

Executive Summary Construction Management In The Bureau of Reclamation (The Next 25 Years)

Construction management capability within the Bureau of Reclamation has been a significant part of its ability to meet the agency's mission goals and objectives. In order to continue to meet these goals and objectives, Commissioner John Keys requested that a group of senior managers assess the agency's approach in the future for providing construction management services both organizationally and functionally. This report presents the current status of construction management within Reclamation and offers considerations and recommendations for this capability into the future.

Reclamation's ability to reliably deliver water, generate power, and manage the interbasin, interstate, and international water issues will become increasingly more difficult as the infrastructure constructed in the past continues to age. Some of Reclamation's early projects are approaching 75 to 100 years in age. The responsibility for public safety below these facilities presents Reclamation with a liability that will need to be addressed. To respond to emergencies that have developed in the past, Reclamation has been able to recruit help from within the ranks of the organization. Reclamation's ability to maintain a core of experienced, qualified construction management staff will enable the agency to meet such challenges in the future.

There are several locations within Reclamation that still have significant construction management capability. The large water development projects of the past are essentially complete. A few authorized projects (such as Animas-La Plata) will continue to be part of the workload; although these projects are anticipated to be completed within the next 10 years. There is still significant construction activity within the organization which encompasses the following programs: authorized ongoing construction projects; Safety of Dams; Repairs, Additions, and Extraordinary Items (RAX); Salinity Control; Rural Water Projects; and work for other agencies. These programs are anticipated to continue into the foreseeable future.

Three potential options are presented regarding the execution of Reclamation's construction management needs over the next 25 years. This report compares and contrasts the three options presented below:

Out-Sourcing – Reclamation would contract to the private sector for all construction management functions that are not inherently governmental.

Under this option, service contracts would be used to contract to the private sector for all construction management functions that are not inherently governmental. Service contracts could be awarded to include any combination of the following functions: inspection, construction geology, material testing, surveying, and contract administration. Reclamation's responsibilities would be to manage the service contracts to make sure construction activities are accomplished, which adds a layer of bureaucracy to the process. When out-sourcing is used as a means to provide construction management services, the lessons learned and benefit to corporate knowledge is minimized because the knowledge gained on any given project is lost when the service contract is complete.

Full Construction Management Capability – Reclamation would continue to provide full construction management as has traditionally been done in the past.

Full capability has generally been the most efficient and cost effective means of completing major construction projects throughout the West during Reclamation's first 100 years. Having this capability has enabled Reclamation to not only respond to emergency situations but also allows for timely responses to future project development. However, as the number and extent of construction projects has declined, it is recognized that maintaining full construction management capability may not be a practical option. The ability to keep a full time construction staff gainfully employed has become more difficult during the valleys, as well as providing sufficient staff during the peaks. Unless additional construction project opportunities become available (such as Reclamation becoming the construction management arm for the DOI) the ability to maintain full construction management capability may not be realistic.

Core Construction Management Capability - Reclamation would continue to maintain in-house construction management capability for critical and/or complex infrastructure, while out-sourcing to the private sector for less critical features.

Under this option, Reclamation would be structured to continue to provide its own construction management for critical infrastructure. But there would be opportunities to out-source this function to the private sector for less critical infrastructure. Out-sourcing would be a management tool exercised by the responsible construction management official and utilized when workloads and staff availability warrant. It would provide flexibility for management by providing an additional alternative to cover the work. In areas where construction is insufficient to support a fulltime construction staff, out-sourcing could provide a reasonable alternative.

Recommendations

The preferred provider of choice for major construction should be with Reclamation personnel in order to maintain technical expertise within the

organization. It has been shown in the past that keeping construction management within the agency ensures highly specialized expertise is available, institutional knowledge is retained, and major construction projects are constructed in the most efficient and cost effective manner. Because the liabilities and risks associated with ownership of these projects are retained by the agency, keeping construction management in-house becomes more critical. Having this capability has enabled Reclamation to respond to emergency situations that would not have been possible otherwise.

Reclamation has had to "grow our own" staff in key positions. Bringing personnel up through the ranks has proven to be an effective means of retaining corporate knowledge, developing specialized technical expertise, and ensuring that competent personnel are available as the more experienced workforce retires. This practice should continue into the future. In order to stabilize the peaks and valleys in workload, the DOI could consider utilizing the construction experience within Reclamation across the various Bureaus within the DOI. If Reclamation were the construction management service center for the DOI, it would provide a more stabilized workload thus resulting in more efficient staffing levels, use of staff, and cost effectiveness throughout the DOI.

It is the recommendation of this group of senior managers that Reclamation take the steps necessary to implement the best management practices by adopting the option of **Core Construction Management Capability**. This option affords the agency the ability to provide oversight on Reclamation's critical features and provides some level of out-sourcing for the less critical construction. Because of the highly specialized technical nature of Reclamation's critical features, the ability to maintain construction management capability for these features is essential. As a management tool, out-sourcing some construction management to the private sector should not diminish Reclamation's ability to accomplish its mission.

The group of senior managers recommends that the following areas of focus should be examined to ensure that construction management capability with the unique knowledge of large dams, power facilities, and distribution systems remains within Reclamation.

1. Continue programs that support Reclamation's mission such as Safety of Dams, Rehabilitation and Betterment, RAX, and operation and maintenance of facilities using in-house capabilities.
2. Develop a diverse workforce, in expertise and age, which is structured to support the critical features and baseline construction requirements.
3. Plan and implement organizational measures to enhance staff management, avoid dispersion, and consolidate expertise by continuing/creating regional

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Present Construction Management Capability

To better evaluate Reclamation's future construction management capability, an understanding of the present construction management capability is important.

Construction management activities include construction contract administration, construction inspection, construction geology, materials engineering and testing, and construction surveying.

The construction management capability of any organization requires a definite degree of expertise in contracting methods. In looking at the future of construction management in Reclamation, contracting techniques must be integrated in the organization to blend means and methods of design and construction management expertise into a final Reclamation constructed product.

The following table provides a snapshot of the current overall construction management capability within Reclamation. Figure 1 depicts this same information showing existing full time equivalents (FTE's) at each location within Reclamation. Although the number of construction personnel have been declining over recent years, it appears that the decrease has stabilized somewhat and is remaining fairly constant.

Table 1
Reclamation Construction Management Staffing 1996/2004

Region	Staff on Board 1996	Staff on Board 2004	Net Change Staff
Mid Pacific	35	41	6
Pacific Northwest	58	40	-18
Upper Colorado	199	138	-61
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TOTAL	447	292	-155

During the period depicted above, very little construction management was out-sourced to the A&E community and Reclamation was able to effectively manage the existing staff by sharing resources to meet its workload. Reclamation has proven in a number of instances to be the construction manager of choice for various organizations such as water districts, project proponents, and federal agencies.

Locations within Reclamation that still have significant construction management capability are: Yakima, Washington; Willows, California; Provo, Utah; Durango, Colorado; Farmington, New Mexico; Billings, Montana; Boulder City, Nevada; and Denver, Colorado. There are small pockets of expertise in several regional and area offices, but it is limited. Of Reclamation's 5,900 employees, less than 300 are currently involved with construction management on a daily basis. Currently, projects are smaller with shorter durations which make future planning much more difficult. In the past, there have been long-term projects scheduled for years in the future. The cost of moving from one location to the next, along with project duration, has become much more significant now than it was in the past. The pool of applicants for construction management vacancies has become more limited due to these factors.

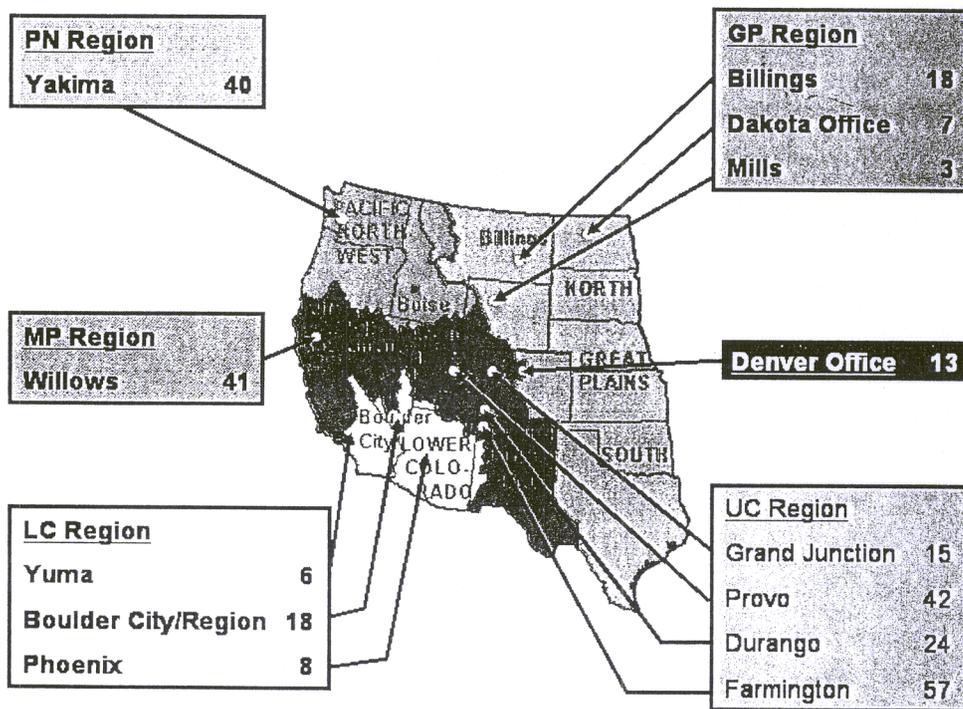


Figure 1
Construction Management Locations and Staffing

Reclamation's Construction Management – Future Workload

Reclamation's construction management workload has changed in recent years and continues to evolve. Over the past 10 to 15 years, the construction of new projects has declined. A few authorized new projects (such as Animas-La Plata) will continue to be part of the workload in the future. However, these projects will likely be smaller and less comprehensive than the traditional large Reclamation projects of the past. Although most of the large construction projects of the past have been completed, there is still significant construction activity in the organization which includes the following programs.

Safety of Dams (SOD): The SOD Program requires a substantial construction management effort. A number of dam modifications have been completed during the past 20 years, and most of the identified SOD modifications remaining should be completed during the next 10 years. However, additional dam rehabilitations or modifications will be required in the future, and it is anticipated that the SOD Program will remain a significant part of Reclamation's future construction workload.

Repairs, Additions, and Extraordinary Items (RAX): Much of the RAX Program is being accomplished through construction contracts. Reclamation's aging infrastructure will necessitate an ongoing effort of repair, replacement, and upgrades in order for Reclamation to continue to accomplish its mission. Such an effort will require construction management, whether in support of O&M or under new rehabilitation authorization. Construction activity in the repair, replacement, and upgrade of Reclamation's facilities is expected to continue into the foreseeable future. In addition, existing facilities are being modified to satisfy today's environmental requirements.

It should be noted, however, that the number of facilities maintained by Reclamation (i.e., not transferred to other entities for O&M) varies greatly from region to region. In some regions, this workload is relatively constant; and in other regions, such as GP, this workload is presently increasing in magnitude.

Salinity Control: Reclamation's \$14 million annual Salinity Control Program is ongoing into the future and requires some construction management oversight requirements. As the salinity program presently operates, Reclamation's construction management is only utilized minimally, with most of the work being out-sourced.

Rural Water Projects: Some regions are responsible for authorized rural water projects which total hundreds of millions of dollars. Appropriations have not been passed by Congress to fund most of this work, but some level of construction of these projects could occur. Typically, this is accomplished by "pass-through" funding to tribes under PL 638 agreements; however, Reclamation retains an important oversight role which requires construction management and engineering expertise.

Other Agencies: The extent to which Reclamation may be called upon to provide construction management services for other agencies in the future is unknown. Consideration should be given to Reclamation becoming the central construction management service center for the DOI. The advantages of such an arrangement are significant and deserve further study.

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Recommendations

It is the recommendation of this group of senior managers that Reclamation take the steps necessary to maintain an adequate level of core construction management capability (option 3) to be able to provide construction management oversight of Reclamation's critical and/or complex features. Some level of out-sourcing for less critical construction may be required to accomplish the mission of the agency. The ability to maintain construction management capability for Reclamation's critical features is paramount; and out-sourcing some construction management to the private sector should not diminish Reclamation's ability to accomplish its mission.

Reclamation should also implement new initiatives and programs to enhance water storage, delivery, and power facilities to avoid the crises and conflict in the West that will likely center on water. Reclamation's institutional knowledge of construction management should be maintained so that future generations can rely on the facilities that will be built or upgraded within the next 25 years. Reclamation has a responsibility to address the issues of focus in Water 2025. The economy of the West and the Nation is dependent on water delivery. Over the next 25 years, lacking any dramatic change in use allocations or population trends, the demand for water will exceed existing storage and delivery capabilities. The Water 2025 projected crisis areas map illustrates this problem. At some point, after all efforts to conserve water have been implemented, new delivery and storage systems will be required to meet this demand. Water for agriculture is important; however, M&I water and environmental issues will likely control the demand for water in the future. As new facilities become necessary, they must be integrated with existing facilities, many of which are Reclamation's, to avoid negative impacts to the river systems.

The group recommends that the following areas of focus be examined to ensure that construction management capability with the unique knowledge of large dams, power facilities, and distribution systems remain within Reclamation.

1. Continue programs that support Reclamation's mission such as Safety of Dams, Rehabilitation and Betterment, RAX, and O&M of facilities using in-house capabilities. In addition, consider either providing a means to fund the minimum necessary construction management staff for valleys in the work loads or supplementing those valleys with outside work. If the proper balance of construction management staff to work were determined, the cost would be minimal. However, without assurances of funding, the capability of attracting long-term personnel would be limited.
2. Develop a diverse workforce, in expertise and age, which is structured to support the critical features and baseline construction requirements. Cross train and share personnel across regions to ensure the development of construction

management capability necessary to support mission requirements of storing and distributing water and generating power, consistent with a corporate perspective.

3. Plan and implement organizational measures to enhance staff management, avoid dispersion, and consolidate expertise by continuing/creating regional mobile construction offices. This should be undertaken as each region's workload dictates.
4. Implement new program initiatives to enhance and develop increased capacity of storing water, distribution, and power generation to meet the critical needs of the West, recognized and promoted in the Water 2025 initiative. As part of this initiative, become more involved and play a larger role with existing programs such as Title 16 and Salinity.
5. Actively pursue removing barriers to provide construction management for multiple agencies (Agency Service Centers) and make Reclamation the construction management Service Center for the DOI. This service should be focused towards highly specialized areas such as Safety of Dams in which Reclamation has already established expertise.

In addition to the above recommendations, the following administrative and organizational considerations should be examined.

Staffing: An adequate and comprehensive succession plan should be in place to maintain continuity, develop expertise within the ranks, and ensure that corporate knowledge is passed on.

Organizational Structure: It is premature to make any significant changes in Reclamation's organization concept. It is recommended that as long as there is sufficient workload in the offices with significant on going construction (Yakima, Willows, Provo, Durango, and Billings), our customers are better served with personnel based closer to the work. The continuing need for the Farmington Construction Office should be based on whether adequate and consistent funding for the Navajo Indian Irrigation Project (NIIP) is provided in the future. The PN, GP, and MP Regions currently have mobile construction offices which provide construction management services throughout their respective regions. Because of UC Region's ongoing new construction on Animas-La Plata, Central Utah Project, and NIIP, it is anticipated that separate offices with significant construction management capability will continue until each of these large projects are completed. When this occurs during the next 10 years, it is expected that the UC Region would also move to a single mobile construction office type organization. At present, the LC Region has no designated construction office and the need for a future mobile construction office would depend upon future construction within that region. The Technical Service Center's construction group should continue to be utilized as a clearing house for various construction personnel as it has in the recent past.

The need for change in the organizational concept should not be attempted until a future direction is decided. Even then, logic would dictate that centralization of the construction core capability would be necessary. This centralization should be considered from region to region as dictated by the remaining work load, based on a global corporate perspective. This concept would provide for new major projects such as ALP by using a traditional project construction office in addition to the mobile construction office concept.

Policy Impacts: Core construction capability could be maintained more effectively if policies were established that would allow Reclamation to perform construction management on a reimbursable basis for other agencies within the DOI.

Legislation: Maintaining core construction capability will require a dependable and consistent funding source. In order to upgrade the infrastructure to today's standards and remove or at least minimize the huge liability from the Federal Government, legislation may be required to provide a funding mechanism. Additionally, future appropriations for other projects such as rehabilitation and betterment loans or salinity could be utilized to maintain some Reclamation core construction capability. This funding should not be allowed to be passed-through as this would defeat the purpose of having sufficient technical expertise and knowledge to competently oversee Reclamation's critical infrastructure.

Education/Training: Specific funding for education and training may be required to help ensure an adequate program is in place.

Summary

For the last 100 years, Reclamation has maintained its own in-house capability to conceive, plan and build America's infrastructure to accomplish its mission. But during the next 100 years, much of what Reclamation has built will need to be repaired or replaced with new, state-of-the-art infrastructure. Therefore, this in-house capability, with its inherent corporate memory and history is essential in meeting Reclamation's mission in the 21st century.

In conclusion we believe it is critical to Reclamation's mission that core construction management capability is maintained in order to:

- Be prepared for emergency situations.
- Perform construction management in the most timely and cost effective manner.
- Maintain people who are the most knowledgeable and possess the specialized means and abilities needed to work on complex projects.
- Maintain an efficient interface with Reclamation's internal O&M, design and contracting functions.

- Be in the best possible position to protect the long-term interest of the Government as the owner.
- Maintain resources for utilization to improve designs and to assure quality features are constructed.
- Maintain capability for inherently governmental functions and to work in and on security sensitive areas.

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Full capability has generally been the most efficient and cost effective means of completing major construction projects throughout the West during Reclamation's first 100 years. Having this capability has enabled Reclamation to not only respond to emergency situations but also allows for timely responses to future project development. However, as the number and extent of construction projects has declined, it is recognized that maintaining full construction management capability may not be a practical option. The ability to keep a full time construction staff gainfully employed has become more difficult during the valleys, as well as providing sufficient staff during the peaks. Unless additional construction project opportunities become available (such as Reclamation becoming the construction management arm for the DOI) the ability to maintain full construction management capability may not be realistic.

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Recommendations

The preferred provider of choice for major construction should be with Reclamation personnel in order to maintain technical expertise within the

organization. It has been shown in the past that keeping construction management within the agency ensures highly specialized expertise is available, institutional knowledge is retained, and major construction projects are constructed in the most efficient and cost effective manner. Because the liabilities and risks associated with ownership of these projects are retained by the agency, keeping construction management in-house becomes more critical. Having this capability has enabled Reclamation to respond to emergency situations that would not have been possible otherwise.

Reclamation has had to “grow our own” staff in key positions. Bringing personnel up through the ranks has proven to be an effective means of retaining corporate knowledge, developing specialized technical expertise, and ensuring that competent personnel are available as the more experienced workforce retires. This practice should continue into the future. In order to stabilize the peaks and valleys in workload, the DOI could consider utilizing the construction experience within Reclamation across the various Bureaus within the DOI. If Reclamation were the construction management service center for the DOI, it would provide a more stabilized workload thus resulting in more efficient staffing levels, use of staff, and cost effectiveness throughout the DOI.

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The group of senior managers recommends that the following areas of focus should be examined to ensure that construction management capability with the unique knowledge of large dams, power facilities, and distribution systems remains within Reclamation.

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3. Plan and implement organizational measures to enhance staff management, avoid dispersion, and consolidate expertise by continuing/creating regional

mobile construction offices. This should be undertaken as each region's workload dictates.

4. Implement new program initiatives to enhance and develop increased capacity of storing water, distribution, and power generation to meet the critical needs of the West, recognized and promoted in the Water 2025 initiative. As part of this initiative, become more involved and play a larger role with existing programs such as Title 16 and Salinity.

5. Actively pursue removing barriers to provide construction management for multiple agencies (Agency Service Centers) and make Reclamation the construction management Service Center for the DOI. This service should be focused towards the highly specialized areas such as Safety of Dams in which Reclamation has already established expertise.

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Construction Management In The Bureau of Reclamation (The Next 25 Years)

Introduction

On March 3, 2004, Commissioner John Keys requested a group of senior managers to envision Reclamation's future management of construction activities for the next 25 years. The intent of this report is to assess Reclamation's current construction management capabilities, evaluate construction management capability needs over the next 25 years, and offer considerations and recommendations to meet future demands.

Reclamation's construction management capability has been a significant part of its ability to meet the agency's mission goals and objectives. In order to continue to meet these goals and objectives, Reclamation needs to assess its approach for providing construction management services both organizationally and functionally.

Background

One of the Secretary's highest priorities under the Water 2025 Initiative is to avoid a water crisis in the West while continuing Reclamation's mission to provide reliable water and generate power. Reclamation's contributions have greatly contributed to development and growth of the West; however, some of Reclamation's early projects are 75 to 100 years old, and are in critical need of rehabilitation and betterment. As the infrastructure continues to age, Reclamation's ability to reliably deliver water and power and manage the interbasin, interstate, and international water issues will become increasingly more difficult.

The large construction projects of the past are no longer common. The opportunities to maintain construction management capability at the end of the 20th century became more difficult and it appears that this will continue. In order to be prepared for the next 25 years, it is important to evaluate where Reclamation is today and determine what will be needed over the next 25 years. The simple fact remains that in order to maintain construction management capability, there needs to be ongoing construction projects. Although the regularity of the large construction projects of the past have gone away, there is still significant construction activity in the organization including safety of dams, operations and maintenance, and ongoing authorized construction projects.

Reclamation construction management has evolved over Reclamation's history. Prior to the 1980's, the focus of construction management was on constructing projects to store and transport water. Construction contracting, coordination of staffing, and significant program oversight were centralized in the Denver Office.

In the 1980's, a shift occurred that moved more control to the regional offices in order to separate the contracting function from a centralized construction management organization located in Denver. During the 1990's, Reclamation's controls for construction management were completely decentralized from Denver to the region and area offices. All the Reclamation Instructions and guidelines including those that pertained to construction management activities were sunset. The Mid Pacific (MP) and Pacific Northwest (PN) Regions, in which major projects were completed or near completion, chose to centralize the construction management responsibilities to one office. The Lower Colorado (LC), Upper Colorado (UC), and Great Plains (GP) Regions continued to maintain capability in various locations within their regions. It became apparent that there was a need for consistency in construction management. To provide standards, guidance, and codify the current way of doing business, a new policy was approved and implemented for design and construction management in 2000, placing responsibility for design and construction activities with the regional directors. The policy allowed regional directors to retain the responsibility for design and construction management or delegate it to the area manager, division chief, or other responsible official as appropriate. These are the policies, directives, and standards that are currently in place.

Research to Determine how Other Governmental Agencies Accomplish Construction Management

In an effort to better understand the past, present, and future construction management practices in the industry, several telephone interviews were conducted. The following Federal agencies were contacted: National Park Service (NPS), Corps of Engineers (COE), and Tennessee Valley Authority (TVA). In addition, two quasi-governmental agencies were contacted: Metropolitan Water District of Southern California (MWD) and British Columbia Hydro (BCH). Excluding the NPS, the above agencies were selected because of their similarity with Reclamation's mission for delivery of water and power. NPS was selected because it is a sister Department of the Interior (DOI) agency with a substantial construction budget. The Department of Energy (DOE) was not included in the research because of the unique environment in which it operates. Literature research was also performed and the Federal Acquisition Regulations were reviewed. In general, a wide variety of construction management practices exist. The factors that determine an agency's particular method are varied and can be overlapping.

The prevailing theme discovered through these interviews is that construction management contractors are utilized within the organizations but at varying degrees of involvement and control. Existing practices are to limit employment of construction management contractors to the extent agencies can avoid compromising their key components and features. Consistently, key areas of concern include cost effectiveness, quality assurance (QA), and ensuring that technically competent oversight is provided for each agency's critical features. Clearly, if these three objectives are not met, then out-sourcing of construction management is not in the best interest of the agency and is not considered. Generally, construction management out-sourcing is considered for projects where there are limited resources available, location

of the work creates undue expenses, and requirements of specialized technical expertise is not required. NPS is an exception to this philosophy with all construction management out-sourced.

It was evident from the interviews that in every case, the preference was to provide construction management through in-house capability. Although NPS personnel also felt this way, due to their agency policies and directives, it does not appear that they will be revising their methods in the foreseeable future. It was felt that in-house construction management provided better control, resulted in a technically superior product, and was the most cost effective way of doing business.

A table that illustrates the various issues and current conditions within these agencies is presented in Appendix A. Also included in Appendix A is a summarization of each of the interviews.

One additional consideration examined during the research process was the project delivery method of "design/build" both in context of it's applicability to Reclamation's future needs and in the research conducted of how other agencies utilize this method. The COE uses this method extensively in its military program and on a very limited basis for the civil works program. A cursory review of the water resources market indicates somewhat limited application at this time. This delivery method should be considered as an option for Reclamation projects. However, there are significant limitations associated with this method for Reclamation's unique projects, resulting in reduced effectiveness. These limitations, in part, include: developing an adequate scope of work in the early stages of project development to commit a contract, performing National Environmental Policy Act (NEPA) compliance and land acquisition processes to fit with the early contracting, matching the authorization with the early contracting, securing agreements in a timely manner with outside project participants, and obtaining reliable funding to commit to early contracting.

Present Construction Management Capability

To better evaluate Reclamation's future construction management capability, an understanding of the present construction management capability is important.

Construction management activities include construction contract administration, construction inspection, construction geology, materials engineering and testing, and construction surveying.

The construction management capability of any organization requires a definite degree of expertise in contracting methods. In looking at the future of construction management in Reclamation, contracting techniques must be integrated in the organization to blend means and methods of design and construction management expertise into a final Reclamation constructed product.

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Construction Management, TSC (1997-2004)	18	13	-5
TOTAL	447	292	-155

During the period depicted above, very little construction management was out-sourced to the A&E community and Reclamation was able to effectively manage the existing staff by sharing resources to meet its workload. Reclamation has proven in a number of instances to be the construction manager of choice for various organizations such as water districts, project proponents, and federal agencies.

Locations within Reclamation that still have significant construction management capability are: Yakima, Washington; Willows, California; Provo, Utah; Durango, Colorado; Farmington, New Mexico; Billings, Montana; Boulder City, Nevada; and Denver, Colorado. There are small pockets of expertise in several regional and area offices, but it is limited. Of Reclamation's 5,900 employees, less than 300 are currently involved with construction management on a daily basis. Currently, projects are smaller with shorter durations which make future planning much more difficult. In the past, there have been long-term projects scheduled for years in the future. The cost of moving from one location to the next, along with project duration, has become much more significant now than it was in the past. The pool of applicants for construction management vacancies has become more limited due to these factors.

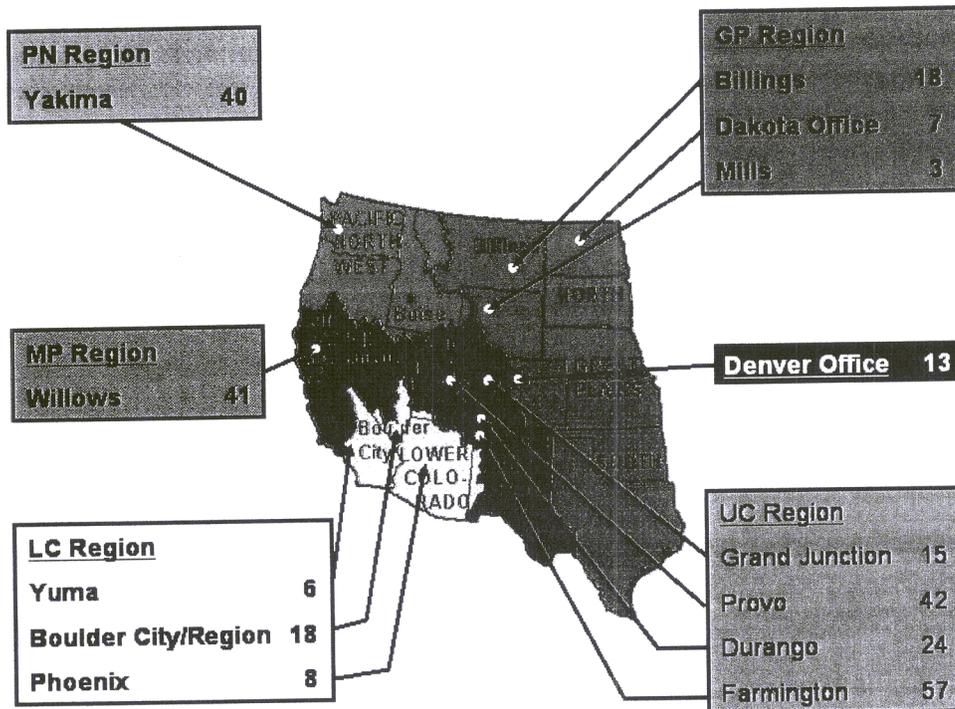


Figure 1
Construction Management Locations and Staffing

Reclamation’s Construction Management – Future Workload

Reclamation’s construction management workload has changed in recent years and continues to evolve. Over the past 10 to 15 years, the construction of new projects has declined. A few authorized new projects (such as Animas-La Plata) will continue to be part of the workload in the future. However, these projects will likely be smaller and less comprehensive than the traditional large Reclamation projects of the past. Although most of the large construction projects of the past have been completed, there is still significant construction activity in the organization which includes the following programs.

Safety of Dams (SOD): The SOD Program requires a substantial construction management effort. A number of dam modifications have been completed during the past 20 years, and most of the identified SOD modifications remaining should be completed during the next 10 years. However, additional dam rehabilitations or modifications will be required in the future, and it is anticipated that the SOD Program will remain a significant part of Reclamation’s future construction workload.

Repairs, Additions, and Extraordinary Items (RAX): Much of the RAX Program is being accomplished through construction contracts. Reclamation’s aging infrastructure will necessitate an ongoing effort of repair, replacement, and

upgrades in order for Reclamation to continue to accomplish its mission. Such an effort will require construction management, whether in support of O&M or under new rehabilitation authorization. Construction activity in the repair, replacement, and upgrade of Reclamation's facilities is expected to continue into the foreseeable future. In addition, existing facilities are being modified to satisfy today's environmental requirements.

It should be noted, however, that the number of facilities maintained by Reclamation (i.e., not transferred to other entities for O&M) varies greatly from region to region. In some regions, this workload is relatively constant; and in other regions, such as GP, this workload is presently increasing in magnitude.

Salinity Control: Reclamation's \$14 million annual Salinity Control Program is ongoing into the future and requires some construction management oversight requirements. As the salinity program presently operates, Reclamation's construction management is only utilized minimally, with most of the work being out-sourced.

Rural Water Projects: Some regions are responsible for authorized rural water projects which total hundreds of millions of dollars. Appropriations have not been passed by Congress to fund most of this work, but some level of construction of these projects could occur. Typically, this is accomplished by "pass-through" funding to tribes under PL 638 agreements; however, Reclamation retains an important oversight role which requires construction management and engineering expertise.

Other Agencies: The extent to which Reclamation may be called upon to provide construction management services for other agencies in the future is unknown. Consideration should be given to Reclamation becoming the central construction management service center for the DOI. The advantages of such an arrangement are significant and deserve further study.

Given all of the above, there will be an overall decrease in Reclamation construction activity when the current major projects are completed. Then it is anticipated that there will be a fairly constant construction management requirement in Reclamation as a whole, with fluctuations in each region, as affected by major SOD modifications, RAX, etc.

Options for Future Construction Management

Based on Reclamation's mission, present construction management capability, anticipated future workload, and research of similar agencies' construction management experience; three potential options are presented regarding the execution of Reclamation's construction management needs over the next 25 years.

The three options are:

1. Out-Sourcing - Contracting out all construction management capability functions that are not inherently governmental.
2. Full Construction Management Capability - Maintaining full construction management capability to accomplish the workload.
3. Core Construction Management Capability - Maintaining essential core capability for critical and complex features which consists of both new constructions and modifications to existing features, while contract out the remainder of Reclamation's needs as appropriate.

The option implemented will have an effect on the construction management expertise available in Reclamation. Although it should not be considered comprehensive, Table 2 gives an idea of the types of expertise Reclamation would expect to maintain associated with each of the options.

**Table 2
Construction Management Areas of Expertise**

Option I - Outsourcing Predicted 2010 and Beyond	Option II Present – 2004	Option III – Maintain Core Construction Management Predicted 2010 and Beyond
	Quality Assurance	Quality Assurance
	Satellite Field Offices	Satellite Field Offices
	Mobile Lab	Mobile Lab
Modification Analysis and Review	Modification Analysis and Review	Modification Analysis and Review
	Underwater Construction	Underwater Construction
Procurement Services	Procurement Services	Procurement Services
Budget Controls	Budget Controls	Budget Controls
	Topographic Mapping	Topographic Mapping
Design Support	Design Support	Design Support
Auto CAD	Auto CAD	Auto CAD
Public Involvement	Public Involvement	Public Involvement
	Surveys	Surveys
	Material Testing	Material Testing
	Mechanical, Electrical, Civil Inspections	Mechanical, Electrical, Civil Inspections
Engineering	Engineering	Engineering
As-built drawings	As-built drawings	As-built drawings
Construction Reports	Construction Reports	Construction Reports
	Terra Modeling	Terra Modeling
	Mechanical Installation	Mechanical Installation
Operations and Maintenance	Operations and Maintenance	Operations and Maintenance
	Claims Analysis	Claims Analysis
	Controlled Blasting	Controlled Blasting
	Safety	Safety
Complete Construction Photo History	Complete Construction Photo History	Complete Construction Photo History
	On Site Engineers	On Site Engineers
	Contract Administration	Contract Administration
	Dispute Resolutions and Partnering Services	Dispute Resolutions and Partnering Services
	Specialized Construction Practices	Specialized Construction Practices
	Construction Geology	Construction Geology

Out-Sourcing

Reclamation would contract to the Architect/Engineering (A/E) community for the construction management functions not inherently governmental. Included under this option would be inspection, construction geology, material testing, surveying (subject to Government scrutiny for original and final construction quantities), and some contract administration activities. Reclamation's responsibilities would be to manage construction and service contracts to accomplish construction activities. Reclamation would handle a fluctuating workload by utilizing service contracts. It is believed that indefinite delivery indefinite quantity (IDIQ) service contracts for construction management support would be awarded and task orders issued as each construction contract is awarded. Figure 2 graphically displays the general processes that would be involved if full out-sourcing of construction management were utilized.

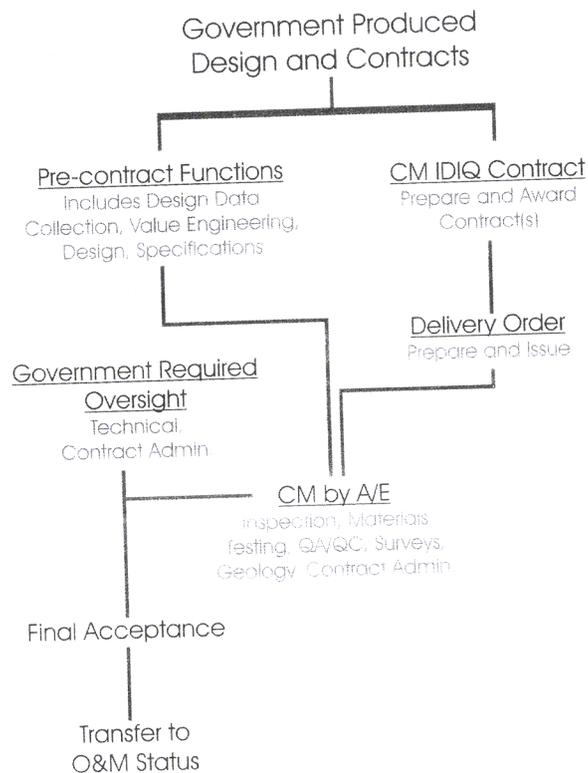


Figure 2
Out-Sourcing

Federal Acquisition Regulations (FAR) dictate how the interests of the Government are protected when construction management functions are out-sourced. Also, it should be noted that there are some functions that are classified as inherently governmental and cannot be contracted. Appendix B lists these FAR requirements as well as reports from various committees that have examined this issue.

As required in FAR 37.114 (see Appendix B), “a sufficient number of qualified Government employees are assigned” to oversee service contracts that support Government decisionmaking. The NPS performs all of its construction management activities in this manner. The NPS utilizes a variety of contracting approaches to procure its construction management services from the private sector. However, the NPS indicated it has lost its capability to perform construction management services with its own staff and lacks in-house construction expertise to provide management with the necessary knowledge for decisionmaking. They are reliant on the capabilities and judgment that are provided through the private sector. Overall cost savings to the Government using this approach is questionable according to the NPS. However, no pre- or post-contracting out studies have been performed by the NPS.

Reclamation currently performs most of its construction management activities on critical and/or complex facilities. The inspection of these type facilities requires full-time inspection to ensure the final product meets the design intent. As discussed in Appendix B, it is Reclamation’s obligation to perform QA on all critical and complex features. This is required for a variety of reasons such as knowledge, design intent, consistency from project to project, and potential impacts to mission. Because of under increased security requirements at Reclamation facilities, oversight of construction contractors by non-Reclamation employees could be an unacceptable situation.

It must be noted that an integral aspect of efficient construction is the integration of the contracting process. Contracting methods must be determined early in the design process by involving the construction staff with a focus on the best contractual instrument to implement the design into construction. When out-sourcing is used as a way to provide construction management services, the lessons learned and benefit to corporate knowledge is minimized because the knowledge gained on any given project is lost when the service contract is complete. A benefit of performing construction management services with in-house capability is the added value to the collective corporate knowledge. Consistency between project and inspection personnel is important for clients and contractors. This is difficult to achieve using contractor inspection forces.

If out-sourcing of construction management is utilized, it would be necessary to have stringent selection criteria in place. The technical capabilities and experience of not only the firm but also those individuals assigned to the onsite project must be carefully evaluated to ensure that the project would be constructed to Reclamation standards. Those individuals assigned to the project must be identified during the evaluation process to ensure that they have sufficient experience and technical expertise. While there are many companies in the private sector that provide construction management services, only the very large firms have the experience and capability to manage large Reclamation construction projects. These firms must also exhibit the intent of protecting the Federal investment and providing the long-term benefits to the public envisioned in the project plans. This intent would be accomplished by using appropriate engineering and construction standards that may not always be used in non-Reclamation projects.

It should be recognized that additional government oversight is required when outsourcing is used. Even though construction management could be provided by the private sector, there remains the required accountability. This accountability should be handled by Reclamation personnel and as such results in an additional layer of bureaucracy (oversight) which tends to increase the overall costs of the project. With time, the removal of Reclamation personnel from the onsite construction activities has the potential of resulting in a staff that no longer has the proper technical experience and background to oversee the specialized work required on Reclamation structures. A possible outcome from this would be that the day-to-day communications and dealing with construction contractors would have to be handled by service contract employees. The number of construction management personnel would decrease under this option, but this decrease would be offset somewhat by the increase in Reclamation's administrative workforce. Additional administrative personnel would be required to plan, administer, and provide oversight of the program, projects, and contracts. Contracting costs and reporting would also likely increase.

Full Construction Management Capability

Full construction management capability has been Reclamation's traditional operating practice since its inception. Currently, this is still the case, although as mentioned previously, there are some instances where construction management is already contracted to the private sector. Full capability has generally been the most efficient and cost effective means of completing major construction projects throughout the West. Figure 3 gives a general representation of this process. Having this capability has enabled Reclamation to not only respond to emergency situations but also allows for timely responses on future project development. However, as the number and extent of construction projects has declined, it is recognized that full construction management capability may not be a practical option. The ability to keep a full time construction staff efficiently utilized has become more difficult during the valleys, as well as providing sufficient staff during the peaks. Unless additional construction project opportunities become available (such as Reclamation becoming the construction management arm for the DOI) the ability to maintain full construction management capability may not be realistic.

Government Produced Design and Contracts

Pre-contract Functions
Includes Design Data
Collection, Value Engineering,
Design, Specifications

Government CM
Inspection, Materials
Testing, QA/QC, Surveys,
Geology, Contract Admin.

Final Acceptance

Transfer to
O&M Status

Figure 3
Full Construction Management Capability

In order to attempt to maintain full construction management capability, a comprehensive effort would be required. The focus to continue with the Dam Safety Program until all of Reclamation's high risk dams meet today's design standards and are within an acceptable level of risk is not only prudent but absolutely necessary to meet public safety issues. At the same time, it is recognized that because of the type, magnitude, and age of the facilities, the Dam Safety Program will be ongoing for the near and extended future. Many of our existing tunnels, pipelines, and canals are approaching 75 to 100 years old. Additionally, the population adjacent to many of our facilities has greatly increased. For example, some of our canals which only had farm land below them 25 years ago, now have subdivisions with thousands of homes. The responsibility for public safety below these types of facilities is even higher than for some of our dams.

In 1983, when Glen Canyon Dam spilled for the first time, significant damage occurred in both spillways. Reclamation responded by mobilizing an experienced construction staff from various locations throughout the organization. Because of the available corporate expertise, Reclamation was in a position to direct the repairs using a time and materials contract under an emergency procurement. An A/E contractor could not have provided this inherently governmental requirement of administering a time and materials contract. Although this was a rare occurrence, it has happened more recently at Folsom Dam radial gates and the Willow Creek Dam sinkhole. It will be important for Reclamation to have the construction management expertise to be able to respond to similar situations in the future should they occur.

Although private consultants are technically capable, they do not have the inherent responsibility and accountability of ownership associated with Reclamation projects, as well as the liability associated with the original design and construction. Reclamation's facilities provide a valuable resource that is necessary not only for the present but also critical for future growth and development of the western United States. These facilities are for the benefit of the general population and therefore the liability and responsibility of their O&M is provided by the government. Meeting Reclamation's mission depends on our ability to deliver water and power. Reclamation's management of its facilities requires an institutional knowledge of the O&M, design, and construction for those facilities. These three areas (O&M, design, and construction) are dependent upon each other. Contracting for any of the three adds an additional burden to the other two, while making the transfer between the various functions on a project less synergistic.

Core Construction Management Capability

Core construction management capability would consist of a combination of the two previously described alternatives wherein in-house construction management capability would be maintained for critical features with specialized technical needs, while out-sourcing would be used for less critical features. Figure 4 depicts the process that would be involved if this option were implemented. Service contracts for non-inherently governmental functions would be required as discussed in the out-sourcing option. A difficulty in this approach is optimizing the number of staff, being able to provide meaningful ongoing work so the level of desired expertise could be maintained, and the ability to fill vacancies with equivalent expertise. To implement this option, an evaluation would be performed to look at today's workload and staffing level. However, Reclamation's staff would be expected to decrease moderately during the next 10 to 12 years after completion of the current major projects, then stabilize.

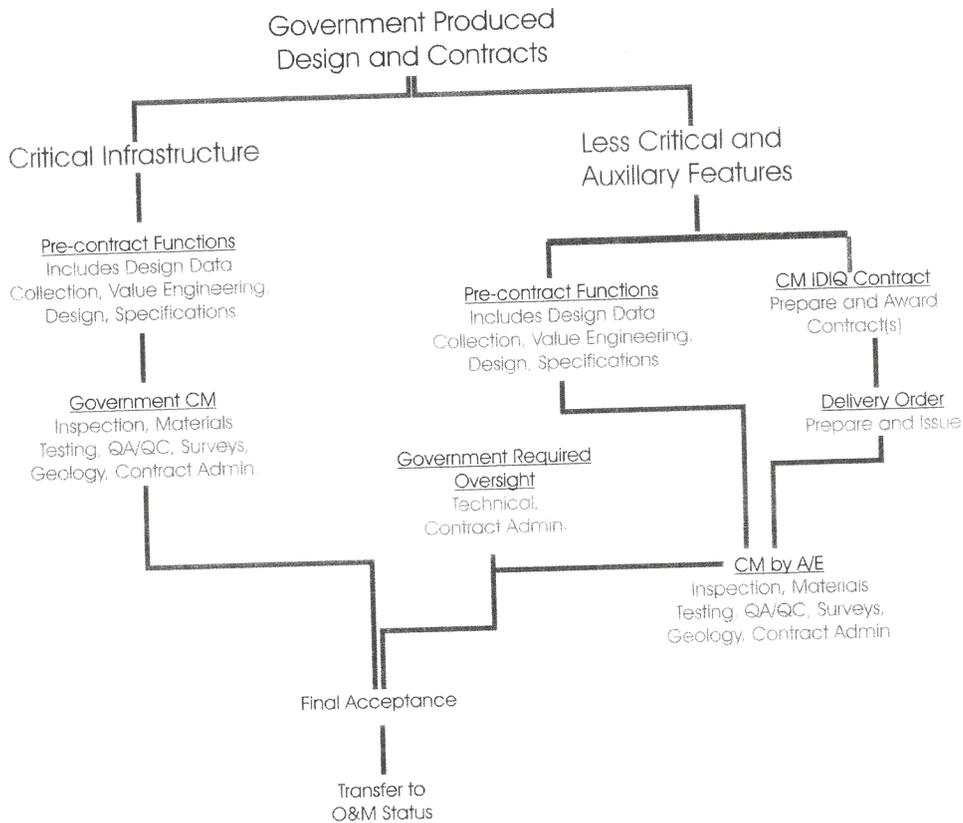


Figure 4
Core Construction Management Capability

There is evidence that Reclamation is already heading towards this option. Construction management staffing appears to have reached an optimum level that is supporting the critical construction. Reclamation is already involved with programs that utilize the private sector almost exclusively. One example is the Salinity Program within the UC Region where open canals are being converted to pressure irrigation systems. The design and construction management of this \$14 million annual program is primarily being performed by private consultants because of enactment of legislation in 1995. This resulted in changing the program from a traditional Reclamation design and construct program to a grant program where most of the engineering was transferred to the private sector.

Under the core capability option, Reclamation would be structured to continue to provide its construction management for critical infrastructure, while out-sourcing this function to the private sector for less critical features. Out-sourcing would be a management tool exercised by the responsible construction management official and utilized when workloads and staff availability warrant. It would provide flexibility for management by providing an additional alternative to cover the work. In areas where

construction is insufficient to support a fulltime construction staff, out-sourcing could provide a reasonable alternative.

Reclamation would continue to implement the current policies on performance of construction management and staff utilization. The preferred provider of choice for major construction should be with Reclamation personnel, if there is sufficient capability, in order to maintain our expertise. This appears to be the most prudent when considering the costs associated with out-sourcing, the corporate knowledge that is retained when services are provided with in-house capability, and the liability and risks inherent with major projects. For major construction such as dams, tunnels, pumping and power plants, and large pipelines, the in-house capability and expertise is critical. A thorough understanding and familiarity of these types of structures is necessary to ensure that facilities are not compromised. This can be accomplished only by having direct oversight of any construction activities on these features. Only personnel involved with these structures on a daily basis over the course of many years can have an adequate understanding of their nature and characteristics. The in-house resources can be utilized for the critical, highly specialized and complex work, while service contracts would be used to minimize the resource requirements, cover peak workload times, and to oversee less critical construction work.

Reclamation would also need to be willing to evaluate construction resources, combined with a determination of where those resources would be required, and then develop construction management organizations to provide the appropriate services. This should be accomplished using regional mobile construction offices which share resources to maximize workload efficiency. However, Reclamation would need to evaluate the impacts on personnel and their families that are required to be more mobile, as we provide service with an optimized working staff over a larger geographical area. Reclamation would need to be sensitive in attempting to assign staff within work areas close to their family, yet remembering the benefits of assigning personnel for service needs and training.

A corporate approach to staff development and utilization is an essential consideration. Over the years, Reclamation has had to "grow our own" staff in key positions. Bringing personnel up through the ranks has proven to be an effective means of retaining corporate knowledge, developing specialized technical expertise, and ensuring that competent personnel are available as the more experienced workforce retires. This would need to be continued, but on a corporate level rather than through each individual office.

Finally, Reclamation should consider removing barriers to provide construction management services to other entities. If this were to occur, Reclamation-provided construction management probably should be focused on areas such as Safety of Dams where Reclamation has already demonstrated its technical expertise. Providing construction management services for other agencies possibly has the greatest potential for efficiently utilizing staff for Reclamation and the DOI. Reclamation is not unique in experiencing a dwindling personnel base or the need to produce with fewer

personnel both now and in the future. A similar situation is occurring with all government agencies, thus it is more important today and for the future that agencies maximize the effective use of their staff. There appears to be a very real need in the DOI as well as in other areas of government, for construction management expertise, especially on Safety of Dams projects. Reclamation adds value because of its knowledge of design, construction, and O&M of large storage, distribution, and power facilities and large civil construction in general. If Reclamation were the construction management service center for the DOI, it would provide a more stabilized workload by reducing the peaks and valleys; thus resulting in more efficient staffing levels, use of staff, and cost effectiveness. It would help sustain and hone not only Reclamation's construction management expertise, but also ensure for NPS, FWS, BIA, and BLM that a stable, adequately staffed DOI construction management organization is in place at all times. It would afford more opportunities for training and development, afford more opportunities for personnel, and help to maintain a competent and experienced staff. It would reduce the overall cost of programs to Reclamation and the DOI. In addition, other areas that could benefit from the service center approach include work for other agencies, foreign governments, and Native American assistance (see Appendix C). All of this would allow Reclamation to better perform its core mission of providing water and power to the West.

Keeping core construction management within the agency ensures that highly specialized expertise is available, is integrated into the agency needs, and that institutionally knowledgeable personnel are producing technically sound projects.

Recommendations

It is the recommendation of this group of senior managers that Reclamation take the steps necessary to maintain an adequate level of core construction management capability (option 3) to be able to provide construction management oversight of Reclamation's critical and/or complex features. Some level of out-sourcing for less critical construction may be required to accomplish the mission of the agency. The ability to maintain construction management capability for Reclamation's critical features is paramount; and out-sourcing some construction management to the private sector should not diminish Reclamation's ability to accomplish its mission.

Reclamation should also implement new initiatives and programs to enhance water storage, delivery, and power facilities to avoid the crises and conflict in the West that will likely center on water. Reclamation's institutional knowledge of construction management should be maintained so that future generations can rely on the facilities that will be built or upgraded within the next 25 years. Reclamation has a responsibility to address the issues of focus in Water 2025. The economy of the West and the Nation is dependent on water delivery. Over the next 25 years, lacking any dramatic change in use allocations or population trends, the demand for water will exceed existing storage and delivery capabilities. The Water 2025 projected crisis areas map illustrates this problem. At some point, after all efforts to conserve water have been implemented, new delivery and storage systems will be required to meet this demand. Water for

agriculture is important; however, M&I water and environmental issues will likely control the demand for water in the future. As new facilities become necessary, they must be integrated with existing facilities, many of which are Reclamation's, to avoid negative impacts to the river systems.

The group recommends that the following areas of focus be examined to ensure that construction management capability with the unique knowledge of large dams, power facilities, and distribution systems remain within Reclamation.

1. Continue programs that support Reclamation's mission such as Safety of Dams, Rehabilitation and Betterment, RAX, and O&M of facilities using in-house capabilities. In addition, consider either providing a means to fund the minimum necessary construction management staff for valleys in the work loads or supplementing those valleys with outside work. If the proper balance of construction management staff to work were determined, the cost would be minimal. However, without assurances of funding, the capability of attracting long-term personnel would be limited.
2. Develop a diverse workforce, in expertise and age, which is structured to support the critical features and baseline construction requirements. Cross train and share personnel across regions to ensure the development of construction management capability necessary to support mission requirements of storing and distributing water and generating power, consistent with a corporate perspective.
3. Plan and implement organizational measures to enhance staff management, avoid dispersion, and consolidate expertise by continuing/creating regional mobile construction offices. This should be undertaken as each region's workload dictates.
4. Implement new program initiatives to enhance and develop increased capacity of storing water, distribution, and power generation to meet the critical needs of the West, recognized and promoted in the Water 2025 initiative. As part of this initiative, become more involved and play a larger role with existing programs such as Title 16 and Salinity.
5. Actively pursue removing barriers to provide construction management for multiple agencies (Agency Service Centers) and make Reclamation the construction management Service Center for the DOI. This service should be focused towards highly specialized areas such as Safety of Dams in which Reclamation has already established expertise.

In addition to the above recommendations, the following administrative and organizational considerations should be examined.

Staffing: An adequate and comprehensive succession plan should be in place to maintain continuity, develop expertise within the ranks, and ensure that corporate knowledge is passed on.

Organizational Structure: It is premature to make any significant changes in Reclamation's organization concept. It is recommended that as long as there is sufficient workload in the offices with significant on going construction (Yakima, Willows, Provo, Durango, and Billings), our customers are better served with personnel based closer to the work. The continuing need for the Farmington Construction Office should be based on whether adequate and consistent funding for the Navajo Indian Irrigation Project (NIIP) is provided in the future. The PN, GP, and MP Regions currently have mobile construction offices which provide construction management services throughout their respective regions. Because of UC Region's ongoing new construction on Animas-La Plata, Central Utah Project, and NIIP, it is anticipated that separate offices with significant construction management capability will continue until each of these large projects are completed. When this occurs during the next 10 years, it is expected that the UC Region would also move to a single mobile construction office type organization. At present, the LC Region has no designated construction office and the need for a future mobile construction office would depend upon future construction within that region. The Technical Service Center's construction group should continue to be utilized as a clearing house for various construction personnel as it has in the recent past.

The need for change in the organizational concept should not be attempted until a future direction is decided. Even then, logic would dictate that centralization of the construction core capability would be necessary. This centralization should be considered from region to region as dictated by the remaining work load, based on a global corporate perspective. This concept would provide for new major projects such as ALP by using a traditional project construction office in addition to the mobile construction office concept.

Policy Impacts: Core construction capability could be maintained more effectively if policies were established that would allow Reclamation to perform construction management on a reimbursable basis for other agencies within the DOI.

Legislation: Maintaining core construction capability will require a dependable and consistent funding source. In order to upgrade the infrastructure to today's standards and remove or at least minimize the huge liability from the Federal Government, legislation may be required to provide a funding mechanism. Additionally, future appropriations for other projects such as rehabilitation and betterment loans or salinity could be utilized to maintain some Reclamation core construction capability. This funding should not be allowed to be passed-through

as this would defeat the purpose of having sufficient technical expertise and knowledge to competently oversee Reclamation's critical infrastructure.

Education/Training: Specific funding for education and training may be required to help ensure an adequate program is in place.

Summary

For the last 100 years, Reclamation has maintained its own in-house capability to conceive, plan and build America's infrastructure to accomplish its mission. But during the next 100 years, much of what Reclamation has built will need to be repaired or replaced with new, state-of-the-art infrastructure. Therefore, this in-house capability, with its inherent corporate memory and history is essential in meeting Reclamation's mission in the 21st century.

In conclusion we believe it is critical to Reclamation's mission that core construction management capability is maintained in order to:

- Be prepared for emergency situations.
- Perform construction management in the most timely and cost effective manner.
- Maintain people who are the most knowledgeable and possess the specialized means and abilities needed to work on complex projects.
- Maintain an efficient interface with Reclamation's internal O&M, design and contracting functions.
- Be in the best possible position to protect the long-term interest of the Government as the owner.
- Maintain resources for utilization to improve designs and to assure quality features are constructed.
- Maintain capability for inherently governmental functions and to work in and on security sensitive areas.

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