year for use when matched by an equal

amount of local government and/or private monies. Through this innovative program, ADOT can make programming adjustments to MAG Program projects in response to local offers to augment Program revenues.

The Department's priority programming process is oriented to a maximum five-year time horizon. However, the MAG Program extends to the year 2005 in terms of RARF funding. By limiting its primary focus to the next five-year period, the Department and consequently MAG may be making program adjustments which reflect primarily short-term considerations instead of the full, long-term objectives of the MAG Program.

Recommendations

Both ADOT and MAG should consider the full MAG Program in terms of its revenues, costs, scope, and schedule when developing priority programming decisions and adjustments to be reflected in the annual updates to the Department's five-year highway construction program.

ADOT should continue and expand its matching program for encouraging local government and private sector funding participation in return for expediting project programming, in order to leverage existing RARF and HURF revenues for the MAG Program.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.8 How was the initial allocation of funds among right-of-way acquisition, location and design work, and construction determined? Who was responsible for making the determination?

Background

Prior to the passage of Proposition 300, estimates of the costs for right-of-way acquisition and construction (including preliminary engineering) were developed for each MAG Program corridor, based upon unit costs applied by consulting firms responsible for the development of areawide corridor planning studies in 1984/1985, as well as actual documentation from urban highways built in the early to mid-1980s (I-10, Superstition Freeway, and Squaw Peak Parkway). Shortly after Proposition 300 passed, the newly formed Urban Highways Section developed an internal estimate of the entire MAG Program. This November 1985 estimate indicated the cost in constant 1985 dollars of preliminary engineering, right-of-way acquisition, and construction, broken down by individual corridor. This preliminary estimate was based upon general assumptions regarding the length, number of lanes, type of facility, and grade level for each corridor comprising the MAG Program. It was prepared prior to the conduct of either location or design concept studies for most of the MAG Program corridors.

This preliminary estimate by the Urban Highways Section is summarized in the first column of Exhibit 5-4, which shows the breakdown of the estimate into preliminary engineering, right-of-way acquisition, and construction. These costs are for the entire 20-year MAG Program and they are in constant 1985 dollars. They exclude the Superstition Freeway and two-thirds of the costs of the Grand Avenue corridor, which were to be funded by State transportation funds, and include only right-of-way acquisition costs for the Estrella Freeway. As indicated by Exhibit 5-4, preliminary ADOT estimates suggest two-thirds of the MAG Program costs would be used for construction, with 30 percent consumed by right-of-way acquisition and 4 percent used for location and design.

EXHIBIT 5-4

ORIGINAL AND CURRENT ESTIMATES OF TOTAL MAG PROGRAM COSTS BY FUNCTION
(Millions of Dollars)

EXPENSE CATEGORY	1985 UHS PRELIMINARY ESTIMATE[1] (1985 $)		FY 1986-91 ACTUALS[2] (Current $)		FY 1992 - 2005 ESTIMATE[2] (1991 $)		FY 1986-2005 ESTIMATE[2] (Current and Constant $)	
Preliminary Engineering	$ 123	4%	$ 181	10%	$ 247	4%	$ 428	6%
Right-of-Way Acquisition	$ 906	30%	$ 931	52%	$1,156	22%	$2,087	29%
Construction	$2,005	66%	$ 450	25%	$2,950	55%	$3,400	48%
Subtotal	$3,034	100%	$1,562	87%	$4,353	81%	$5,915	83%
Debt Service and Other (Current $)	N/A	--	$ 241	13%	$ 991	19%	$1,232	17%
Total	$3,004	100%	$1,803	100%	$5,344	100%	$7,147	100%

Sources:

[1] *ADOT Urban Highways Section, November 1985.*
[2] *ADOT Administrative Services Section, August 1991.*

Analysis

During the first five years of the MAG Program (FY 1986-91), a total of about $1.8 billion has been expended for the Program, as shown in the second column of Exhibit 5-4. Of this total, $1.56 billion went for preliminary engineering (10 percent), right-of-way acquisition (52 percent), and construction (25 percent), while $241 million cost for debt service and other related costs (13 percent). The relatively high percentages of total non-finance-related costs of preliminary engineering and right-of-way acquisition reflect the extensive amount of location and design work required to prepare and frequently revise construction plans for the MAG Program, and the escalating costs of right-of-way resulting from additional acreage requirements and significantly higher acquisition costs.

Exhibit 5-4 also displays current estimates of the costs to complete MAG Program corridors as currently located and designed. The $5.3 billion cost-to-complete estimate consists of constant 1991 dollar estimates for preliminary engineering (4 percent), right-of-way acquisition (22 percent), and construction (55 percent), and current dollar estimates for debt service/other costs (19 percent). Overall, over $7.1 billion is expected to be expended to complete the MAG Program as currently conceived. The ultimate allocation of costs for the entire 20-year MAG Program provides 6 percent for preliminary engineering, 29 percent for right-of-way acquisition, 48 percent for construction, and 17 percent for debt service/other. This reflects a somewhat lower allocation to construction than the preliminary 1985 Urban Highways Section estimate, due to the higher costs being spent on debt service, right-of-way acquisition, and preliminary engineering.

Conclusions

The allocation of MAG Program funds to preliminary engineering, right-of-way acquisition, construction, and debt service reflects the policy and priority programming guidance of MAG, which called for expedited construction schedules, consistent with its stated corridor priorities and funded by a high bonding program. To expedite construction schedules meant performing preliminary engineering and right-of-way acquisition as early and rapidly as possible, consistent with funding availability. As a result, relatively higher percentages of MAG Program funds were spent on these functions in the first five years of the Program.

To a large measure, these higher percentage allocations of funds to preliminary engineering and right-of-way acquisition reflect the logical sequence of project development activities, which require location, design, and right-of-way acquisition activities to be performed in sequence prior to the initiation of construction. For the MAG Program, it was decided to perform all location and design concept studies within the first three years of the Program and to begin right-of-way acquisition as soon as these various studies were completed.

In the early years of the Program, preliminary engineering and right-of-way acquisition costs for segments were often programmed together, which allowed such costs to be applied

to each activity as it evolved. In more recent years, design and right-of-way costs are programmed separately in order to better control the use of MAG Program funds relative to their intended allocation.

In the remaining years of the MAG Program, the past percentage allocation of funds for construction is expected to more than double, while right-of-way acquisition is expected to consume a significantly smaller percentage of Program resources. However debt service costs are expected to represent almost 20 percent of the remaining costs to complete the MAG Program.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.9 What were the short and long-term effects of this allocation on individual segments, program costs, and ADOT's ability to complete the highway system as originally planned?

Background

The allocation of MAG Program costs to the various functions of preliminary engineering, right-of-way acquisition, and construction was based on the policy and priority directions of the MAG Regional Council. MAG Regional Council policies established in January of 1986 directed ADOT to follow a high bonding strategy in order to expedite the Program, to complete all location and design concept studies within five years so that needed right-of-way could be protected, and to accelerate the construction schedule on several high priority segments, where possible. These policies and the priorities assigned to individual sections of MAG Program corridors provided the basis for ADOT scheduling of MAG Program projects into the five-year highway construction programs since 1986. These projects generally followed the MAG Regional Council's priorities and their functional nature was determined by the traditional sequencing of location, design, right-of-way acquisition, and construction activities for a highway construction project.

Analysis

In the short-term, the allocation of MAG Program funds by functional activity accomplished the timely completion of location and design concept studies for all corridors comprising the Program. To some extent, the urgency to complete the early studies enabled local interests to obtain commitments for selected corridor or section enhancements in order to gain timely community consensus. The combining of preliminary engineering, right-of-way, and utility costs in the project budgets contained in the Department's five-year programs in the years immediately following the vote on Proposition 300 made it more difficult to monitor and control right-of-way acquisition costs, since cost overages in the right-of-way area could be compensated for by using funds intended for preliminary engineering or utility work. This, and the expanding scale and cost of right-of-way requirements for the MAG Program caused higher levels of Program funding to be used for right-of-way acquisition. During FY 1987, right-of-way acquisition represented 70 percent of MAG Program expenditures, while preliminary engineering and construction each represented about 11 percent.

In more recent years, the allocation of MAG Program funding has gradually shifted, with more money spent on construction and less on right-of-way (with the exception of 1990, when a quarter billion dollar settlement was finalized with the Salt River Pima-Maricopa Indian Community for the acquisition of a ten-mile stretch of right-of-way for the Pima Corridor). In FY 1991, construction represented 45 percent of MAG Program expenditures, while right-of-way acquisition represented 21 percent and preliminary engineering 12

percent. According to ADOT's current five-year program and current estimates of the remaining portions of the MAG Program, this trend is expected to continue, with construction outspending right-of-way acquisition by more than 2 to 1 (see Exhibit 5-4).

The most recent estimates of MAG Program revenues by source suggest that total funding over the 20-year life of the program will be $4.7 billion (in current inflated dollars), including $3.3 billion in RARF monies[1], $1.0 billion in HURF monies, and $0.4 billion in interest income, Federal aid, and other sources. This reveals at least a $2.4 billion funding shortfall for the overall MAG Program. This difference will likely be two to three times this amount when inflationary effects and further project development efforts are added to the estimates of future project costs. With $1.8 billion in MAG Program revenues already spent, only $2.9 billion or 62 percent of the current estimated revenue potential for the Program will be available to pay for the $5.3 billion constant dollar estimate of remaining costs. Thus, the estimated cost to complete the MAG Program is expected to exceed estimated available revenues by at least 83 percent, and this percentage will likely increase unless the Program is significantly curtailed or substantial additional funding sources are developed and tapped.

Conclusions

The allocation of MAG Program revenues by function, corridor, or segment had little to do with the current fiscal outlook for the overall Program. The MAG Program policies and priorities had a significant influence, by committing the Department to a high bonding approach to program financing and accelerated construction schedules for selected Program sections. The major influences on the fiscal outlook of the overall Program were the escalating project costs resulting from scope increases, enhancements, and higher land costs, and the optimistic nature of the original revenue estimates, which raised expectations regarding the amount of funds which could be provided directly by the half-cent excise tax over a twenty-year period.

To some extent, the MAG Program was both a beneficiary and victim of the economic business swings affecting the Maricopa County area over the past decade. The MAG Program was born out of the boom years of the first half of the 1980s, where the optimism of economic expansion fueled community support for the nation's largest urban freeway program, funded largely by local revenues. However, this optimism led to optimistic revenue estimates, which helped justify a larger-sized program. Then when the MAG Program began, the need to expedite construction caused the Department to aggressively pursue the acquisition of right-of-way at the high point in the real estate cycle for Maricopa

[1] Based on preliminary trend forecasts developed in mid-1991 by the Administrative Services Division.

County. However, once real estate prices had significantly dropped, prior expenditures, bonding commitments, and shortfalls in the growth of RARF revenues combined to prevent the Department from being able to aggressively take advantage of the situation. While hindsight would suggest that the Program would have benefitted from deferring advanced acquisitions to later years, there was no way at the time of Program initiation to predict the economic developments of the last five years.

Current efforts to more carefully monitor and control right-of-way acquisitions, to avoid accelerated acquisitions, and to limit advanced acquisitions to demonstrated hardship cases which do not required condemnation will improve the Department's ability to control the allocation of MAG Program funds to the right-of-way acquisition function.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.10 What changes, if any, are necessary in the priority process to ensure the remaining portions of the program are completed as efficiently, effectively, and economically as possible?

Analysis and conclusions

There are essentially three fundamental limitations in the current priority programming process as it is applied by ADOT and MAG to the MAG Program. These are:

- Lack of long-term perspective to guide short-term priority programming decisionmaking
- Inadequate public involvement/notification regarding yearly priority programming deliberations by MAG
- Lack of accountability of the MAG Regional Council for its authority and influence over the MAG Program

The current priority programming process supplied to MAG Program projects reflects the Department's traditional priority programming process, in that it is oriented to the development of a five-year program of projects which is updated on an annual basis. While such a process is adequate for a program which is funded on essentially a perpetual basis and whose scope is solely defined by the ongoing highway development process of ADOT, with input from local communities, it is not adequate for addressing the programming issues associated with a program whose scope is quite large and fairly well defined, and whose funding timeframe is fairly long but limited. With a 20-year timeframe, the MAG Program is subject to having its long-term overall objectives jeopardized by short-term policies or decisions regarding financing, priority setting, and programming. This is why both ADOT and MAG need to explicitly take into consideration the long-range budgeting, resource, and financial implications of priority programming issues, options, and decisions as they effect the MAG Program, on a program-wide as well as a corridor and section basis.

Under the current ADOT priority programming process, formal public involvement is provided through the public hearings held by the State Transportation Board in April of each year to present/discuss the tentative five-year program update. In addition, the MAG Management Committee and Regional Council are provided with several opportunities to review and comment on draft versions of the tentative program as it relates to the MAG Program, in February and again in March, prior to the April public hearings.

Given the visibility, importance, sensitivity, and local nature of the MAG Program, there is a greater need for ADOT and MAG to take a much more pro-active role in alerting and involving the general public in the priority programming process as it relates specifically to

the MAG Program. In particular, the MAG Regional Council needs to provide for active public review of its priority-setting process, as well as the programming decisions which result in the MAG Program projects being included in the State's five-year program. This could take the form of annual public hearing(s) to discuss the status of the overall MAG Program, proposed changes to the MAG Program priority-setting process and results, and changes to the scope and schedule of projects that either have been or are to be programmed. These public hearings could be scheduled following the release of an annual fiscal status report in the full MAG Program, prepared by a MAG Program Fiscal Analysis Unit, which reports to the MAG Regional Council and is independent of ADOT (as described in the recommendations to Question 6.1 of Section 6).

Under the current institutional arrangements, MAG has significant authority with regards to defining the MAG Program and establishing priorities for its projects. In representing the interests of their communities, individual members of the MAG Regional Council can also exert significant influence over project scope, funding, and programming decisions. However, despite this authority and influence, and the significant role it plays in establishing policies and priorities for the MAG Program, MAG is not held accountable for the results of the MAG Program. As evidenced by the focus and scope of this performance audit, ADOT is primarily held accountable for the status, problems, and achievements of the MAG Program.

MAG needs to be recognized for its role in determining and revising the MAG Freeway/Expressway Plan, developing and adjusting section priorities, and helping to guide the priority programming of the MAG Program. The MAG Regional Council should report to the public on the progress and status of the MAG Program. MAG should also take a more active role in advising ADOT regarding significant changes to the financing, scope, and scheduling of MAG Program corridors or the overall Program, particularly those changes which have significant budgetary or policy implications.

Recommendations

ADOT and MAG should take a longer-term view of the MAG Program to ensure that overall budgetary, resource, and financial implications of priority programming issues, options, and decisions are considered at the program, corridor, and section levels.

MAG Regional Council should sponsor annual public hearings on the status of the MAG Program and possible changes to Program priorities, scope, schedule, and financing, following issuance of an annual fiscal status report.

MAG Regional Council should be held accountable for its role in defining the MAG Freeway/Expressway Plan, developing section priorities, and programming/scoping projects. Public accountability can be established through the public hearing process and annual fiscal status report, suggested above.

REVIEW OF PRIORITY PROGRAMMING PROCESS

5.11 Are changes needed in the statutory roles of the MAG Regional Council, ADOT, and the Transportation Board?

Analysis and conclusions

Our review of the priority programming process used for the MAG Program has found that current sections of Title 28 of the Arizona Revised Statutes provide specific, dual responsibilities for both the State Transportation Board and the Maricopa Association of Governments for developing priorities and construction schedules for projects in the MAG Program to be funded using RARF monies. The overlap implied by these statutes provides a reasonable check-and-balance between local (MAG) and State (Transportation Board) authorities in overseeing the implementation of the MAG Program. This helps promote the consideration of both local and State transportation policies, priorities, and standards so as to facilitate continuity and consistency.

While the statutory authorities for priority programming of the MAG Program vested in MAG, the Transportation Board, and ADOT appear to be a reasonable way to ensure consistency and continuity between the MAG Program and the State's overall transportation program, the way in which these authorities are executed is worthy of refinement to make the process more open and accountable to the local public. In particular, the MAG Regional Council has not been pro-active enough in developing and sharing information on the MAG Program with the public. By relying on ADOT and MAGTPO to perform these functions, the MAG Regional Council has become less visible and therefore less accountable to the public for its activities and responsibilities relative to the MAG Program. Without their own independent staff to question and assess the status of the MAG Program and proposed changes to the Program, the MAG Regional Council lacks the capability to develop its own collective judgments regarding how to guide implementation of the Program.

Under the current institutional arrangements, the MAG Regional Council relies heavily on the MAGTPO to develop strategies and select courses of action regarding implementation of the MAG Program. While MAGTPO provides a very useful and necessary set of functions, its primary status as a unit of ADOT's Transportation Planning Division raises questions in the public's mind regarding the objectivity and accountability of this unit. Given these questions and the need for restoring public credibility in the management of the Program and its monitoring, the MAG Regional Council should take a more pro-active role in alerting and involving the public regarding MAG Program status and developments (including both past, programmed, and unprogrammed activities). Through public hearings and annual reporting, the MAG Regional Council can and should become more accountable to the public for the formulation of the MAG Regional Transportation Plan, definition of MAG Program corridor and section priorities, and changes to MAG Program

implementation/financing policies. The MAG Regional Council should also be more involved as a group in resolving significant issues affecting the whole MAG Program and/or selected corridors. In so doing, the Council can help to moderate the number of outside influences on ADOT's administration of the Program by better coordinating the efforts of its member communities as they attempt to pursue their individual interests.

In carrying out its statutory responsibilities for priority programming of the MAG Program, the MAG Regional Council should become a better fiscal watchdog over the MAG Program by monitoring and assessing both the short-term and long-term budgetary implications of Program developments and major changes in overall Program and corridor scope, schedule, revenues, costs, and financing.

ADOT should become a better fiscal manager by developing and producing management information and reports which consistently cover the full scope of the overall MAG Program's fiscal, technical, and temporal characteristics, and using this information to alert appropriate decisionmakers and the public of the status of the Program, the need for change, options to accomplish change, and the implications of these options. Given its technical resources, management systems, and experience with the MAG Program developed over the last five years, ADOT is clearly in the best position of any group in Maricopa County to carry out and administer the implementation functions (preliminary engineering, right-of-way acquisition, and construction) associated with the MAG Program. ADOT should therefore continue to perform these functions.

Recommendations

The Transportation Board and the MAG Regional Council should retain their dual statutory authority over the priority programming of the MAG Program.

The MAG Regional Council should take a stronger role in coordinating the efforts of member communities to influence the MAG Program in order to resolve conflicts, improve consistency, and better control the number and extent of changes/enhancements being requested.

The MAG Regional Council should monitor and assess both the short-term and long-term budgetary implications of MAG Program developments and major changes in scope, schedule, revenues, costs, and financing.

ADOT should retain its statutory authority to carry out and administer the preliminary engineering, right-of-way acquisition, and construction of the MAG Program.

ADOT should expand the focus of its management systems and reports to include the full MAG Program, in terms of revenues, costs, activities, accomplishments, and schedule.

6. REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

This portion of the performance audit addresses questions regarding the adequacy, effectiveness, and appropriateness of management practices applied by ADOT to the MAG Urban Highways Program (Program). Program management practices typically involve the functions of planning, programming, directing, monitoring, and control. For purposes of this performance audit, we respond to inquiries concerning:

- Budgetary controls for the Program and its components
- Management supervision over different functions and phases of the Program
- Policies and standards for controlling design, concept, and scope changes
- Financial management procedures and systems
- Conflict of interest controls for ADOT staff

The following presents the findings, conclusions, and, where appropriate, recommendations resulting from the audit team's assessment of ADOT's program management of the MAG Urban Highways Program.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.1 What budgetary controls were established over individual projects, highway sections, and the program as a whole?

Background

Prior to the passage of Proposition 300, the urban controlled access highway program for Maricopa County represented about $123 million or ten percent out of a $1.25 billion, five-year statewide transportation facilities construction program (FY 1986-1990). With the passage of Proposition 300 on October 8, 1985, the urban controlled access highway program for Maricopa County grew to $1.6 billion or fifty-five percent of the $2.9 billion, five-year statewide transportation facilities construction program for FY 1987-1991. Thus, with the passage of Proposition 300, the MAG urban highways program became the single largest portion of the State's planned five-year highway construction program beginning in FY 1987.

This dramatic increase in program funding and scope caused ADOT to immediately being the process of establishing the resources, organizational units, procedures, processes, systems, and documentation to carry out the intent of Proposition 300. This included establishing an Urban Highways Section within the Highway Development Group of the Highways Division to oversee the development of design plans for the corridors, sections, and projects making up the RARF-funded MAG Urban Highways Program. In addition, the Department decided to utilize outside management consulting firms to oversee the design work of individual design consultants, thereby limiting the size of the ADOT staff required for the Urban Highways Section.

When Proposition 300 was passed, cost estimates for the MAG Program were generally based on areawide corridor planning studies. In only a few instances (e.g., portions of the Outer Loop corridor) did the Department have preliminary engineering plans available in 1985, which defined the location and design concepts for segments comprising the MAG Program. As discussed in Section 4 on Program Costs, the Department did not have a complete set of location and design concept studies for the entire MAG Program until 1989, three and one-half years into the Program. These studies provided the Department with its first set of realistic preliminary estimates for the design, right-of-way acquisition, and construction costs for the entire MAG Program. However, even these estimates were and continue to be subject to further changes as the corridor designs are refined through the efforts of: corridor-based management consultants in preparing general plans for each corridor, and their respective section design teams in preparing the preliminary and final engineering plans.

The revenue basis for Proposition 300, as described in Section 3 on Revenue Forecasts, was a planning estimate predicated upon an extrapolation of historical data concerning excise tax-related activities in Maricopa County. Following passage of Proposition 300, MAG Program revenues were developed using econometric models for RARF and HURF moneys. These models have been periodically reviewed and refined in order to bring their results closer to actual revenue levels, particularly the RARF forecasting model.

Criteria

Proper fiscal management of the MAG Program requires the existence and use of those processes, reports, and systems which enable program managers and decisionmakers to access the budget status of the Program and its component corridors and sections; to assess the implications of revenue, cost, and scope changes; and to control these changes to maintain the financial integrity of the Program over the 20-year life of the Program.

Analysis

ADOT, like other state transportation agencies and highway departments, prioritizes, programs, and manages its State highway construction program through a five-year, statewide, transportation facilities construction program. This five-year program provides a schedule and budget for development and construction of those projects contained in the State Highway System, based on planning and priority-setting input from local/regional agencies, local citizens and businesses, and ADOT staff. The five-year program is revised and updated each year to: account for work completed in the prior year; add a new fifth year; and revise/reprogram projects in the new program based on changing/evolving needs and concerns. The establishment and annual updating of this five-year priority program of transportation facility capital improvements is mandated by State statute (A.R.S. 28-104).

Estimates of project costs (for preliminary engineering, right-of-way acquisition, and construction) contained in the five-year program provide the traditional bases for controlling the Department's highway construction budget. The Department has developed and improved over the years a variety of management reports, approval procedures and forms, and information systems to enable ADOT managers to monitor and control the Statewide highway construction program.

The Department's statewide transportation capital improvement program has been funded primarily by a variety of on-going federal and State funding sources. Most of the funds supporting the Department's highway construction program have traditionally been based on user fee taxes collected at the federal and/or State levels. These funding sources have been reauthorized at increasing levels during the past decade, nationwide. These funds are typically restricted to certain categories of highways. However, they are seldom restricted to a certain project or function until budgeted in the annual five-year program.

The passage of Proposition 300 ushered in a new era for financing State highway projects in Arizona. It enabled the Maricopa County region to institute an additional half cent excise tax over a period of 20 years, whose proceeds could only be used to pay for the design, right-of-way acquisition, and construction of freeways, expressways, and parkways contained in the Maricopa Association of Government's Regional Freeway/Expressway Plan, as well as debt service associated with bonds issued for the Program. Unlike the Department's traditional highway construction program, the MAG Program had a fixed revenue generating time frame. In addition, the Proposition 300 ballot implied that a finite number of centerline miles of freeways/expressways/parkways would be completed within that time frame and revenue estimate.

In setting up the mechanisms to administer the design, right-of-way acquisition, construction, and financing of the MAG Program, the Department resorted to its traditional processes and controls used for its statewide highway construction program. This meant that the MAG Program would be controlled at the project level, for those projects contained in the five-year highway construction program.

During the past five years, the MAG Program has essentially been managed at the project level in terms of budget cost control, through the Department's five-year highway construction program. Since the inception of the MAG Program, the Department has created and improved a variety of management reports, approval procedures and forms, and automated information systems to help ADOT managers control that portion of the MAG Program which is contained in the approved ADOT five-year highway construction program. However, the focus of ADOT's budgetary cost controls on those projects contained in the Department's five-year highway construction program has meant that there have been no budgetary cost controls established at the program, corridor, or section levels for the overall MAG Program. This is a contributing factor in the dramatic increases in program, corridor, and section costs.

By waiting until projects were sufficiently developed to be included in the Department's five-year highway construction program and considering only those project already obligated or included in the five-year program, the Department has lacked the controls to determine when design commitments and escalating project costs were jeopardizing the ability of the MAG Program to be completed within its shrinking budget and fixed time frame constraints. As a result, the Department committed to a significant expansion to the scope of the MAG Program, a variety of system upgrades, and an accelerated right-of-way acquisition program which significantly increased the cost of the MAG Program, particularly in the first three years of the Program. In order to retain local community support, local jurisdictions were allowed to request enhancements during the development of corridor location and design concept studies, without being constrained by what the MAG Program could ultimately afford without further revenue sources.

Despite the absence of budget controls at the program, corridor, or section levels of the MAG Program, there exist rigorous funds management systems, reports, and controls in the offices of the Administrative Services Division, due in part to the requirements associated with the bonding of both RARF (1/2 cent sales tax) and HURF (15 percent funds) moneys. The Administrative Services Division, through its component offices, performs a variety of funds management functions, including financial planning for the five-year program, monitoring the financial status of the five-year program, performing cash management of the program funds, and monitoring and managing bond funds. However, the full MAG Urban Highways Program is considered only in terms of the projected revenue availability from RARF and HURF funds to pay the debt service requirements associated with past and/or projected bond issuances during the existing five-year program.

Conclusions

The lack of budgetary controls at the program level (and at the corridor and section levels following completion of the location and design concept studies) has contributed to the difficulty which both ADOT and MAG have had to manage and control the escalation of MAG Program scope and costs within the constraints of the revenues coming into the Program. As a result of the Department focusing its management attention and budgetary controls on projects contained in succeeding ADOT five-year programs, commitments were made to scope increases in the Program (more lanes, higher proportion of freeways versus expressways, depressed freeways, freeway-to-freeway interchanges, and more interchanges/crossover roads) while revenue levels were increasingly unable to match targeted levels originally projected at the start of the Program. Thus from the start, the Program was permitted to become increasingly budget imbalanced, as estimated cost levels rose and forecasted revenue levels shrank. Further, the high bonding policies of MAG tended to obscure the visibility of the effects of this growing budget dilemma.

The lack of budgetary controls at the program, corridor, and section levels suggests a weakness in the adequacy of program-level oversight and management control. This reflects on both ADOT, which is responsible for administering the design, right-of-way acquisition, construction, and financing of the MAG Program, and MAG, which is responsible for developing and updating the MAG Regional Transportation Plan and setting the priorities to guide the scheduling of MAG Program activities. This weakness resulted in the Department and MAG ultimately committing to a program that could not be funded within the constraints imposed by the original authorizing legislation for Proposition 300. However, this has not impeded ADOT's ability to ensure adequate revenue coverage to satisfy the covenants of outstanding RARF and HURF bonds.

ADOT established project-level budget controls for the MAG Program through the annual update of its five-year highway construction program.

The budget controls at the project level appear to be reasonable and adequate as they apply to the MAG Program. These include a wide variety of reports produced by staffs of the Urban Highways Section and Administrative Services Division: to track project budget, schedule, and scope status; control change order requests/approvals; ensure that adequate revenues are available to fund MAG Program projects contained in the Department's five-year program; and fully support the total debt service obligations associated with all outstanding RARF and HURF bonds.

Recommendations

ADOT should establish budgetary controls at the Program, corridor, and section levels for the MAG Program.

The Department should establish budgetary controls at the program, corridor, and section levels to ensure that MAG Program commitments (design, scope, schedule, and funding) are made consistent with known or expected budget and schedule constraints, and to ensure that the Transportation Board and ADOT are held accountable for carrying out their responsibilities consistent with MAG Program scope requirements and revenue/schedule constraints. To accomplish this, ADOT should review its management systems and reports, and develop suitable adaptations which permit the capturing and reporting of:

- Historic, current (programmed), and future costs of the MAG Program at the program, corridor, and section level by function (design, right-of-way acquisition, construction)
- Historic, current, and forecasted revenues by funding source for the MAG Program
- Variances between original/last year/current year cost estimates for the full 20-year MAG Program at the program, corridor, and section levels by function (design, right-of-way acquisition, construction)
- Variances between original/last year/current year revenue estimates for the full 20-year MAG Program by funding source
- Summary of key scope/feature characteristics of the MAG Program at the program, corridor, and section levels (original, last year, and current).

Management procedures and forms will also be required for reviewing and approving changes to the budgeted cost, funding levels, project scope, or project schedule for the MAG Program, so that the fiscal implications of these changes are understood by managers and decisionmakers in ADOT and MAG.

The MAG Regional Council should take a more pro-active role in monitoring and evaluating the status of the overall MAG Program and providing guidance to ADOT regarding major priority, programming, scope, and financing issues affecting the fiscal integrity of the overall MAG Program at the program and corridor levels.

According to the legislation which authorized Proposition 300, MAG has the authority to develop and revise the regional transportation plan for Maricopa County, to prioritize corridors contained in this plan, and to provide a suggested construction schedule for these corridors. Given these authorities, MAG can exert significant influence over the execution of the MAG Program. To date, MAG has exerted this authority primarily through development of the MAG Regional Freeway/Expressway Plan, development and revision of MAG Program section priorities, formulation of policy directives to ADOT advocating a high bonding approach and accelerated acquisition of right-of-way early in the Program, and more direct involvement in the development of ADOT's five-year transportation construction program annual updates starting in September 1989. However, MAG has done little as a group to ensure the fiscal adequacy of the overall MAG Program. Instead, its individual members have often requested enhancements which have further increased MAG Program costs.

Given the authorities described above, MAG represents the only locally-based organizational unit with a statutory basis for exerting management control over the MAG Program and holding ADOT accountable for their efforts on the Program. However, the MAG Regional Council, as a coalition of local elected officials representing the Maricopa County metropolitan area, needs to be able to act in a cohesive, coordinated fashion to provide fiscally-responsible direction to ADOT in programming and executing the MAG Program, supported by independent and objective inputs and advice.

Establish a MAG Program Fiscal Analysis Unit to advise the MAG Regional Council and report to the public regarding the status of the MAG Program and the fiscal implications of changes to the MAG Program scope, schedule, priorities, costs, and revenues.

To facilitate budgetary control over the MAG Program, the MAG Regional Council should take a more pro-active role in monitoring and assessing the fiscal implications of major policy, priority, programming, scope, and financing decisions regarding the overall MAG Program and its corridors. To do this, we recommend that a one-to-two person MAG Program Fiscal Analysis Unit be established, reporting to the MAG Regional Council. This unit would be responsible for:

- Advising the MAG Regional Council regarding the fiscal, scope, and schedule status of the MAG Program

- Advising the MAG Regional Council regarding the fiscal implications of possible major changes to the MAG Program's scope, schedule, priorities, financing, and costs

- Requesting and directing, as required, outside independent assistance in evaluating revenue forecasts, cost estimates, and management information provided by ADOT for the MAG Program

- Developing periodic analyses which provide the MAG Regional Council with alternative strategies for addressing fiscal problems or funding opportunities relating to the MAG Program

It is not intended for this unit to be involved in the oversight and day-to-day management and administration of the MAG Program, to be duplicating the planning activities of MAGTPO, or to be reviewing or approving design standards or project change orders. The focus of this unit should be on those major policy, programming, financing, and corridor scope issues which have significant fiscal implications at the program and corridor levels of detail.

The proposed MAG Program Fiscal Analysis Unit would rely extensively on MAG Program cost, revenue, financial, and scope information produced by ADOT. Given its experience with the MAG Program over the past five and one-half years, the Department is in a much better position to: estimate the realistic costs to complete the remaining portions of the Program funded by RARF and HURF moneys; estimate the levels of revenues which are likely to be available to fund these corridor and sections, as well as debt service; and adapt various project management reports to provide the information needed to support the fiscal program management function relating to the MAG Program. The proposed MAG Program Fiscal Analysis Unit would analyze and interpret this information and subsequently advise the MAG Regional Council (and MAG Management Committee) regarding the fiscal implications of major scope, schedule, revenue, cost, and/or financing changes on the overall MAG Program budget and possible strategies to address problems or opportunities. This information should be used by MAG decisionmakers to: collectively evaluate the fiscal consequences of major changes to or developments in the MAG Program; help them make more informed decisions regarding possible changes to the Program; and to maintain its budget/fiscal integrity.

While this unit would of necessity rely significantly an ADOT's Urban Highways Section, Rights of Way Section, Construction Section, Transportation Planning Division, and Administrative Services Division for scope, schedule, revenue, cost, and financial data on the MAG Program, its sole reporting relationship to the MAG Regional Council would help to ensure that the MAG Program fiscal analysis and reporting functions are focused solely on the issues affecting the MAG Program, are fully responsive to the needs of the MAG Regional Council, and are independent of ADOT.

The MAG Program Fiscal Analysis Unit should issued an annual status report on the entire MAG Program and conduct subsequent public hearings.

The proposed MAG Program Fiscal Analysis Unit should develop and issue through the MAG Regional Council an annual fiscal report describing the status of the MAG Program relative to original and current objectives and scope. This annual report should track Program accomplishments against plans and schedules, indicating budgeted and actual costs and revenues at the program, corridor, and section levels of detail. The report should also describe proposed actions to address changes in the scope, schedule, costs, revenues, and financing for the MAG Program in order to establish/maintain a budget-balanced program which is consistent with the collective objectives and priorities of the entire MAG region. This report should be issued to the MAG Management Committee and MAG Regional Council for approval, and subsequently released to the Governor's Office, Legislative transportation committees, ADOT/Transportation Board, and the general public. Such an annual reporting of the fiscal condition of the MAG Program will help make the program management function relating to the MAG Program more accountable to the people of Maricopa County, promote public understanding of the information being disseminated regarding the MAG Program, and build public confidence in the way the Program is being administered and managed.

Following release of the annual fiscal report on the MAG Program, the MAG Regional Council should conduct from one or more public hearings on the contents of the report to inform the public regarding the fiscal status of the MAG Program and to solicit their input regarding future developments in the Program. The proposed MAG Program Fiscal Analysis Unit should actively participate in these public hearings.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.2 How were revenue and cost estimates incorporated into the budgetary controls established for the program?

Background

Initial cost estimates for the MAG Urban Highways Program prior to the vote on Proposition 300 were largely based on planning estimates at the corridor level of detail for right-of-way and construction, using average costs per mile. These cost estimates were very preliminary and lacked the specificity to be anything but "ballpark" figures subject to significant change. The revenue estimates prior to the Proposition 300 vote were predicated upon optimistic assumptions regarding the future rate of growth of excise tax revenues after 1985. Both sets of estimates provided the fiscal framework for the MAG Program at its inception in October of 1985.

Once the Program began, ADOT began the continuing process of developing the specific requirements to implement the Program, based on the framework provided by the Proposition 300 referendum. However, in proceeding with its task, ADOT did not establish a revenue constrained budget for the whole Program and made little attempt to control the costs to that budget until this past year.

Analysis

In the early months of the MAG Program following approval of Proposition 300 by Maricopa County residents, the newly-established Urban Highways Section of ADOT's Highway Development Group began to develop an initial estimate of corridor and segment costs for the MAG Program. This initial effort started a multi-year process of more fully defining the nature of the facilities to be built by ADOT using RARF monies. By defining the number of interchanges, the extent of the depressed versus elevated highways, and the number of miles and lanes of freeways versus expressways, the Urban Highways Section generated an initial estimate of total Program costs of $3.0 billion in 1985 dollars. This estimate was developed prior to the Department issuing location and design concept studies for most segments making up the Program.

During the next 3-1/2 year period, ADOT consultants completed location and design studies for the full Program. In this period, significant growth in the Program cost estimates occurred, due primarily to:

- A significant (42 percent) overall increase in traffic volume projected in 1986 for the region, requiring more lanes per segment, more freeways instead of expressways, more

freeway-to-freeway interchanges, and more right-of-way acreage to accommodate the larger freeway facilities

- Escalating right-of-way costs, due to higher land costs; greater acreage required (40 percent increase) due to larger facilities, more interchanges, drainage requirements, and depressed facilities; and consideration of asbestos abatement, relocation, noise abatement, demolition, and Superfund site requirements

- Local community requests for depressed freeway sections, noise barriers, additional interchanges, additional crossroad bridges, expanded access facilities, landscaping, and modular signing

These cost increases were anticipated as early as 1986 by staffs of both the Urban Highway Section and MAGTPO. In June 26, 1986, MAGTPO staff noted the following in an internal office memo (MAG Freeway/Expressway Corridors: Status and Issues, page 6):

> "Costs are escalating. In general, costs are a function of design guidelines. Two special topics which have escalated costs are: (1) More complex freeway-to-freeway interchanges, and (2) higher level expressways.
>
> Local jurisdiction demands for access and half-mile crossings could unduly escalate costs.
>
> ADOT may need to become more flexible on the basic eight-lane ultimate profile. More capacity is needed in some central locations while outlying locations may be overbuilt."

In addition, ADOT's corridor management consultants were well aware of the escalating costs of the MAG Program. In March of 1988, DeLeuw Cather and Company, Outer Loop Management Consultant to ADOT, prepared a report summarizing the *Construction Cost Estimates for MAG Freeway/Expressway Corridors - Mid 1985 to March 1988*. This report showed that the design and construction costs associated with the Program had jumped by over 56 percent during the two years, 1986 and 1987. For selected corridors, the increases were even more dramatic, as shown below:

- Outer Loop (Agua Fria and Pima) - 112% increase

- East Papago - 72% increase

- Hokokam - 79% increase

- Price - 190% increase

After the April 1987 ADOT Quarterly Status Report on the MAG Freeway/Expressway System, there was no mention in subsequent Quarterly Status Reports of the overall costs of the program or the corridor level costs until January of 1990, when it was reported that the total Program costs had risen to $6.1 billion (in 1989 dollars), while revenues from both HURF and RARF monies would total only $3.2 billion (in 1989 dollars). This January 1990 Quarterly Status Report for the first time indicated that the Program was in major fiscal trouble and that even the current five-year program (1990-1994) was overprogrammed.

In February 1987, the Administrative Services Division released its first financial briefing report on the MAG Program, focusing on the HURF and recently initiated RARF bonding programs. In this report, it was acknowledged that Program expenditures were exceeding levels anticipated the prior year, due to:

- "Cost increases related to design"
- "Higher R/W [right-of-way] acquisition levels"

Starting in 1986, the Administrative Services Division began tracking and projecting both RARF and HURF revenues attributable to the MAG Program. However, the annual financial briefings to the State Transportation Board focused on the current and prior fiscal year's performance by revenue fund and cash flow forecasting for each of the five years of the upcoming five-year highway construction program, not the fiscal condition of the full 20-year program relative to expected revenues and costs.

During the period of fiscal years 1987 through 1991, ADOT has incorporated revenue and cost estimates for the MAG Program through the annual five-year highway construction program update process. Project cost estimates are first entered into a strategic planning model by the Urban Highways Section, which properly sequences the project phases. This information is then sent to the Administrative Services Division. Using a cash flow model first developed by the Administrative Services Division in 1986, the costs of projects proposed for the five-year program are compared to the available revenue anticipated from RARF, HURF, bonds, and other sources (interest income, Federal-aid, third-party contributions). Project cost estimates are much more realistic once they get to the stage of being included in a five-year program, particularly initial year projects. Program revenues include projections of available revenues in each year of the five-year program, including fund revenues, other revenues, bond proceeds, cash carryover, and debt service. Changes to project costs and program revenues are typically accounted for in the annual preparation of the next five-year program.

Since 1988, the Department has required that highway construction program spending be limited to the levels defined by the latest five-year highway construction program.

In addition, MAG Program revenues are constantly being monitored to ensure adequate bond coverage is maintained to comply with the covenants associated with all outstanding RARF and HURF bonds applicable to the MAG Program, and to allow the Department to manage the financial requirements of the MAG Program on a cash flow basis, instead of an encumbrance basis.

During the past year, the significant reduction in the anticipated growth of RARF revenues, coupled with earlier increases in Program costs, has caused the Department and MAG to adjust both its bonding plans and five-year programs by deferring and reducing the size of bond issuances and project commitments. The Department is implementing other strategies to address the fiscal problems confronting the Program, such as:

- Staging the construction of selected facilities to permit the construction of lower cost, interim facilities at an earlier time frame than would otherwise be possible due to funding constraints

- Entering into cost-sharing agreements with local communities and private groups which offer to match ADOT funds to expedite the implementation of projects which might not otherwise be funded or constructed

- Deferring the acquisition of right-of-way to a time frame closer to the start of construction and avoiding advanced acquisition in cases likely to require condemnation, except for hardship cases

- Performing value engineering analyses of project plans at the 30 percent stage of completion to identify more cost effective alternative approaches to complex, costly design elements (started in 1989)

- Allowing right-of-way acquisition costs to influence facility location decisions if suitable alternative alignments can significantly lower right-of-way costs

Project cost changes resulting from these efforts, coupled with changes caused by design or construction change orders, completed design plans, and right-of-way acquisition/condemnation agreements/decisions are incorporated into the Department's project-based cost accounting system, TRACS, which records all ADOT active and completed project costs by corridor, section, and function. TRACS-based reports show the budgeted costs, as established by the five-year program, the actual costs which are incurred as the projects are advanced to completion, and the variance between budgeted and actual costs. The TRACS reports are issued monthly by the Administrative Services Division. Most of the MAG Program-related input to TRACS is provided by the Urban Highways Section. In addition, the Administrative Services Division produces a variety of reports

which track the budget status/variance of projects contained in the five-year program. These are discussed in response to the next audit question.

Conclusions

Over the past five and one-half years, the Department's estimates of MAG Program revenues and costs have become increasingly detailed and accurate, as they relate to the succeeding five-year highway construction programs. Project cost estimates have become more realistic and accurate as the details of the location, design concept, and construction plans have been developed and approved. Completing the location and design concept studies for the entire MAG Program of freeway corridors was a significant step towards arriving at a realistic overall estimate for building the RARF-funded system. Developing general plans for several of the MAG Program corridors and completing final design plans for certain of the MAG Program segments has further improved the completeness and accuracy of project/Program cost estimates. Bi-annual updates of right-of-way cost estimates focusing on parcels associated with the five-year highway construction program, has provided increasing accuracy in the budget estimates for MAG Program right-of-way acquisition.

Revised revenue and cost estimates have been incorporated in the Department's succeeding five-year highway construction programs. The absence of a program-level budget comprised of corridor and section cost estimates and constrained by estimated levels of available funding by source (RARF, HURF, Federal aid, and third party contributions) has made it more difficult to alert MAG Program policy and program decisionmakers (MAG Regional Council and State Transportation Board) regarding the:

- Fiscal status of the overall Program
- Fiscal implications of project design changes and Program bonding actions
- Capability of the Program's various funding sources to pay for the full Program designs as currently planned, within the time frame remaining in the Program as authorized by statute and public referendum

Recommendations

The Department should develop an overall program budget for the MAG Program, incorporate cost and revenue changes as they become apparent, and use the budget to control the Program scope, schedule, and financing.

The Department should develop a budget for the overall MAG program and incorporate revenue and cost changes as they occur. The MAG Program-level budget should be

comprised of the corridor and section level costs by major category (design, right-of-way acquisition, construction, and debt service) and the revenues by major sources (RARF, HURF, bond proceeds, Federal aid, and third-party contributions). This Program-level budget should be updated annually, as the fund projections and five-year highway construction programs are updated. During the year, design and construction change orders should be evaluated in terms of their effects on the budget. In addition, significant project scope and revenue estimate changes need to be evaluated in terms of their budget implications. Information concerning major changes at the program and corridor levels needs to be used by the proposed MAG Program Fiscal Analysis Unit to supply MAG decisionmakers with fiscal information and analyses to allow them to make necessary policy, budgetary, and programming decisions to ensure the Program achieves its objectives to the maximum extent possible, that is both equitable and cost-effective (as suggested in Question 6.1).

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.3 What monitoring of budget variances (budget versus actual) occurred for individual projects, highway sections, and the program as a whole?

Analysis

In the early years of the MAG Program, budget variance monitoring was limited since there was almost no reliable cost information for the MAG Program corridors, sections, or projects. As a result, significant increases in Program costs were committed to for the design, right-of-way acquisition, and construction of the MAG Program corridors and sections. In addition, early in the MAG Program, ADOT approved design change orders for extra work already performed or started. This practice, known as Equitable Adjustment Change Orders, was halted in 1989 through an administrative memorandum from the Highway Development Group Engineer. Budget variance monitoring for the MAG Program also began in 1989, as the MAG Program cost estimates began to outstrip anticipated revenues.

Because ADOT establishes MAG Program budgets at the project level of detail for those projects included in the Department's five-year highway construction programs, its Program budget monitoring is focused on those projects contained in the existing five-year program, plus those projects already completed or on-going from prior five-year programs. The monitoring process consists of monthly updating and reporting of actual project costs, organized and reported by project, section, and corridor. These actual costs are compared to authorized budget amounts per project, section, and corridor.

Actual MAG Program costs are reported to the Administrative Services Division's TRACS project cost accounting system through the Urban Highways Section on a monthly basis, including design, right-of-way acquisition, and construction.

Several reports are prepared by the Administrative Services Division to monitor the budget status of MAG Program projects and the ADOT five-year highway construction program. These include the following:

- *Preliminary Engineering Financial Analysis Report.* Presents monthly report of preliminary engineering budget items by funding source, updated by the addition of new agreements and change orders, and showing variances relative to approved budget amounts.

- *Quarterly Status of Funds Report.* Shows funds obligated to date and original programmed amount by route system and source.

- *Monthly Status and Projection of Highway Construction Funds.* Shows construction funds obligated, estimated funds to be obligated, and estimated funds not obligated by category of funds.

- *Monthly Status of Construction Projects Awarded.* Shows construction projects awarded versus programmed funds by project.

- *Balance of Funds Report.* Presents monthly report of comparison of project costs versus programmed funding by source at time of contract bid, award, completion, and closure; updated weekly.

- *Completed Project Status Report.* Compares project costs, once completed, to original programmed amount and shows variance by funding source; updated weekly and issued as required.

- *Engineering Consultant Controls Report.* Presents monthly comparison of engineering consultant contract programmed amounts to new agreements and change orders, grouped by project type (federal, State, MAG, PIMA).

- *MAG Corridor Report.* Shows annual obligations versus expenditures by project phase for each MAG Program corridor, indicating year to date amounts for the Program since its inception and for the current year.

- *Status of MAG Projects Variance Report.* Presents yearly comparison of obligated funds versus programmed funds by MAG project, indicating variance; updated weekly.

- *Five-Year Program Variance Report.* Shows funding available for programmed projects by category of cost and fund source, indicating variance between construction project estimates and programmed amounts for projects contained in the five-year highway construction program.

- *CE Cost Inventory Report.* Provides project-specific information regarding approved construction engineering cost goals, projected construction engineering costs, a comparison of projected costs with those from a historical data base of statewide projects and project progress.

- *Statewide Construction Projects.* Lists the projected construction engineering costs, the value of all change order, force accounts, and fiscal variances for each construction contract. In addition, it provides the original value of the contract as it was awarded, what the budget is for the project, and indication of the variance between the budget and the current value of the project.

- *Construction Contract Distribution.* Provides information regarding the value of contractor payments, total engineering costs, and a running percentage of construction engineering costs. This is presented by engineering district and by month.

Through these reports, managers in the Highways Division and Administrative Services Division monitor and report on budget variances at the project, corridor, and program levels, for projects included in prior or current ADOT five-year highway construction programs.

ADOT issues a quarterly status report (usually issued two to three times a year) on the MAG Program, which indicates the physical and financial status of the MAG Program relative to the current five-year program. In addition, the Department issues an annual report to the legislative which describes the accomplishments of the Department relative to projects contained in the five-year plan, including a specific section on the Maricopa County urban controlled access highways.

In addition to reports, a variety of monthly meetings are held to discuss the status of the MAG Program, including:

- Priority Programming Committee
- MAG Regional Council
- MAG Management Committee
- ADOT Highway Division Project Management Meeting
- MAGTPO/Urban Highway Section Progress Meeting
- Corridor Management Consultant Progress Briefing

In addition to ADOT staff, corridor management consultants regularly monitor the budgets of project design contracts under their responsibility and issue detailed monthly progress reports which describe the status, accomplishments, and problems encountered by the management consultant and their respective section design teams.

The Right-of-Way Section generates a monthly right-of-way transaction report, which lists expenditures by parcel.

Conclusions

ADOT has developed over the past decade a wide variety of project budget monitoring reports that are used to indicate the nature and level of variances between programmed and actual project costs. Many of these budget monitoring reports have been developed during the past several years, as the Department has sought more timely and useful information to help Program managers keep track of actual project costs versus programmed project costs. This has been a gradual, evolutionary process whereby refinements and additions are continually being made to the budget monitoring tools of the Department. These tools provide an increasingly effective mechanism for alerting MAG Program managers at ADOT of the status and relative changes to one-year and five-year budgeted costs at the project, corridor, and program levels.

Currently, many of the Department's budget monitoring tools focus on the design and construction categories of project costs in order to provide management information which is functionally oriented for use by ADOT's design and construction managers. All of these tools deal entirely with historical and programmed costs which do not go beyond the current five-year highway construction program. As such, they reflect the extent of ADOT's budget controls, which are limited to projects contained in the latest five-year program, plus all completed projects.

Recommendations

ADOT should expand the scope of its budget monitoring reports to include the entire MAG Program, for use by senior decisionmakers at ADOT and MAG.

ADOT should continue its efforts to refine and improve its budget monitoring reports to ensure their adequacy, timeliness, accuracy, and appropriateness for use by MAG Program managers. These reports should be expanded to reflect the full MAG Program, so that budget variances can be assessed relative to the overall MAG Program. The distribution of these reports shall include relevant MAG Program managers in the Urban Highways Section, Administrative Services Division, the proposed MAG Program Fiscal Analysis Unit, and senior management of ADOT, as appropriate. In addition, the proposed MAG Program Fiscal Analysis Unit should develop and publish an annual fiscal report on the schedule and fiscal status of the overall MAG Program relative to the RARF funds, which includes a discussion of budget variances affecting the overall MAG Program and its fiscal integrity (as suggested in Question 6.1).

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.4 Were appropriate approvals obtained for budget variances, and were appropriate adjustments made to project, section, and overall program budgets?

Analysis

In the early years of the MAG Program, there was little control exerted over the costs of the Program activities since there were no real program, corridor, or section budgets to begin with and the Department and MAG wanted to demonstrate as much progress as soon as possible. This pressure to produce tangible results in the first several years of the MAG Program resulted in location and design concept studies significantly exceeding their initial scopes and schedules due to frequent enhancements and design changes, and right-of-way acquisitions far exceeding expected costs. The lack of initial budgets for the MAG Program, combined with limited internal controls over changes to Program scope, cost, and schedule, allowed the Program to escalate far beyond its revenue potential in the first three years following passage of Proposition 300.

During the last two years, the Department has been developing and tightening its internal controls over changes to MAG Program project budgets contained in the Department's five-year highway construction program. With the completion of corridor location and design concept studies and several corridor general plans and section final designs, the Department has better estimates of the cost of the MAG Program at the program, corridor, section, and project level. The Department is currently using this information to develop project, section, and corridor budgets for MAG Program activities contained in the five-year program. With the five-year program budgets as a basis, the Department has instituted the following controls over budget variances:

- Significant increases to the budgeted amounts in the five-year program, at the corridor level of detail, must be reviewed by the Priority Planning Committee and subsequently approved by the State Transportation Board.

- Design and construction contract change orders must be approved prior to the work being done, with higher levels of authorization required for higher cost changes.

- Right-of-way acquisition activity is now allocated funding on a quarterly basis, with Urban Highways Section authorization needed to begin the parcel acquisition process.

- ADOT's five-year program includes contingency amounts to account for possible design or construction change orders.

- Significant documentation exists to describe the budget and change order review and approval process, consisting of training manuals, memoranda, directives, approval forms, standard correspondence and transmittal letters, standard specifications, and management reports.

- Extensive coordination and communication is fostered among groups within ADOT and its consultants regarding proposed design or construction change orders.

Changes in the cost of programmed, budgeted projects require review and approval by a hierarchy of ADOT managers with increasing authority, depending on the extent and relative size of the proposed cost change. ADOT's change order approval process for design consultant contracts is administered by the Engineering Consultant Services Section and documented by internal administrative memoranda and the procedural manual *Project Leader's Manual for Post-Award Process* (January 1990). For change orders relating to a design contract, the following individuals must approve the request prior to its authorization:

Value of Design Change Order	Signature Required
■ $50,000 or less	Urban Highway Section Engineer
■ $50,001 to $500,000	Highway Development Group - Deputy State Engineer
■ More than $500,000	State Engineer

For change orders relating to a construction contract, the following individuals must approve the request:

Value of Construction Change Order	Signature Required
■ Less than $15,000, no change in specification, design, or unit prices	Resident Engineer
■ $15,000 to $50,000	District Engineer
■ $50,001 to $200,000	Construction Section Engineer
■ $200,001 to $500,000	Highway Operations Group - Deputy State Engineer
■ More than $500,000	State Engineer

The review of design and construction change orders for MAG Program projects involves the relevant corridor engineering teams in the Urban Highways Section, as well as representatives of the corridor management consultant (as applicable) and other functional units within ADOT likely to be affected by the proposed changes (structures, traffic, hydrology, etc.). Change orders are also circulated through the Office of Resource Management in the Administrative Services Division, to ensure that adequate Program funds are available to cover the pending change order. Approved change orders are subsequently entered into the TRACS system as they become actual costs.

Significant changes to MAG Program project costs, schedules, or limits are reviewed on a weekly basis by the Project Development Committee, and the Priority Planning Committee on a monthly basis. Often project cost increases affecting one section of a corridor are balanced against possible surpluses in other sections of the same corridor's budget. When cost increases result in costs of programmed projects being exceeded by more than ten percent or $100,000, or the need for a significant reallocation of budgeted funds between projects and corridors, the Priority Planning Committee must be consulted to justify the increase and the State Transportation Board's approval must be subsequently obtained.

The absence of program-level budgets for the overall MAG Program has made it very difficult for ADOT or MAG to make adjustments to project, section, or program budgets, except as they relate to projects contained in the five-year program and the cash flow revenue stream projected for this program. Therefore, adjustments to the MAG Program are based on short-term considerations and constraints. During the last two years, the Department recognized that the overall MAG Program is overprogrammed and underfunded. Due largely to the fiscal discipline imposed on the Department by the covenants associated with RARF and HURF bonds issued by the Department for the MAG Program, ADOT has begun to trim down its programming of MAG Program projects by staging or deferring projects. Exhibit 6-1 shows the decline in the size of the MAG Program as budgeted in the Department's five-year highway construction programs since 1986. These figures reflect a declining level of budgeted bond proceeds in succeeding programs, and project deferrals starting in FY 1990. These adjustments have been reviewed and approved by both the State Transportation Board and MAG Regional Council through the annual five-year program update process. These adjustments are appropriate, given the constraints imposed by the RARF and HURF bond covenants and the need to maintain a positive cash flow. However, they lack an overall MAG Program budget context to help guide ADOT and MAG decisionmakers.

Conclusions

During the early years of the MAG Program, the Department lacked adequate internal controls over changes in MAG Program costs. This contributed to the escalation of Program costs in the first three years of the MAG Program. During the last two years, the

EXHIBIT 6-1

COMPARISON OF MAG PROGRAM TO STATEWIDE FIVE-YEAR HIGHWAY CONSTRUCTION PROGRAM BUDGETS

(Millions of Dollars)

5-Year Program	Statewide Total	MAG Program	%
1986-1990 (Pre-Proposition 300)	$1,250	$ 123	10%
1987-1991	2,900	1,600	55%
1988-1992	2,940	1,500	51%
1989-1993	2,781	1,300	47%
1990-1994	2,804	1,300	46%
1991-1995	2,445	864	35%
1992-1996	2,148	610	28%

Source: ADOT Five-Year Transportation Facilities Construction Programs

Department has instituted a wide variety of procedures, directives, forms, and reporting systems designed to control changes to the MAG Program project budgets contained in the Department's five-year program. They also provide effective controls to ensure the Department complies with the covenants associated with outstanding RARF and HURF bonds. However, the absence of overall Program budgets at the program, corridor, and section levels of detail preclude proper monitoring and control of program, corridor, or project changes which related to those portions of the MAG Program beyond the latest five-year program.

Recommendations

ADOT should develop overall MAG Program budgets at the program, corridor, and section levels of detail and develop internal controls to ensure monitoring and management control by ADOT and MAG decisionmakers over changes which would affect the overall MAG Program scope, schedule or fiscal integrity.

This recommendation can be implemented through adoption of those recommendations contained in the prior two question responses.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.5 Who had responsibility for overseeing the day-to-day management of the program, including the monitoring of budgets and costs? Were these individuals adequately supported by management information systems?

Background

When Proposition 300 passed, ADOT was still largely a rural highway department, with a number of urban controlled access freeway projects in Maricopa County funded by federal interstate monies (e.g., Superstation Freeway and portions of the Outer Loop). With the approval of Proposition 300, the Department established the Urban Highways Section within the Highway Development Group to oversee the pre-construction development of plans for the MAG Program. The Department also decided to limit the size of this new unit by hiring management consulting firms to oversee design consulting firms preparing plans for sections of the corridors making up the MAG Program.

When the MAG Program began, the Department lacked most of the current management information systems now being used to track, program, budget, and monitor the MAG Program projects in the five-year program. Most of these systems and reports have been instituted during the past two to three years.

Analysis

Since the initiation of the MAG Program, responsibility for overseeing the day-to-day management of the program has been held by: the Urban Highways Section, for most pre-construction functions involving the development of construction project plans; the Right-of-Way Section, for the acquisition of right-of-way needed for the Program; the Administrative Services Division, for performing funds management, financing, cash flow budgeting and review, and financial management and reporting; and the Construction Division, for construction of the MAG Program projects. In addition, top management of the Department has varying levels of involvement in the day-to-day management of the MAG Program.

The Urban Highways Section is responsible for overseeing the work of corridor management consultants, ensuring that location and design concept studies are adequately prepared, reviewing requests for change orders and acting on those under $50,000, interacting with other ADOT units involved in the MAG Program development process, and interacting with outside groups impacted by MAG Program projects. The Urban Highways Section includes two units devoted to the MAG Program, each of which consists of two to three corridor teams comprising the full MAG Program. These corridor teams, each headed by a corridor engineer, carry out the day-to-day activities of the Urban Highways Section in

directing the work of the corridor management consultants and participating in various internal and external coordination meetings. The Urban Highways Section includes a Technical Support Services unit which monitors the MAG Program and maintains an overall program-wide cost estimate for the MAG Program. The Urban Highways Section also provides post-design support to the Construction Section, once MAG Program projects are advertised for construction bid.

The Urban Highways Section is supported by a Strategic Planning Model (developed by one of the corridor management consultants for ADOT in 1988), which allows the Section to schedule project activity by function, so that the program is reasonably balanced and the functions are reasonably phased. The Section also receives a number of TRACS-based reports from the Administrative Services Division regarding project financial status and variance, change orders, consultant contract status and variance, cash flow, and completed project status. In addition, the Urban Highways Section receives monthly, automated corridor-based project progress activity reports, generated by each corridor management consultant using the TRANSPORT 1 project management information system.

The Right-of-Way Section, until this year, was fairly autonomous in its responsibility to manage the day-to-day acquisition of rights-of-way for the MAG Program. However, concerns over the significant cost increases incurred by the Right-of-Way Section in acquiring property for the MAG Program during the early years of the Program and the Section's difficulty in managing right-of-way activities within the budget limits and corridor priorities set by the Department's five-year program, the head of the Highway Development Group authorized the Urban Highways Section to act in an oversight capacity relative to MAG Program right-of-way acquisitions.

As a result of this, Urban Highways Section authorization is required prior to the initiation of parcel acquisition by the Right-of-Way Section. Condemnation cases sent to the Attorney General's Office must also be channelled through the Urban Highways Section, which maintains a condemnation case data base and issues a monthly report on condemnation case activity. In addition, a condemnation support team was established to be administered by the Urban Highways Section. Another change has been the allocation of funds for right-of-way acquisition on a quarterly basis by the Administrative Services Division, to reduce the potential for right-of-way expenditures jeopardizing the five-year program budget. These various internal controls placed on the Right-of-Way Section reflects the Department's concerns over past spending in this area, the volatility and magnitude of costs associated with right-of-way purchases for the MAG Program, and the Department's ability to manage the right-of-way acquisition costs within the broader framework of program development. These changes also reflect the fact that over the past decade, the proportion of highway project costs associated with right-of-way have dramatically increased. As a result, it may be more cost-effective to alter the alignment or project plans than to seek condemnation of property.

The Right-of-Way Section issues the following monthly management reports:

- Right-of-way parcel status report - automated report indicating the status of all active or just completed parcel acquisitions
- Right-of-way transaction report - automated report on number and cost of completed parcel acquisition transactions
- Personnel resource management system report - automated report on person-hours applied to right-of-way acquisition activities
- Monthly scheduling and status report (Plans Services)

Right-of-Way Section staff rely primarily on manual files to document their day-to-day activities and records. While the right-of-way parcel status report provides useful management information to the Department or the status of right-of-way acquisition activities, the information is not as timely as it could or should be. This information should be updated on a more frequent and timely basis.

The Administrative Services Division has several organizational units which support the MAG Program management function. The Office of Resource Administration in the Finance Group performs cash/bond management functions, financial forecasting and reporting of financial status, and project budget analysis relative to the five-year program. The Office of Fiscal Planning runs the RARF and HURF revenue forecasting models for the MAG Program. The Administrative Services Division provides a wide variety of automated reports to support management of the MAG Program, including:

- Construction project status reports
- Financial reports, covering cash flow and year-to-date comparison
- Financial forecasts for five-year program
- Project cost trend reports
- Status of scheduled reports
- Status of MAG projects variance report
- Status and projection of highway construction funds
- Completed project status report

- Daily investment report
- Fund balance report
- Annual reports of forecasts of MAG funds
- Debt service schedules by bond issue
- MAG corridor report of obligations and expenditures by phase
- Preliminary engineering financial analysis and variance

Many of these reports have been developed or significantly improved in the last several years to better serve ADOT managers responsible for such programs as the MAG Program.

The Construction Section, through its district field staff, oversees the construction of MAG Program projects. This activity is supported by the Urban Highways Section and the appropriate corridor management consultant/section design consultant, who provide post-design consultation regarding design-sensitive issues that arise during the construction process.

During the initial formative years of the MAG Program, it was reported to the audit team that top management of the Department became quite active in the day-to-day management of the program, as the Department sought to retain local community support for the Program through accommodation of local requests for enhancements. However, as the perceived availability of funding has shrunk in recent years, the level of direct involvement by top management in the day-to-day activities of the Program has subsided.

Conclusions

In the early years of the MAG Program, day-to-day management responsibilities were shared by the Urban Highways, Right-of-Way, and Construction sections; Administrative Services Division; Transportation Planning; and top management of the Department. The involvement of top management was significant, particularly in the resolution of issues affecting local jurisdiction requests or concerns during the initial formative years of the MAG Program.

During the first three years of the MAG Program, the Department lacked many of the management information systems or reports needed to facilitate program management. Since 1988, a number of such systems and reports have been developed to aid program and project managers. This is an evolving process which needs to be continued to ensure that

MAG Program managers get timely, accurate, and useful information to effectively manage the Program.

The current allocation of responsibilities among the ADOT units managing the MAG Program appears reasonable. The major weakness affecting those units responsible for the day-to-day management of the MAG Program is the lack of a program-wide budget and supporting management reports, which could be used by MAG Program managers to better control Program/project scope and schedule changes given funding constraints/opportunities.

Currently, the Urban Highways Section has the primary responsibility for managing the day-to-day preconstruction activities associated with the MAG Program relating to project development. The Urban Highways Section and Right-of-Way Section manage the right-of-way acquisition for the MAG Program, in part through the actions of the condemnation support team. The Administrative Services Division's Office of Resources Administration and Office of Fiscal Planning are responsible for the day-to-day financial management of the MAG Program relating to revenue forecasting, cash management, bond financing, and five-year program budgeting and reporting. The Construction Section oversees the construction phase of the MAG Program. These groups are served by a variety of management information system and reports, which focus on the latest five-year highway construction program and historical project activity/obligations. In addition, management oversight is provided by the Deputy State Engineers for Development and Construction, the State Engineer, and the Director of the Transportation Planning Division.

Recent changes that provide greater internal control by the Urban Highways Section over the activities of the Right-of-Way Section relating to MAG Program projects should improve the Department's ability to keep MAG Program costs for right-of-way acquisition in line with budget allowances and facilitate dialogue between these two units regarding innovative ways to limit costs associated with condemnation cases.

Recommendations

Modify/expand information systems and reports to allow for inclusion of MAG Program elements which are beyond the latest five-year program, based on the development and updating of an overall MAG Program budget.

Expand the right-of-way management information reports to permit the tracking of parcel acquisition status and acquisition cost variance relative to appraised value for all parcels identified for the MAG Program, including concluded, in progress, programmed, and remaining parcels.

Review all management information reports pertaining to the MAG Program and revise their structure/format consistent with the needs of their primary users. Review

the distribution lists for these reports and revise consistent with the current assignment of MAG Program responsibilities.

Consider including the Urban Highways Section Engineer in the Department's Executive Information System, in particular, for that portion pertaining to urban controlled access highways (such as the MAG Program).

The Urban Highways Section should review its Strategic Planning Model data base for the MAG Program to ensure that corridor section limits are consistent with those used by the corridor management consultants.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.6 What level of staff within ADOT was responsible for supervising design and negotiating with local communities? Did these staff have authority and control appropriate to their responsibilities?

Background

When the MAG Program began in late 1985, ADOT recognized the need to establish a specialized unit within the Highway Development Group to be responsible for coordinating the location and design of urban highways. Having already been involved in the development of urban freeway projects in the Maricopa County area for several years (I-10 and Superstition freeways), the Department understood the need to have a specific organizational unit which could focus on urban controlled access highway project development. It was felt that such a unit would be able to develop the experience and expertise to deal with urban highway-related issues and requirements, which differ from those in the more rural parts of the State.

Shortly after passage of Proposition 300, the Department established the Urban Highways Section in the Highway Development Group. This unit began with a handful of staff, many of which had been involved in the location and design work associated with on-going urban freeway projects in Maricopa County.

Analysis

The Urban Highways Section currently has a maximum staff complement of 40 persons, including administrative, technical, and clerical staff. The primary responsibilities of the Section include:

- Coordinating the location and design of urban freeways on the State Highway System, including the MAG Program highways
- Reviewing and overseeing management consultants who manage the work of consulting engineering firms preparing construction plans for MAG corridor sections
- Providing information on the design and construction progress of urban freeways
- Providing technical engineering expertise to support the project development process for urban freeways
- Coordinating project development activities for urban freeways with local governments, utility companies, federal and State agencies, and other units of ADOT

- Providing input to the ADOT five-year construction program development process

Within the Section are two MAG Program service units, each headed by an Assistant Urban Highway Engineer and having from two to three corridor teams (as shown in Exhibit 6-2). Each corridor team consists of a corridor engineer, and from two to three technical staff. Each corridor team is responsible for the supervision and coordination of management consultants and design firms assigned to a specific grouping of MAG Program corridors. These corridor teams, headed by a corridor engineer, are the primary ADOT staff who are responsible for supervising the design and development of highway sections and negotiating with local communities. These staff have the authority and control necessary to carry out their responsibilities. The corridor engineers are further supported in their efforts by their respective Assistant Urban Highway Engineers and the Urban Highway Engineer. In addition, the corridor teams receive administrative and technical support from the Section's Administrative Support Services unit and Technical Support Services unit, respectively.

Should issues arise between the Urban Highways Section and other sections of ADOT (such as approving design features, completing reviews in a timely fashion, or approving designs or construction change orders), the Deputy State Engineer for Highway Development can be called upon to help resolve the dispute. Should local communities be unable to concur with Urban Highways Section staff regarding project features or mitigation measures, their representatives can approach ADOT management (Director, Deputy Director, State Engineer, and Deputy State Engineers) to resolve the issue.

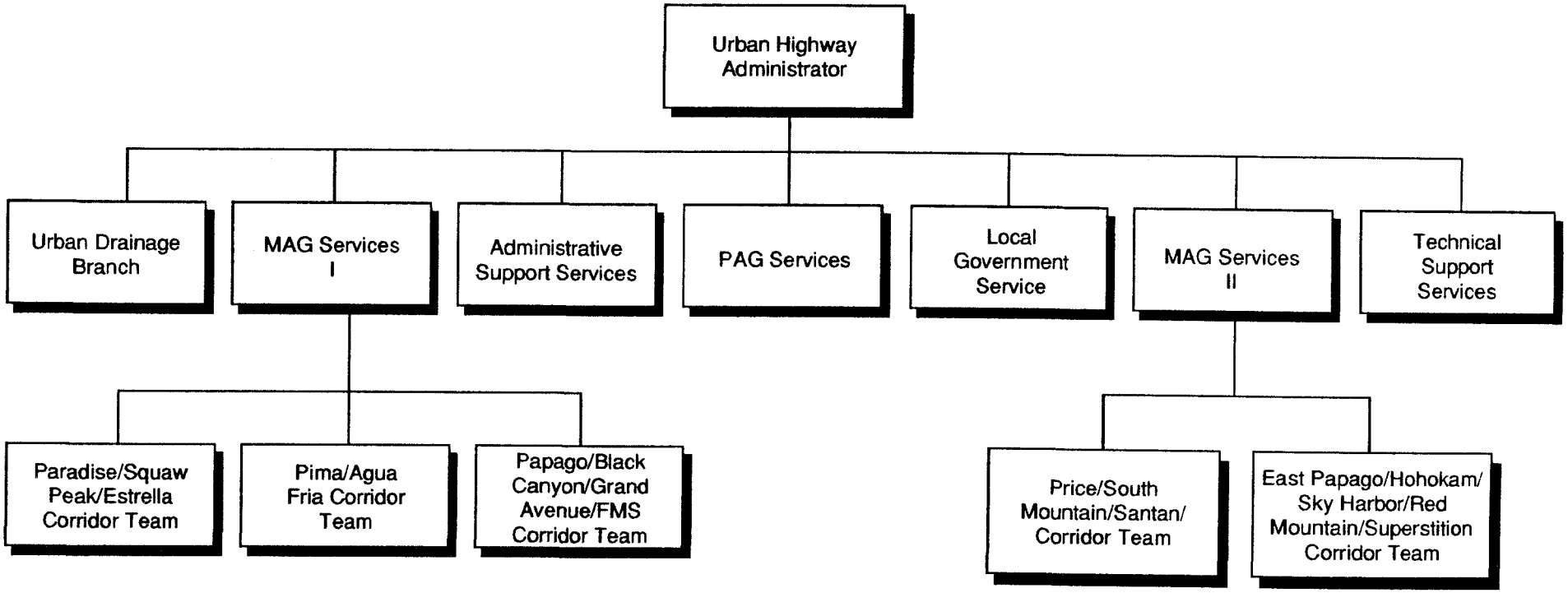
In the past year, the Urban Highways Section has expanded its oversight role to include the programming of parcel acquisition by the Right-of-Way Section to ensure that only those parcels required by the five-year program are acquired. The Urban Highways Section is also coordinating the efforts of the Highway Development Group's Condemnation Support Team, to work with the Right-of-Way Section in identifying alternative courses of action to potentially expensive condemnation cases being pursued on ADOT's behalf. The Urban Highways Section also serves as the conduit for issuing parcel condemnation cases to the State Attorney General's Office, maintaining a parcel condemnation tracking system, and producing a monthly condemnation status report.

Conclusions

The Urban Highways Section, through its two MAG Services Sections and five corridor teams, is the primary unit responsible for supervising the design and development of individual sections of the MAG Program and negotiating with local communities. While these staff have authority and control appropriate to their responsibilities, significant opportunity exists for local communities or developers to petition high level authorities within ADOT to resolve disputes regarding design features and mitigation measures associated with MAG Program projects.

EXHIBIT 6-2

ADOT URBAN HIGHWAYS SECTION ORGANIZATION



In the early years of the MAG Program, top management of ADOT was heavily involved in the process of addressing local community requests for corridor enhancements. With the completion of all location and design concept studies for the MAG Program by 1989 and the recent cut back in the programming of MAG Program projects in the Department's five-year highway construction programs, the number of local community disputes reaching top management have been significantly reduced, according to Urban Highways Section staff.

Recent changes in the responsibilities of the Urban Highways Section to help control the programming of right-of-way acquisitions related to the MAG Program and to coordinate ADOT efforts to better manage the parcel condemnation process represent effective strategies for better controlling the cost of right-of-way acquisition for the MAG Program.

The responsibility of the Urban Highways Section is to identify those properties that will be needed for upcoming construction projects. Funds are programmed at the appropriate time to allow for orderly right-of-way acquisition. The Urban Highways Section and the Right-of-Way Section jointly manage the parcel condemnation process through the Condemnation Support Team. Both of these strategies are effective in helping control right-of-way costs for the MAG Program.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.7 What responsibilities did the management consultants have for overseeing the day-to-day management of the design, development, and construction process? Did management consultants have authority appropriate to their responsibilities? Did ADOT exercise sufficient oversight control over its consultants?

Background

When the MAG Program began in late 1985, ADOT established the Urban Highways Section within the Highway Development Group to manage the development and design of the corridors and facilities comprising the MAG Programs. However, due to the immense scope of the Program and the policy direction received from the MAG Regional Council to expedite the Program, ADOT decided to employ management consultants to directly oversee and manage the various consulting engineering firms which would ultimately be retained to prepare construction plans for each corridor section. These management consultants were hired on a corridor-by-corridor basis, once location and design concept studies for each corridor were completed and the next phase in corridor development was programmed to proceed.

The use of management consultants for the MAG Program was based on prior successful efforts by the Department to employ a management consultant for the completion of the I-10 Papago Freeway through Phoenix. The use of management consultants for the MAG Program enabled the Department to avoid a more significant increase in internal staff to oversee the development of MAG Program construction plans and to have available to the Department significant engineering management expertise relating to urban freeways which could be tapped to develop necessary procedures and systems.

Analysis

Beginning in 1985, one day after passage of Proposition 300, ADOT retained DeLeuw Cather & Company to serve as management consultant for the entire Outer Loop, consisting of the Aqua Fria and Pima corridors. Since that time, as location and design concept studies have been completed for other MAG Program corridors, management consultants have been retained by the Department. The following corridors currently are assigned to specific management consultants:

- Squaw Peak Extension
- Price/South Mountain/Santan
- East Papago/Hohokam/Sky Harbor

In general, management consultants assigned to MAG Program corridors are responsible to plan and manage engineering design work and provide construction scheduling for projects associated with these corridors. More specifically, corridor management consultants:

- Establish communication procedures with local agencies and affected utilities
- Assist ADOT in preparing and conducting public involvement activities
- Conduct weekly staff meetings with the Urban Highways Section and monthly status meetings with ADOT management
- Develop/use a management information system to monitor, forecast, and report progress
- Develop the general plan for the design work
- Assist ADOT in selecting, negotiating, and administering engineering design consultants
- Coordinate work activities between design consultants
- Monitor performance and progress of design consultants to ensure accuracy and compliance with ADOT design policies and guidelines
- Perform various technical services on a corridor-wide basis (right-of-way plan development, field survey preparation, hydrology/drainage plans, geotechnical investigation, archeological studies, resource inventory and construction planning/sequencing, and traffic plans)
- Develop special provisions and specifications for design work
- Provide post-design services (engineering assistance to help maintain project schedules, plans interpretation and review, cost estimate review, and correction of plan errors and omissions)
- Perform value engineering reviews of plans at the 30 percent stage of completion
- Review proposed design and construction change orders
- Establish and apply contract administration procedures relative to engineering design consultants

When the MAG Program began, the Department lacked a consistent set of design procedures specifically tailored to urban highways. As a result, the management consultants

did not have the design process adequately defined to ensure consistency in the development of construction plans for the MAG Program. The first management consultant recognized this problem and was directed by the Urban Highway Section in 1986 to prepare a Urban Highway Design Procedures Manual for the Department, based on their prior experience. This manual forms the basis for design work performed on the MAG Program. A number of other systems and manuals have been prepared by the management consultants for the Department to facilitate the consistent performance of management consulting functions and to serve the needs of the Urban Highways Section. Examples of these include:

- Development of the Department's Urban Highway Design Procedures Manual (by DeLeuw Cather & Company in 1986)
- Development of Statewide Project Management Procedures Manual to guide the work of management consultants (by Sverdrup Corporation in 1988)
- Development of a manual describing Review Procedures for Urban Highway Plans (by DeLeuw Cather & Company in 1988)
- Development of a Strategic Planning Model for use by the Urban Highways Section to program and monitor the schedule for MAG Program projects (by Daniel, Mann, Johnson & Mendenhall in 1988)
- Application of a project management information system for use by all management consultants to prepare monthly project status and forecast reports in a consistent format (by DeLeuw Cather & Company in 1986 using TRANSPORT1)

The authority of the management consultants working on the MAG Program is based on their contracts with the Department. This authority is appropriately tempered by the Urban Highways Section, which exercises supervisory authority over the work of the management consultants. Coordination between the management consultants and the Urban Highways Section occurs through the following mechanisms:

- Monthly and quarterly progress reports, including schedule status, work status, budget status, and budget projections by section, function, and contractor
- Monthly and quarterly status meetings with ADOT management (Urban Highways Section staff and other Department staff as appropriate)
- Weekly staff meetings with the ADOT corridor team

- Ongoing interaction with corridor team staff and other ADOT technical staff, as appropriate

The Department has exercised sufficient oversight control over the consultants through the extensive coordination and communication between the management consultants and the Department.

Conclusions

ADOT's use of management consultants to oversee the work of engineering design consultants in preparing construction plans for the MAG Program has enabled the Department to leverage its in-house engineering staff resources by providing the Department with specialized expertise needed to:

- Develop the systems, procedures, and guidelines for managing the production of construction plans
- Manage the consultants preparing these plans and review their progress and performance
- Perform specialized technical services
- Coordinate with groups both inside and outside of ADOT
- Prepare construction schedules and perform post-design support

The responsibilities and authority of the management consultants are well defined by written contracts, with significant interaction and oversight control provided by the Urban Highways Section and their respective corridor teams.

In reviewing the management consultant contracts issued to date by ADOT for the MAG Program, the largest by far has been the Outer Loop contract with De Leuw Cather & Company. Given the high priority, complexity, size, and broad geographic coverage of this corridor, this has been one of the most challenging corridors to manage. Other management consultant assignments to date have been for much shorter portions of the MAG Program (East Papago/Hohokam/Sky Harbor and Squaw Peak Extension) or have had major portions programmed for later in the schedule (Price/South Mountain/Santan). Limiting the scope of future management consultant contracts should make the resulting corridor design development more manageable by reducing the span of control of the management consultant. This would also provide greater flexibility in responding to programming changes affecting specific corridors.

Recommendations

The Department should seek to limit the size of future management consultant contracts, based upon the number of centerline miles, schedule priorities of segments, and geographic coverage, so that the span of control of the management consultant is not excessive.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.8 Were ADOT program management or consultant decisions altered or modified as a result of influence or pressures exerted outside the appropriate and established forums for local citizen participation? If so, what was the impact on program costs and ADOT's ability to complete the highway system as originally planned?

Background

The scope of the MAG Program was not well defined when Proposition 300 passed in October 1985. During the first three years of the Program, the Department contracted out for the preparation of location and design concept studies for those corridors which had not advanced beyond the corridor planning stage. During these critical formative years of the Program, significant changes and enhancements to the Program were made. These included:

- Increase number of lanes, increased number of miles of freeways versus expressways, and increased number of freeway-to-freeway interchanges due to traffic forecast increases

- Increased miles of freeways to be depressed below grade, increased number of traffic interchanges and crossroads, increased number of noise walls, increased access points at traffic interchanges, alignment changes, non-highway drainage control, traffic management, and modular signing due to local community/developer requests

Because of the significant pressure applied to ADOT by MAG to quickly show substantive progress on the MAG Program, the Department appears to have tried to accommodate the desires of the various jurisdictions through which Program corridors would pass. Because the Department had not developed a budget for the entire MAG Program which could have been used to manage the Program scope to the revenue limits of the RARF and HURF funds, the Department permitted the Program to significantly expand in scope and cost. Without the control of a cost-based budget constrained by projected revenues over the term of the Program, the Department's Urban Highways Section and its location and design concept engineering consultants lacked budget controls when they negotiated design features for MAG Program corridors with local jurisdictions. It was during this initial three-year time frame that the Department committed to most of the MAG Program enhancements and non-right-of-way-related cost increases.

Analysis

Program management staff from ADOT whom we interviewed indicated that there were many channels available to communities and groups outside of the Department to influence

the design and program management decisions relating to the MAG Program. This was made possible by the lack of budget constraints and the desire to reasonably satisfy local requests in order to expedite the Program. As a result, numerous enhancements were accepted into the corridor concept studies and general plans during the first three years of the Program to satisfy local requests for greater access or mitigation of visual, noise, or drainage effects.

Local access to the process was provided through numerous public meetings which were held during the development of the location and design concept studies. In most cases, the location and design concept studies were subjected to a public hearing, at the location and/or the design concept stages of the study effort. Local jurisdictions could also request and negotiate for changes to design features or segment programming with the corridor teams. If the negotiations failed to resolve a dispute, then access was provided at higher levels of ADOT management, until the Director made the final decision. In the early years of the Program, it was reported that the ADOT Director frequently became involved in negotiations with local jurisdictions.

In some instances, ADOT effectively withstood outside pressures to expand the MAG Program without adequate justification or funding support. Several examples include:

- ADOT rejection of a request by the City of Chandler for a crossover road at Galveston Street over the Price Expressway unless the City and affected developer paid the $3 million cost to depress the Price Corridor and build the crossover bridge

- ADOT rejection of requests for six-lane crossover streets by the Cities of Tempe and Mesa unless the cities paid for the cost difference relative to the originally-proposed four-lane crossover streets

- Use of intergovernmental agreements to pool funding from a variety of sources for MAG Program projects which involve a variety of beneficiaries and participants (e.g., Salt River channelization project related to the East Papago/Hohokam/Sky Harbor Corridor)

In the early years of the Program, however, the willingness of ADOT to satisfy local requests for design or program changes resulted in the Department committing to certain design features that would likely have been modified or rejected under a more fiscally constrained environment. Examples include:

- Depressing portions of the Santan Corridor and committing to a six- to eight-lane full freeway design, despite its outlying location and limited forecasted traffic volume

- Depressing the stacked interchange between the Superstition Freeway and the Price Corridor in Tempe

- Committing to one-mile spacing of traffic interchanges along significant portions of the MAG Program, as well as numerous crossroads between interchanges (this compares to the minimum standard of two-mile spacing for urban highways and three-mile spacing for rural highways recommended by the Federal Highway Administration)

- Providing local access ramps to freeway-to-freeway interchanges

- Allowing the use of modular signing and signal hardware along those portions of the MAG Program built in Tempe, which traded higher current capital costs payable using RARF monies for lower future maintenance costs payable using non-RARF monies

In addition, the many requests by local communities and business interests for MAG Program changes and enhancements caused the costs of management consultant and design consultant contracts to significantly increase, due to the need to make frequent changes to the various MAG Program corridor designs and project construction plans.

While is it not possible to quantify the full cost impacts of enhancements made to the Program which go beyond minimum design standards, MAGTPO estimated in 1990 that Program expansions and enhancements amounted to over $1.2 billion in additional costs in 1990 dollars. While much of this increase can be justified by sound engineering judgment and criteria, the above examples suggest that significant budget savings could be realized by avoiding those enhancements which go beyond minimum required design standards and whose incremental costs cannot be funded by the affected local jurisdiction or developer.

In addition to local community officials, various local business interests (developers, land speculators, property owners, etc.) sought to influence ADOT in defining MAG Program corridor alignments and design concepts. Typical requests were for additional access ramps at proposed traffic interchanges, construction of additional access roads serving their property, or offers to have their property acquired by the Department. In one instance, the former ADOT Director in late 1988 intervened on behalf of a local developer seeking to have his building at 7th Avenue and Cambelback Road in Phoenix bought by the Department under its advanced acquisition program. This property was located within the alignment planned for the Paradise Corridor and the developer was in financial difficulty due to his inability to significantly lease the recently constructed building as a result of the proposed alignment of the Paradise Corridor. The Department ended up paying $250,000 more than the $1.5 million appraisal of fair market value so the Department could use the building to house ADOT staff while renovations were made to the Engineering Building. This property was ultimately acquired by ADOT on February 8, 1989, using RARF funds, despite the fact that the Paradise Corridor has yet to be included in ADOT's five-year

programs for construction and the building was intended for use by ADOT without reimbursement to the RARF fund.

In February 1991, ADOT recognized the potential need to reimburse the RARF fund for the Department's use of properties acquired with RARF monies. As a result, reimbursement amounts were estimated for three buildings acquired using RARF funds and occupied by ADOT staff, based on estimated market rental rates. The three buildings included in this review are located at the following sites:

- 7th Avenue and Camelback Road
- Northwest Corner University and 46th Street
- Beardsley Road and I-17

However, while the Department deposits, into the RARF fund, rental revenues received from property acquired with RARF monies and used by private individuals or companies, the Department has yet to reimburse the RARF fund for the office rental savings provided when its staff occupies similar properties.

Conclusions

ADOT has faced and continues to face many diverse pressures to enhance projects that are part of the MAG Program. This is an inherent part of the process of developing and implementing such a major local program. Collectively, the MAG Regional Council directed ADOT to expedite construction of the MAG Program, institute a high bonding approach to Program financing, and provide for full right-of-way protection within the first five years of the Program.[1] While ADOT attempted to carry out its responsibilities consistent with these policy directions, individual communities actively sought to add enhancements to the MAG corridor plans being developed. As a result, ADOT was placed in the awkward position of having to negotiate with local cities over Program enhancements at a time when it was being pushed by MAG to expedite the Program through the rapid completion of location and design concept studies. To meet these competing requirements, ADOT frequently agreed to corridor enhancements.

While reasonable efforts were made by the Urban Highways Section to control these requests and adopt only those which could be justified, some communities often took

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[1] Letter to State Transportation Board Chairman from MAG Regional Council Chairman, February 13, 1986.

advantage of their access to top ADOT management to gain concurrence. Because neither MAG nor ADOT established Program costs as a constraint tied to Program revenues, the long-term integrity of the overall Program became sacrificed to the short-term advantages sought by individual local jurisdictions. Thus, while ADOT management is by statute accountable to the State Transportation Board and the Office of the Governor, the jurisdictions represented by members of the MAG Regional Council were able to exert significant influence over alignment, design concept, and programming issues relating to MAG Program corridors, both collectively through MAG and individually in direct one-on-one negotiations with ADOT. While this is neither unusual nor unexpected, it does suggest the need for better fiscal management controls, particularly for programs largely funded by local revenue sources.

The declines in forecasted RARF and HURF revenue growth of the last several years, coupled with the declining level of project programming reflected in recent ADOT five-year programs for the MAG Program, have reduced pressures from local officials and others for further enhancements which cannot presently be paid for. One ADOT staff person interviewed for this audit estimated that since the Program's financial limitations have become more apparent, the number of outside requests for enhancements has been cut in half. This reflects the value of budget controls.

ADOT has not reimbursed the RARF fund for the office rental savings resulting from the Department's use of property acquired with RARF monies. This is not consistent with the Department's treatment of private or commercial use of these kinds of properties.

Recommendations

Establish and update MAG Program budgets at the program, corridor, and section levels.

Controlling outside influences, so that Program costs are kept at a reasonable level given revenue funding limitations can only be done if all parties are aware of the fiscal consequences of scope or programming changes and the budgetary limits imposed by existing revenue sources. The development and regular updating of MAG Program budgets at the program, corridor, and section levels will help provide this awareness and establish a basis for fiscal control (as suggested in Question 6.1).

MAG Regional Council should proactively support ADOT's efforts to control Program costs by controlling project enhancements and changes.

The proposed MAG Program Fiscal Analysis Unit should assess the overall fiscal implications of local jurisdiction requests for major changes or enhancements to the MAG Program. This will enable the MAG Regional Council to collectively act to support ADOT

efforts to keep the MAG Program within budget and encourage local communities/business interests to pay for enhancements which exceed minimum requirements which are not budgeted for.

ADOT should reimburse the RARF fund for the Department's use of property acquired with RARF monies.

In the best fiscal interest of the MAG Program, MAG should require that ADOT establish reasonable rental rates for properties it has acquired with RARF monies and to apply these rates regardless of whether the Department or any entity (private or public) is using the properties. The resulting revenues should be deposited in the RARF fund for use in the MAG Program.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.9 Were ADOT program managers, technical staff, and management consultants adequately buffered from outside pressures or interference? Are controls over such potential interference adequate? How do these controls compare to those governing Federal highway and other ADOT projects?

Background

As discussed in the prior question's response, ADOT was exposed to on-going outside pressure by local community and business interests seeking changes or enhancements to Program alignment, design features, or right-of-way acquisition. This pressure was most intense in the early formative years, when location and corridor studies were being prepared for most corridors comprising the MAG Program and the emphasis of both MAG and ADOT was on expediting the Program schedule, not controlling the budget.

Analysis

Interviews with both current and former members of the ADOT Urban Highways Section indicated that in the early years of the MAG Program, the corridor teams and management consultants were effectively buffered primarily by the Urban Highways Section Engineer, who attempted to enforce the Department's design guidelines in evaluating local requests for enhancements. If the local communities or business interests were not satisfied, top management of the Department became the buffer and ultimate negotiator. While this process did not prevent the Department from agreeing to a variety of enhancements in order to expedite the Program schedule, it did remove most of the direct outside pressures from the corridor teams and the management consultants.

As the Program evolved and project activity shifted from location and design concept study preparation to final design, right-of-way acquisition, and construction, a more formal buffering mechanism was applied through the greater involvement of the Priority Planning Committee and the State Transportation Board in considering Program changes which affect the Department's five-year highway construction program. Other requests for Program changes and enhancements continue to be dealt with by the Urban Highways Section Engineer. However, the widely recognized funding limitations of the Program provide a more conducive environment for resisting unreasonable local requests for enhancements and encouraging the commitment of local matching funds or right-of-way donations to gain ADOT agreement to requests for design feature enhancements or expedited project schedules.

With the more active role played by the Priority Planning Committee, the controls being used by the Department to deal with outside requests for changes to the MAG Program are

much more comparable to those used for other State and federal highway projects. The main difference is the absence of the Federal Highway Administration (FHWA), whose jurisdictional independence, funding authority, and technical review responsibilities enables it to exert a significant influence in resisting outside local pressures to change project plans without significant technical justification. Given that the MAG Program is primarily funded by local revenue sources, the opportunity to enlist the FHWA as a buffer is limited to those projects involving portions of interstate freeways running through Maricopa County (e.g., I-10 and I-17), such as freeway-to-freeway interchanges where MAG Program freeways intersect federally-funded facilities.

Conclusions

With most major location and design concept issues already resolved for the corridors comprising the MAG Program, the Department has several important buffers in place to more effectively control outside pressures on the Program. These include the Urban Highways Section Engineer, Priority Planning Committee, and the State Transportation Board. However, the effectiveness of these buffers could be significantly improved if they had a realistic overall Program budget to gauge the fiscal impacts of requested changes proposed by outside influences. This is based on the notion that the most effective buffer for the MAG Program to control outside influences is a widely perceived, constrained budget.

Short-term budget constraints imposed by the Department's five-year program are currently facilitating the efforts of the Urban Highways Section and the Priority Planning Committee to avoid outside requests for unrealistic short-term changes or enhancements to the Program. ADOT managers need to be given the tools to assess the long-term budget consequences of change requests to help them be more effective buffers for the Department. The same applies to the MAG Regional Council, which can serve as a collective buffer to protect the Program from unreasonable requests made by individual members, as well as others.

Recommendations

Top management of ADOT should continue to enforce the chain of command for dealing with outside requests for changes to the MAG Program by referring these requests to the Urban Highways Section or the Priority Planning Committee, depending on their scope.

ADOT and MAG should have an overall long-term MAG Program budget to be used as Program buffers to assess the fiscal implications of proposed Program changes and enhancements and thereby improve their effectiveness in controlling these requests and/or converting them to opportunities for funding enhancements from local governments and the private sector.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.10. What criteria or guidelines governed the process of approving or disapproving local requests for upgrades in highway designs? Who made these decisions and were the decisions adequately justified? How were cost impacts of these decisions considered?

Background

When the MAG Program began, the Department's development of urban freeway construction plans was guided by a wide variety of design guidelines and standards established at the national level by such groups as the American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA), and Transportation Research Board (TRB), and at the State level by ADOT. The guidelines and standards guided the overall design development effort of ADOT for highways throughout the State. However, these guidelines generally reflected rural highway design standards and were not oriented to the conditions and requirements specifically applicable to urban freeways.

Recognizing the need for a set of design guidelines and standards that would guide the consistent development of construction plans for all corridors of the MAG Program, the Urban Highways Section requested the first MAG Program corridor management consultant, De Leuw Cather & Company, to develop an Urban Highway Design Procedures Manual for the Department, based on their past experience in designing urban highways combined with that of the Department. The resulting manual was developed during 1986 and has been used and updated for the MAG Program ever since.

Criteria

The criteria for responding to this question are the guidelines and standards listed in the Department's Urban Highways Design Procedures Manual. This manual references design standards, specifications, manuals, procedures, policies, and regulations relating to:

- Field surveys
- Photogrammetry and mapping
- Construction drawings
- Structures drawings
- Traffic signals and lighting

- Signing and markings
- Highway geometric design
- Right-of-way plan standards
- Work zone traffic control
- Hydrologic design
- Materials engineering
- Computer-Aided Drafting and Design
- Utility design and coordination
- Roadside development services/landscape design
- Pavement design
- Foundations investigation
- Highway capacity analysis
- Construction safety
- Environmental regulations

There are also a wide variety of manuals which support the design development process at ADOT relative to the MAG Program. These include:

- Urban Highway Design Details Manual
- Highway Development Process Guide
- Priority Programming Process Guide
- Urban Landscape Guidelines
- Drainage Design Guidelines
- Pump Station Design Guidelines

- Right-of-Way Acquisition Process Manual
- Utility Design and Coordination Manual
- Review Procedures for Urban Highway Plans
- Noise Mitigation Policy Guidelines

In addition, management consultant guidelines are provided in the Project Management Procedures Manual. Further design criteria may also be provided in the form of supplemental design criteria, contained in Project Design Memoranda provided by the corridor management consultants during the course of a project.

Analysis

Local requests for upgrades in highway designs are reviewed by the corridor teams in the Urban Highways Section and management consultants using the design guidelines and standards contained or referenced by the Department's Urban Highway Design Procedures Manual, as well as any supplemental design criteria. It should be noted that these design criteria provide guidance in the development of urban freeway construction plans. As such, they point out preferred practice and often prescribe a range of values for acceptable designs.

Given the latitude allowed by design guidelines and standards, other factors are considered by the Urban Highways Section and top management in evaluating local requests for highway design upgrades. These include:

- The effectiveness of the upgrade in mitigating various environmental impacts, such as noise, visual, drainage, and air pollution
- The need for additional access and its beneficiaries
- The implementation feasibility of the upgrade
- The cost of the upgrade and the funding source(s)
- The effect on the operation of the facility
- The effect on public safety

The Urban Highways Section makes the initial determination of whether to adopt, revise, or reject the upgrade request, based on input provided by the management consultant, corridor

engineer, Assistant Urban Highways Section Engineer, and Urban Highways Section Engineer, as appropriate. Higher level ADOT management (Deputy State Engineer, State Engineer, or Director) and the Priority Planning Committee become involved if there is a major cost impact or if the initial Department response is not acceptable to the upgrade proponents.

In recent years, as the financial resources of the Program have moderated, greater emphasis has been placed on the criteria of cost and third-party funding availability. The cost impacts are considered relative to the impacts on projects contained in the Department's five-year program.

Further control over design upgrades to MAG Program corridors which result in changes to the development of construction plans or to the projects once in the construction phase is provided by the change order application, review, and approval processes administered by the Engineering Consultant Services Section for design-related change orders and the Construction Section for construction-related change orders. This process considers the technical, operational, and safety implications of the change, its costs, and schedule impacts on the project.

Conclusions

The Department uses generally accepted design guidelines and standards for evaluating local requests for design upgrades to MAG Program projects. In early years of the Program, the Department evaluated local requests for upgrades relative to these standards and avoided those upgrades which failed to meet minimum specifications. However, in cases where upgrades resulted in specifications being exceeded (e.g., more lanes planned than justified by traffic forecasts or excessive frequency of traffic interchanges), the Department was less stringent in considering the long-term cost implications for the overall MAG Program.

The Department is now doing a better job of evaluating local requests for project upgrades through the efforts of three organizational units:

- Urban Highways Section considers the costs of the upgrades and the potential for third-party funding
- Priority Planning Committee monitors the financial integrity of the Department's five-year highway construction program
- Engineering Consulting Services Section and Construction Section controls design and construction change orders

Of particular note is the performance of the Construction Section in controlling construction-related change orders. Of the $224 million in construction projects on the MAG Program completed between the initiation of the Program and May 1991, the final amount billed has been within 3.9 percent of the bid amount, and 5.1 percent below the original engineering estimates. This performance compares very favorably with national statistics, which indicate construction change orders generally fall in the range of 5 to 10 percent above bid amounts.

Under the current financially-constrained environment, the Department is limiting project upgrades to those which can be paid for through third-party funding arrangements or by right-of-way donations. This is a significant departure from the approach taken during the earlier development of location and design concept studies for Program corridors.

Recommendations

Consideration of local demands for design enhancements and project upgrades due to mitigation and access concerns should be made in light of the full fiscal consequences on the MAG Program budget at the program, corridor, and section levels. This requires developing and updating such a budget and holding ADOT managers accountable to abide by budget limits set at the corridor and segment levels when considering requests for upgrades.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.11. What management policies, procedures, and systems were established to promote efficient and economic allocation of the program's financial resources? What changes, if any, in management practices are needed to strengthen financial management and improve cost efficiency? Will additional changes be necessary if the proposed tax is enacted?

Conclusions

As described in the preceding responses to questions making up this section on Program Management, ADOT has been gradually developing management policies, practices, and systems to help it better monitor, direct, and control its administration of planning, programming, financing, design, right-of-way acquisition, and construction of the MAG Program, consistent with the policy guidance provided by the MAG Regional Council and the State Transportation Board. Among these many developments, the following are most significant:

- Development of an *Urban Highway Design Procedures Manual* and *Urban Highway Design Details Manual*
- Development of standardized *Review Procedures for Urban Highway Plans*
- Development of a Strategic Planning Model for use by the Urban Highways Section in developing and evaluating alternative programming schedules of MAG Program projects
- Development of a value engineering process applied by both ADOT Highway Development Group staff and MAG Program corridor management consultants
- Development of Project Management Procedures to guide assignment of project responsibility, reporting of project status, and handling of project changes by ADOT personnel
- Development of Management Procedures Manual for management consultants
- Adoption of a standardized project management information system for use by all MAG Program management consultants
- Elimination of the practice of approving change order requests for extra design work that had already been performed

- Development of the "red letter process," whereby Urban Highways Section personnel and management consultant staff meet and correspond with local zoning and code enforcement personnel regarding possible development within proposed freeway corridors, the implications of such development on the design and construction of the corridor, and possible actions to prevent such development

- Development of a Condemnation Support Team to provide proper technical support to the State Attorney General's Office - Transportation Division, in preparing for possible and actual condemnation cases

- Providing quarterly allotments of programmed funds for right-of-way acquisition to help control costs

- Policy guidance to avoid accelerated right-of-way acquisition, focus advanced acquisition on demonstrable hardship cases, and refuse taking advanced acquisition cases to condemnation except for documented hardship cases

- Urban Highways Section involvement in authorizing the initiation of right-of-way acquisition activities and channeling condemnation cases to the State Attorney General's Office

- Establishment of an internal review process whereby right-of-way plans are reviewed by design personnel to see if location or design changes can be instituted to save potentially higher costs of acquiring sensitive right-of-way parcels

- Development of right-of-way status reports on programmed parcel acquisitions

- Development of a Condemnation Tracking System to monthly report on the nature and status of condemnation cases being handled by the State Attorney General's Office

- Development of a project cost accounting and reporting system, TRACS, and the continuing development and refinement of management reports based on this system

- Development of the Project Financial Planning and Monitoring System

- Development of a Project Database System

- Development of a Cash Flow Forecasting System for use in planning the next five-year portion of the MAG Program

- Increased role being played by the Priority Planning Committee to deal with outside efforts to change the Program scope or time frame

- Expanding use of third-party matching fund arrangements to expedite projects and get enhancements funded by other than RARF or HURF sources

- Use of intergovernmental agreements to capture third-party funding of projects which offer shared benefits beyond the MAG Program

- Staging MAG Program construction of sections so that partial facilities which are adequate in the short term can be implemented within constrained budgets

- Development of quarterly progress and status reports on the MAG Program by MAGTPO

- Development of a formal process to facilitate early review and comment on the Department's five-year construction program by MAG

- Initiation of monthly breakfast meetings with technical and management staff from ADOT, MAG staff, and representatives of applicable local cities

- Development of Engineering Consultant Services status report on engineering design contracts and management consulting contracts

These various actions, many of which have occurred in the past two years, demonstrate the serious attention being given to the issues of program management by managers throughout ADOT. They also demonstrate that significant progress has been made to better control the MAG Program and promote more cost-effective allocation of Program financial resources. However, significant additional steps need to be taken to enable the Department and MAG to effectively manage the overall MAG Program within the constraints imposed by the authorizing legislation and Proposition. These recommendations are listed below.

Recommendations

Budgetary controls need to be established at the program, corridor, and section levels for the overall MAG Program, including management forms, procedures, and reports which track actual, programmed, and not-yet-programmed activity in terms of revenues by source, costs by category, scope, and time frame. The budget should be reviewed every six months and updated annually.

MAG should establish a one- to two-person MAG Program Fiscal Analysis Unit to monitor and assess the fiscal status of the overall MAG Program, and to advise the MAG Regional Council and MAG Management Committee regarding the consequences of major revenue, financing, cost, scope, and schedule changes to the MAG Program.

The proposed MAG Program Fiscal Analysis Unit should prepare and issue for public dissemination an annual report on the relative status of the MAG Program, in terms of revenues, costs, scope, and schedule, indicating accomplishments, programmed activities, and unprogrammed efforts needed to complete the Program. This will provide quicker, more independent reporting to the public of the fiscal status and progress of the MAG Program. This report should be followed up by MAG-sponsored public hearings, whose results can serve as input to ADOT/Transportation Board efforts to update the Department's five-year highway construction program.

The Urban Highways Section Engineer should be provided direct access to the ADOT Executive Information System to facilitate monitoring and control of the MAG Program.

ADOT and the MAG Regional Council should annually reassess the MAG Program budget, scope, schedule, and financing strategies and adjust them to maintain the fiscal integrity of the overall Program, consistent with the covenants of outstanding RARF and HURF bonds. When appropriate, this should include reassessing prior location and design features to determine if more cost-effective alternatives can be substituted. Such a process should include consideration of:

- Corridor deletion or realignment
- Reduced number of lanes per corridor or segment consistent with realistic traffic forecasts
- Reduction of the frequency of RARF-funded traffic interchanges and crossroads (to every two to three miles)
- Reduction in the miles of depressed freeways
- Application of lower design standards which equal or exceed minimum urban design guidelines
- Increased staging of MAG Program facilities to include freeway-to-freeway interchanges
- Reduced crossroad lane widths to be consistent with adjacent local roads
- Local funding of all lighting beyond that required for minimum safety standards
- Reduce local access to freeway-to-freeway interchanges

- **Local funding of right-of-way acquisitions**

ADOT should submit local requests for major MAG Program changes and enhancements which would materially increase the cost of the Program to the full MAG Regional Council via the MAG Program Fiscal Analysis Unit for review and internal MAG resolution prior to final action by the Priority Planning Committee and State Transportation Board.

Include disclosure statements on all revenue, cost, and budget projections to ensure that readers understand the assumptions, limitations, basis, and caveats regarding the accuracy or reasonableness of the figures.

When describing the financial/fiscal status of the MAG Program for internal and external purposes, ADOT and MAG should be consistent in the use of either constant or current (inflated) dollars for both revenues and costs, noting explicitly which basis is used. Currently, the Administrative Services Division portrays MAG Program revenues in current (inflated) dollars, the Urban Highways Section portrays MAG Program project costs in current (actual) dollars for all historical expenditures and constant (current same year) dollars for all programmed and future project costs, while the MAGTPO portrays all MAG Program costs in constant (current same year) dollars. This makes comparisons meaningless and Program monitoring and reporting very difficult.

Because the Department manages the MAG Program on a cash flow basis, both internal and external reports concerning the MAG Program should reflect the cash flow basis for cost and revenue accounting, regardless of whether the Administrative Services Division, Urban Highways Section, or MAGTPO produces the report.

Have local communities pay for the incremental design-related costs, as well as the incremental right-of-way and construction costs of requested enhancements to MAG Program corridors or projects.

The MAG Regional Council should hold public hearing(s) prior to adopting changes to the MAG Plan or the MAG Program priorities.

These recommended management practices are proposed regardless of whether additional taxes or extension to the existing excise tax increment are enacted. If further funding is provided to the MAG Program via the extension of the current tax or the enactment of a further increment, the MAG Regional Council and ADOT will be in a much better position to finance the completion of the MAG Program as currently defined without having to take significant scope reducing actions to bring the Program's costs into line with its expected revenues. ADOT is in a better technical and administrative position to manage external

requests for project enhancements. The prospect of further funding reinforces the absolute necessity to have a budget-based monitoring, reporting, and control process in place so that short-term decisions regarding scope, financing, and scheduling are not permitted to undermine the long-term viability of the Program.

Should new excise tax-based funding be obtained for the MAG Program, we believe that the MAG Regional Council and the Transportation Board need to carefully consider the fiscal and administrative consequences of whatever financing approaches might be used to channel funds to the Program. Numerous persons interviewed as part of this audit questioned the high bonding policy of the MAG Regional Council. This was not because of a philosophical aversion to bonding for transportation capital improvement projects, per se. Instead, it reflected a concern that by advancing so much of the Program funds within the first five years of a 20-year program, the Program became difficult to effectively manage, given the status of Program plans and ADOT management practices at the time of the Proposition 300 vote.

The MAG Regional Council and Transportation Board should consider more moderate bonding strategies which would enable the Department to develop and maintain a more balanced program over the life of the available funding sources.

REVIEW OF PROGRAM MANAGEMENT PRACTICES AND PROCEDURES

6.12 Did the entities involved in developing and implementing the program have sufficient controls over possible conflicts of interest?

Background

In recent years, public concerns over the escalating costs of right-of-way acquisition for the MAG Program has resulted in various suggestions in the media that some individuals directly involved in the promotion and/or administration of the program may have used their advance knowledge of freeway corridor plans to benefit themselves or their associates through land speculation activities on parcels known to be within the planned paths of MAG freeway corridors.

Criteria

As an agency of state government, the Arizona Department of Transportation falls under the State conflict of interest laws contained in A.R.S. 38-501 to -511. These statutes establish minimum standards for the conduct of public officers and employees who are or may become involved with a contract or decision in their official capacity which might affect their pecuniary, financial, or proprietary interests or those of close relatives. Specific applicable statutes include:

- Disclosure of Substantial Interest

  A.R.S. 38-503 - which requires any public officer or employee who has, or whose relative has, a substantial interest in any decision of, or contract, sale, purchase, or service to such public agency shall make known such interest in the official records of such public agency and shall refrain from participating in any manner as an officer or employee in such decision.

- Public Competitive Bidding

  A.R.S. 38-503(c)(2) - which requires public competitive bidding for contracts to supply goods or services to a public agency in excess of $300 in any single transaction.

- Representation of Others

  A.R.S. 38-504(A) - which prohibits any public officer or employee from representing another person for compensation before a public agency by which he/she is or was employed or served within the preceding 12 months concerning any matter with which such officer or employee was directly concerned and in which he/she personally

participated during his/her employment or service by a substantial and material exercise of administrative discretion.

- Disclosure or Use of Confidential Information

  A.R.S. 38-504(B) - which prohibits a public officer or employee from disclosing or using for profit information which is designated as confidential, other than by statute or rule, and which he/she obtained from his/her agency as a result of his/her employment or service with the agency. The prohibition exists during the course of employment or service, and for two years after employment or service has terminated, unless appropriate authorization from the agency has been obtained.

- Improper Use of Office for Personal Gain

  A.R.S. 39-504(C) - which prohibits public officers and employees from using or attempting to use their official position in order to secure valuable benefits for themselves, unless such benefits are part of the compensation they would normally be entitled to for performing their duties.

- Receiving Additional Income for Services

  A.R.S. 38-504(A) - which prohibits a public officer or employee from agreeing to receive or receiving, either directly or indirectly, compensation other than as provided by law for services rendered by him/her in any case, proceeding, application, or other matter before his/her agency.

The State's conflict of interest laws define public officers as all elected and appointed officers of a public agency (such as the State Transportation Board, ADOT Director, etc.) and employees as anyone employed by an incorporated city or town, political subdivision of the State, the State, or any of its departments, commissions, agencies, bodies, or boards for compensation, whether on a full-time, part-time, or contract basis. This includes consultants or contractors hired by the Department.

The Department has a written Administrative Procedure (PER-6.02) which identifies and defines conflict of interest situations regarding employees of ADOT. This procedure is based on the State's conflict of interest law (A.R.S. 38-502 and -503), and the Standards of Conduct for State employees set forth in the Department of Administrative Personnel Rule R2-5-501. The procedure prohibits ADOT employees from engaging in employment or self employment outside the Department in addition to their State position which is not compatible with their duties and responsibilities of State service employment, or which tends to impair their capacity to perform those duties in an acceptable manner. The

procedure also describes other areas of potential or actual conflicts of interest which are prohibited, such as:

- Work done by ADOT employees in a private capacity which may be construed by the public to be an official act

- Employees affiliating with public or private organizations or entities so as to raise an expectation that official favors will be granted

- Employees accepting or soliciting, either directly or indirectly, anything of economic value which is or may appear to be designed to influence official conduct, particularly from a person seeking to obtain contractual, business, or other financial arrangements with the Department or who has interests that might be substantially affected by the performance of the employee's duty

- Employees accepting meal, beverage, or other refreshment purchased by a person seeking any financial arrangement with ADOT, except when provided in the ordinary course of a meeting or conference, when such refreshments are offered at no charge to all participants

Analysis

The primary entities involved in developing and implementing the MAG Program include the Maricopa Association of Governments (MAG) and the Arizona Department of Transportation (ADOT). As the principal planning agency for the metropolitan Phoenix area, as designed by the Governor's Office, MAG is responsible for developing and defining the elements of the MAG Regional Freeway/Expressway Plan and for establishing the priorities for implementing this plan. ADOT, through the State Transportation Board, is responsible for the planning, programming, design, right-of-way acquisition, construction, and financing of elements of the plan. Most of the technical staff for transportation planning at MAG are actually employed by ADOT, whose Transportation Planning Division shares these staff with MAG on a full-time basis and recognizes them as the MAG Transportation Planning Office (MAGTPO).

Officers and employees of ADOT (as a public agency of the State government) and the MAG Regional Council (whose members are elected local government officials) fall under the auspices of the State statutes pertaining to conflicts of interest. MAG employees, who are also employees of the League of Arizona Cities and Towns, are also covered by the State's conflict of interest statutes, since the League serves as an instrumentality of local governmental entities. In its work for the MAG Program, MAG serves as an instrumentality of the local governments comprising its membership from the Maricopa County region. MAG also contracts to the Arizona Department of Transportation to

perform selected administrative and technical work relating to the MAG Program, as well as various air quality, socio-economic, public transportation, and aviation/airport issues. These contracts include specific language prohibiting conflicts of interest by employees and public official members of MAG.

The State's conflict of interest statutes clearly define the minimum standards for the conduct of public officers and employees to avoid actual or perceived conflicts of interest relating to such programs as the MAG Program. These statutes are contained in the Arizona Revised Statutes and described in the Arizona Agency Handbook, which discusses statutes, rules, constitutional provisions, and case law pertinent to staff government. As noted earlier, only some of the State's conflict of interest statutes are described in the ADOT Administrative Procedures Manual. The MAG personnel rules are silent on the issue of conflict of interest.

Conclusions

Existing state statutes (A.R.S. 38-503 and -504) provide sufficient control over possible conflicts of interest situations involving officers and employees of ADOT and MAG, as they relate to the MAG Program. Of particular note are those statutes regarding disclosure of substantial interest, disclosure of confidential information, and improper use of office for personal gain. The effectiveness of these statutes depends on their common knowledge within the affected agencies and their proper enforcement. The fact that several of the relevant statutes are not prescribed in the ADOT Administrative Procedures Manual raises questions regarding the familiarity of Department employees with these statutes. In the same respect, MAG staff do not receive specific administrative information regarding the State's conflict of interest statutes, except as contained in contract terms for work performed by MAG for ADOT. While the statutes represent sufficient bases for controlling possible conflicts of interest by ADOT and MAG officers and staff regarding the MAG Program, the effectiveness of these controls could be improved by more thoroughly incorporating them into the administrative procedures manuals of both ADOT and MAG.

Recommendations

ADOT and MAG should provide their staffs with administrative procedures that fully explain what is allowed and what is prohibited under applicable conflict of interest laws.

Both ADOT and MAG should develop new or augment existing administrative procedures (such as ADOT's Administrative Procedure PER-6.02 - Conflict of Interest/Secondary Employment) to discuss the full range of conflict of interest statutes pertaining to public officers and employees (A.R.S. 38-501 to -511), as described in the *Arizona Agency Handbook* (Chapter 8), issued by the Office of the Attorney General. Such procedures should reference the pertinent statute; discuss its intent, prohibitions, requirements, and

applicability; and provide appropriate forms as may be required (for disclosure, reporting, etc.).

This recommendation is not prompted by specific instances of conflicts of interest being demonstrated by officers or staff of ADOT or MAG, but by the conclusion that a more thorough and pro-active notification of officers and staff of these prohibitions could prevent such instances from inadvertently occurring due to employee lack of knowledge of their prohibition.

7. REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

This portion of the performance audit addresses questions regarding the adequacy of current statutes, resources, policies, and procedures relating to ADOT's right-of-way acquisition function as it applies to the MAG Program. For the purposes of this performance audit, we respond to inquiries concerning:

- Adequacy of current statutory authority to control right-of-way acquisition costs consistent with the public interest
- Adequacy of support from Attorney General's Office
- Adequacy of internal controls over right-of-way acquisition process
- Appropriateness of MAG Program funds allocation to the right-of-way acquisition function
- Factors contributing to increases in right-of-way acquisition costs
- Opportunities to control or mitigate the costs of right-of-way acquisitions

The following pages present the findings, conclusions, and, where appropriate, recommendations resulting from the audit team's assessment of ADOT's right-of-way acquisition process as applied to the MAG Program.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.1 How do Arizona's laws governing right-of-way acquisition compare to laws in other states? What jurisdictions use the "before and after" concept previously proposed by ADOT?

Background

To compare Arizona's laws governing right-of-way acquisition to other states, the assessment begins with a review of the basics of right-of-way acquisition. We will then discuss specific terms such as "just compensation," "highest and best use," "fair market value," "most probable price," and "the 'before and after' appraisal are then defined."

Real property is said to be a composite term for it embraces the tangible, that is, the physical elements of real estate, and also those intangible attributes, the rights of ownership. Appraisers are concerned with real property since they evaluate the rights and benefits to be derived from the ownership of real estate.

The bundle of rights theory holds that the ownership of real property may be compared to a bundle of sticks wherein each stick represents a distinct and separate right or privilege of ownership. These inherent rights of ownership of real property are guaranteed by law, but are also subject to certain limitations and restrictions. They are the rights to use it, to sell it, to lease it, to enter it, to give it away, and finally, the right to refuse to exercise any of these rights.

While the legal definition of land implies complete ownership of land and everything attached to it, under it, and over it, legal title to land does not, in fact, convey absolute fee simple title to real property and the unrestricted exercise of the entire bundle of rights. These rights and privileges are limited by the four powers of government: (1) the power of taxation; (2) the power of eminent domain; (3) police power (the right to regulate property for promoting the public's safety, health, morals, and general welfare; zoning ordinances; building codes; traffic regulations; and sanitary regulations are based upon police power of government); and (4) the right to have titular ownership of property returned to the State (in the event an owner does not pay his taxes or if the owner dies and leaves no heirs.)

An appraiser must assume the responsibility of being familiar with the broad range of property rights and their more common characteristics, and with the usual manner in which they are utilized and transferred. The appraisers must further be familiar with the relationship between the particular property right and its contribution to the entire bundle of rights that they are appraising.

The appraisal of real property to be acquired for public projects presents unique appraisal problems not found in standard real property appraisal situations. This can be attributed to a variety of appraisal concepts which are largely determined by law. A State's appraisals must meet stringent standards of thoroughness, accuracy, and appropriate methodology in order to withstand the rigors of potential condemnation proceedings and to assure the rights of the property owner.

The standard definition of "just compensation" in right-of-way acquisition is the amount of money paid to a property owner under the theory that in order to be "just," the property owner should be no richer nor poorer than before the taking. Since just compensation must be paid for private property taken for a public purpose, the State obtains one or more appraisals of the property being acquired and establishes an estimate of just compensation to be offered to the property owner. When an entire property is being acquired, the estimate of just compensation is the same as the approved estimate of market value developed in the appraisal process. When a portion of a parcel is required, more than one approach may be utilized, depending upon the jurisdiction.

"Highest and best use" is typically defined as "that reasonable and probable use of the property as of the date of valuation which is most likely to produce the greatest net return to the land and improvements." Ordinarily, landowners are prudent investors and have carefully studied the potential of their property and are putting it to its highest economic use. However, the appraiser must do independent analysis and researching to arrive at the property's actual highest and best use. To have a base for making this judgment, an appraiser must have made a thorough investigation and analysis of the neighborhood and general area's social and economic trends. This step in the appraisal process is one of the most important, and an error at this stage of the appraisal will definitely forecast an error in the conclusion. Any conclusion by the appraiser regarding highest and best use must be supported by the appraiser through mathematical analysis or logical reasoning and must be presented in the appraisal report. Elements to be considered in determining the highest and best use include, among others, zoning and building restrictions, size of land and its suitability for development, supply and demand, and neighborhood trends.

It is important in the highest and best use consideration not to value the land for one use and the improvements for another use and combine the two elements into a value for the entire property. This violates the consistent use theory. Improvements are to be valued to the extent they contribute to the highest and best use of the property or for their value for removal, whichever is greater.

The federal statutes indicate that appraisals for roadway right-of-way taking shall be made on the basis of "fair market value." For that definition, fair market value is defined as "the amount in cash...for which in all probability the property would be sold by a knowledgeable owner willing, but not obligated to sell, to a knowledgeable purchaser who desires, but is

not obligated, to buy." It is the actual value of the land on the date of the taking, with all its adaptations to general and special uses, that is to be considered.

The language used to define "fair market value" in Arizona until just recently was "the highest price estimated in terms of money which the property will bring if exposed for sale in the open market with a reasonable time allowed to find a purchaser, buying with full knowledge of all the uses and purposes to which it is adopted and for which it is capable of being used." In 1990 Arizona changed its definition of fair market value to "the most probable price...used."

Entire acquisitions involve a straightforward appraisal approach utilizing market data, cost, and income approaches as appropriate for the type of property being considered.

Partial acquisitions involve the acquisition of only a portion of a larger tract, leaving a remainder; therefore, the valuation of just compensation for partial acquisitions is generally a more complex assignment than is valuing an entire acquisition. After the land and improvements within the acquisition area have been valued, the appraiser must determine the value of the remainder after the acquisition. In determination of the value of the remainder, the appraiser should:

1. Assume the project has been completed according to plan;

2. Recognize the highest and best use for the remaining property, but only as it exists as a remnant of the prior larger parcel; and

3. Show by sales data or other applicable appraisal techniques, the market value of the remaining property based upon its highest and best use.

To assist the appraiser in valuing the remaining land, comparable sales listings (involving properties from which a right-of-way acquisition has been made in order to measure, by market data, the value of remainder properties) should be maintained by the Region Appraiser.

Nationally, one of the standard procedures for partial acquisitions is to appraise on a "before and after" basis. The "before and after" methodology of appraising is mainly used on larger partial takings. It is used to offset the financial damage or depreciation inflicted on the property as a result of the taking. It is done by subtracting the monetary benefits of the new road's contribution to the property from the total determined compensation.

In utilizing this approach, the subject parcel is appraised twice. The first or "before" appraisal is completed at the subject's current value. In estimating the "before" value, the appraiser is to disregard any increase or decrease in the market value of real property prior

to the date of valuation and caused by the project for which property is to be acquired or by the likelihood that the property would be acquired for the project, other than any decrease due to physical deterioration within the reasonable control of the owner. Note also that a change in the highest and best use of the remainder area due to the acquisition might result in a finding of damages or benefits to the remainder area or it may result in a material change in the intensity of use within a highest and best use, thereby being a basis for finding damages or benefits.

The second or "after" appraisal is done predicated on the condition of the parcel as it would be after completion of the road. To determine the compensation based upon fair market value, the benefits to the property as defined by the "after" appraisal are subtracted from the damages caused by the proposed project.

Criteria

The following criteria were used to assess the Arizona laws pertaining to the acquisition of right-of-way by the Arizona Department of Transportation:

- Public Law 92-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and updated, a federal law whose Right-of-Way acquisition guidelines must be followed by any State receiving federal funds

- Title 28, Transportation Laws of Arizona, Chapter 13 - Highways Division

- State of Arizona Department of Transportation, Highways Division Manual - Volume V.

Analysis

In September of 1988, the Arizona Department of Transportation performed a survey of 16 states to determine the experience of other state transportation agencies using the "before and after" method of appraisal. Additionally, the State of Texas performed a 50-state analysis, while the audit team also contacted a number of states. ADOT's survey was completed (1) to provide information to support legislative proposals to permit the use of "before and after" method of appraisal in Arizona; and (2) to determine the major areas where ADOT's right-of-way policies differed from the policies of other states. The responses to the ADOT survey were outlined in a memorandum supplied to the audit team at the beginning of the project.

A summary of the responses to ADOT's 16-state survey, is presented in Exhibit 7-1. When those states were asked if the "before and after" law worked well for their departments, approximately two-thirds of the states that responded said that their "before and after" law works well. Two other states said that their law had not yet been tested adequately to give

EXHIBIT 7-1

SUMMARY OF ADOT SURVEY OF STATE TRANSPORTATION AGENCIES USING THE "BEFORE AND AFTER" METHOD OF APPRAISAL

	Question #1		Question #2				Question #3				Question #4				Question #5		Question #6		Question #7			
	Yes	No	GD	FR	PR	NR	GD	FR	PR	NR	GD	FR	PR	NR	Yes	No	Yes	No	GD	FR	PR	NR
Alabama	X		X				X				X					X		X				X
Arkansas	X		X					X				X				X		X		X		
Colorado	X					X				X				X		X		X		X		
Connecticut	X		X					X					X			X		X		X		
Delaware	X			X			X						X		X			X		X		
Kansas	X		X					X					X		X			X				X
Kentucky	X		X				X					X				X		X				X
Maine	X		X					X			X					X		X			X	
Minnesota	X			X						X				X		X		X				X
Missouri	X		X							X				X		X		X				X
N. Hampshire	X					X				X				X		X		X				X
N. Carolina	X				X			X				X				X		X			X	
S. Carolina	X		X							X			X		X			X		X		
Texas	X			X				X				X			X			X	X			
Vermont	X					X				X				X				X				X
Washington	X		X					X				X			X			X	X			

Legend
GD = Good
FR = Fair
PR = Poor
NR = No Reply

Question #1: Which states utilize the "Before and After" Theory?

Question #2: How has the "Before and After" law worked for their departments?

Question #3: How successful has the court experience been?

Question #4: How is the public perception of the "Before and After" law?

Question #5: Does the state pay legal fees of Condemnees?

Question #6: Are businesses compensated during road construction?

Question #7: To what degree has the state experienced savings from the "Before and After" method of Appraisal?

Source: Arizona Department of Transporatation's Right-of-Way Acquition Process, ADOT, February 1991.

reliable answers. None of the respondents felt that this approach had been a failure; however, one state expressed a reservation about the cost-effectiveness of this law.

In response to an inquiry regarding court experience, three of the sixteen states (18%) reported success in court. Three states said they have had little or no experience in court. The other responses were mixed, but no state said that its efforts were clearly unsuccessful. These findings are consistent with the national acquisition experience of the audit team who have worked in states using the "before and after" method of appraisal.

When the inquiry regarding public perception of the law was answered, responses were inconclusive. Only two states realized a favorable or acceptable public response. However, none reported a highly unfavorable public perception. The general public's awareness and understanding of right-of-way laws and procedures seems to be limited. These findings are also consistent with the national experience of the audit team. In general, the public appears to be extremely uninformed regarding the procedures of right-of-way acquisition, as well as the specifics of appraisal methods.

When the question "What do you do when you have the option to take all or part of a small private parcel?" was posed, six of the sixteen states surveyed said that they could purchase part or all of a small parcel only if it was needed for the transportation project. This would indicate that these states cannot purchase any property other than that needed for the road project. Another six states indicated they may buy a small property parcel not directly needed for a highway project if an uneconomic remnant of the original parcel would remain. Three of the responding states indicated they could condemn property needed for highway purposes and would be unable to condemn any portion of the property not directly needed for the highway project. This would leave the question of an uneconomic remainder to be settled separately from the original condemnation proceeding.

Over half of the states responding to the survey replied that they would not pay the legal fees of condemnees under any circumstances. Three additional states permit recovery of legal fees only if the condemnee prevails. Two states indicated that they would award legal fees in certain situations. The remaining two states noted that they may award legal fees only in inverse condemnation cases.

When asked how they handled compensating owners of businesses during road construction that limits customer access, thus adversely affecting business, thirteen of the sixteen states replied they do not pay damages. The State of Maine compensates the owner with damages only if the business is relocated. In Texas, damages may not be granted unless access to a business is totally denied. Further, the States of Illinois and Montana also refuse to compensate a business for loss of revenue unless total access is denied during construction. This is accomplished by taking an average of the last three to five years' income, as

documented by the company's tax records, and compensating the owner for the projected loss of revenue for the time access is denied.

Two of the surveyed states reported making payments for "proximity damages". All states surveyed denied damage payments for reduced business access resulting from the addition of a median. Also, business damages for items such as "good will" or "going concern value" were denied. Likewise, eleven of these states do not pay for "proximity damages" to land adjacent to--but not taken for--a new project, but whose sales production is damaged by the encroaching roadway.

All of the States surveyed by Arizona indicated they use a "before and after" method of appraisal. Also all federal agencies use this method for valuing property.

Of the states surveyed, five states have reported considerable dollar savings from enactment of the "before and after" law. Responses to this question varied from millions of dollars in the State of Washington to $280,000 during the last three years in Arkansas. Texas estimated savings in the $18-20 million range and Delaware responded that $3-4 million over the past few years had been saved. South Carolina also indicated the law has saved money, but felt it could not provide an estimate of the amount. Only North Carolina believed the law had not resulted in actual savings. Specifics of the "before and after" method of appraising are discussed later in this section.

Information obtained from a recent report on governmental cost cutting proposals for the State of Texas[1] and the audit team's verification of information indicated that since this ADOT survey, Texas no longer uses the "before and after" or federal rules for appraisal due to a recent constitutional challenge.

This July 1991 report indicates that there are 24 states that sanction enhancements to offset the purchase price of a partial take, 22 states that have either a specific statute or constitutional provision that prohibits the enhancement of the remainder from being offset against the value of the land taken, and 4 states that require that enhancement of the remainder may be offset only against damage to the remainder and not against the value of the taking, but do not so require on constitutional grounds. Those states that use the "before and after" method of appraisal are listed in Exhibit 7-2. States that prohibit its use are listed in Exhibit 7-3. The Texas report further noted that of the ten largest states by population, five allow this practice. Of the ten largest states by total road miles, six allow this practice.

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[1]*Breaking the Mold-A Report of the Texas Performance Review, Volume 2, Part 1*, Texas Legislative Budget Board, July 1991.

EXHIBIT 7-2

STATES PERMITTING "BEFORE AND AFTER" METHOD OF APPRAISAL BY STATUTE OR CASE LAW

STATES CONTACTED	CONTACTED BY
ALABAMA	Arizona/Texas
CONNECTICUT	Arizona
DELAWARE	Arizona/Texas
HAWAII	Texas
IOWA	Texas
KANSAS	Arizona/Texas
KENTUCKY	Arizona/Texas
LOUISIANA	Texas
MASSACHUSETTS	Texas
MICHIGAN	Audit Team/Texas
MINNESOTA	Arizona/Texas
MISSOURI	Arizona/Texas
NEW HAMPSHIRE	Arizona/Texas
NEW JERSEY	Texas
NEW YORK	Texas
NORTH CAROLINA	Arizona/Texas
PENNSYLVANIA	Texas
RHODE ISLAND	Texas
SOUTH CAROLINA	Arizona/Texas
SOUTH DAKOTA	Texas
VERMONT	Arizona/Texas
WASHINGTON	Arizona/Texas
WISCONSIN	Audit Team/Texas
WYOMING	Texas

An advantage of utilizing the "before and after" method is that the State is not unduly penalized for building or expanding roadways which subsequently benefit the areas affected. Such benefits may include increasing traffic capacity of a roadway, or bringing access from a highway closer to the property, thus enhancing the commercial value of the property; recognizing the proper use of underutilized property (e.g., land whose highest and best use

EXHIBIT 7-3

STATES PROHIBITING "BEFORE AND AFTER" METHOD OF APPRAISAL BY STATUTE

STATES CONTACTED	CONTACTED BY
ALASKA	Audit Team/Texas
ARIZONA	Audit Team/Texas
CALIFORNIA	Texas
COLORADO	Texas
FLORIDA	Texas
GEORGIA	Texas
IDAHO	Audit Team/Texas
ILLINOIS	Audit Team/Texas
INDIANA	Audit Team/Texas
MAINE	Texas
MARYLAND	Texas
MONTANA	Audit Team/Texas
MISSISSIPPI	Texas
NEBRASKA	Texas
NEVADA	Texas
NEW MEXICO	Texas
NORTH DAKOTA	Texas
OHIO	Texas
OKLAHOMA	Texas
TENNESSEE	Audit Team
UTAH	Texas
VIRGINIA	Texas

STATES ADMINISTRATIVELY PROHIBITING "BEFORE AND AFTER" METHOD OF APPRAISAL

STATES INTERVIEWED:	INTERVIEW CONDUCTED BY:
NEBRASKA	Texas
OREGON	Audit Team/Texas
TEXAS	Audit Team
WEST VIRGINIA	Texas

would be commercial); and increasing highway frontage on uniquely and/or irregularly shaped property by expansion or construction of a highway.

Another advantage in using the "before and after" appraisal method is that increased donations of right-of-way are expected if the price of the parcel purchased for right-of-way can be offset against any enhancement in value to the remainder of the parcel. Some of the reasons for donation of lands for highway purposes are that (1) it encourages the highway department to build a roadway planned for an area in a particular corridor, thereby increasing the value and potential use of property along a roadway; and (2) the donations of right-of-way are eligible to be treated as a deduction of the fair market value of the land on the contributor's federal income tax return. This deduction can only be realized if the land is donated versus being condemned; therefore, by donating the land, the landowner saves being taxed on the enhancement value of the acquisition and the State saves additional money that would have otherwise been spent if condemnation proceedings were required.

Conclusions

As an alternative to "before and after" legislation, the Arizona legislature recently passed House Bill 2110 which changed the terminology for right-of-way condemnation compensation from "the highest price" to "the most probable price". The term "most probable price" is a subjective term, and it does not necessarily refer to the value of the property at the time of taking. This allows for several possible interpretations; and, therefore, its effectiveness for protecting the State from unreasonable awards is questionable. This bill represented a compromise between ADOT and the State legislature and will be analyzed in further detail under Question 7.2 of this audit report.

Arizona has incorporated into its right-of-way procedures the Uniform Relocation Assistance and Real Property Acquisition policies Act of 1970. By adopting these procedures and guidelines, the Arizona Department of Transportation's laws are similar to those of other states for the most part, as well as adhere to federal guidelines.

Arizona policies and procedures differ from many other states and the Federal government in one major right-of-way acquisition area, that is, the "before and after" law. The rest of the policies and procedures of ADOT are consistent with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, from which highway departments generally draw their right-of-way policies.

At least 24 states and all federal agencies use the "before and after" method of appraising property. This approach relies on historical market data in order to fairly measure the value of remainder properties. This approach would benefit ADOT in several regards. It would determine those factors which would enhance a parcel after the construction of a roadway, thereby offsetting the damages or depreciation of the taking by the highway department.

This effectively lowers the cost to purchase the right-of-way by demonstrating the benefits the parcel receives due to the construction of the road. It would also promote the donation of right-of-way and the reduction in condemnation cases, as affected property owners recognize the Federal income tax advantages of donation versus condemnation under the rules of "before and after" appraisal. This might lower the cost of right-of-way acquisition for those larger parcels likely to otherwise require condemnation.

Given the size and nature of the MAG program and its numerous partial takes, it would be advisable to utilize a "before and after" appraisal approach, thereby allowing the State to receive credit for the benefits the roads produce to adjacent property. In this manner, the State does not bear an undue burden for funding a roadway system which benefits specific land owners due to their proximity to the corridors alignments.

Recommendations

See recommendations under Question 7.2.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.2 Do current laws result in offers for property and court decisions and settlements which are fair to both property owners and the State? What changes, if any, should be made in Arizona's laws to improve fairness to all parties? What actions has ADOT previously taken to address its concerns with the statutes?

Criteria

The right of eminent domain is granted in both the federal and state constitutions. It is also provided in these documents that no private property can be taken without just compensation to the landowner. Arizona Revised Statutes 28-1865, Subsection N indicate that just compensation of fair market value is "the most probable price..."

Analysis

Current laws and ADOT policies mandate that "an approved appraisal shall be the basis for all purchases." The appraisal is completed by either a staff appraiser or, if the staff workload dictates, a fee appraiser. It is the duty of ADOT's Appraisal Services Unit to maintain a list of qualified fee appraisers.

Once the appraisal has been completed, it must be reviewed by the ADOT Appraisal Review Unit and approved prior to any offer being made to the property owner. To insure the integrity of this process, the ADOT Appraisal Review Unit is independent from the ADOT Appraisal Services Unit.

On parcels where the appraised compensation is between $50,000 and $150,000, the appraisal must be approved by the Manager of the Appraisal Services Unit. If the appraised compensation is over $150,000, it must be approved by the Chief Right-of-Way Agent. In some instances, two or more appraisals may be performed. This may have occurred because a landowner has his property appraised and then the State's appraiser performs an appraisal for acquisition purposes. In cases where two appraisals have been performed and a wide discrepancy exists, the review appraiser meets with each appraiser to determine the causes for the differences and makes an estimation of fair market value following the established procedures.

The majority of Arizona laws regarding compensation involved in the acquisition process are structured to favor the property owners. This was provided to insure that the individual does not bear an excessive burden of a project designed to benefit the entire community.

The one difference between Arizona's statutory authority and that of many other states, including federal agencies, is the lack of use of the "before and after" method of appraisal.

While this appraisal approach is used primarily on larger parcels, where there is a partial take, the dollar amounts involved in such parcels on the MAG Program corridors are potentially substantial and merit further consideration.

Based on interviews conducted in this audit, senior staff in ADOT's Right-of-Way Section and the State Attorney General's Office indicated that the laws of the State currently heavily favor property owners. It is their view that presently, both case law and federal statutes favor the property owner so overwhelmingly that they create an imbalance and place an undue burden on the State.

ADOT has frequently proposed "before and after" and other legislation within the last five years to correct this perceived imbalance. However, when introduced to the Legislature, many of these proposals have met strong opposition. Below are listed several of the proposed bills, with a short summary of their contents and dispositions as of the writing of this audit report.

- 1987 was the first year ADOT proposed legislation to allow "before and after" appraisals to be conducted, but it was never officially introduced because of lack of support in the Legislature.

- In 1988, House Bill 2326 was the second time ADOT introduced legislation to approve "before and after" appraisals. This bill failed to be heard in committee.

- In 1989, House Bill 2007 was the third time ADOT introduced legislation to allow "before and after" appraisals. This bill also failed to be heard in committee.

- In 1990, Senate Bill 1318 would have prevented property owners from changing zoning as a way to obtain more compensation. This bill failed to be heard in committee.

- In 1990, House Bill 2110 was a compromise "before and after" bill. The bill in its final form had six major points:

    (1) It allowed ADOT to enter into negotiations to purchase property at a price mutually acceptable to the property owner and the Department;

    (2) It changed the definition of market value from the "highest price" to the "most probable price" that a property will bring;

    (3) It stated that any decrease or increase in the market value of the property to be acquired, due to the project, shall be disregarded;

(4) It provided that appraisals be made available to property owners' attorneys in condemnation cases;

(5) It addressed a technical issue relating to payment of interest in condemnation cases; and

(6) It afforded an opportunity to the seller of highway right-of-way to buy the property back if it was no longer needed by the Department.

This bill was passed in 1990, and while it contained some wording that was beneficial to ADOT, it failed to alleviate many of the concerns expressed by the Department regarding its inability to offset the price of a partial take with the value of enhancements associated with the remaining portions of an owner's property.

Our research reveals that the Department did not pursue legislation to allow the "before and after" approach in the 1991 legislative session recently completed. Two bills that did pass which deal with property acquisition issues include the following:

- House Bill #2092, Chapter 300, Reference title: Transportation; Condemnation; Resolution of Necessity. This bill provides a new process for ADOT to acquire property in highway corridors by inverse condemnation. It also requires ADOT to adopt a resolution of necessity within 18 months after a corridor is set. Applicability is limited to future highway corridors not already accepted into the State Highway System, thereby exempting the current MAG Freeway/Expressway Plan corridors.

- Senate Bill #1042, Chapter 12, Reference Title Transportation; Condemnation; Repurchase Timing. This bill allows the original landowner to repurchase land taken by the State for transportation purposes, but later not used, up to eight years after the deed is recorded.

Conclusions

Based upon the audit team's experience and research, we believe that current Arizona laws strongly favor the interests of the property owner. A better balance should be provided by allowing ADOT to apply the "before and after" appraisal method. Our experience and research suggest that the "before and after" law fairly compensates property owners and provides the needed protection to the State from excessive awards.

The use of the "before and after" method is a recognized procedure in the appraisal profession. In interviewing a sample of appraisers who have worked with members of the audit team on highway-related projects, the consensus is that "before and after" appraisals are adequate tools to measure the effects of the partial takings.

It is contrary to the interests of the State to allow a landowner the ability to change zoning in a rural area, once the corridor of a highway has been identified. This practice allows a land speculator the ability to buy property in the path of a proposed freeway for agricultural value, and when approached by the State, can claim that the property was purchased for a commercial purpose. Under current Arizona law, the property owner would then be entitled to compensation at higher commercial value without any offsetting benefits the property would realize from the road's construction. The ability to be compensated based on the projected use of a property, without any offsetting benefits caused by the new roadway disproportionately favors the interests of the landowners who are affected by large takings by the State.

The appraisal process appears to be fair to both the property owners and the State, even though the appraisal methodology and subsequent offers to the landowners overly favor the landowner. The appraisal process in itself is adequate and the review process then ensures the integrity of the conclusions.

Recommendations

ADOT should continue to seek legislative authority to utilize the "before and after" appraisal method.

The audit team recommends that ADOT continue to introduce legislation in favor of a "before and after" appraisal method and advocate its approval. In order to pass the "before and after" legislation, the Bill will need the full support of ADOT as well as MAG, local elected officials, the business community, and the local citizens interested in fiscally prudent efforts to complete the MAG Program. It will need to be structured such that it will survive constitutional challenges while avoiding cumbersome provisions such as those that would require State payment of attorney's fees, loss of business damages, or proximity damages.

Given the large dollar amounts involved in right-of-way acquisition for the MAG Program and the industry-accepted practice of using this property valuation method, this is a legitimate and fair appraisal formula. Additionally, the "most probable price" definition of fair market value, as prescribed in A.R.S. 28-1050, needs further refinement and clarification to provide a consistent, documentable basis for appraising property required by ADOT. ADOT should continue to strive for these changes in statute.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.3 Has the State been adequately and competently represented by the Attorney General's Office in condemnation cases?

Background

The Transportation Division of the Attorney General's Office of the State of Arizona is responsible for handling cases where negotiation has reached an impasse and the Chief Right-of-Way Agent has determined that litigation is necessary. The Attorney General's Office then proceeds with legal action. It has the authority to settle a case if it is clearly in the State's best interest. Otherwise it proceeds to trial where compensation is determined by the Court.

The Attorney General's Office also handles driver's license reviews and all civil actions relating to transportation for the State. These various responsibilities result in significant case loads.

There is substantial personnel turnover in the Attorney General's Office that is attributed in part to funding and salary limitations.

Analysis

During the course of our interviews of persons both inside and outside of ADOT, we received a variety of answers to this question. Some indicated that the Attorney General's Office has competently represented ADOT. Others noted that the Transportation Division of the Attorney General's Office has limited staff, many of whom lack the background and experience to effectively compete against the legal resources retained by property owners to represent them in condemnation cases initiated by ADOT. Still others stated that ADOT impeded the efforts of the Office of the Attorney General by delaying turning over condemnation requests for action. Due to limited resources and the added burden of delayed "requests to prosecute," it was generally perceived that the Transportation Division was often unable to give each case the proper attention it deserved.

Over the years, the Attorney General's Office has requested staff increases from ADOT as shown below. These requests are noted in a Memorandum dated February 2, 1989 and in other agency documentation. None of the seven positions requested for 1991-1992 have as yet been authorized by ADOT.

PAST STAFFING REQUESTS

YEAR	POSITION REQUESTED
1986-1987	1 Special Agent IV 1 Legal Secretary II (2 requested, one supplied) I Legal Res. Sr. Specialist
1987-1988	1 Attorney IV 1 Special Agent IV 1 Legal Secretary II 1 Legal Res. Sr. Specialist

Additionally, outlined below is a table of current and future staffing requests.

CURRENT AND FUTURE STAFFING REQUESTS FOR STRATEGIC BUDGET PROCESS

1990-1991	2 Assistant Attorney Generals 1 Administrative Assistant II 1 Legal Assistant 1 Special Agent IV 2 Legal Assistant III 1 Clerk Typist III
1991-1992	2 Assistant Attorney Generals 1 Special Agent IV 2 Legal Assistant III 2 Legal Secretary II

There are, at the time of the writing of this report, 13 attorneys employed in the Transportation Division, with one additional vacancy authorized to be filled.

During the first four and a half years of the MAG Program there was no official format for communication and coordination between ADOT and the Attorney General's Office . This problem has since been addressed by the Highway Development Group of ADOT through the creation of the Condemnation Support Team. This team's functions are spelled out in the HIGHWAY DEVELOPMENT GROUP POLICY AND IMPLEMENTATION MEMORANDUM NO. 90-6 which was issued March 21, 1990 and subsequently revised on

June 4, 1991. According to the memo, this team meets on a monthly basis to address any issues that arise in regards to condemnation suits.

The Assistant Urban Highway Engineer has the primary responsibility for coordinating condemnation support assistance. Support is to be provided by the Right-of -Way Reviewer, a Senior Right-of-Way Appraiser, the Right-of -Way Acquisition Agent, the Urban Highway Right-of -Way Coordinator or Highway Plans Coordinator, the Corridor Management Consultant, and any other outside consultants. This team can be helpful to the Attorney General's Office in its case preparation and representation of the State in condemnation suits.

In order to keep all affected sections and units informed of the status of the condemnation cases, the Urban Highways Section maintains and issues monthly Condemnation Tracking Report. The first report was issued in April 1991. The Audit Team reviewed the condemnation tracking reports from April through July, 1991. The information contained therein is informative and detailed. The report is circulated throughout Urban Highways Section, Right-of-Way Operations, Right-of-Way Plans, and to the ADOT Litigation Support Team.

According to the ADOT Urban Highways Section Condemnation Tracking System Summary Report issued July 2, 1991, there are currently 183 active cases. This total includes cases where settlements have been negotiated and are awaiting judgement and/or payment, or the final order of condemnation has not been received and recorded. There are also, at the issuance of the July Report, three condemnation trials that were scheduled for the month of July 1991.

Conclusions

The ability of the Transportation Division staff in the Attorney General's Office to represent ADOT in right-of-way condemnation cases is limited by the defensibility of the appraisals that are prepared for the properties. Past deficiencies in the ability of the Attorney General's Office Transportation Division to represent ADOT resulted primarily from insufficient coordination between ADOT and the Transportation Division and limited staff resources within the Transportation Division.

During the past year, ADOT has attempted to address the first deficiency, by establishing a Condemnation Support Team to help coordinate technical support for potential or pending condemnation cases; establishing a condemnation tracking report system to help the Department monitor the status and progress of right-of-way condemnation cases and workload; and having the Urban Highways Section serve as the conduit for all condemnation cases being forwarded to the State Attorney General's Office.

The staffing deficiency has been partially resolved by the current slowdown in the Program and the slump in the real estate market reducing the number of condemnation cases. However, this may be only a temporary solution. Despite the aforementioned requests for additional staffing, only one additional attorney has been added to the Attorney General's Office Transportation Division staff over the last four years, 1987 to 1991.

Case loads of up to 40 condemnation files early in the MAG Program may have prevented Transportation Division attorneys from devoting required amounts of time and preparation to each case, particularly since these same attorneys also had a variety of other ADOT-related responsibilities. From a staffing standpoint, adequate representation was an unrealistic expectation, during the early formative years of the MAG Program. Given the current slow down of new acquisitions, the current case load is much more reasonable. However, if workload returns to its former level, performance will again be affected.

From our investigation, there have been very few documentable cases where the original offer by ADOT was upheld by the Court. It appears that in nearly every instance, the State was ordered by the Court to pay a higher settlement than originally offered. However, proper preparation by the Attorney General's staff in order to argue against high counter-demands is clearly evidenced as having been beneficial in keeping selected awards substantially lower.

Recommendations

ADOT should budget adequate resources (permanent or contract) for the Transportation Division of the State Attorney General's Office to adequately handle cases resulting from programmed right-of-way acquisition for the MAG Program.

The Transportation Division of the Attorney General's Office draws its funding directly from ADOT. All requests for additional personnel are reviewed by the Director of ADOT. In the future, ADOT should estimate the projected workload of the Attorney General's Office, based on ADOT's projected acquisition program, and fund Transportation Division staffing accordingly, with appropriate lead time for adequate training of new staff members.

The benefits to a full time staff of trained condemnation attorneys are that they would be familiar with ADOT's policies and procedures and be ready to prosecute the cases assigned to them. Also a cohesive team approach to problem solving can be promoted in order to assist in areas where one may be more proficient in an area than another, thereby aiding problem solving and alternate approaches to prosecuting cases.

In instances where workloads and timing do not allow for adequate preparation for trial with current staff or when highly complicated cases with significant exposure to the State occur, outside counsel should be utilized.

Qualified outside council may be utilized for short periods of time without the State's having to be burdened with long-term personnel costs after the case loads lighten.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.4 What right-of-way acquisition plans and strategies should be considered in the future to contain future costs? For example, what should be the planning and timing of acquisitions for future projects? What portion of program funds should be allocated for right-of-way acquisitions? Is the current allocation adequate and cost effective over the life of the program?

Background

Since the inception of the MAG Program, through June 26, 1991, ADOT has acquired 4,236 acres of land at a cost of $674,210,800. This is an average of $190,253 per acre. For the 1,954 parcels purchased in this time frame, this represents an average of $345,041 per parcel.

These parcels represent a total of 33 percent of the acreage needed to complete the project. MAG Program. Exhibits 7-4 and 7-5 show the range of land values paid by corridor, and percentage of land acquired by corridor.

Analysis

To arrive at valid findings we have compared projected costs and allocations to actual monies expended, together with an analysis of current acquisition strategies as defined in the five-year program.

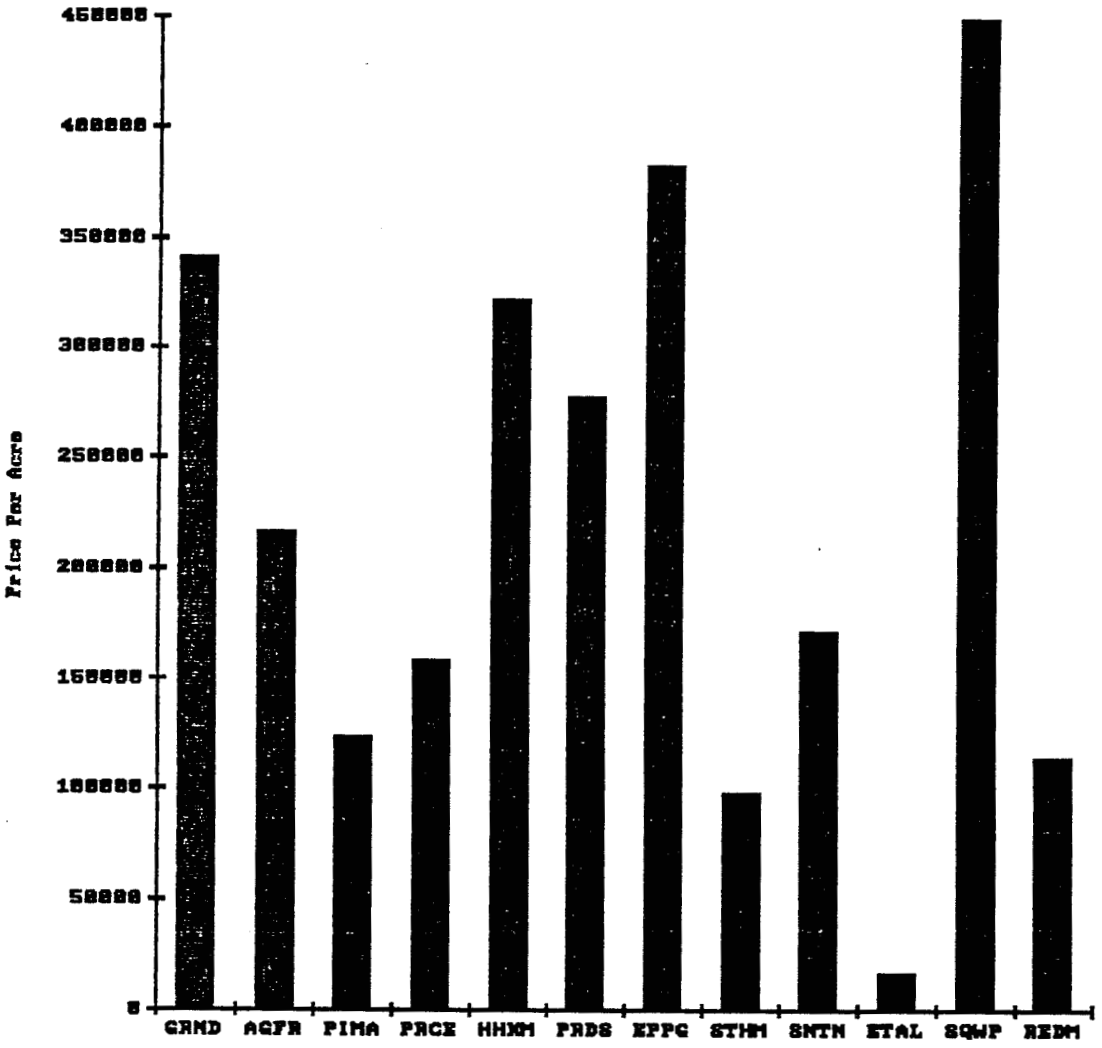
According to the five-year highway construction program for Fiscal Years 1992-1996 prepared by ADOT's Transportation Planning Division, the priority funding will be for Interstate Reconstruction Projects. This refers to the ongoing repair of interstate roads for which ADOT is responsible. Second on the priority program list is the funding for the MAG and PAG Controlled Access Routes.

ADOT is currently employing several strategies in addition to proposing legislative reforms to control right-of-way acquisition costs. Among these methods are the following:

- Continuing to monitor the costs of right-of-way acquisitions.
- Establishing a separate fund to be used for advanced acquisition of residential properties located within corridors of the MAG Freeway/Expressway Plan in order to alleviate hardships of the infirm or financially burdened.
- Avoiding accelerated acquisition of right-of-way and limiting advanced acquisition to demonstrated hardship cases

EXHIBIT 7-4

MAG PROGRAM RIGHT-OF-WAY ACQUISITION COSTS PER ACRE BY CORRIDOR



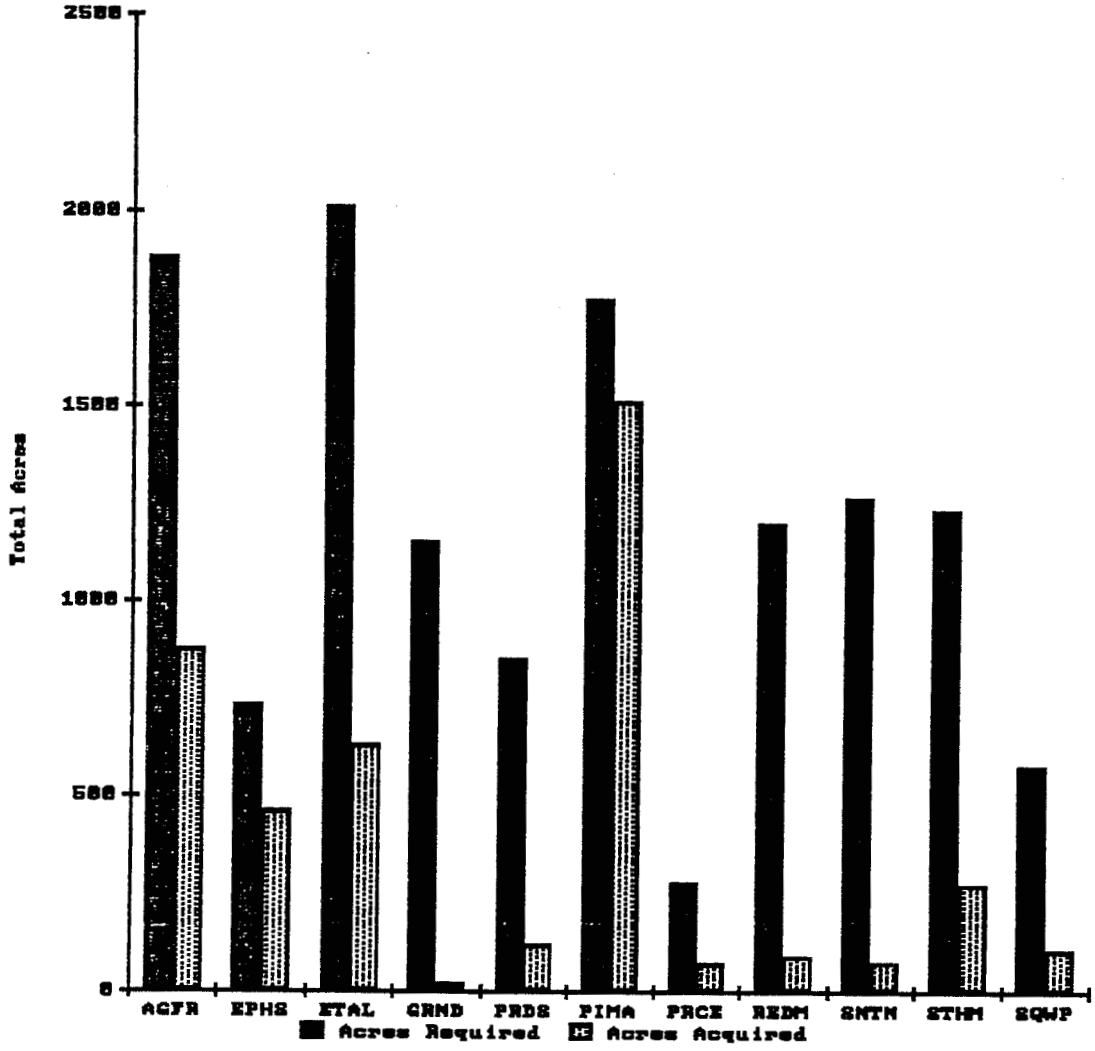
LEGEND

CORRIDOR	ABBREVIATION	AVERAGE PRICE PER ACRE
Grand Avenue	GRND	$ 340,630.
Agua Fria	AGFR	$ 215,971.
Pima	PIMA	$ 122,889.
Price	PRCE	$ 157,700.
Hohokam	HHKM	$ 321,009.
Paradise	PRDS	$ 277,259.
East Papago	EPPG	$ 382,126.
South Mountain	STHM	$ 97,730.
Santan	SNTN	$ 171,206.
Estrella	ETAL	$ 16,214.
Squaw Peak	SQWP	$ 448,871.
Red Mountain	REDM	$ 114,230.
OVERALL AVERAGE PRICE PER ACRE		**$ 222,153.**

Source: ADOT Highways Division.

EXHIBIT 7-5

PERCENTAGE OF MAG PROGRAM RIGHT-OF-WAY ACREAGE ACQUIRED BY CORRIDOR



LEGEND

CORRIDOR	ABBREVIATION	ACRES REQUIRED	ACRES ACQUIRED	PERCENTAGE ACQUIRED
Agua Fria	AGFR	1881	876	46.57%
E. Papago/Hohokam/ Sky Harbor	EPHS	733	459	62.62%
Estrella	ETAL	2010	632	31.44%
Grand Avenue	GRND	1151	21	1.82%
Paradise	PRDS	851	121	14.22%
Pima	PIMA	1770	1508	85.20%
Price	PRCE	277	73	26.35%
Red Mountain	REDM	1200	89	7.42%
Santan	SNTN	1265	77	6.09%
South Mountain	STHM	1233	272	22.06%
Squaw Peak	SQWP	576	108	18.75%
TOTAL		**12947**	**4236**	**32.72%**

Source: ADOT Highways Division.

- Establishing a condemnation support team of Highways Division staff to assist the Transportation Division of the State Attorney General's Office prepare for condemnation cases and develop alternative alignments and designs which might lower the cost of right-of-way acquisition.

- Employing "value engineering," to reaffirm the overall function of a transportation system and to determine whether or not alternative or modified concepts will fulfill the same function while offering tangible savings in overall right-of-way, construction, and operation costs.

- Instituting a "red letter process" which is designed to coordinate efforts of ADOT and local jurisdictions to forestall development in corridors by working with local officials to restrict zoning of property within or adjacent to highway corridors.

- Cooperating with local governments and private developers in obtaining right-of-way contributions and zoning restrictions.

- Working with landowners and municipalities to help pay for traffic interchanges.

- Cooperating with local governments for the design and construction of joint use drainage facilities where such facilities act to reduce costs.

- Studying financing alternatives such as leasing land above and below highways, privatization, transportation corporations, road utility districts, and other mechanisms.

Currently ADOT estimates of the costs to acquire remaining right-of-way needed for the various corridors comprising the MAG Program amount to almost $1.2 billion. Exhibit 7-6 lists the breakdown of this total by corridor.

The allocated right-of-way budget in the FY 1992-1996 program is $80.6 million. Using This represents only 6.8 percent of the total dollar value of the remaining right-of-way required for the MAG Program as currently planned. To match the requirements listed in Exhibit 7-6, ADOT would need to spend on a average over $83 million a year (in 1991 dollars) over the remaining 14 years of the Program. At the current programmed level of right-of-way acquisition, it would take about 73 years to acquire all the right-of-way needed for the Program. Therefore, the current allocation falls far short of the level of funding needed remaining over the life of the program.

Currently, there are $12 million allocated for advanced acquisition in the 1991-1992 time frame. Funds are derived from both RARF and HURF monies. However, these funds were budgeted for Fiscal Year 1992, and there are no further funds scheduled for this purpose during the rest of the current five-year program.

EXHIBIT 7-6

REMAINING RIGHT-OF-WAY COSTS BY MAG PROGRAM CORRIDOR
(Millions of Dollars)

Agua Fria	-	$ 50.7
Estrella	-	69.1
Grand Avenue	-	273.0
Hohokam	-	9.6
Paradise Parkway	-	321.6
Pima	-	42.6
Price	-	42.0
Red Mountain	-	89.0
Santan	-	161.1
Sky Harbor	-	8.3
South Mountain	-	48.4
Squaw Peak	-	55.8
Total		$1,171.2

Source: ADOT Urban Highways Section, July 1, 1991.

Conclusions

ADOT has instituted a variety of strategies to help control the costs of future right-of-way acquisitions for the MAG Program. With two-thirds of the MAG Program acreage left to

be acquired, the continued application of these strategies and the development of further strategies is essential if the Department is going to be able to keep the right-of-way acquisition costs from further significant escalation.

Current allocation of program funding is based on the priority programming of MAG section projects, consistent with the priorities of the MAG Regional Council. At current programmed spending levels, the Department will be able to acquire only 20 percent of the remaining right-of-way needed for the MAG Program by 2005. This reflects the lower levels of excise tax revenues forecasted for the rest of the Program, the higher costs already incurred on past Program activities, and the higher costs and acreage of right-of-way needed for the overall Program than originally estimated in 1985.

Unless significant additional funding sources are found or major portions of the MAG Program are curtailed in scope or deleted, less than half of the total right-of-way needed for the MAG Program will be able to acquired before the Program runs out of available funds.

Recommendations

Continue to avoid accelerated acquisition of right-of-way, regardless of funding availability, and avoid advanced acquisition where a negotiated settlement can not be reached, except in demonstrated hardship cases.

Accelerated acquisition of right-of-away can lead to expensive problems due to the pressures placed on staff in the Right-of-Way Section of ADOT and the Transportation Division of the State Attorney General's Office. These problems include having to return for "second takes" when additional parcel portions are needed, or having to perform multiple relocations of businesses or homeowners.

The Department should avoid pursuing advanced acquisition cases, except in documented hardship cases, if condemnation is required.

Expand the scale of the advanced acquisition program during periods of lower real estate prices.

When real estate prices are down, ADOT should attempt to acquire property needed for MAG Program corridors, particularly those with projects in the five-year program. However, this must be done within the constraints of available MAG Program funding and consistent with the section priorities assigned by the MAG Regional Council. It must also reflect the need to advance both preliminary engineering and construction in a balanced fashion. Otherwise, the Department could end up with significant unused real estate and no ability to build freeways on it.

Expand the local matching program for expediting MAG Program projects and intensify efforts to obtain land donations from affected property owners in return for expediting projects in the five-year program schedule.

Given the MAG Program's financial constraints, ADOT should significantly expand its local matching and property donation programs in order to leverage available RARF and HURF monies. This would enable more of the MAG Program to be completed within the schedule and funding constraints of Proposition 300 and encourage local support for the development of other funding sources for the MAG Program.

ADOT should assess the full costs and risks associated with taking condemnation cases to trial in determining the most cost-effective strategy to handling right-of-way acquisition cases.

As a cost saving procedure, there is the need for ADOT to consider all costs involved in settling a case through the Attorney General's Office. Potential preparation costs for expert testimony, additional appraisals and/or witness fees can outweigh the expense of a settlement. To pursue a condemnation case where the possibility of higher costs exists can expose the State to both the expenses of preparation as well as the payment of an award that favors the landowner. In a situation where this circumstance occurs, review by the upper management of ADOT of all potential cost exposure is warranted so as to determine possible final liability and, therefore, be in a position to contemplate a settlement which may be less expensive in the end. This is not intended to diminish the effectiveness of eminent domain proceedings, or the need for the State to have and use this authority, rather it is meant to realistically explore a means for financial responsibility of public funds.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.5 Does the right-of-way section have adequate controls over the appraisal development, negotiation, and settlement process? Are the controls sufficient to ensure the integrity of the process?

Background

The Right-of-Way Section is charged with the responsibility of acquiring any property rights needed for any State highway project. Under the Right-of-Way Section is the Appraisal Unit, upon whose valuations are based the "fair market value offer" presented to the landowner from whom property interests are to be acquired.

Criteria

The policies and procedures of the Right-of-Way Section are documented in the Arizona Department of Transportation Highways Division ADOTM-1 Volume V Manual.

Analysis

The Arizona Department of Transportation Highways Division ADOTM-1 Volume V Manual as amended and updated was reviewed to determine the adequacy of the procedures and controls of the ADOT Right-of-Way Section. The manual is broken into nine sections, each of which comes under the direction of the Right-of-Way Section. They are:

1. Right-of-Way Administration
2. Right-of-Way Operations
3. Right-of-Way Appraisal
4. Right-of-Way Acquisition
5. Right-of-Way Condemnation
6. Right-of-Way Plans
7. Right-of-Way Titles
8. Right-of-Way Property Management
9. Right-of-Way Relocation

Based on our review of this manual and other procedural documentation of the Right-of-Way Section and Highway Development Group, we found that the internal system of checks and balances within ADOT's negotiation and settlement procedures is consistent with and comparable to other states.

Under the Appraisal (ADOTM-1-V-4042) tab at Chapter 1.02, it is stated that appraisal services fall under the direction of the Chief Right-of-Way Agent. The Appraisal Services Manager, under the direction of the Chief Right-of-Way Agent, must operate under the appraisal policies and procedures as outlined in the ADOTM-1-V Manual. However, to insure the integrity and impartiality of the appraisal process, any appraisal must be reviewed and approved before negotiations begin. To further insure the soundness of the appraisal, under Chapter 2.02, Subheading "D," the Manual states that the Appraisal Review Unit shall be separate from the Appraisal Services Unit. This is implemented in order to eliminate any internal conflict of interest and to preclude the possibility of any outside input on the appraised value.

To further insulate the different sections from the appraisal process, Right-of-Way Section (ADOTM-1-V-4043) Chapter 7.02 Subheading "A," states that no acquisition agent who has made or has assisted in making the parcel appraisal shall in any manner participate in the acquisition thereof.

Under the Right-of-Way Acquisition section of the ADOT-1 Manual, Chapter 2.04, the Acquisition Agent has to observe the rules and regulations governing the specific transaction in accordance with the Acquisition Standards, Chapter 7, and lists the State and federal laws by which the agent must abide.

One important item that was formerly lacking from the Right-of-Way Section's ability to negotiate was the ability to perform administrative settlements. In April of 1990, the Manager of the Acquisition Services unit requested and received authorization from Chief Right-of-Way Agent to approve administrative settlements up to $10,000. This authorization is documented in a memo dated April 16, 1990. The Manager of the Acquisition Services unit was also granted authority to approve ADOT leases in this memorandum.

In the course of the audit we found a number of examples where controls were not effectively followed. In the case of the acquisition of right-of-way for the Agua Fria Freeway through the Arrowhead Ranch development, there was virtually no documentation as to the purported negotiations and subsequent understanding that was supposedly reached regarding the basis for acquiring this property for the Outer Loop, west of I-17 and north of the Phoenix City limits. The alignment of the corridor through the Arrowhead Ranch property allegedly took place predicated on the future donation of property. The guidelines set forth under Chapter 2.05 state that in the course of negotiations the agent must enter all

actions taken with respect to the subject parcel into the Contact Report. In the course of interviewing ADOT employees we were informed that the early negotiations (1982-1986) for the Arrowhead Ranch right-of-way were conducted by the State Engineer and Director. These discussions between ADOT and the developers of Arrowhead Ranch failed to reach a final agreement. However, the alignment decision to run a portion of the Outer Loop through the Arrowhead Ranch property remained. The Department began the formal right-of-way acquisition process for this property in 1987 without a firm basis for establishing what had earlier transpired between ADOT and the developer regarding the developer's willingness or commitment to donate property to the MAG Program. As a result, the case has ended up in court over the issue of just compensation. Better, more thorough documentation consistent with the standards of the Department, could have clarified the intent of the developers with respect to possible land donation and provided ADOT decisionmakers a more informed basis for deciding where to locate the corridor and how much to budget for right-of-way acquisition.

Another example of a control that was not exercised properly involved the Department's acquisition of property located at 4747 North 7th Avenue. This recently completed building was purchased by ADOT under the Advanced Acquisition Program for an amount, that according to a February 2, 1989 Memo from the negotiator, was in excess of fair market value. The appraised price was $1.5 million, and because of the debt load of the owner, an administrative settlement in the amount of $1.75 million was requested and approved. While the building was located in the planned alignment for the Paradise Parkway corridor, this project had yet to be included in any ADOT five-year program for actual construction. The main advantage of acquiring the property was that the building could be used as temporary office space during the remodeling of ADOT's main offices. In addition, the adjacent property was condemned for use as a parking lot for ADOT. These actions suggest an inappropriate use of MAG Program funds, particularly since the building's use by ADOT staff was not reimbursed to the RARF fund until early this year.

Conclusions

The Right-of-Way Section appears to have proper controls over all the necessary phases of negotiation and appraisal, based on our review of ADOT policy manuals and our investigation of interoffice memos and reports.

While the Department has developed proper controls over the right-of-way acquisition function, deficiencies such as those cited above suggest that further diligence be applied to ensure that these controls are properly and consistently applied. In recent years, the Highway Department Group has instituted a variety of procedures aimed at improving the control of right-of-way activities. These include:

- Establishment of a condemnation support team in March 1990 to ensure proper internal review and support of property acquisition cases which are likely or actual candidates for condemnation proceedings

- Provision of Urban Highways Section involvement in authorizing the Right-of-Way Section to proceed with property acquisition consistent with the five-year program

- Institution of quarterly funding allocations to the Right-of-Way Section by the Administrative Services Division, in order to better control right-of-way expenditures relative to the five-year program budget

- Implementation in early 1991 of a condemnation tracking system and monthly condemnation status report

- Development of the "red letter process" to facilitate communication and coordination between ADOT and local zoning/code enforcement agencies regarding prospective development in MAG Program corridor alignments

ADOT has taken steps in the past two years to improve controls over the right-of-way acquisition function and to ensure they are being followed. We recommend that ADOT continue to review their controls and consider the following suggestions for improvement.

Recommendations

The Right-of-Way Section should ensure that all right-of-way acquisition cases be fully documented from the initiation of internal discussions to final disposition.

In accomplishing this, the Chief Right-of-Way Agent should require that all unit managers in the Right-of-Way Section make sure staff follow all applicable documentation procedures and formats. This should involve periodic reviews of all case files by the unit managers, and unannounced spot reviews by the Chief Right-of-Way Agent. The case files should include all letters, memos, agreements, reports, correspondence, meeting notes, and other such documentation to fully describe the chronology, responsibility, nature, and basis of each step in the right-of-way acquisition process.

The Right-of-Way Acquisition Parcel Status Report data base should be updated more promptly to facilitate up-to-date management reporting of right-of-way acquisition activities to ADOT MAG Program managers both inside and outside the Right-of-Way Section.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.6 What factors have most contributed to increases in right-of-way costs over original estimates? At what stages in the process, and on what types of purchases, have the most significant increases occurred? How does ADOT's experience with these increases compare to prior experiences in Arizona and national experience?

Background

There are several different types of property rights that can be acquired for highway projects. The most expensive acquisitions occur when the State needs to acquire a fee interest in a piece of property. There are two types of fee ownership that the State may acquire. The first is a whole taking of a parcel. This occurs when the State requires an entire property for roadwork or the portion that is not needed becomes an uneconomic remainder and is, therefore, purchased to alleviate any undue burden being placed on the property owner. The second type of fee interest that the State may acquire is through a partial taking. A partial taking occurs when only a portion of the property is needed, and the remainder is viable for use.

Analysis

The original cost estimates for right-of-way on the MAG Program were based on preliminary planning estimates from a series of areawide transportation corridor planning studies performed in 1984/1985, plus representative historical cost information from recent urban freeway projects in the Phoenix area (I-10, Superstition Freeway, and Squaw Peak Parkway).

The initial estimates of right-of-way costs were based on average costs per mile of freeway, assuming a 300-foot-wide corridor. The per mile average unit costs reflected past right-of-way acquisitions from the early 1980s. These unit costs tended to be understated, since they were not adjusted for inflation and did not generally reflect the related costs of:

- Demolition
- Relocation
- Asbestos abatement
- Hazardous waste containment (Superfund site)
- Noise abatement

As the MAG Program evolved, following the 1985 vote, the scope of the Program increased. These scope changes included:

- 14 percent increase in total lane-miles (+162 lane miles) due to higher traffic forecasts
- 23 percent increase in the total number of traffic interchanges (+29 traffic interchanges)
- 14 new freeway-to-freeway interchanges (none in initial plan)
- 41 miles of expressway replaced by freeway
- 55.6 miles of freeway becoming depressed (versus 9.1 miles originally planned)

Due to these Program scope increases, the number of acres required for the MAG Program increased from an initial estimate of 8,500 acres to the current estimate of 12, 947 acres. This represents a 54 percent increase in the amount of land needed for the Program.

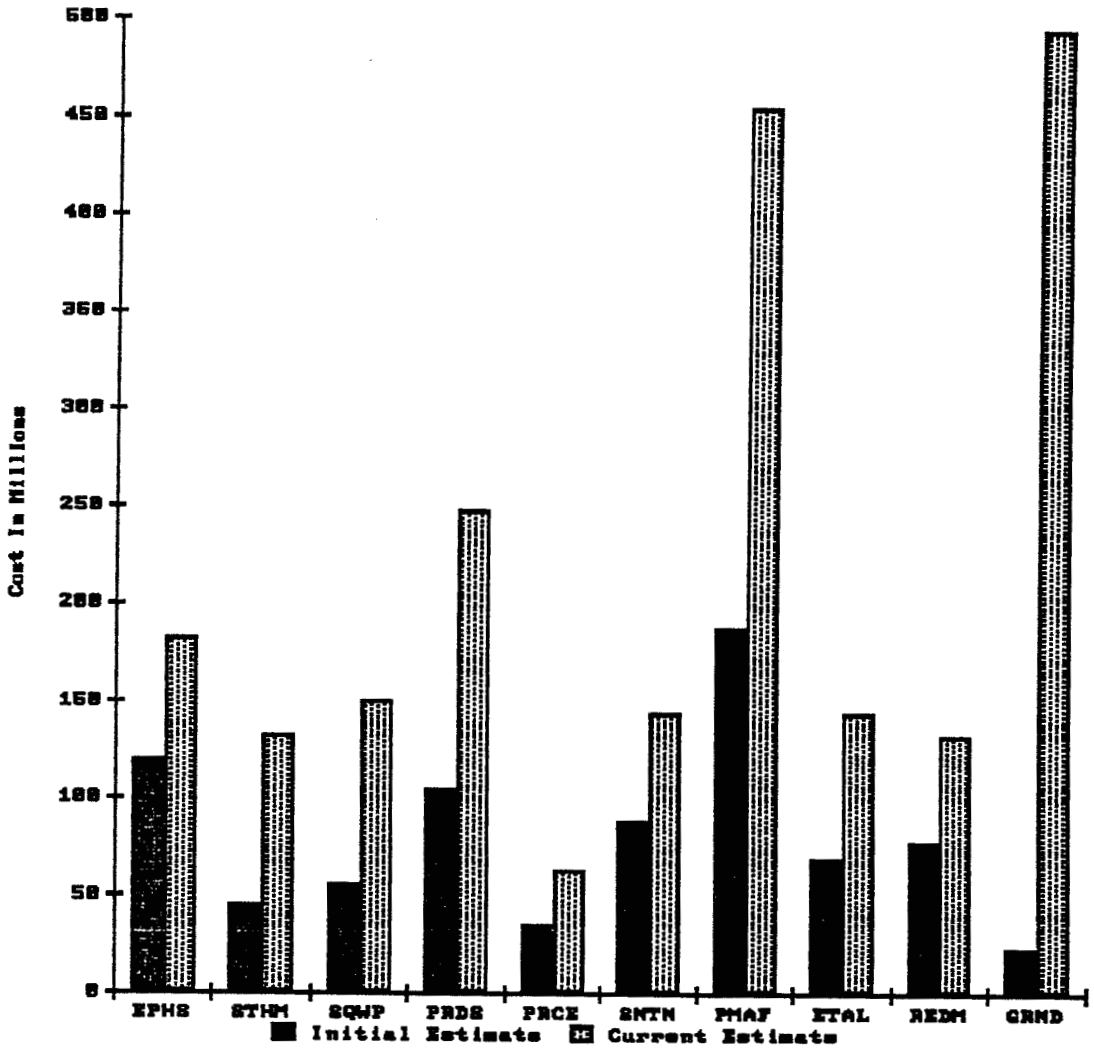
In 1990, MAGTPO estimated that these various Program scope changes had increased the right-of-way cost estimate for the Program by $350 million. MAGTPO also estimated that the higher cost per acre of real estate contributed another 750 million to the total. As shown in Exhibit 7-7, the current estimate of total right-of-way costs for the MAG Program has grown from $803.6 million in 1985 to $2.14 billion currently, representing a 167 percent increase over a six-year period.

Other factors that should be considered in determining what caused the increases in right-of-way costs are the costs of court settlements and condemnations. While these are relatively few in number, accounting for about 6.5 percent of the total number of parcels acquired to date, the costs were considerable. Based on ADOT information, Exhibit 7-8 shows that the percentage difference between the State's offers and the final awards on MAG Program cases that were settled without trial was about 15.3 percent. Exhibits 7-9 and 7-10 indicate court awards based on trial reports and requests for authority to condemn within the MAG Program. Over the past five years, the overall costs of court awards were about double the offers originally made by the Department. Much of this difference can be attributed to a single case, where the court awarded $21.5 million in Fiscal Year 1989-90 for a property originally appraised by ADOT at $8.95 million

According to Exhibit 7-9, the highest percentage of difference between the State's offer and the court awards during a single fiscal year occurred in FY 1989-1990, when there was 140 percent difference. According to ADOT, a recent study of right-of-way costs for the federal interstate highway program indicated that final settlements averaged 37.3 percent above state transportation departments' original estimations of value for both out-of-court

EXHIBIT 7-7

INITIAL AND CURRENT MAG PROGRAM RIGHT-OF-WAY COST ESTIMATES



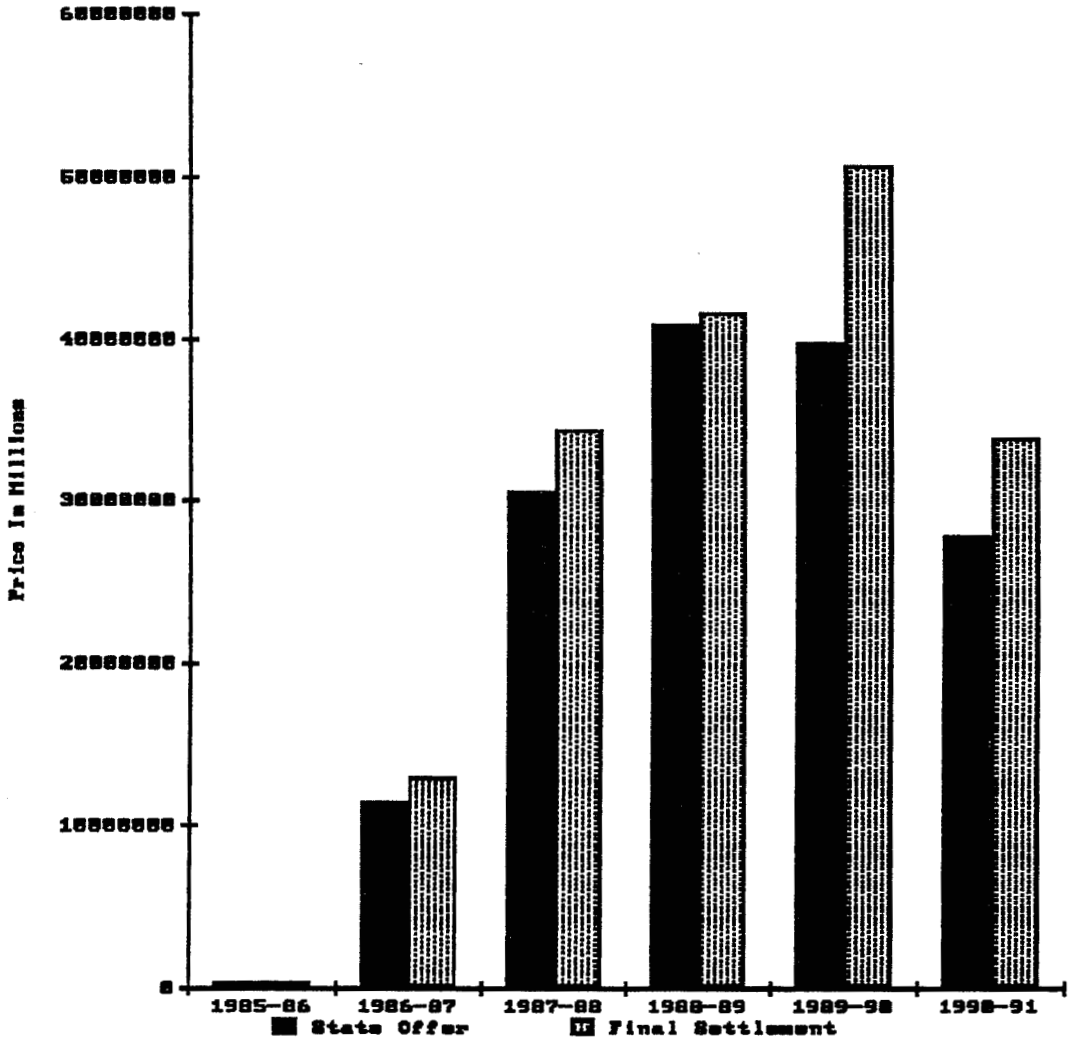
LEGEND

CORRIDOR	ABBREVIATION	INITIAL ESTIMATED RIGHT-OF-WAY COSTS	CURRENT ESTIMATED RIGHT-OF-WAY COSTS
E. Papago/Hohokam/ Sky Harbor	EPHS	$ 120.3	$ 182.0
South Mountain	STHM	$ 45.0	$ 132.0
Squaw Peak	SQWP	$ 55.0	$ 150.0
Paradise	PRDS	$ 104.0	$ 247.0
Price Road	PRCE	$ 35.0	$ 63.0
Santan	SNTN	$ 88.0	$ 144.0
Pima & Agua Fria	PMAF	$ 187.3	$ 454.0
Estrella	ETAL	$ 69.0	$ 144.0
Red Mountain	REDM	$ 77.0	$ 132.0
Grand Avenue	GRND	$ 23.0	$ 494.0
TOTAL		**$ 803.6**	**$ 2,142.0**

Source: ADOT Highways Division.

EXHIBIT 7-8

MAG PROGRAM RIGHT-OF-WAY SETTLEMENTS WITHOUT TRIAL



LEGEND

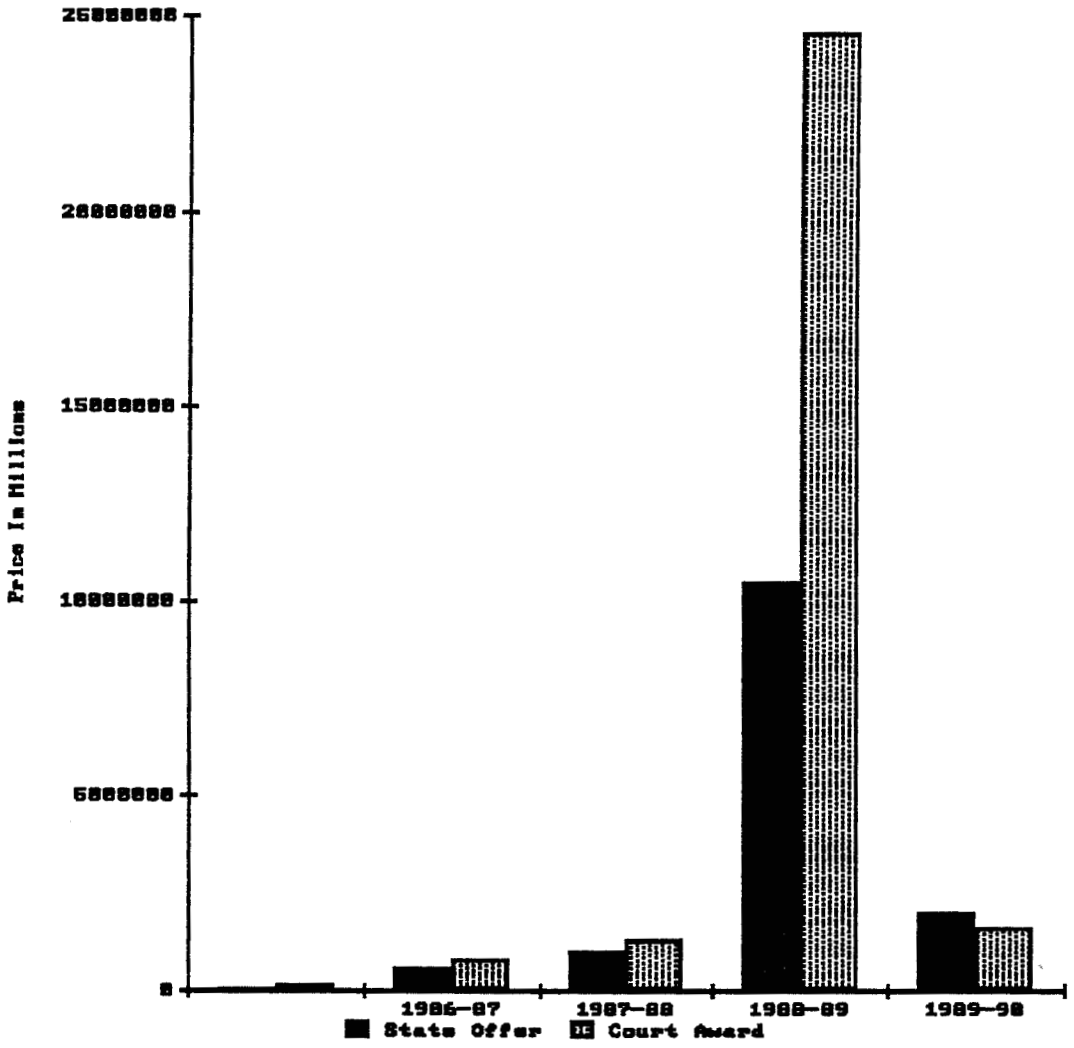
YEAR	NUMBER OF CASES	STATE OFFER	FINAL SETTLEMENT
1985-86	6	$ 334,900.	$ 356,300.
1986-87	24	$ 11,383,376.	$ 12,982,858.
1987-88	44	$ 30,509,880.	$ 34,337,615.
1988-89	66	$ 40,843,075.	$ 41,569,920.
1989-90	62	$ 39,750,762.	$ 50,686,958.
1990-91	41	$ 27,860,738.	$ 33,868,310.
TOTAL	**243**	**$ 150,682,731**	**$ 173,801,961.**

PERCENTAGE OVER STATE OFFER/EXPERT TESTIMONY: 15.34%

Source: ADOT Highways Division.

EXHIBIT 7-9

MAG PROGRAM RIGHT-OF-WAY
COURT AWARDS BASED ON TRIAL REPORTS



LEGEND

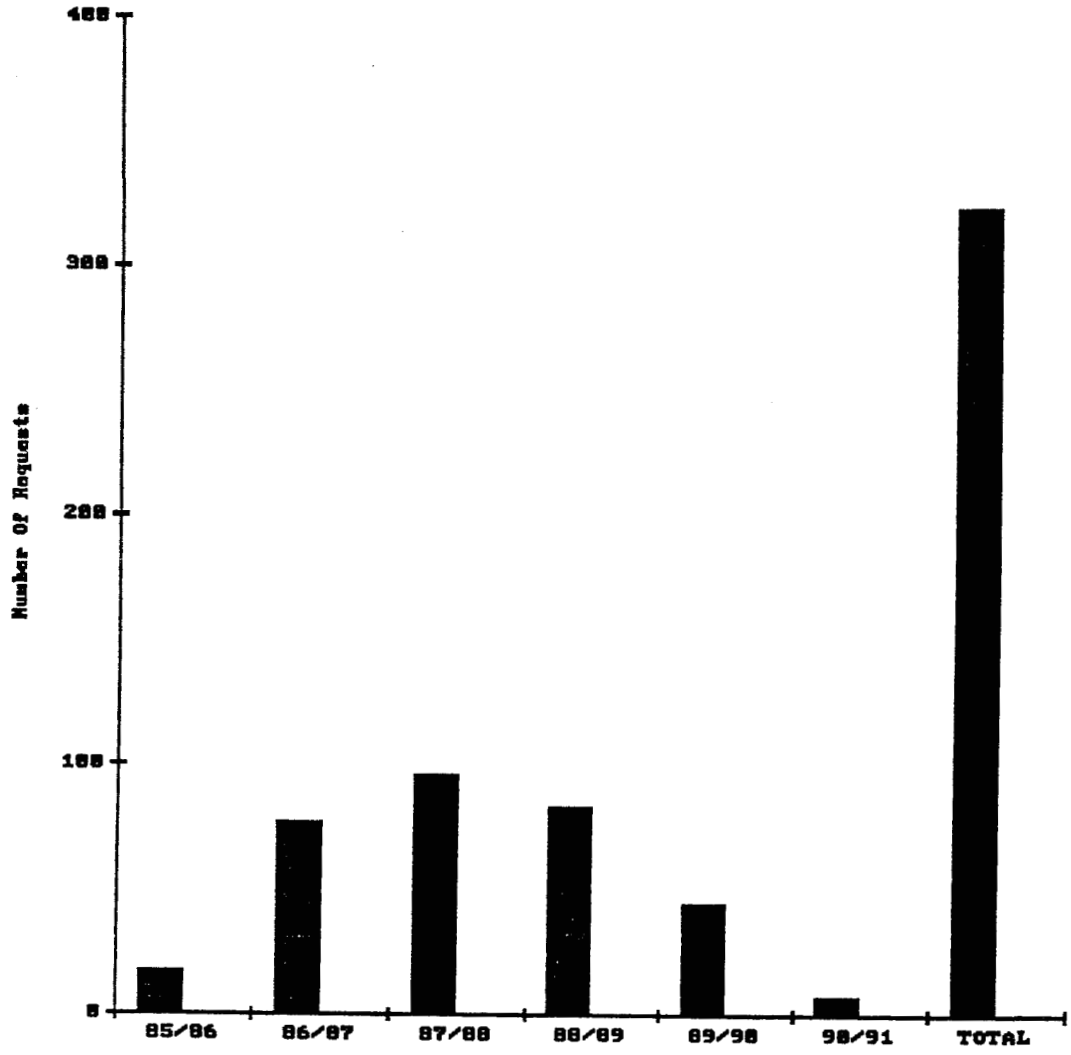
YEAR	NUMBER OF CASES	STATE OFFER	COURT AWARD
1985-86	0	$ N/A	$ N/A
1986-87	1	$ 34,650.	$ 121,650.
1987-88	2	$ 551,300.	$ 771,339.
1988-89	2	$ 996,125.	$ 1,290,000.
1989-90	5	$ 10,470,100.	$ 24,565,833.
1990-91	2	$ 1,968,000.	$ 1,582,163.
TOTAL	**12**	**$ 14,020,175.**	**$ 28,330,985.**

PERCENTAGE OVER STATE OFFER/EXPERT TESTIMONY: 102.07%

Source: ADOT Highways Division.

EXHIBIT 7-10

MAG PROGRAM RIGHT-OF-WAY
REQUESTS FOR AUTHORITY TO CONDEMN



LEGEND

CORRIDOR	85-86	86-87	87-88	88-89	89-90	90-91	TOTAL
Agua Fria	4	45	17	0	1	0	67
Pima	3	14	31	7	2	1	58
Squaw Peak	1	0	2	6	8	0	17
East Papago	9	14	45	60	32	6	166
Grand Avenue	0	0	0	3	0	0	3
South Mountain	0	2	0	0	1	0	3
Red Mountain	0	2	1	0	0	0	3
Paradise	0	0	0	1	0	0	1
Price Road	0	0	0	6	0	0	6
TOTAL	**17**	**77**	**96**	**83**	**44**	**7**	**324**

Source: ADOT Highways Division.

settlements and court awards. Arizona's experience with the MAG Program reflects an average increase of 22.7 percent, which compares quite favorably with the national statistics cited above.

A review of Exhibit 7-10 indicates that the volume of condemnation cases for the MAG Program has decreased significantly since FY 1987-88. This is due to the combined effects of a reduced level of effort by ADOT to acquire right-of-way by condemnation for the MAG Program, the downturn in the local economy and the local real estate market, and the reduced size of the MAG Program budgeted in succeeding ADOT five-year programs.

Conclusions

Since the start of the MAG Program, estimates of the cost to acquire all right-of-way required to complete the Program have grown by $1.1 billion, more than doubling the original estimate. Design and scope changes that have occurred since the MAG Program was started have driven up the acreage of right-of-way needed, increasing the overall cost by an estimated $350 million. Condemnation awards and the general increases in property values which had occurred between the time when the historical acquisitions were made (upon which the preliminary MAG Program cost estimates were based) and the time when ADOT began acquiring property for the MAG Program have resulted in an additional estimated $750 million increase in the cost for MAG Program right-of-way.

ADOT has obtained approximately 6.5 percent of all parcels through court proceedings. This is in line with ADOT's experience statewide and is comparable to the audit team's knowledge of other states. As a rule of thumb in the right-of-way industry, it is expected that anywhere from 5 percent to 10 percent of all parcels acquired require court action to settle; and usually in an urban area, a higher percentage can be expected. When considering both out-of-court settlements and court awards, ADOT's average percentage increase in settlement costs for MAG Program right-of-way is only two-thirds of comparable national statistics. The major difference noted here is the size of the awards granted by the courts, a statistic that was significantly impacted by a single case in Fiscal Year 1989-90, in which the court awarded $21.5 million for a property originally appraised by ADOT for $8.95 million.

Recommendations

For recommendations on controlling right-of-way costs see Question 7.7.

REVIEW OF RIGHT-OF-WAY ACQUISITION LAWS AND PRACTICES

7.7 Can ADOT more effectively control or mitigate the factors affecting right-of-way costs by modifying its internal policies, practices, procedures or controls governing the right-of-way planning and acquisition process?

Conclusions

ADOT's procedures and policies, as outlined earlier in this section, are consistent with those of most states. The policies of ADOT, as defined by the ADOTM-1 Right-of-Way Manual, are based in large part on statute.

In reviewing the policies of ADOT with the purpose of looking for cost efficient modifications which could be made, three specific areas of improvement should be addressed.

First, ADOT needs to consider all costs and risks involved in settling a case through the Attorney General's Office. Potential costs to pay for expert testimony, additional appraisals and/or witness fees can outweigh the expenditure of a settlement. To pursue a condemnation case where the possibility of higher costs exists can expose the State to both the expenses of preparation as well as the payment of an award that favors the landowner. In a situation where this circumstance occurs, review by the upper management of ADOT of all potential cost exposure is warranted so as to determine possible final liability and, therefore, be in a position to contemplate a settlement which may be less expensive in the end.

Eminent domain proceedings are a necessary part of a state transportation agency's right-of-way acquisition and negotiation process. However, in the interest of fiduciary responsibility with public monies, there may be cases where the cost of preparation for a trial may be more than any potential award. In certain cases, it would be in the best interests of the State to consider a counter offer before proceeding with the trial.

Second, accelerated schedules often expose the State to higher costs. Accelerated schedules can cause increases through change orders by contractors. These may occur when the Right-of-Way Plan Services unit prepares for a scope of work under an accelerated schedule. Realizing that the entire process begins with the planning of a project, putting extra pressure on the Plans Services unit may force the "scope of work" that is distributed to contractors to be prepared with undue haste. The possibility of accidentally omitting details from the scope of work becomes a real probability and this may expose the State to change orders from contractors that may result in substantially increased costs. While ADOT is not currently on an accelerated schedule, it would be in the best interests of ADOT to avoid accelerated schedules in the future. Other problems that stem from

accelerated schedules may include design changes that force a "double take" from a property owner, or that force a "double move" for a relocated business. All of these potential problems are expensive to the State by their nature and can be avoided for the most part by eliminating any acceleration of acquisitions other than those acquisitions in the Advanced Acquisition Program.

Third, an Advanced Acquisition Program, as opposed to accelerated scheduling, may be an effective method of controlling costs. Among the program's objectives, as outlined in an Office Memo dated May 25, 1990 from the Chief Right-of-Way Agent, is forestalling development in proposed highway corridors by purchasing property well in advance of normal acquisition and construction schedules. This is particularly cost-effective if property can be acquired during periods of lower real estate prices. After FY 1991-1992, there are no funds allocated for this program. The potential long-term cost savings of this program merit considering of continued funding.

These and other suggestions for helping ADOT more effectively control right-of-way costs of the MAG Program are listed below.

Recommendations

ADOT should continue to consider the full costs and risks of taking a condemnation case to court versus accepting a negotiated settlement in determining the most cost-effective strategy to handling right-of-way acquisition cases.

ADOT should avoid accelerated acquisition schedules, regardless of the size or funding status of the MAG Program. ADOT should program its right-of-way acquisition efforts to avoid "second takes," "double moves" for relocated businesses, and uncertainty on the part of land owners by establishing a methodically steady pace of right-of-way acquisition efforts and thereby controlling the time frame between funding authorization and actual acquisition.

ADOT should extend the Advanced Acquisition Program, consistent with budgetary and priority programming constraints, and avoid advanced acquisition of properties which would need to be condemned, except for demonstrated hardship cases.

ADOT should be joined by MAG, RSET, the local business community, and residents interested in completing the MAG Program in the most fiscally prudent manner in promoting legislative changes to permit the "before and after" appraisal method, that can survive constitutional challenges while avoiding cumbersome provisions such as those that would require State payment of attorney's fees, loss of business damages, or proximity damages.

ADOT should reimburse the RARF fund for the Department's use of property acquired with RARF monies.

ADOT should assess the staffing requirement of the Transportation Division of the Attorney General's Office, given the projected work load from the Department, and authorize/fund sufficient full-time or contract staff in a timely manner. Legal staff required by the MAG Program should be funded out of the MAG Program funds, since they perform a direct function in support of the acquisition of right-of-way for the MAG Program.

ADOT should continue to pursue land donations and third-party funding arrangements with private developers, businesses, and local jurisdictions to lower the costs of right-of-way acquisition and to increase its available funding. To facilitate this, ADOT should significantly increase its local matching program for expediting projects in the Department's five-year program.

ADOT should continue its recent initiative to provide a condemnation support team to assist the Office of the Attorney General in preparing for impending cases, and to seek alternative alignments or design changes which could significantly mitigate the need to proceed with condemnation prior to submitting cases to the Office of the Attorney General.

ADOT's Right-of-Way Section should consistently document all actions/agreements involving the appraisal, negotiation, settlement, and acquisition of property for the MAG Program, and update its Right-of-Way Parcel Status Report database in a more timely manner to facilitate up-to-date management reporting.

ADOT Right-of-Way Section staff and top management should continue to strive to comply with the policies and procedures for guiding and controlling the Department's right-of-way acquisition process. This will require periodic/random management reviews of documentation to ensure compliance by staff.

8. CONCLUSIONS

The prior sections present the findings and recommendations of the comprehensive performance audit of ADOT's Urban Highways Program. Detailed responses to 46 questions concerning MAG Program revenue forecasts, cost estimates, priority programming procedures, program management procedures, and right of way acquisition procedures are documented in this report.

The performance audit is intended to serve several important purposes. Many of the questions in the performance audit focused on clarifying and documenting responsibilities and rationales for prior MAG Program decisions as well as clarifying matters of "fact," such as the contents of MAG plans at the time of the Proposition 300 vote in 1985. Some questions also were raised because of widely different understandings of events and roles in the MAG Program that needed to be clarified. A second grouping of questions focused on why certain problems and issues have arisen with the MAG Program and responsibilities for such problems. A third set of questions focused on MAG and ADOT policies and procedures to assess their adequacy and appropriateness to meet future Program requirements.

Problems and opportunities for improvement have been identified in each of the five areas of focus of the performance audit. Many recommendations have been made to improve the efficiency and effectiveness of ADOT's and MAG's management of the Program. Some of these problems could have and should have been avoided by both ADOT and MAG while some problems were very difficult to foresee, such as the significant economic downturn in Maricopa County. In some cases, the problems were beyond the control of ADOT or MAG, such as changing State laws concerning right of way acquisition, which is the responsibility of the State Legislature.

In assessing the conclusions and recommendations in this performance audit, the following should be kept in mind:

- The MAG Program, which is intended to add about 230 miles of freeways and expressways to the existing Maricopa County highway system, is the largest current urban freeway and expressway program in the nation. This program is an enormous undertaking by any standards.

- The program is unique in terms of its being funded by local revenues and in terms of ADOT's and MAG's institutional relationships and roles in the Program.

- Virtually all urban highway and public transportation construction programs nationally have encountered citizen concern and opposition because of real and perceived impacts on neighborhoods, parks, businesses, and other land uses. Many of these programs have

also encountered schedule delays and, in certain cases, significant cost escalation because of expanded design requirements; inflation in materials, labor, and right of way; and schedule slippage.

- Despite the many years of transportation planning for Maricopa County, the approval by the Legislature and ultimately by the voters of the half-cent excise tax for the MAG Program occurred over a relatively short period of time. An aggressive implementation program was adopted by MAG and this required ADOT, which was heavily focused on rural highway construction programs, to quickly initiate a large-scale urban highway design, right-of-way acquisition, and construction program in Maricopa County.

- The original revenue and cost estimates for the MAG Program at the time of the Proposition 300 vote were essentially planning level estimates that were not based on detailed engineering studies or on sophisticated econometric analyses. These are some of the reasons why revenue forecasts have been overly optimistic and costs have increased beyond the original estimates. The dramatic and essentially unforseen slowdown in the County's, the State's and the nation's economy also had a significant impact on MAG Program revenues and costs.

This report contains many recommendations to correct known Program problems; to improve existing ADOT and MAG policies, procedures, and practices; and to develop and implement new procedures to enhance the efficiency and effectiveness of the MAG Program in the future. The thrusts of the recommendations are to:

- Promote greater public accountability of both ADOT and MAG in terms of financial management, revenue estimation,cost control, and schedule adherence and to recognize MAG's important plan development, priority setting, and financial policy roles in the Program

- Promote and facilitate public involvement in and familiarity with the status and future priorities of the Program through MAG's preparing an annual report for the Program and holding annual public hearings on the status, future priorities, and costs and revenue requirements of the Program, as well as by the Transportation Board and ADOT improving the timeliness, clarity, and consistency of communications with the public, elected officials, local governments, and other interests

- Improve ADOT's revenue estimation, priority setting , and program management practices to fully account for overall Program revenue and schedule constraints and commitments, and not just focus on the next five-year highway program

- Implement a budget-based monitoring, reporting, and control process for the overall MAG Program so that short-term decisions regarding scope, financing, and scheduling are not permitted to undermine the long-term viability of the Program.

- Seek legislative approval of the "before" and "after" method of right-of-way acquisition which is intended to control costs and more equitably balance property owner and State interests in the right-of-way acquisition process

- Control right-of-way costs by avoiding accelerated right-of-way acquisition and advanced acquisition in cases of condemnation

- Encourage MAG and the Transportation Board to consider more moderate bonding strategies for the MAG Program which would enable the Department to develop and maintain a more balanced program over the life of the available funding sources.

The specific recommendations presented in the report build upon the many improvements ADOT has made in its policies, procedures, and practices,particularly in the last two to three years. The recommendations, in our judgment , are feasible to implement with the support of MAG and the Legislature. These recommendations should be implemented regardless of whether additional revenues are approved to complete the balance of the MAG Program. However,it is especially important that the audit's recommendations be implemented if additional Program revenues are authorized. The implementation of and adherence to the recommended program management procedures is a key to ADOT's and MAG's controlling local government and citizen requests for project enhancements if additional funds become available to the MAG Program.

The MAG Program is scheduled to be complete in the year 2005 if adequate funding is available. It must be recognized that forecasts of population, development, revenues, and costs over such a long period are subject to many uncertainties. Well designed and implemented financial management and program management procedures and systems will help anticipate and respond to unforeseeable demographic and economic changes that will inevitably occur over time.

APPENDIX A

PERFORMANCE AUDIT QUESTIONS

Review of Excise Tax Revenue Forecasting Procedures

1. What entities were involved in developing original revenue forecasts? How were original revenue estimates determined?

2. Were estimation methods and assumptions appropriate? How did assumptions compare to those used in other forecasts at the time?

3. Was the forecasting process adequately documented and subject to appropriate review and approval?

4. Were the forecasts updated in an appropriate and timely manner? Were appropriate and timely adjustments made in the program in response to the updated forecasts?

5. Are current revenue forecasts (for both the existing one-half cent sales tax and proposed additional one-half cent sales tax) appropriate and reasonable, and based on sound and defensible forecasting methods?

6. Has ADOT adequately managed the bonding process for the existing one-half cent sales tax? What changes, if any, will ADOT need to make in its management of the bonding process if the proposed additional one-half cent sales tax is enacted?

7. By how much will the revenues from the existing one-half cent sales tax exceed the debt service requirements for existing bonds?

Review of Program Cost Estimates

1. What entities were responsible for developing original estimates of program costs, including costs for right-of-way acquisition and construction?

2. How many miles of highway were assumed in original cost estimates? How many miles were assumed in the estimates as presented to the voters in 1985? What adjustments were made to the original number of miles? Were corresponding adjustments made in cost estimates?

3. How many acres of right-of-way were assumed in original cost estimates? What adjustments were made to original estimates and costs?

4. What design features (e.g., number of interchanges, miles of roadway below grade, number of lanes, etc.) were assumed in developing original cost estimates? What design features were assumed for the program as presented to the voters in 1985? Were these assumptions appropriate and realistic given traffic volume projections and other factors which would normally be considered in designing an urban highway system?

5. On what basis were cost/mile right-of-way and construction estimates developed? How did these estimates compare with actual costs of right-of-way and construction of freeways previously constructed in Maricopa County and with costs experienced nationally? Did the estimates include all costs normally associated with right-of-way or construction costs?

6. What impact did changes in original design features have on original estimated costs for right-of-way and construction?

7. Were appropriate and timely adjustments made in program cost estimates in response to design level changes on individual segments of the system?

8. How, if at all, did new or unforeseen regulatory requirements impact program costs?

9. Are current program cost estimates appropriate and reasonable, including estimates for remaining right-of-way acquisition and construction?

Review of Priority Programming Process

1. What are the statutory roles of the Maricopa Association of Governments (MAG) Regional Council, ADOT, and the Transportation Board in setting corridor priorities and programming construction activity?

2. How were original corridor priorities set for the program? What were the roles of the MAG Regional Council, ADOT, and the Transportation Board?

3. Has the priority setting process sufficiently open and accessible to the public? Was the process adequately documented?

4. What criteria were used in setting the original corridor priorities? Did the programming process follow these priorities? Are these acceptable criteria and priorities in the transportation industry?

5. What adjustments were made to original corridor segment priorities? When were the adjustments made? Who initiated adjustments? How were adjustments reviewed and approved? What was MAG's role? What was ADOT'S and the Transportation Board's role?

6. What was the basis for the adjustments of original programming decisions? Were justifications made for sound financial or technical reasons? Were justifications of the modifications adequately documented?

7. Were appropriate and timely program adjustments made in response to declining revenues?

8. How was the initial allocation of funds among right-of-way acquisition, location and design work, and construction determined? Who was responsible for making the determination?

9. What were the short and long term effects of this allocation on individual segments, program costs, and ADOT's ability to complete the highway system as originally planned?

10. What changes, if any, are necessary in the priority process to ensure the remaining portions of the program are completed as efficiently, effectively, and economically as possible?

11. Are changes needed in the statutory roles of the MAG Regional Council, ADOT, and the Transportation Board?

Review of Program Management Practices and Procedures

1. What budgetary controls were established over individual projects, highway sections, and the program as a whole?

2. How were revenue and cost estimates incorporated into the budgetary controls established for the program?

3. What monitoring of budget variances (budget vs. actual) occurred for individual projects, highway sections, and the program as a whole?

4. Were appropriate approvals obtained for budget variances and were appropriate adjustments made to project, section, and overall program budgets?

5. Who had responsibility for overseeing the day-to-day management of the program, including the monitoring of budgets and costs? Were these individuals adequately supported by management information systems?

6. What level of staff within ADOT was responsible for supervising design and development of individual highway sections and negotiating with local communities? Did these staff have authority and control appropriate to their responsibilities?

7. What responsibilities did the management consultants have for overseeing the day-to-day management of the design, development, and construction process? Did management consultants have authority appropriate to their responsibilities? Did ADOT exercise sufficient oversight control over its consultants?

8. Were ADOT program management or consultant decisions altered or modified as a result of influence or pressures exerted outside the appropriate and established forums for local citizen participation? If so, what was the impact on program costs and ADOT's ability to complete the highway system as originally planned?

9. Were ADOT program managers, technical staff and management consultants adequately buffered from outside pressures or interference? Are controls over such potential interference adequate? How do these controls compare to those governing Federal highway and other ADOT projects?

10. What criteria or guidelines governed the process for approving or disapproving local requests for upgrades in highway designs? Who made these decisions and were the decisions adequately justified? How were cost impacts of these decisions considered?

Review of Program Management Practices and Procedures (Continued)

11. What management policies, procedures, and systems were established to promote efficient and economic allocation of the program's financial resources? What changes, if any, in management practices are needed to strengthen financial management and improve cost efficiency? Will additional changes be necessary if the proposed tax is enacted?

12. Did the entities involved in developing and implementing the program have sufficient controls over possible conflicts of interest?

Review of Right-of-Way Acquisition Laws and Practices

1. How do Arizona's laws governing right-of-way acquisition compare to laws in other states? What jurisdictions use the "Before and After" concept previously proposed by ADOT?

2. Do current laws result in offers for property and court decisions and settlements, which are fair to both property owners and the State? What changes, if any, should be made in Arizona's laws to improve fairness to all parties? What actions has ADOT previously taken to address its concerns with the statutes?

3. Has the State been adequately and competently represented by the Attorney General's Office in condemnation cases?

4. What right-of-way acquisition plans and strategies should be considered in the future to contain future costs? For example, what should be the planing and timing of acquisitions for future projects? What proportion of program funds should be allocated for right-of-way acquisitions? Is the current allocation adequate and cost efficient over the life of the program?

5. Does the right-of-way section have adequate controls over the appraisal development, negotiation, and settlement process? Are controls sufficient to ensure the integrity of the process?

6. What factors have most contributed to increases in right-of-way costs over original estimates? At what stages in the process, and on what types of purchases, have the most significant increases occurred? How does ADOT's experience with these increases compare to prior experiences in Arizona and national experience?

7. Can ADOT more effectively control or mitigate the factors affecting right-of-way costs by modifying its internal policies, practices, procedures or controls governing the right-of-way planning and acquisition process?

APPENDIX B

LIST OF INTERVIEWEES

GENERAL INTERVIEWS:

Burton Barr	Former State Legislator, Arizona
Larry Chavez	Chairman, Transportation Board
Peter Corpstein	Former State Legislator, Arizona
Kenneth Driggs	Executive Director, Regional Public Transportation Authority
Senator James Henderson	Senate Transportation Committee
Cyril Hodgins	Economic Consultant, Regional Public Transportation Authority
Dennis Hoffman	Economics Professor, Arizona State University
Representative Jack Jackson	House Transportation Committee
Paul Johnson	Mayor of Phoenix, Arizona
Joseph Lane	Former Speaker of the House, Arizona
Robert Lockwood	House Research Director, Legislative Staff Committee
Alan McGuire	V.P., Rauchscher Pierce Refsnes, Inc., Legislative Staff Committee
Charles Miller	Associate Administrator, Federal Highway Administration
Dennis Mitchem	Arthur Andersen & Co./Residents for Safe and Efficient Transportation (RSET)
James Redpath	Former Chief Counsel, Arizona Department of Transportation
Guy Reed	Former Member, Transportation Board
Robert Robb	RSET Consultant/Chamber of Commerce
Peggy Rubach	Mayor of Mesa, Arizona
Donald Schlagenhoff	Economics Professor, Arizona State University
Representative Lela Steffey	House Transportation Committee
Senator Douglas Todd	Senate Transportation Committee
Terry Trost	Chamber of Commerce Economist, Legislative Staff Committee
Vivian Valle	Citizens Opposed to Senseless Transportation Schemes (COSTS)
Jane White	Co-Chairperson, Freeway Action Now
Laurie Woodall	Assistant Attorney General, Transportation Division

ARIZONA DEPARTMENT OF TRANSPORTATION INTERVIEWS:

Charles Cowan	Director, Arizona Department of Transportation
James Creedon	Deputy Director, Arizona Department of Transportation
Harry Reed	Director, Transportation Planning Division
Roger Herzog	Priority Programming, Transportation Planning Division
Terry Johnson	MAG Transportation Planning Office, Transportation Planning Division
Suzanne Sale	Division Director, Administrative Services Division
John McGee	Special Asst. for Strategic Management, Administrative Services Division
Herb Uphoff	Chief Economist, Administrative Services Division
Gail Nash	Comptroller, Administrative Services Division
Thomas Ross	Resource Administration, Administrative Services Division
Timothy Ahrens	Cash Management Manager, Administrative Services Division
Bradley Steen	Fiscal Planning Economist, Administrative Services Division
Paul Palley	Cash Management Economist, Administrative Services Division
Gary Robinson	State Engineer, Highways Division
August Hardt	Deputy State Engineer, Highway Operations Group
Ronald Williams	Construction Manager, Construction Section
Robert Mickelson	Deputy State Engineer, Highway Development Group

Dennis Grigg	Assistant State Engineer, Structures Section
John Lewis	Assistant State Engineer/Location Section
Richard Strange	Location Services Engineer, Location Section
Rosendo Gutierrez	Engineer, Urban Highways Section
Larry Langer	Assistant Engineer, Urban Highways Section
Charles Eaton	Assistant Engineer, Urban Highways Section
William Hayden	Administrative Support Services Officer, Urban Highways Section
Lee Albertson	Cost Control/Value Engineer, Urban Highways Section
Rolando Simeon	Corridor Engineer, Urban Highways Section
Stephen Martin	Design Engineer, Urban Highways Section
Terry Bourland	Right-of-Way Utilities Engineer, Urban Highways Section
Bob Helmandollar	Chief Right-of-Way Agent, Right-of-Way Section
John Wilson	Administrative Services Officer, Right-of-Way Section
Brian Rockwell	Operations Services Manager, Right-of-Way Section
Calvin Pepper	Acquisition Services Manager, Right-of-Way Section
Stephen Hansen	Appraisal Services Manager, Right-of-Way Section
Peter Eno	Plans Services Manager, Right-of-Way Section

MAG INTERVIEWS:

Jack DeBolske	Secretary
Dennis Smith	Staff Coordinator