G A O
Accountability * Integrity * Reliability

United States General Accounting Office
Washington, DC 20548

March 16, 2001

The Honorable Joe Knollenberg
Chairman, Subcommittee on the
District of Columbia
Committee on Appropriations
House of Representatives

Subject: Restructuring of the District of Columbia Department of Public Works' Division of Transportation

This letter responds to the Subcommittee's request for information on how the government of the District of Columbia (District) is addressing two factors—a staffing shortage and an increased workload—that may be affecting the ability of the Department of Public Works (DPW), Division of Transportation (DDOT), to contract for work. In June 2000, we briefed the Subcommittee that as of April 30, 2000, $530.5 million in unexpended federal-aid funds was available to DDOT for projects that date back to at least fiscal year 1993. Of that amount, at least $282 million was for projects for which contracts had not been awarded.[1] We also reported that DDOT's processing times for design and construction projects were lengthy—25.7 months and 21.6 months, respectively, from the date the Federal Highway Administration (FHWA) notified DDOT of its obligation ceiling to the date when the contractor was sent the notice to proceed with the work. At that time, the new Acting Director of DDOT said that problems with staffing and procedures, such as those for internal and external project review and approval, were delaying the award of contracts for projects.

As agreed with the Subcommittee, the objectives of our work were to provide information on (1) how state and other engineering and construction organizations were handling staffing shortages and increased workloads and (2) the status of the District's efforts to reorganize DDOT to improve service. As further agreed, we provided the District with the information we gathered on what others, including two

[1]The $530.5 million refers to obligated, unexpended federal-aid funds. Under the federal-aid highway program, the federal government's obligation to pay the states and the District of Columbia for the federal share of a project's eligible costs occurs when the project is approved and the project agreement is executed. See 23 U.S.C. § 106. The term "obligation" can also refer to the commitment the government makes when it awards a contract.

state highway departments, were doing to address staffing shortages. This information should aid DDOT in its efforts to refocus and reorganize to more effectively carry out its mission and improve its productivity and responsiveness to the highway improvement needs of the District. Enclosure I lists the reports and documents that we provided to DDOT officials.

Results in Brief

To handle staffing shortages and increased workloads, states and other engineering and construction organizations have been relying increasingly on contractors to perform functions that were previously done in-house. This trend was reflected in two state highway departments, identified by FHWA, that we visited. Both Arizona and South Carolina were relying extensively on consulting engineers to handle major portions of their workloads. Two recent studies also identified ways in which organizations acquiring design and construction services have dealt with staffing shortages and increased workloads. A September 1998 report by the American Association of Highway and Transportation Officials (AASHTO) identified 24 different strategies that state highway departments have used to cope with these challenges. In addition, a January 2000 report by the Federal Facilities Council (FFC),[2] formerly the Federal Construction Council, identified 18 best practices being used by federal construction agencies and the construction industry in general to provide adequate management and oversight for design review functions in an era of limited resources. These practices include team building, partnering, and involving all stakeholders in the early stages of a project's development and in design review activities throughout the project.

The Acting Director of DDOT has started to reorganize DDOT to improve performance. Specifically, he has developed plans to increase the use of contractors to supplement DDOT's staff and has established cooperative relationships with other governmental agencies by adopting strategies and best practices that others have found to be effective. For example, to address understaffing, he plans to increase the use of contractors in various areas, including project management, and start using random materials testing to better utilize his inspection staff. The Division currently contracts for most of its design work and is using such organizations as FHWA's Eastern Lands Division (ELD) and the Washington Metropolitan Transit Authority (WMATA) to supplement its staff. The Director also plans to reorganize staff into four project teams, each of which will have all the disciplines necessary to be responsible and accountable for assigned projects from beginning to end.

---

[2]FFC is a continuing activity of the Board on Infrastructure and the Constructed Environment of the National Research Council (NRC). It is a cooperative association of 20 federal agencies with interests and responsibilities related to all aspects of facility design, acquisition, management, maintenance, and evaluation. FFC is convened under the aegis of NRC, the operating arm of the National Academies of Sciences and Engineering. Its mission is to identify and advance technologies, processes, and management practices that improve the performance of federal facilities over their entire life cycle, from planning to disposal. While its study addressed facility design and construction, the best practices identified were drawn from research on all types of construction, including highways and other infrastructure, and can be applied to any process that involves design and construction.

Since the reorganization is just beginning, it is too early to tell whether it will be successful. However, relying heavily on contractors for needed services and granting staff greater responsibility for projects and holding them accountable for performance were among the strategies that both Arizona and South Carolina officials said they had adopted to improve their staffing and workload situations. These and other strategies included in the Director's plans—such as team building, partnering, and involving all stakeholders early—are among the best practices identified in the FFC study as ways to improve the design review process with limited resources.

Background

The federal-aid highway program, overseen by FHWA, provides federal reimbursement to a state (or, in this case, the District) for a portion of the costs actually incurred. This program makes funding available to construct, reconstruct, and improve highways and bridges on designated federal-aid routes and for other special-purpose programs and projects. To start a project, a state uses its own money to finance the initial stages and receives reimbursement for the federal government's share of the project's cost as work is completed. For most federal-aid highway projects, the federal government pays 80 percent of the cost and the state pays 20 percent.

DPW is responsible for managing the District's transportation program, which includes roads, bridges, sidewalks, streetlights, and signalized intersections. It maintains over 1,400 miles of public roads and 215 bridges. About 32 percent of the District's public road inventory—about 450 miles of public roads and 202 bridges—are eligible for federal support and can be maintained using FHWA and District matching funds. The remaining 68 percent of the inventory—more than 970 miles of local roads and alleys and 13 bridges—is considered local and therefore must be maintained under the local transportation program using only District funds.

In its April 1996 report, FHWA stated that the District's transportation program was understaffed by about 124 positions. This calculation was based on the size of the program and assumed the preservation of the program's conventional transportation organizational structure and functions. DDOT's current staffing is about the same as it was in 1996. DDOT's Acting Director told us that the District's financial crisis, downsizing, and early retirements have all adversely affected the Division's ability to increase its staffing. Even now, the District is offering early-out retirement opportunities that may affect the Division's staffing position. As noted, DDOT's Acting Director said that staffing and procedural problems were delaying the award of contracts for projects, resulting in lengthy processing times for design and construction projects. Specifically, t was taking an average of 25.7 months for design projects and 21.6 months for construction projects from the date FHWA notified DDOT of its obligation ceiling to the date the contractor was sent the notice to proceed to begin the work.

Although DPW has been unable to increase DDOT's staffing, it has submitted projects to FHWA that have been approved, allowing FHWA to obligate all but $2.2 million of

the grant funds made available to the District for fiscal years 1989 through 1999.[3] However, as we noted when we briefed the Subcommittee in June 2000, at least $282 million of $530.5 in unexpended federal-aid funds was for projects for which as of April 30, 2000, contracts had not yet been awarded.[4] Still, the total annual expenditures of federal-aid and District matching funds reported by the District have steadily increased since fiscal year 1996, reaching an 11-year high of an estimated $165 million in fiscal year 2000.[5] Tables 1 and 2 show the breakdown between projects involving the District's unexpended balance of federal-aid funds for which contracts had and had not yet been awarded as of April 20, 2000.

Table 1: Unexpended Federal-Aid Funds for Projects for Which Contracts Were Not Yet Awarded
Dollars in millions

Category of projects	Number of projects	Dollar value	Explanation
Barney Circle project	1	$143.3[a]	These funds were to be deobligated and reobligated to fund other approved local and federal-aid projects.
Major construction projects in the procurement process	11	24.2	These projects are in various stages of the procurement process.
Major construction projects awaiting completion of other projects	2	24.5	Two projects are being delayed intentionally because of other major work in the same area.
Major construction projects not in the procurement process	17	63.0[b]	Funds for these projects have been obligated, but the procurement process has not begun.
Local projects funded by previously deobligated Barney Circle moneys	2	21.3	One project was in the procurement process; the other was in the design process.
Old right-of way project	1	6.0	A decision was needed on the sale of property; funds were to be deobligated and reobligated in August 2000.
Total		**$282.3**	

[a]The Barney Circle moneys totaled $173 million. Some of these funds have already been deobligated and reobligated to other projects.

[b]Of the $63 million, $27.9 million was awaiting a decision by the Washington Metropolitan Area Transit Authority and the National Park Service on whether a garage will be built at the Anacostia Metro Station.

Source: DDOT.

[3]DDOT received $2.4 million in additional obligation ceiling from FHWA during the August redistribution period for fiscal year 1994, but a project was dropped from DDOT's plans. Consequently, DDOT could not obligate $2.2 million in funds.

[4]Of the $530.5 million in unexpended federal-aid funds, about $248.5 million was for projects for which contracts had been awarded or that involved funding provided to other agencies. This $248.5 million includes all $41.7 million that is in design or design contract negotiations for which specific details were not available when we did our initial assignment. The remaining $282 million was for projects for which contracts had not been awarded, including contracts whose procurement process had not yet begun and others whose procurement process was under way.

[5]As of December 2000, DDOT was still in the process of reconciling its accounts for FHWA funds for fiscal year 2000.

Table 2: Unexpended Federal-Aid Funds for Projects Under Contract or Being Transferred to Another Agency

Dollars in millions

Category of projects	Number of projects	Dollar value	Explanation
Major projects under construction	60	$130.0	These projects are being constructed.
Major design projects	83	41.7	These projects were in design or negotiation for a design contract.
Funds transferred to other agencies	8	19.3	These include moneys transferred to other agencies. For example, federal-aid funding for the Washington Area Metropolitan Transit Authority was transferred through the District. The District does not control the expenditure of these funds.
Funds passed through to other agencies	8	8.7	The agencies bill the District for the funds as they are expended. For example, the Council of Governments receives planning funds in this manner.
Final voucher not submitted to FHWA	[c]	13.6	The final voucher was been completed but not yet submitted to FHWA.
Awaiting federal reimbursement	1	1.1	The final voucher has been submitted to and is awaiting reimbursement from FHWA.
Other	[c]	33.8	These include many small projects that had unexpended balances, such as change orders to projects, bicycle improvements, traffic and safety improvements, and special projects to improve air quality.
Total		**$248.2**	

[c]According to a District official, this was made up of a group of projects, but the system that generated the report did not give the number.

Source: DDOT.

The District has not been the only recipient of federal-aid highway funds to have problems with staffing shortages and workload increases. In its 1998 report, AASHTO stated that individual states were struggling to meet their staffing needs because of downsizing, expanded work programs, and early retirements.[6] It stated, for example, that Missouri's Department of Transportation project inspection staffing ratio had dropped from seven employees for every $1 million in construction in 1978 to only one employee per $1 million in 1997.

As FFC has reported, in both state and private organizations, in-house engineering has almost disappeared, and engineering contractors are increasingly more involved in projects. Private-sector owners and government agencies traditionally have maintained some level of internal planning and design oversight capability to ensure that construction projects acceptably balance the factors of cost, schedule, quality, and performance. Until the 1990s, federal agencies often maintained an in-house engineering organization, consisting in part of architects and engineers, that was responsible for the technical aspects and oversight of planning, design, and construction processes. Over the last decade, as a result of efforts to reduce the size

[6]*Strategies for Coping With Construction Project Staffing Demands*, Construction Administration Task Force, AASHTO, Subcommittee on Construction (Sept. 1998).

of the federal government, agencies have downsized their design and engineering staff and relied more on outside consultants for technical expertise. Although agencies have generally retained their design oversight responsibilities, fewer staff resources are now devoted to design review. Furthermore, in 1997, The Business Roundtable stated that virtually all major firms had reduced the size of, and scope of work performed by, their engineering organizations.

Strategies Being Used to Cope With Staffing Shortages and Workload Increases

The states are using a variety of strategies and best practices to handle staffing shortages and workload increases. The two states we visited, Arizona and South Carolina, and other states are increasing their use of consulting engineer contracts and are using other methods, such as sampling instead of full testing and increasing compensation levels for in-house engineers. The Arizona Department of Transportation (ADOT) uses consulting engineers for tasks such as surveying, construction contract administration, and materials testing. During fiscal year 1999, the South Carolina Department of Transportation (SCDOT) issued two 5-year contracts for projects totaling roughly $1.5 billion. The contractors are to augment SCDOT's staff by doing many of the tasks normally done by in-house staff. In addition, AASHTO's 1998 report identified 24 strategies that state highway departments were using to cope with staffing demands. Moreover, in January 2000, FFC identified 18 best practices being used by the construction industry as a whole to provide adequate management and oversight of design and construction projects.

Arizona

ADOT uses consulting engineers for tasks such as surveying, construction contract administration, and materials testing. It uses both full-service and on-call consulting engineer contracts to provide needed services. Full-service consulting engineers provide all the services required to monitor a specific project. These could include the services of a resident engineer, chief inspector, field office supervisor, materials laboratory supervisor, survey party chief, traffic control specialist, and/or landscape inspector. ADOT appoints a project monitor-in-charge to oversee the contractor's work. On-call consulting engineers provide needed services on a task-order basis.[7] According to an ADOT official, using on-call contracts enables ADOT to negotiate a task order in 15 to 30 days, compared with the 60 to 90 days needed to advertise, sign a contract, and issue a notice to proceed on a specific-project basis. Consequently, needed work can begin more quickly with a task order. ADOT also hires consulting engineers to serve as project managers with responsibility for an entire project from beginning to end. These engineers may assume many of the responsibilities normally handled by ADOT staff.

In an effort to retain professional employees, the State Engineer told us, ADOT restructured its pay system for engineers. Engineers received an initial 10-percent

[7]On-call contractor contracts do not identify specific projects but rather the services to be provided as needed on projects assigned by task order.

pay raise the first year, followed by a 5-percent pay raise in each of the 2 subsequent years, in exchange for giving up their job protection and agreeing to work at the pleasure of the ADOT Director. In addition, ADOT put in place a program called Partnering—a teamwork-oriented construction management method that attempts to eliminate the adversarial relationship between owners and construction contractors that is inherent in traditional design and construction processes. The purpose of partnering is to develop a proactive spirit of cooperation through a structured, systematic methodology for developing teamwork and cooperation through shared goals, open communication, problem identification and resolution, conflict escalation procedures, and monitoring of team performance. This program was developed to improve ADOT's relationships with contractors, obtain fair interpretations of specifications, and reduce contractors' claims, project time, and cost growth. One of the ADOT officials we spoke with told us that the program has been successful in reducing litigation and claims, improving operations, and saving money.

South Carolina

SCDOT is accelerating its efforts to compress the time needed to execute its workload without increasing its in-house staffing levels. To accomplish this, it has initiated a program called Construction and Resource Manager (CRM). Through this program, SCDOT competitively hired two CRM contractors to provide support staff to assist SCDOT program managers in delivering projects on time and within budget. CRM staff act as extensions of the regular SCDOT staff, who still make all final decisions, since this authority has not been given to contract personnel. CRM staff are assigned to various tasks, including project and program management, preliminary engineering, design supervision and review, acquisition of rights-of-way, construction engineering and inspection, financial management, and disadvantaged business enterprise use. Each CRM contractor is to assist in approximately $750 million worth of road and bridge projects, as well as design work up to the environmental impact stage. Other contractors are to undertake the design work beyond the environmental impact stage through the construction of these projects. If SCDOT staff were to do the work planned for the two CRM contractors, SCDOT estimates that it would have to hire about 500 staff—200 for preliminary engineering and 300 for construction-related services. SCDOT did not estimate the cost difference between contracting for and hiring the increased staff.

Furthermore, as part of its implementation of the CRM contracts, SCDOT established 11 Work Process teams: Executive, Strategic Planning, Disadvantaged Business Enterprise (DBE), Financial, Procurement, Environmental/Design, Utilities, Program Development, Right-of-way, Construction, and Information Technology/WEB. According to an SCDOT official, these teams—made up of representatives from SCDOT, the CRM contractors, and FHWA—have developed, to date, 83 initiatives to improve SCDOT's current procedures and practices. Of these initiatives, 32 have been implemented, 14 require additional executive approval before work can continue on them, and the remainder range in completion from 0 to 98 percent. Some highlights of the completed initiatives include streamlining the contractor submittal processes including value engineering proposals, developing a comprehensive quality assurance/quality control manual for preconstruction activities, improving and shortening the DBE certification process, improving utility relocation and payment

procedures, making the right-of-way acquisition process more efficient and reducing the condemnation rate, and posting SCDOT's strategic plan on its Web site.

Other States

Many other states deal with staffing shortages by using contractors to handle tasks ranging from surveying and staking construction sites to providing unstaffed computer-controlled scales for weighing materials. AASHTO's 1998 report identified 24 different strategies that various states were using to cope with staffing shortages. Three of the most frequently used strategies identified in the report were contracting for inspection and contract administration services (15 states), contracting for construction surveying and job-site staking (15 states), and requiring contractors to provide quality assurance (13 states).

For example, the AASHTO report said that New Mexico had awarded two contracts for consultants to provide complete construction management services for work assigned. Each consultant managed two construction contracts. Florida used consultant construction engineers and inspectors to handle about 60 percent of its work. According to the report, these efforts were working well in both states. Additionally, Arkansas reported that contractors were performing acceptance testing for construction work at roughly the same rate as its in-house inspectors previously did. Meanwhile, its in-house inspectors were sampling and testing roughly one of every four acceptance tests performed by the contractors. Colorado was working to set up a quality system that would eventually make contractors responsible for all quality control and one level of quality assurance.

Other strategies identified in the AASHTO report included prioritizing inspections, reducing testing frequencies, phasing inspections (inspecting work at predetermined stages), reducing paperwork requirements, using student technical assistants and construction aids, implementing automated construction management systems, and using various innovative contracting procedures such as construction warranties and the design-build concept.[8] DDOT already uses design-build contracts.

FFC Has Identified Best Practices to Improve Project Management and Oversight When Resources Are Limited

In January 2000, FFC published a study that presented five key findings and identified best practices and technologies that federal agencies and other owners can use to provide adequate management and oversight of design reviews throughout the facility acquisition process.[9]

---

[8]AASHTO has issued a report entitled *Primer on Contracting 2000*, 2nd ed. (Oct. 1998), that discusses innovative contracting procedures, but neither AASHTO nor FHWA fully supports all the identified techniques. Furthermore, AASHTO advises agencies to consult their legal counsel to verify the legal sufficiency of using these techniques. For these reasons, we have not discussed these techniques in our report, but we have provided DDOT with a copy of the report.

[9]The term "facility," as used here, includes buildings and other constructed facilities and associated infrastructure (roads, utility plants, distribution systems, and the like).

Two of the key findings in the report are directly relevant to the design review issues discussed in this letter. First, the FFC study concluded that the team responsible for design oversight should include representatives of all project stakeholders: the owner, user, architect/engineer (A/E), construction contractor, operation and maintenance staff, and major equipment vendors. The report said that this team should participate in and contribute to design-related activities associated with each phase of the acquisition process, from conceptual planning through start-up. Second, the report concluded that the owner's interests are best served when the in-house staff can function as "smart buyers."

FFC defined a smart buyer as one who retains an in-house staff that understand the organization's mission, requirements, and customer needs and can translate those needs and requirements into appropriate direction. FFC further said that a smart buyer retains the ability and technical knowledge to lead and conduct teaming activities, accurately define the technical services needed, recognize value during the acquisition of such technical services, and evaluate the quality of the services ultimately provided. According to FFC, as long as the owner retains the in-house ability to operate as a smart buyer, contracting for a broad range of design-review-related functions does not appear to increase the owner's risk, as long as such functions are widely available from a competitive commercial marketplace. If the owner does not have the capacity to operate as a smart buyer, the owner risks delays, cost overruns, and facilities that do not meet performance objectives.

In developing a list of 18 best practices, FFC relied heavily on research conducted by the Construction Industry Institute, The Business Roundtable, NRC, FFC, and similar organizations. The study organized the best practices into five categories related to the role of the owner, teamwork and collaboration, advance planning, process, and benchmarking. The 18 best practices are described in detail in enclosure II. These practices include team building, partnering, and involving all stakeholders in the early stages of a project's development and the design-review-related activities associated with each phase of the project.

Planned Reorganization of DPW's DDOT Includes Several of the Construction Industry's Best Practices

The Acting Director of DDOT said that he is reorganizing the Division to improve performance. He told us he recognizes that some of the problems to be addressed include understaffing, an increased workload, and a lack of systems that give staff responsibility and accountability for projects. He believes that the Division can deal with these problems better if a restructuring occurs that allows teamwork and collaborative processes to be implemented.

The Division uses contractors for design work. In addition, DDOT has entered into partnerships with other government agencies, such as FHWA, WMATA, and the Navy's Chesapeake Public Works Center. FHWA is providing support by managing more than $50 million in projects and is helping DDOT to develop its first-ever design-build contract for street reconstruction and upgrade, and WMATA is providing such services as quality control of design and inspection. Navy Public Works is providing project management oversight on the second phase of the M Street SE rehabilitation.

The Acting Director indicated that he is considering contracting under these partnering arrangements for more project management and inspection services and internally using random materials testing to make more efficient use of his in-house inspection staff. In addition, he is beginning to employ more job-order and open-end contracting devices to increase production. Moreover, he is talking with AASHTO about implementing AASHTO-WARE project management software, currently employed in 37 states, to improve project status management and cost control.

He also plans to reorganize the staff into four ward-based project teams that will have responsibility and accountability for specific projects from beginning to end.[10] He believes that using this team approach will help improve both internal and external communications. He also believes that, with more support from contractors and other government agencies as part of a broader effort to refocus and reorganize DDOT, the Division's responsiveness and performance can be improved.

With FHWA, WMATA, and the Navy providing support, the Acting Director believes it is a good time to reorganize DDOT. Under the present structure, he said, there is no system in place to encourage staff to become responsible or accountable for projects. Consequently, staff do not need to take responsibility for more than their assigned tasks as a project moves through the design and construction process. In other words, their responsibilities do not extend beyond their assigned jobs to the successful completion of the project.

Through team building, the Acting Director wants to create a culture of responsibility and accountability that extends to the process, as well as to individual projects. He wants teams to know the status of their projects and the problems that have been identified and to work together to resolve any problem that may arise. However, he has pointed out that for teams to be successful, they need everything necessary to accomplish projects, such as dedicated technical, procurement, financial, and legal support.

Under the current plan, which is in the early stages of implementation, four project teams would be made up of individuals from the entities involved in the process. A DDOT official said that as of February 2001, DDOT was interviewing internal candidates to lead the project management teams and hoped to have team leaders identified by the end of the month. Each team would be responsible for moving a project all the way through the process. For example, as proposed, engineers, contract specialists, financial specialists, and lawyers would all be members of a project team. There would also be a group of experts in various fields of engineering to provide additional support to the project teams for specific problems. The project teams would oversee the work of contractors hired to design and build the projects. Under this system, more design-build and project management could be used to expedite the process According to the Acting Director, the project team would be responsible for holding the design firm accountable for its design—something that is not being done now.

---

[10]The District is divided geographically into eight wards for representation, electoral, and administrative purposes.

In addition, the Acting Director has expanded the reorganization by creating the position of Neighborhood Infrastructure Officer (NIO). If the reorganization is fully implemented (funded), there would be 32 of these positions, 4 for each ward in the city. The new positions, with two shifts of work, would first be offered to qualified inspectors who already work for DDOT. The NIOs would be responsible for inspecting for and reporting on the condition of roads in their assigned ward, as well as for monitoring utility cuts in the roads and any other projects in their assigned ward. The NIOs would serve as DDOT's "eyes and ears" in the wards, continually evaluating the condition of their transportation infrastructure and developing priorities both for street maintenance activities and for street construction and rehabilitation. The Acting Director also plans to modify the role of DDOT's asphalt and concrete inspectors, making them responsible for quality assurance, much as every other state in the local region has done. Specifically, he would move these inspectors out of asphalt and concrete plants and have them randomly check the quality of asphalt and concrete at locations where these materials are being installed. In addition, the Acting Director said that DDOT was developing a proposed rulemaking change that would make contractors, rather than DDOT, responsible for ensuring the quality of construction materials. He also said that DDOT is developing a training program for both plant and site inspectors to upgrade their skills.

The Acting Director further said that DDOT has contracted with the Office of Change Management, within the Department of Transportation's Volpe Research Center, to provide support in working through the Division's realignment and that the Mayor and City Administrator announced they would likely include in their fiscal year 2002 budget proposal a policy initiative to create a separate District Department of Transportation.

The Acting Director believes that the results of this reorganization, if successful, will be improved communications, greater responsibility, and greater accountability for projects. He also believes that, with expanded partnerships, increased contracting, and better deployment of staff resources, projects will be completed sooner and funds will be spent more quickly. He believes an expenditure level in excess of $200 million a year is attainable. He expects to implement the major components of the reorganization by the spring of 2001.

The Acting Director believes that it will be important to have good communication between the project team and project stakeholders and to get all stakeholders involved early so that problems can be anticipated, not addressed after they occur. He said that stakeholders would include entities outside the District government, such as the National Park Service and the National Capital Planning Commission, which should generally become involved in projects at an early stage. The Acting Director believes that partnering arrangements between project teams and stakeholders should reduce the amount of time needed for rework on projects. Such arrangements are among the best practices identified in the FFC study.

In general, given the difficulty District organizations have had in managing change, making the internal and external cultural changes necessary to make the planned restructuring of DDOT successful will be challenging. As the FFC study notes, the construction industry traditionally operates in an adversarial environment, with owners, designers, and builders separated by formal contractual documents and

backed up by teams of lawyers. The study further states that conflicting interests among the parties have often resulted in poor communications, poor problem solving, and poor results.

Although DDOT may have difficulty making the paradigm shift, its efforts hold significant potential. According to the FFC study, team building and partnering, when approached effectively, can produce impressive results. To illustrate the point, the study quoted the following passage from a 1999 *Partnering Desk Reference Guide,* prepared by the National Aeronautics and Space Administration:

"The Arizona Department of Transportation, formerly averaging $5 million annually in litigation costs, did not have a litigated claim on any of the over 400 projects partnered from 1991 to 1997. The Texas Department of Transportation and the U.S. Army Corps of Engineers have both experienced decreases in litigation almost as dramatic. For those organizations that have "Mature" partnering programs, litigation is no longer an issue."

When multiple organizations make a commitment to work cooperatively toward a common objective utilizing team-building techniques, the practice is called partnering. Partnering may be a relatively short-term relationship used to complete a single project, or it may become a longer-term relationship with the committed organizations cooperating for a multitude of projects. Either way, partnering is a viable strategy for changing attitudes and the relationship between an owner and a contractor.

According to AASHTO, partnering has often resulted in a relationship between the owner and the contractor that has promoted the achievement of mutual and beneficial goals. For this reason, according to AASHTO, many state departments of transportation have promoted the partnering concept to reduce claims and expedite projects. A January 1995 survey by AASHTO's Subcommittee on Construction found that 46 of 50 states had used partnering and that partnering had resulted in reduced claims for 34 states.

DDOT's reorganization is just beginning, and not all of the affected parties have yet endorsed the plans. Nevertheless, the plans incorporate strategies such as team building, partnering, and improved communications among stakeholders that have been identified as best practices for the construction industry. Furthermore, the plans include approaches that both ADOT and SCDOT identified in our discussions as ways to improve operations.

Agency Comments

In February 2001, we received e-mail comments on a draft of this report from DDOT's Acting Director, and SCDOT's Assistant to the State Engineer and oral comments for ADOT's Assistant State Engineer. All three officials generally concurred with the information in our report and provided additional, clarifying, or updated information, which we included in the report where appropriate.

Scope and Methodology

To respond to the first objective, to provide information on how other organizations were handling staffing shortages and increased workloads, we reviewed studies on coping with the demand for construction project staffing and innovative contracting procedures.[11] We also drew upon information developed by FFC on best practices for reviewing facility designs.[12] In its study, FFC relied heavily on construction industry research that was applicable to all types of construction. In addition, we visited two states, identified by FHWA staff, that were using innovative processes to meet staffing shortages and increased workloads. The FHWA staff identified ADOT because it has used a small staff to manage its program for years and SCDOT because it has awarded $1.5 billion in projects to two contractors. We visited both these offices and interviewed state officials to obtain information on how they were handling staffing and workload changes. We reviewed the supporting documentation these offices provided concerning their operations.

To respond to the second objective, to provide information on the status of the District's efforts to reorganize DDOT to improve service, we interviewed District DDOT officials on the status of the reorganization and reviewed documents describing the planned new structure for the Division. We also compared the Division's planned actions to industry best practices and staffing and workload management strategies identified under the first objective.

We did our work between July 2000 and March 2001 in accordance with generally accepted government auditing standards.

We are sending copies of this letter to Senators Mike DeWine, George V. Voinovich, Mary L. Landrieu, and Richard Durbin; Representatives Tom Davis, Connie Morella, and Chaka Fattah; and Delegate Eleanor Holmes Norton in their capacities as Chair, Vice Chair, or Ranking Member of Senate and House Subcommittees with jurisdiction over District of Columbia matters and to Representative Ernest J. Istook, Jr., who requested this work in his previous capacity as Chairman, House Subcommittee on the District of Columbia. We are also sending copies to the Honorable Anthony A. Williams, Mayor, District of Columbia; the Honorable Alice Rivlin, Chair, District of Columbia Financial Responsibility and Management Assistance Authority; Mr. Charles C. Maddox, Esq., Inspector General, District of Columbia; and other interested parties. Copies will also be made available to others upon request.

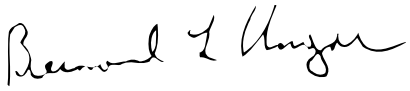
---

[11] *Strategies for Coping With Construction Project Staffing Demands*, Construction Administration Task Force, Subcommittee on Construction, AASHTO (Sept. 1998); *Best Practices Guide for Innovative Contracting Procedures*, Utah Technology Transfer Center (Logan Utah); *Primer on Contracting 2000*, 2nd ed., Construction Administration Task Force, Subcommittee on Construction, AASHTO (Oct. 1998).

[12] *Adding Value to the Facility Acquisition Process: Best Practices for Reviewing Facility Designs*, Federal Facilities Council Technical Report #139 (Washington, D.C.: National Academy Press, n.d.).

Key contributors to this letter were Ronald L. King and Thomas G. Keightley. If you have any questions, please contact me on (202) 512-8387.

Sincerely yours,



Bernard L. Ungar
Director, Physical Infrastructure Issues

Reports and Documents Provided to DDOT Officials

Reports

1. *Strategies for Coping With Construction Project Staffing Demands*, Construction Administration Task Force, Subcommittee on Construction, American Association of State Highway and Transportation Officials (AASHTO) (Sept. 1998).
2. *Adding Value to the Facility Acquisition Process: Best Practices for Reviewing Facility Designs*, Federal Facilities Council Technical Report #139 (Washington, D.C.: National Academy Press, n.d.).
3. *Best Practices Guide for Innovative Contracting Procedures*, Utah Technology Transfer Center (Logan, Utah: n.d.).
4. *Primer on Contracting 2000*, 2nd ed., Construction Administration Task Force, Subcommittee on Construction, AASHTO (Oct. 1998).

Documents

Arizona Department of Transportation

1. Consultant Construction Management Manual.
2. Engineering Consultant Contract and Joint Project Agreement Award and Administration Procedures.
3. Consultant Prequalification Packet.
4. Engineering Consultants Section, Statement of Qualifications Package for Contract No. 01-49 Construction Administration.
5. Engineering Consultants Section, Statement of Qualifications Package Temporary Technical Engineering Personnel for Various Construction Administration Projects.
6. Engineering Consultants Section, Statement of Qualifications Package for Contract No. 01-17 Statewide On-call Services Construction Administration.
7. Engineering Consultants Section, Statement of Qualifications Package for Contract No. 01-40 On-call Roadway Design.
8. Partnering a Strategy for Excellence.

South Carolina Department of Transportation

1. Overview—Construction and Resource Manager Program.
2. Request for Proposal—Construction and Resource Manager.
3. Construction and Resource Manager—East Region.

Best Practices Identified by the Federal Facilities Council

The following list of 18 best practices identified by the Federal Facilities Council (FFC) relies heavily on research conducted by the Construction Industry Institute, The Business Roundtable, the National Research Council, FFC, and similar organizations. The best practices are organized into five categories related to the role of the owner, teamwork and collaboration, advance planning, process, and benchmarking. While these practices use facility acquisition as an example, they would generally apply to any design and construction process.

Role of the Owner

- Be a smart buyer. Facility acquisition processes (including reviews of designs) work best when the owner has sufficient in-house expertise to qualify as a smart buyer. A smart buyer is one who retains an in-house staff that understands the organization's mission, requirements, and customers' needs and who can translate those needs and requirements into a corporate or strategic direction. A smart buyer also retains an in-house staff that includes technical experts who can articulate the nature of the technical services being bought, recognize good value during the negotiation of such services, and evaluate the quality of the services as they are provided.

- Develop a scope of work that clearly and accurately defines the owner's expectations regarding the facility's cost, schedule, performance, and quality. The owner's standards, more than those of any other entity involved in the acquisition process, will set the tone for all aspects of design review activity. The owner's scope of work should be used as the yardstick for measuring performance.

- Avoid the temptation to micromanage design reviews. Architectural and engineering firms (A/E) are selected on the basis of their experience and expertise; they should be given wide latitude to bring that expertise to fruition.

Teamwork and Collaboration

- Use team-building and partnering techniques to build good working and communicative relationships among the participants, as well as to align all participants toward common objectives and expectations.

- Ensure that all interested parties participate in design reviews from the planning and design phases, so that all perspectives are represented as the design evolves. Broad participation creates early project endorsement or "buy-in," reducing the potential for later disagreement or the need for changes. At a minimum, involve representatives of the owner, the user, the A/E, construction management staff, maintenance and operations staff, and staff with specialties such as procurement, safety, and fire protection. Where possible and appropriate, include the construction contractor, permitting agency staff, and independent specialists for value engineering and

independent review. Err on the side of excess participation—it is cost-effective protection against subsequent unexpected and expensive fixes and oversights.

- Use the same A/E throughout the facility acquisition process to maximize continuity and allow participants to build and apply their experience baseline. Using the same A/E for conceptual planning, detailed design, construction support engineering services, and start-up takes advantage of the A/E's intimate understanding of both the owner's and the project's needs and supports the continuity of personnel involved.

- Use senior, experienced personnel who understand the relationship of a facility to meeting the agency's overall mission and who can effectively evaluate the evolving design and guide the review process.

- Participants should commit for the duration of the activity to ensure continuity. Changing participants from any of the organizations involved in reviewing the design can disrupt the work flow and threaten the stability of good team relationships.

- Participate in a design awards program to recognize and motivate excellence. Nothing succeeds like success! Recognition of a job well done gives visibility to a successful process and motivates all of the participants to continually improve.

Advance Planning

- Focus attention on the review of designs during the conceptual planning and design phases, where the ability to influence the ultimate functionality and cost of the project is the greatest. Effective design review processes start out being very intensive and proactive, with an intensity that declines through the procurement, construction, and start-up phases of the acquisition process.

- Do not start the final stage of design—preparation of the construction plans and specifications—until the preliminary engineering has been completed. To do otherwise could significantly slow the overall design activity because of frequent interruptions and rework caused by incomplete definition of the project's scope.

Process

- Tailor the design review approach to the project's specifics. The project's complexity, cost, mission criticality, visibility, method of contracting, and schedule are just a few of the variables that can drive aspects of the design review approach. Also, frequency, intensity, and reliance on outsourced experts and consultants should be taken into account in developing a design review approach.

- Keep up the pace to maintain momentum and keep the facility acquisition process on schedule. The review of designs at each phase of the process should not impede progress toward a completed facility. A stop-start or prolonged process affects the acquisition in many ways, perhaps the most critical of which is the increased

potential that organizations will reassign participants.

- Pay special attention to the civil, structural, electrical, and mechanical interfaces. Historically, 30 to 50 percent of all construction change orders result from interference fit problems between trades. Is the power supply appropriate to the specific mechanical equipment? Does the heating, ventilating, and air-conditioning (HVAC) ducting interfere with structural members?

- Exploit technology. The technological revolution has provided many tools to enhance design review processes, including computer-aided design, three-dimensional modeling, data collection and distribution software programs, and rapid communications systems, including the Internet.

- Conduct a postoccupancy evaluation to develop a lessons-learned document for future reference. After the facility starts up, the design review team should document objective results (how did the final cost and schedule compare with those planned?) as well as subjective results (is the user pleased with the facility's performance?). The postoccupancy evaluation should also relate approaches taken during the various phases of the facility acquisition process with the final results.

Benchmarking

- Measure the results achieved by design review processes in order to assess their level of performance. A process cannot be managed if it is not measured. Successful benchmarking requires an organization to identify relevant performance characteristics, measure them, and compare the results against either established industrial norms or against similar measured characteristics of other organizations recognized for their excellence.

- Document both unusually good and bad performance for future reference. Even better, find a way to share such information with other organizations and federal agencies.

(393003)

Orders by Internet

For information on how to access GAO reports on the Internet, send an e-mail message with "info" in the body to

info@www.gao.gov

or visit GAO's World Wide Web home page at

http://www.gao.gov

To Report Fraud, Waste, and Abuse in Federal Programs

Web site: http://www.gao.gov/fraudnet/fraudnet.htm

E-mail: fraudnet@gao.gov

Automated answering system: 1-800-424-5454