TECHNICAL MEMORANDUM

DATE:       June 22, 2012                Project No.: 376-00-11-06
TO:         Dennis Diemer, Woodland-Davis Clean Water Agency
CC:         Doug Baxter, City of Woodland
            Diane Phillips, City of Davis
FROM:       Lindsay Smith, R.C.E. #72996
REVIEWED BY:  Jim Yost, R.C.E. #24137
SUBJECT:    Water and Wastewater Operations: Public or Private Contract

PURPOSE

The purpose of this technical memorandum (TM) is to present the results of a comparative evaluation of public and private operations of water and wastewater systems, as requested by the Woodland-Davis Clean Water Agency (WDCWA).

SCOPE OF EVALUATION

The scope of this comparative review is limited to the three water and wastewater operations alternatives defined below and does not include private facility ownership or acquisition (which is common elsewhere, but has not generally occurred in the United States) or investor-owned public utilities (e.g., San Jose Water):

1. Private operations and maintenance contracts – The public agency enters into an operations and maintenance (O&M) contract with a private operations firm for a defined period of time. The contract may include O&M of the entire utility system or a portion of the system (e.g., O&M of the water treatment plant (WTP) only).

2. Private operations and maintenance associated with Design-Build-Operate (DBO) contracts – The public agency enters into a private O&M contract as an integral part of a defined DBO project. Private O&M follows construction of the project facilities and continues for a defined period of time.

3. Public operations – The City, Agency, or District directly operates and provides all labor and direct costs associated with the O&M of their water and/or wastewater system.
For simplicity, both direct O&M contracts and contracts associated with a DBO project will be discussed together and referred to as private operations. Differences between the two types of private operations contracts will be noted where they exist.

PRIVATE OPERATIONS

A report by the Government Accounting Office (GAO) in August 2002 titled Water Infrastructure: Information on Financing, Capital Planning, and Privatization found that an estimated 29 percent of public agencies defer annual maintenance expenditures due to insufficient funds. Over time, deferred maintenance leads to operational issues, increased potential for unforeseen capital costs or operational interruptions, and costly future capital improvements. To address fiscal challenges and concerns with aging infrastructure, some public utilities are looking to the private market for construction and/or operations assistance. Private-public partnerships are not new, but are becoming more popular as the cost to operate and maintain aging utility systems becomes a national concern. The US Conference of Mayors reports that an estimated four out of 10 cities are actively considering private-public partnerships. These partnerships can come in many forms, including but not limited to, private operations contracts, design-build projects, DBO contracts and others.

As opportunities arise, private operations firms evaluate the profit potential of each prospective project. Although each project differs, according to the GAO Report there are five main evaluation criteria:

- The opportunity to improve operational efficiencies. This is normally centered around staffing needs, and energy and chemical use.
- The potential for system growth. Future growth ensures a larger operations scope of work and potential for involvement in a private-public partnership for facilities expansion.
- The utility’s proximity to existing firm operations. Closer proximity results in lower travel expenses for technical and managing staff and may increase bulk buying potential of chemicals and common maintenance supplies.
- The capital investment required to reduce maintenance costs and to increase efficiencies or upgrade an aging system, affect the conditions under which the firm will enter into a contract.
- The terms of the contract are important, especially for a utility with an aging infrastructure. The number of years included in the contract affects the company’s ability to recoup any capital investment.

Public Works Financing reported that the satisfaction with private water and wastewater contract operations is high with an average of 89 percent of communities renewing their contracts between 2001 and 2011. The contract renewal rate of the operations companies submitting on the Davis Woodland Water Supply Project (DWWSP) exceed this published average (Veolia – 92%, United Water – 99%, CH2M HILL – 98%).

Despite the documented success of private operations, there are also some disadvantages to consider. Listed below are the key advantages and disadvantages to private operations.
Advantages of Private Operations

- Access to company technical and management experts
- Contractor is responsible for providing qualified operators
- Cost reductions through bulk buying power
- Transfer of risk from the owner to the operations company
- Ability for the owner to enforce contract-required performance and maintenance provisions
- Competitive bidding encourages operations contract price savings
- Lower owner overhead costs
- Integration of operational considerations in design\(^{(a)}\)
- DBO procurement process provides incentives for the design and construction of a reliable and highly efficient facility\(^{(a)}\)

\(^{(a)}\) DBO project benefit primarily.

Disadvantages to Private Operations

- Potential emphasis on short-term profit by the contractor
- Additional owner administrative costs for management of operations firm
- Owner input limited by contract on means and methods performed by operations firm
- Potential pass-through of regulatory liability to agency
- Risk transfer to contractor may increase cost
- Potential turnover of private operations management staff

Many of the advantages and disadvantages will be referenced in the case studies included below and in the discussion on public operations. Worth noting are the DBO project specific benefits. In addition to the operational benefits noted by many cities throughout the United States, there are additional benefits when the operations are part of a larger DBO contract. Especially in the case of a new Agency, such as the WDCWA, having operational input during the design and construction phase of the project can be critical to achieving reliable and efficient operability of the finished facility. The streamlined approach of the design-build process also helps ensure the construction of a robust and highly efficient facility when a member of the DBO team is responsible for long-term facilities operations. Any equipment replacements or operational inefficiencies will reduce the team’s profits and, therefore, will likely be avoided upfront through focus on efficient facilities design and assurance of quality construction practices.
There is a relationship between the length of the private contract and the assurance of long-term water system reliability. California operations contracts have tended to be short-term or less than 10 years. Other operations contracts discussed below have longer terms. The DWWSP draft RFP requires a 15-year term with an option to extend the contract an additional 5 years, as well as a built-in prepaid equipment replacement and repair schedule to assure reliability.

Information on several private operations projects is presented below. The selected projects discussed represent a fraction of the large number of currently active private operations contracts (1,508 as reported by Public Works Financing in March 2012). Only project information published by third party sources is included, as opposed to relying on information directly solicited from the private operations firms. Some of the projects listed below are operated by private operations firms that are short-listed for the DWWSP, however, others are not. To provide a balanced evaluation, also included are private operations projects in which contracts were terminated due to cause. Please note that the published financial and system information for each agency is not presented in a consistent format or with the same level of detail in the referenced sources. This is due to the availability of information secured during our research. All costs and cost savings references are related to operations and maintenance only and do not include capital construction costs associated with DBO projects.

Private Operations Contract Summaries

**Novato Sanitary District, CA**
- Estimated $1.5 million annual savings
- 7.0 mgd wastewater treatment plant (WWTP) capacity
- $2.6 million annual contract amount (includes chemicals, labor, and power)
- 5-year operations contract with two 3-year possible extensions
- Contract initiation in 2009

**Milwaukee Metropolitan Sewerage District, WI**
- $140 million savings over 10-year operations contract
- 392 mgd total system capacity
- Contract initiation in 1998
- In 2008, contract rebid and awarded to new contractor for 10 years

**City of Gardner, MA**
- $11 million operations savings over 20-year operations contract
- 5.0 mgd WWTP capacity
- 3.0 mgd WTP capacity
- Part of a DBO contract
- Contract initiation in 1998
City of Easton, PA\textsuperscript{13}

- Annual operational cost savings of $660,000
- 12 mgd WTP capacity
- 10 mgd WWTP capacity
- Eliminated compliance problems within three months of taking over operations
- 10-year operations contract
- Contract initiation in 1994
- In 2004 contract rebid and awarded to a different private operation firm for 10 years.

City of Danville, VA\textsuperscript{13}

- Operational cost savings of $807,000 after first year of operation
- 24 mgd WWTP capacity
- 10-year operations contract
- Implemented a Preventive Maintenance Plan using a Computerized Maintenance Management Program

City of Camden, NJ\textsuperscript{13}

- $2.0 million annual operational savings
- 21.5 mgd water system capacity
- 20-year operations contract

City of Bessemer, AL\textsuperscript{13}

- $100 million savings over 10 years of private operations
- 24 mgd WTP capacity
- Contract initiation in 1997 for 24 years
- Part of a DBO contract

Town of Phillipsburg, NJ\textsuperscript{13}

- $550,000 savings in first year of operations
- 3.5 mgd WWTP capacity
- Contract initiation in 1995
Indianapolis, IN

- Exceeded expected 38 percent cost savings; totaling $189 million of savings in the first 14 years of private operations
- Wastewater system operations
- Contract initiated in 1994; renewed 10-year contract in 2007
- Effluent violations significantly reduced and facility accidents almost eliminated
- Preventive and predictive maintenance programs established

Jersey City, NJ

- Projected $38.5 million savings over 5-year contract
- 80 mgd WTP capacity
- Contract initiated in 1996
- Contract renewed in 2012

Discussion of Select Private Operations Contracts

As mentioned previously, in order to provide a balanced evaluation of private operations, presented below are private operations projects in which the contracts were terminated due to cause. The fate of the private operations contract for Richmond, CA is in question, but has not been terminated.

City of Richmond, CA

- $3.3 million original annual operations contract
- $7.0 million of actual annual expenditures including the cost for the contract plus City management staff time

The City of Richmond has had discussions since late 2011 regarding the value of services that are currently provided through their private-public partnership for O&M of their wastewater system. Operations are now in the ninth year of a 10 year contract, and provide for management of the plant and the collection system. Anticipated savings over the life of the contract were $75 million, however, based on their total budgeted amount for Veolia services Richmond appears to be paying higher than anticipated costs for managing the private operations contract. The actual savings to the City of Richmond for private operations is unknown. Although water quality regulatory compliance has been substantially achieved throughout the private operations contract, Richmond is experiencing numerous issues related to deferred maintenance at the City’s WWTP. In late 2011, the City instructed staff to begin the discussions and studies that are required to evaluate the need for a separation agreement with Veolia. The City is expected to consider this issue further by this year.
City of Atlanta, GA

- 195 mgd total water system capacity
- Contract initiation in 1998
- Contract terminated in 2002

The City of Atlanta entered into a private-public partnership when the combination of rapid growth, the need to invest capital in new utilities and aging infrastructure, and a history of U.S. Clean Water Act violations came to a head. The estimated cost savings of private operations was estimated at $400 million over the 20-year contract term. The large scale, long term operations contract procurement was undertaken 15 years ago, when there was little precedent for, or understanding of, such transactions. The selected contractor, United Water, bid aggressively, seeking market share.

The extensive work scope of the private operations contract included operating and maintaining the entire water system (not just a single plant) as well as billing and collections. United Water soon found itself in a loss position when the details of the deteriorated condition of the City’s buried infrastructure became more evident. The mounting maintenance costs forced United Water to seek to renegotiate their service contract. The City was reluctant to negotiate contract modifications due to frayed customer relations resulting from the difficulties United Water experienced in ramping up service for such a large system. Although conditions improved under private operations, the number of customer complaints about poor water quality, a long backlog on maintenance work orders, and insufficient water pressure caused the City to ultimately terminate their private operations contract. The contract provided the City with a mechanism to require performance and accountability from the private operations contractor; however, the City chose to take over the O&M duties in an effort to diffuse mounting public pressure.

During the four years of private operations the City experienced some significant benefits, including having an outside entity reduce the overstaffed workforce of 700 by more than 200; overhauling an antiquated billing and collection system; receiving a settlement payment and capital improvements left in place worth in excess of $15 million when the system was returned; and saving approximately $8 million annually in system operating and maintenance costs ($30 million for City operations versus $22 million for contract operations). Experience has led a number of utilities to focus more on use of private operations for individual greenfield plants and smaller utility systems than for very large scale, multi-plant, existing urban systems including many hundreds of miles of aging pipelines, like the Atlanta water system. There seem to be problems with private operations agreements when the condition of the existing infrastructure is not well known. To help alleviate these potential problems, a condition assessment should be completed prior to executing a contract with a private operations firm. This will allow both the owner and the operations firm to fairly assess the scope and fee for annual operations.

Gary, IN Sanitation District

- $20 million savings over 10-year contract
- 60 mgd WWTP and collection system
- Contract initiated in 1998
- Contract terminated in 2010
A project success in terms of project cost savings, but the private contractor for Gary, Indiana has been accused of violating the Clean Water Act by “tampering with a Monitoring Method and aiding and abetting” and has also been accused of “conspiracy to defraud the US and aiding and abetting.” An indictment was filed in December 2010, and is scheduled to go to trial in August 2012. Criminal indictments are serious, but not common to the private operations industry, and the Gary situation was complicated by an ongoing labor dispute. To our knowledge there have been no other similar indictments associated with a private operations firm. More information will surface through the trial about the involvement of the operations firm in the allegations. The private-public partnership agreement was terminated by Gary, Indiana in 2010.

City of Stockton

- Estimated $1.0 million annual operational savings
- Part of a DBO contract
- 20 year operations contract

From conception, the Stockton DBO project had organized opponents. These opponents ultimately filed a lawsuit against the City alleging that the private-public contract was invalid because the Environmental Impact Report was not certified prior to contract execution. Ultimately the judge declared the contract invalid and the private operations contract was terminated. Between contract execution and termination, the DBO team designed and implemented the project capital upgrades and proceeded to successfully operate the City’s wastewater system. In fact, up until project termination, the DBO project saved the City an estimated $80 million. Ultimately, it was a California Environmental Quality Act compliance issue that halted the project.

PUBLIC OPERATIONS

Many public agencies operate their own water and wastewater utilities with varying levels of efficiency. One of the reasons to consider private operations is their ability to provide highly efficient operations due to their vast firm-wide operational experiences. Except for agencies that have transitioned from public to private operations, it can be difficult to determine the overall efficiency of a public utility. The American Water Works Association is trying to help in this effort by preparing surveys of water and wastewater utilities with an emphasis on performance indicators. The last survey was completed in 2010; however, the most recent published results are documented in the Benchmarking, Performance Indicators for Water and Wastewater Utilities Report: 2007 Annual Survey Data and Analyses Report (Benchmarking Report). The report provides key performance indicators in the areas of organizational development, customer relations, business operations, water operations, and wastewater operations. One of the performance indicators included in the 2007 Benchmarking Report is O&M cost per million gallons (MG) of water processed. The range between the 25th and 75th percentile of O&M costs per MG is $1,037 to $2,310. The problem with general O&M cost ranges is that the details of the utility system are omitted. Water source, level of treatment, size of utility, proximity to water source, and many more criteria significantly affect water utility O&M costs. For this reason caution is necessary when comparing general cost ranges.
Of the 60 water utilities from across the United States surveyed in the Benchmarking Report, four were operated by private operations firms and the remaining 56 were operated by public agency staff. The Benchmarking Report does not show a cost breakdown between private and public operations contracts. Most commonly the only available cost comparisons between private and public operations are prepared when a utility changes from public to private operations, as presented in the case studies above. Less common are O&M cost comparisons from a utility transitioning from private to public operations. Two such reports exist in Northern California; one for Fairfield-Suisun Sewer District and one for the City of Petaluma (these are discussed below). Also available is direct cost comparison information for the City of Lodi WTP operation. A summary of these case studies is included below following a listing of some advantages and disadvantages of public operations of water and wastewater utilities.

Advantages to Public Operations

- Emphasis on public service commitment may improve customer service quality
- Owner’s ability to directly control O & M procedures
- Higher owner benefits may attract high quality operators
- Public agency purchasing groups can be formed to increase bulk buying power
- No payment of private operations contractor overhead and profit

Disadvantages to Public Operations

- Responsible for recruiting, training, and retaining qualified operators and maintenance personnel
- Cannot rely on operations contract to ensure compliance and level of care
- No competitive bidding to reduce operational costs
- Owner directly liable for regulatory compliance and any potential noncompliance impacts (e.g., fines)
- Owner directly responsible for union negotiations, and dealing with potential strikes and/or complaints
- Higher labor costs due to more extensive benefits package
- Difficulty sustaining competitive salaries which can cause problems with employee retention

(b) While currently benefit packages are viewed as better in the public sector, the difference between public and private sector benefits is starting to diminish in California.

Case Studies – Public Operation Projects

The principal driving force for private operations has been to reduce both short- and long-term water user costs. When public costs are compared with private bids it is important to note that the bid is a commitment, the public cost is an estimate. Estimates of public operations savings that
reflect projections of municipal costs, particularly administration and overhead, allocated to water operations, should be considered accordingly.

**Fairfield-Suisun Sewer District, CA**

- Predicted savings over private operations of $283,000 annually
- Actual annual savings of roughly $500,000
- 17.5 mgd dry weather WWTP capacity

Fairfield-Suisun was one of the pioneers of private utility operations. Their first private operations contract was signed in 1976. Their most recent 5-year operations contract was signed in 2004. With their private-public agreement coming up for renewal, the District chose to evaluate the option of directly operating their wastewater treatment facility. The District’s biggest concern with private operations was the contractor’s retention of qualified management staff. They felt that the lack of continuity in management staff was leading to maintenance inefficiencies. Fairfield did experience advantages through private operations, including managing fewer employees, lower employee costs, and the transfer of risk to the private operations firm. A 2007 estimate of annual cost saving for Fairfield to return to public operations was just under $300,000. These savings were mainly attributed to the elimination of the District’s costs to manage the private operations contract. Actual cost savings experienced has totaled closer to $500,000 annually. The District credits a main portion of the savings to their recruitment and retention of motivated staff and a maintenance program with reliability and quality as the primary goals. The City’s total compensation package exceeds that offered by the private operations firms and they found that this helped them hire a qualified operations and maintenance staff despite the limited pool of operators. The City did not see an increase in chemical and standard maintenance supply costs as suggested by private operations firms that advertise their bulk buying power. In general the District feels positive about their private operations history, but feels their decision to transition to public operations is also serving them well.

**City of Petaluma, CA**

- Predicted savings over first three years of $1.5 million
- Estimated annual savings of $449,000
- 6.7 mgd dry weather WWTP capacity

In 2009 the City of Petaluma completed construction of the new Ellis Creek Water Recycling Facility. The City has a long history of private operations, but decided that the transition to a new WWTP was a good time to evaluate the option of public utility operations. A combination of scheduling operations staff in time for facility start-up, the cost to prepare a new private operations request for proposal (RFP) document, and the predicted annual cost savings associated with the contractor’s profit and the cost to manage the operations contract (less the amount of increased District labor costs) led to the Council decision to publicly operate their wastewater utility. It is believed that the efficiencies experienced with private operations will continue at the new Ellis Creek treatment facility due to the built-in efficiency of a sophisticated automation and monitoring system. The City also believes that public operations will foster an interest in the long-term O&M of the City’s wastewater system.
**Buckman Direct Diversion Project**

The Buckman Direct Diversion (BDD) Project consists of a new river intake and sediment removal facility on the Rio Grande, 11 miles of raw water pipelines, a 15-mgd WTP, and 15 miles of finished water pipelines. The project will deliver an estimated 8,730 acre-feet of water annually to City of Santa Fe and Santa Fe County customers. The project was designed and constructed as a Design-Build project and included operational services through start-up, commissioning, and training of operations staff. In May 2011, the BDD Board took over the responsibility of O&M for all project facilities. Because BDD did not have existing operations staff, they hired and trained 31 new O&M personnel. According to BDD Facilities Manager Robert Mulvey, the decision to publically operate the BDD facilities was prompted by a need to bring jobs to the struggling Santa Fe economy. Due to the small population, there was a lack of operations staff to fill the vacant positions. BDD worked with the vendors and the community college to create a six-month training program for all BDD O&M staff. Although this training cost the Board a significant amount of money, it allowed for the development of new careers and a consistent knowledge base for all staff. No cost comparisons between private and public operations were completed prior to making the decision to publically operate the facilities.

**City of Lodi, CA**

- Start-up of new $36 million WTP scheduled for late 2012
- 10 mgd WTP capacity
- Public operations expected to exceed private operations by 4 percent annually

The City is currently constructing a new surface WTP that is scheduled for completion in late 2012. The City prepared an RFP for private operations of the new treatment facility and received two proposals from qualified operations firms. The estimate for City operation was $2.2 million annually, while the private contract operations proposals were roughly $2.1 million and $2.3 million. Despite the potential four percent annual savings, the Council voted 3 – 2 to retain staff to publically operate the new WTP. The private operations firms, some members of the public, and the two opposing council members argued that the added benefit of transferring risk does not show up in the cost comparison and has the potential to provide the City with additional cost savings. Proponents of the decision are encouraged by a history of the successful operations of the City’s electric utility and wastewater facilities. There is a feeling that public staff will work to maintain a reliable facility that produces high water quality.

**CASE STUDIES – DBO TOTAL PROJECT COST SAVINGS**

The projects discussed above presented private and public operational project cost savings only. This section briefly discusses the expected savings from DBO projects. Dr. Richard Anderson with The United States Conference of Mayors Water Council states that through anecdotal information they have found cost savings in the average range of 10 percent to 30 percent for DBO projects. Public Works Financing published similar cost savings results in their survey of 22 DBO projects, in which they found that the average life cycle cost savings was 26 percent. Included below are selected third party documented savings for the design, construction and operation associated with DBO projects. Note that none of the cost information contained in this TM was provided by the DWWSP short listed private operations firms.
Table 1. DBO Project Life Cycle Cost Savings

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Estimated Life Cycle Cost Savings, percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Seattle, WA Tolt WTP</td>
<td>47</td>
</tr>
<tr>
<td>City of Seattle, WA Cedar River WTP</td>
<td>31</td>
</tr>
<tr>
<td>City of Lynn, MA WWTP</td>
<td>45</td>
</tr>
<tr>
<td>City of Phoenix, AZ Lake Pleasant WTP</td>
<td>8</td>
</tr>
</tbody>
</table>

The price proposals prepared by the three short-listed DBO teams will be evaluated on a life cycle cost basis. The life cycle cost evaluation will include both capital and operations costs over the length of the operations contract. The selection of the DBO team will be based on non-price evaluation criteria such as technical strategy and business terms and conditions, but will mainly be based on the results of a life cycle cost comparison. This will ensure the Agency that they are paying the lowest overall cost for the design, construction, and facilities operation.

As reported in the previously published listing of successful and unsuccessful private operations and DBO projects, included as Appendix A to this TM, there are no known cases of unsuccessful DBO projects. The list of 53 projects is not an exhaustive list of all water and wastewater DBO/private operations contracts, but includes a compiled listing of the knowledge-base of West Yost Associates and its subconsultants and Hawkins Delafield & Wood LLP.

EVALUATION OF THE DAVIS WOODLAND WATER SUPPLY PROJECT

As demonstrated, both private and public operations have multiple documented successes and failures. The advantages, disadvantages, and potential cost savings need to be evaluated for each project. Consideration for system size, age, location, level of treatment, access to operations staff, existing utility labor expertise, liability risk, and project type (private operations only vs. DBO project) should be used to determine the correct operating alternative for a given agency.

The integration of operations responsibilities with design and construction is only reflected in the history of DBO projects such as Seattle, Lynn, and Phoenix. The October 19, 2010 Project Delivery Analysis and Recommendation TM prepared by Jim Yost and Jerry Gilbert, included as Appendix B, recommended the use of the DBO procurement method. This recommendation was reviewed and supported by the Facilities Procurement Committee, consisting of Agency staff and DBO experts, and was subsequently approved by the Agency Board. DBO continues to be the recommended procurement method for the DWWSP. Together the October 19, 2010 TM, and this review results in the following criteria suggested for the DWWSP:

- Long-term cost – Experience in the US (particularly in the West) using competitive procurement of a DBO contract has indicated long-term cost savings between 15 and 30 percent. Factors that contribute to this include: combining the operations responsibilities with design and construction in one responsible party, pre-funding equipment replacement, and contract incentives for efficient performance. Also it is worth noting that the current construction market in Northern California is extremely competitive compared to the cost saving examples given in this TM.
• Facility size – The operational scope, including operation of the intake, regional pipelines and one treatment facility, is consistent with other successful private operations contracts.

• New Facility – The DWWSP is a new project meaning that no existing staff will be displaced. Also, there are no risks of unknown infrastructure conditions leading to the establishment of a straightforward operations contract with low possibility for renegotiation during the operations period.

• Location – Located in the larger Sacramento metropolitan area, the project facilities are ideal for chemical and supply deliveries, and convenient access to an airport and major freeways to reduce travel costs for private operations firm technical experts (if needed).

• Level of treatment – All of the short listed operations firms have experience with the current benchmark treatment process being proposed. The responsibility for finding qualified operations staff will be the responsibility of the private operations firm as opposed to the WDCWA.

• Existing utility labor expertise – Because there is currently no existing operational expertise within the WDCWA, the Agency will benefit from the expert technical knowledge of the operations firm.

• Liability risk – The WDCWA will pass on much of the liability risk to the contract operator.

• Future costs – The annual operating budget will be essentially fixed after signing the contract, except for pre-agreed inflationary costs. The proposed contract format has been utilized for other successful DBO contract and has been shown to minimize the need for change orders.

• Project type – Assuming a DBO project procurement approach is selected for the DWWSP, the additional benefit of operational input during the design will help to ensure that the facilities will be reliable and efficient. Because the operations firm is responsible for 15 – 20 years of operation, the WDCWA can expect the DBO team to produce a robust, reliable and efficient facility design, and well-constructed final product.

Along with the benefits of private operations, the WDCWA will need to understand their limitations in a private-public partnership. The WDCWA/DBO firm contract has been structured to provide the Agency with appropriate control over the means and methods of O&M. Some of these contractual protections include performance and water delivery guarantees, implementation of a maintenance, repair and replacement plan, and production efficiency guarantees. The experienced team of lawyers, having prepared numerous DBO contracts, that is part of the Agency project team, will provide the Agency with the necessary and proper contractual provisions needed for enforcing the contract. As anticipated in the current Agency cash flow, management staff representing the Agency will be required to coordinate and manage the operations contract. In addition, the DBO contract includes provisions to terminate the operations agreement at an annually decreasing fee. This convenience termination clause allows the Agency to terminate the service contract at any time during the operations period.
The Agency’s operations expert Karl Stinson, previous O&M manager for Alameda County Water District and water treatment operations manager for East Bay Municipal Utility District, estimates the potential savings of private operations over public operations in the range of 10 to 20 percent. The main reduction in cost is due to the decrease in private operations labor. Because the private operations companies have firm-wide operational oversight and expertise they are able to provide less on-site operations and maintenance labor. Although the actual operational savings will not be known until proposals are received from the DBO firms, the Agency budget reflects an annual cost savings assuming private operations of the Agency facilities.
END NOTES


    http://www.usmayors.org/urbanwater/case_studies


### Table A1. Successful Long-Term* DBO Projects

<table>
<thead>
<tr>
<th>Count</th>
<th>Name of Facility</th>
<th>State</th>
<th>Project Type</th>
<th>Facility Type</th>
<th>Firms Involved</th>
<th>Operator</th>
<th>Project Construction Completion Date</th>
<th>Plant Size</th>
<th>Years in Operation</th>
<th>Years of DBO</th>
<th>Contractor Operation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Northeast Bakersfield Water Treatment Plants (WTPs)</td>
<td>CA</td>
<td>DBO</td>
<td>Water</td>
<td>Cal Water DB manager w/Tame &amp; Assoc., B&amp;V, Dillingham, KJ, Lyles Construction, Bookman-Edmonston, Mingus Construction</td>
<td>Cal Water</td>
<td>2003</td>
<td>20 mgd</td>
<td>9</td>
<td>9</td>
<td></td>
<td>In compliance with all permit requirements; membrane filtration technology that includes coagulation, flocculation, sedimentation, 400-micron backwashable screening, microfiltration using PVDF membranes, and chlorine disinfection.</td>
</tr>
<tr>
<td>2</td>
<td>Seattle Public Utilities, Tolt Water Treatment Plant (WTP)</td>
<td>WA</td>
<td>DBO</td>
<td>Water</td>
<td>CDM w/American Water Service company &amp; Dillingham Construction</td>
<td>American Water</td>
<td>2001</td>
<td>120 mgd</td>
<td>11</td>
<td>11</td>
<td></td>
<td>In the eleventh year of initial 15-year O&amp;M contract period; two 5-year extensions are possible at the Owner’s discretion; pre-ozone, high-rate filtration; Successfully obtained Department of Health approval for innovative design criteria for high rate filtration through pilot testing. In compliance with all permit requirements.</td>
</tr>
<tr>
<td>3</td>
<td>Seattle Public Utilities, Cedar Water Treatment Facility (WTF)</td>
<td>WA</td>
<td>DBO</td>
<td>Water</td>
<td>CH2M-Hill DBO manager w/MA Mortenson Construction Co.</td>
<td>CH2M-Hill</td>
<td>2004</td>
<td>180 mgd</td>
<td>8</td>
<td>8</td>
<td></td>
<td>18 year contract operations term with two 5 year extensions (other source says 25 year contract term); Raw water pump station, ozonation, UV disinfection. Cedar WTF is 100% compliant with permits. In compliance with all permit requirements</td>
</tr>
<tr>
<td>4</td>
<td>Tampa Bay Water Authority, Tampa Bay Surface WTF</td>
<td>FL</td>
<td>DBO</td>
<td>Water</td>
<td>Veolia (operator and DBO manager w/ Clark Construction), CDM (design), Brasfield &amp; Gorrie</td>
<td>Veolia</td>
<td>2003</td>
<td>72 mgd</td>
<td>9</td>
<td>9</td>
<td></td>
<td>15 year contract operations term with 5 year extension; Ozonation, conventional treatment with GAC filters. On original contract. In compliance with all permit requirements.</td>
</tr>
<tr>
<td>5</td>
<td>City of Wilsonville, Willamette River WTP</td>
<td>OR</td>
<td>DBO</td>
<td>Water</td>
<td>MWH (DB); Veolia (operator); Slayden Construction (WTP construction); Natt McDougall Company (intake/pipeline construction); Tigard Electric</td>
<td>Veolia</td>
<td>2002</td>
<td>70 mgd</td>
<td>10</td>
<td>10</td>
<td></td>
<td>Ozonation, conventional treatment with GAC filters, river intake. Contract was renewed in fall 2007 for a second five-year term. In compliance with all permit requirements. The water treatment plant performance goals established by the City were more stringent that state and federal regulations. The plant has been in compliance with all City requirements and produces high quality drinking water.</td>
</tr>
<tr>
<td>6</td>
<td>Camp Pendleton Southern Region Tertiary Treatment Plant</td>
<td>CA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>CDM Constructors Inc. was the design-builder and is currently providing operation and maintenance, United Water is a subcontractor to CDM providing O&amp;M labor.</td>
<td>United Water</td>
<td>2006</td>
<td>5 mgd</td>
<td>?</td>
<td>6</td>
<td></td>
<td>Contract tentatively scheduled to be renewed for another 6 yrs. While the SRTPP has experienced zero priority permit violations, some non-priority violations have occurred. Permit requirements changed from the time of the original design to the startup and operation of the plant. The ensuing unusually complex changes resulted in violations and reports to the RWQCB associated with flow monitoring, spills, and exceedance of nitrogen discharge limits (due change from monthly to daily compliance). CDM and United implemented corrective actions.</td>
</tr>
<tr>
<td>Count</td>
<td>Name of Facility</td>
<td>State</td>
<td>Project Type</td>
<td>Facility Type</td>
<td>Firms Involved</td>
<td>Operator</td>
<td>Project Construction Completion Date</td>
<td>Plant Size</td>
<td>Years in Operation</td>
<td>Years of DBO Contractor Operation</td>
<td>Notes</td>
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<tr>
<td>7</td>
<td>San Diego County Water Authority's Twin Oaks Valley WTP</td>
<td>CA</td>
<td>DBO</td>
<td>Water</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2008</td>
<td>100 mgd</td>
<td>4</td>
<td>4</td>
<td>Ultrafiltration membranes, ozonation, biological activated carbon. Twin Oaks Valley WTP in compliance with regulations except for 3 short periods during acceptance testing when plant failed to document continuous disinfection. 15-year operations contract with 5 year extension.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>City of Clovis, Sewage Treatment/Water Reuse Facility</td>
<td>CA</td>
<td>DBO</td>
<td>Wastewater and Recycled Water</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2009</td>
<td>2.8 mgd</td>
<td>3</td>
<td>3</td>
<td>Membrane bioreactor, Siemens Cannibal process, UV disinfection. ST/WRF is 100% compliant with contract. Initial operations contract extends to 2018 at which point a 5-year renewal option will be available.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Bessemer WTP</td>
<td>AL</td>
<td>DBO</td>
<td>Water</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2009</td>
<td>24 mgd</td>
<td>20 year contract operations term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>City of Cranston Wastewater Treatment Plant (WWTP)</td>
<td>RI</td>
<td>DBO</td>
<td>Wastewater</td>
<td>U.S. Filter (Veolia)</td>
<td>U.S. Filter (Veolia)</td>
<td>1999</td>
<td>23 mgd</td>
<td>13</td>
<td>13</td>
<td>25 year operations term</td>
<td></td>
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<tr>
<td>11</td>
<td>City of Fillmore, Fillmore WWTP</td>
<td>CA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>American Water</td>
<td>American Water</td>
<td>2007</td>
<td>1.8 mgd</td>
<td>5</td>
<td>5</td>
<td>20 year contract operations term</td>
<td></td>
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<tr>
<td>12</td>
<td>Forsyth County WWTP</td>
<td>GA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2007</td>
<td>2.5 mgd</td>
<td>20 year contract operations term</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>Honolulu wastewater sludge</td>
<td>HI</td>
<td>DBO</td>
<td>Wastewater</td>
<td>27 dpd</td>
<td></td>
<td>15 dpd</td>
<td>15 year operations term with 10 year extension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Pawtucket WTP</td>
<td>RI</td>
<td>DBO</td>
<td>Water</td>
<td>25 mgd</td>
<td></td>
<td>20 year contract operations term</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>Pinellas County wastewater sludge</td>
<td>FL</td>
<td>DBO</td>
<td>Wastewater</td>
<td>25 dpd</td>
<td></td>
<td>10 year contract operations term with 10 year extension</td>
<td></td>
<td></td>
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<tr>
<td>16</td>
<td>Sacramento wastewater sludge</td>
<td>CA</td>
<td>DBFO</td>
<td>Wastewater</td>
<td>Synagro</td>
<td>Synagro</td>
<td>2004</td>
<td>30 dpd</td>
<td>8</td>
<td>8</td>
<td>20 year contract operations term</td>
<td></td>
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<tr>
<td>17</td>
<td>Plymouth WWTP</td>
<td>MA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>3 mgd</td>
<td></td>
<td>20 year contract operations term</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>Woonsocket WWTP</td>
<td>RI</td>
<td>DBO</td>
<td>Wastewater</td>
<td>16 mgd</td>
<td></td>
<td>20 year contract operations term</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Pima County, Roger Road Water Reclamation Campus</td>
<td>AZ</td>
<td>DBO</td>
<td>Water</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2007</td>
<td>32 mgd</td>
<td>N/A</td>
<td>N/A</td>
<td>10 year operation contract. The plant treats Central Arizona Project Colorado River water to enhanced standards and under very high periodic turbidity conditions, serves rapidly developing North Phoenix, and is expandable to 320 mgd. The plant includes an innovative ballasted flocculation process for high rate sedimentation, ozonation, deep bed monomedia filters, post-filtration granular activated carbon contactors, and ultraviolet disinfection. Largest DBO water project in North America.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>City of Phoenix, Lake Pleasant WTP</td>
<td>AZ</td>
<td>DBO</td>
<td>Water</td>
<td>Black &amp; Veatch, American Water</td>
<td>American Water</td>
<td>2007</td>
<td>80 mgd</td>
<td>5</td>
<td>5</td>
<td>This was to be a 25 year contract operations term. This was a successful DBO project, but litigation arose relating to CEQA compliance issues with the process followed by the City to procure the contract, not the DBO structure, that resulted in the project being halted.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Stockton WWTP</td>
<td>CA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>CH2M Hill OMI and Thames Water</td>
<td>CH2M Hill OMI and Thames Water</td>
<td>N/A</td>
<td>43 mgd</td>
<td>N/A</td>
<td>N/A</td>
<td>This was to be a 25 year contract operations term. This was a successful DBO project, but litigation arose relating to CEQA compliance issues with the process followed by the City to procure the contract, not the DBO structure, that resulted in the project being halted.</td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>Name of Facility</td>
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<td>Project Type</td>
<td>Facility Type</td>
<td>Firms Involved</td>
<td>Operator</td>
<td>Project Construction Completion Date</td>
<td>Plant Size</td>
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<td>Years of DBO Contractor Operation</td>
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</tr>
<tr>
<td>22</td>
<td>Fulton County, Camp Creek WWTP</td>
<td>GA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>Azurix (American Water)</td>
<td>Azurix</td>
<td>2005</td>
<td>24 mgd</td>
<td>7</td>
<td>7</td>
<td>20 year contract operations term. This was the first major project to be implemented under new statewide DBO legislation. The private vendor’s work scope involved building a new and larger treatment plant to upgraded renewal permit standards, while operating an existing, aging facility.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>City of Hialeah RO WTP</td>
<td>FL</td>
<td>DBO</td>
<td>Water</td>
<td>AECOM/Inima</td>
<td>Inima</td>
<td>Anticipated for 2012</td>
<td>10 mgd</td>
<td>N/A</td>
<td>N/A</td>
<td>20 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Lynn WWTP</td>
<td>MA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>U.S. Filter (Veolia)</td>
<td>U.S. Filter (Veolia)</td>
<td>2004</td>
<td>25 mgd</td>
<td>8</td>
<td>8</td>
<td>20 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Spokane County Regional WWTP</td>
<td>WA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>2011</td>
<td>8 mgd</td>
<td>1</td>
<td>1</td>
<td>25 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>City of Wilsonville WWTP</td>
<td>OR</td>
<td>DBO</td>
<td>Wastewater</td>
<td>CH2M-Hill</td>
<td>CH2M-Hill</td>
<td>Anticipated for 2014</td>
<td>4 mgd</td>
<td>1</td>
<td>1</td>
<td>20 year contract operations term; CH2M-Hill is currently operating this WWTP while performing upgrades</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>City of Holyoke WWTP</td>
<td>MA</td>
<td>DBO</td>
<td>Wastewater</td>
<td>Aquarion, Kelda Group PLC</td>
<td>Aquarion</td>
<td>2009</td>
<td>37 mgd</td>
<td>3</td>
<td>3</td>
<td>25 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>City of Newport WWTP</td>
<td>RI</td>
<td>DBO</td>
<td>Wastewater</td>
<td>Earth Tech (Tyco)</td>
<td>Earth Tech (Tyco)</td>
<td>2002</td>
<td>10 mgd</td>
<td>10</td>
<td>10</td>
<td>20 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Naugatuck WWTP</td>
<td>CT</td>
<td>DBO</td>
<td>Wastewater</td>
<td>U.S. Filter (Veolia)</td>
<td>U.S. Filter (Veolia)</td>
<td>2004</td>
<td>10 mgd</td>
<td>8</td>
<td>8</td>
<td>20 year contract operations term</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Beverly Hills Groundwater Desalter</td>
<td>CA</td>
<td>DBFO</td>
<td>Water</td>
<td>Earth Tech (AECOM)</td>
<td>Earth Tech (AECOM)</td>
<td>2003</td>
<td>3 mgd</td>
<td>9</td>
<td>9</td>
<td>20 year contract operations term</td>
<td></td>
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<tr>
<td>32</td>
<td>Santa Paula WWTP</td>
<td>CA</td>
<td>DBFO</td>
<td>Wastewater</td>
<td>PERC Water, Alinda Capital Partners</td>
<td>PERC Water</td>
<td>2010</td>
<td>4.2 mgd</td>
<td>2</td>
<td>2</td>
<td>30 year concession term</td>
<td></td>
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<tr>
<td>33</td>
<td>San Juan Capistrano Groundwater Desalter</td>
<td>CA</td>
<td>DBO</td>
<td>Water</td>
<td>Eco Resources (Southwest Water)</td>
<td>Eco Resources (Southwest Water)</td>
<td>2004</td>
<td>5 mgd</td>
<td>8</td>
<td>0</td>
<td>This was to be a 20 year contract operations term. There were operational issues following the passage of successful acceptance testing. The resolution between the owner and the operator was that the owner would assume operations of the plant, which was working properly when the owner took over operations responsibility.</td>
<td></td>
</tr>
</tbody>
</table>

*Note: The contractor's responsibility for long-term performance creates a greater sustainable financial and management obligation that affects all three phases of the contract: design, construction, and operations.*
<table>
<thead>
<tr>
<th>Count</th>
<th>Name of Facility</th>
<th>State</th>
<th>Project Type</th>
<th>Facility Type</th>
<th>Firms Involved</th>
<th>Operator</th>
<th>Project Construction Completion Date</th>
<th>Plant Size</th>
<th>Years in Operation</th>
<th>Years of Private Contractor Operation</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1</td>
<td>Northwest Bakersfield WTPs</td>
<td>CA</td>
<td>Construction Completion</td>
<td>Water</td>
<td>Cal Water PM &amp; oversight w/Yarne &amp; Assoc., B&amp;V, Dillingham, Lyles Construction, Pall Membrane</td>
<td>Cal Water</td>
<td>2007</td>
<td>8 mgd</td>
<td>5</td>
<td>5</td>
<td>In compliance with all permit requirements.</td>
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<td>2</td>
<td>City of Hawthorne water system and WTP</td>
<td>CA</td>
<td>N/A</td>
<td>Water</td>
<td>Cal Water</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>3</td>
<td>City of Bakersfield water system and wells</td>
<td>CA</td>
<td>N/A</td>
<td>Water</td>
<td>Cal Water</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<td>Tejon Ranch water system, WTP, and WWTP</td>
<td>CA</td>
<td>N/A</td>
<td>Water and Wastewater</td>
<td>Cal Water</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>5</td>
<td>West Basin Municipal Water District transmission and distribution system for recycled water</td>
<td>CA</td>
<td>N/A</td>
<td>Water and Recycled Water</td>
<td>Cal Water</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>UV and chlorine disinfection; Contract renewed in 2005.</td>
</tr>
<tr>
<td>6</td>
<td>Mountain House Community Services District's WTP</td>
<td>CA</td>
<td>N/A</td>
<td>Water</td>
<td>SouthWest Water Company</td>
<td>N/A</td>
<td>15 mgd</td>
<td>10</td>
<td></td>
<td></td>
<td>Contract renewed in 2005.</td>
</tr>
<tr>
<td>7</td>
<td>Horizon Regional Municipal Utility District's WTP</td>
<td>TX</td>
<td>N/A</td>
<td>Water</td>
<td>SouthWest Water Company</td>
<td>N/A</td>
<td>6 mgd</td>
<td>17</td>
<td></td>
<td></td>
<td>Reverse osmosis; contract renewed in 2009. SWWC has received no notice of violations for violating water quality standards within the last 5 years. No violations or penalties.</td>
</tr>
<tr>
<td>8</td>
<td>Atlanta-Fulton County WTP Expansion, Upgrade</td>
<td>GA</td>
<td>N/A</td>
<td>Water</td>
<td>Veolia</td>
<td>1990</td>
<td>90 mgd</td>
<td>22</td>
<td>21</td>
<td></td>
<td>Conventional plant; Complied with all permitting and regulations. In compliance with all permit requirements during this operational period. Contract renewed numerous times. The project was the 2006 recipient of the Distinguished Service Award from the National Council for Public-Private Partnerships. Original O&amp;M agreement signed January 1991, renewed in 1994 for four years with two one-year options. Renewed again in February 2000 for four years with two one-year options. Signed an early extension of options in October 2002 (through December 2005). Signed a five year renewal in January 2006 with two two-year options. The contract was renewed for the first of two-year extension in March 2011.</td>
</tr>
<tr>
<td>Count</td>
<td>Name of Facility</td>
<td>State</td>
<td>Project Type</td>
<td>Facility Type</td>
<td>Firms Involved</td>
<td>Operator</td>
<td>Project Construction Completion Date</td>
<td>Plant Size</td>
<td>Years in Operation</td>
<td>Years of Private Contractor Operation</td>
<td>Notes</td>
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<tr>
<td>9</td>
<td>United Water Idaho WTP, wells, and membrane filtration</td>
<td>ID</td>
<td>N/A</td>
<td>Water</td>
<td>N/A</td>
<td>United Water</td>
<td>N/A</td>
<td>20 mgd</td>
<td>65</td>
<td>60 mgd wells, 6 mgd membrane filtration, 20 mgd conventional surface water treatment plant.</td>
<td></td>
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<td>10</td>
<td>Haworth WTP Expansion</td>
<td>NJ</td>
<td>DB</td>
<td>Water</td>
<td>CDM Constructors Inc. was the design-builder for the expansion; United Water is the owner and operator (operator for 140 years)</td>
<td>United Water</td>
<td>expansion in 2009</td>
<td>188 mgd</td>
<td>140</td>
<td>140 200 mgd ozone, dissolved air flotation, filters. The facility exceeds all performance requirements and complies with all permit requirements. All required inspections, reports and documentations were provided and accepted in a timely manner.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>West Basin Municipal Water District, Edward C. Little Water Recycling Facility in El Segundo</td>
<td>CA</td>
<td>DB</td>
<td>Water and Recycled Water</td>
<td>CDM Constructors Inc. was the design-builder on Phase III and IV; United Water is the operator.</td>
<td>United Water</td>
<td>1994</td>
<td>62 mgd</td>
<td>18</td>
<td>18 4 mgd expansion project completed. Microfiltration and reverse osmosis. Overall 50 mgd plant operated by United since 1994 with 1 contract renewal in 2009. During 18 years of operation, all compliance has been achieved, except for the following two violations. In Jan and Mar 2008, the Fire Department issued a notice of violation for neutralizing hazardous waste at less than pH 2. Deficiencies were corrected and no fines were assessed. In June 2007, an employee was found to be operating without proper certification and a $6,000 fine was assessed. The operator was replaced.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>United Water New Rochelle pump station, transmission pipelines, distribution system pipes and tanks</td>
<td>NY</td>
<td>N/A</td>
<td>Water</td>
<td>N/A</td>
<td>United Water</td>
<td>N/A</td>
<td>N/A</td>
<td>122</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Suburban Water Systems Los Angeles and Orange Counties</td>
<td>CA</td>
<td>N/A</td>
<td>Water</td>
<td>N/A</td>
<td>SouthWest Water Company</td>
<td>N/A</td>
<td>N/A</td>
<td>59</td>
<td>Water distribution system includes 31 reservoirs, 14 wells, 116 booster pumps and more than 800 miles of pipeline. Its network of facilities pumps and distributes approximately 52,000 acre-feet of water a year.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>City of Rio Rancho water and wastewater system (including 1 WTP and 6 WWTPs)</td>
<td>NM</td>
<td>N/A</td>
<td>Water and Wastewater</td>
<td>N/A</td>
<td>CH2M-Hill OMI</td>
<td>2002</td>
<td>N/A</td>
<td>N/A</td>
<td>10 Each operating contract has been for 4 years. The current contract was renewed in 2010 until 2014, with the potential for four additional years. Includes management of 20 deep wells with a peak water supply of 21,200 gpm, 13 water reservoirs with a total storage capacity of 27 million gallons, three water-pumping stations, and approximately 350 miles of transmission and distribution lines. The wastewater system comprises six treatment facilities: a 6-mgd nitrile removal plant, a 1.2-mgd activated sludge plant, a 0.5-mgd activated sludge plant, a 0.005-mgd aerated lago treatment plant, a 0.5-mgd membrane bioreactor plant, and a 0.6-mgd membrane bioreactor plant.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Delaware Pump Station, Water System Improvements, United Water New Jersey</td>
<td>NJ</td>
<td>DB</td>
<td>Water</td>
<td>CDM Constructors Inc. was the design-builder for the improvements; United Water is the owner and operator</td>
<td>United Water</td>
<td>2008</td>
<td>50 mgd</td>
<td>4</td>
<td>4 New pump station and transmission pipelines. The facility exceeds all performance requirements and complies with all permit requirements.</td>
<td></td>
</tr>
</tbody>
</table>

W E S T  Y O S T  A S S O C I A T E S
<table>
<thead>
<tr>
<th>Count</th>
<th>Name of Facility</th>
<th>State</th>
<th>Project Type</th>
<th>Facility Type</th>
<th>Firms Involved</th>
<th>Operator</th>
<th>Project Completion Date</th>
<th>Plant Size</th>
<th>Years in Operation</th>
<th>Years of Private Contractor Operation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Columbia WTP, United Water Boise</td>
<td>ID</td>
<td>Construction</td>
<td>Water</td>
<td>CDM Constructors Inc. was the design-builder; United Water is the owner and operator</td>
<td>United Water</td>
<td>2005</td>
<td>6 mgd</td>
<td>7</td>
<td>7</td>
<td>Microfiltration membranes. The facility meets or exceeds all performance requirements and is in compliance with all permit requirements.</td>
</tr>
</tbody>
</table>

*Note: There are more than 800 private contract operations projects throughout the United States and more than 90% are voluntarily renewed by governmental owners. |

### Table A3. DBO Projects with Issues

<table>
<thead>
<tr>
<th>Count</th>
<th>Name of Facility</th>
<th>State</th>
<th>Project Type</th>
<th>Facility Type</th>
<th>Firms Involved</th>
<th>Operator</th>
<th>Project Completion Date</th>
<th>Plant Size</th>
<th>Years in Operation</th>
<th>Years of DBO Contractor Operation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Olivenhain MWD David C. McCollom WTP</td>
<td>CA</td>
<td>DBB with initial operation by CH, but CH didn't design the original plant</td>
<td>Water</td>
<td>CH2M-Hill/OMI</td>
<td>OMI (for three years); now OMWD staff operate plant</td>
<td>2002</td>
<td>25 original - 2004 expansion to 34 mgd</td>
<td>10</td>
<td>3</td>
<td>This DBB project included the retention of a contractor(CH) to assist with start up operations. Start up problems, probably design and manufacture, were encountered for this membrane project. The District intended from the start to provide in-house staff for operations.</td>
</tr>
<tr>
<td>2</td>
<td>Gary Sanitary District WWTP</td>
<td>IN</td>
<td>N/A</td>
<td>Wastewater</td>
<td>United Water</td>
<td>N/A</td>
<td>60 mgd</td>
<td>12</td>
<td>The Gary Sanitary District is a large municipal wastewater project. There is a pending indictment (filed 12/8/2010) that accuses United Water of 1) “conspiracy to defraud the US and aiding and abetting”, and 2) “Clean Water Act – Tampering with a Monitoring Method and Aiding and abetting”. This serious accusation has not led to contract termination for noncompliance. The contract for United Water operations was let in 1998 and was terminated in 2010.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Novato Sanitary District WWTP</td>
<td>CA</td>
<td>N/A</td>
<td>Wastewater</td>
<td>Veolia</td>
<td>N/A</td>
<td>7 mgd</td>
<td>The contract was not consummated. The issue was the advantages and disadvantages of short-term private operations. It was decided in June of 2011 by a 50.3 to 49.7% vote against.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>City of Richmond WWTP and collection system</td>
<td>CA</td>
<td>N/A</td>
<td>Wastewater</td>
<td>Veolia</td>
<td>N/A</td>
<td>16 mgd</td>
<td>Operations are now in the ninth year of a 10 year contract, and provide for management of the plant and the collection system. Anticipated savings over the life of the contract were $75 million. There have been reported complaints about plant odors that require major city investment to correct, and the City and Veolia are now negotiating, but water quality regulatory compliance has been substantially achieved.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table A4. Short-term, Private Operations-Only Contracts with Issues

<table>
<thead>
<tr>
<th>Count</th>
<th>Name of Facility</th>
<th>State</th>
<th>Project Type</th>
<th>Facility Type</th>
<th>Firms Involved</th>
<th>Operator</th>
<th>Project Completion Date</th>
<th>Plant Size</th>
<th>Years in Operation</th>
<th>Years of Private Contractor Operation</th>
<th>Notes</th>
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<td>OMI (for three years); now OMWD staff operate plant</td>
<td>2002</td>
<td>25 original - 2004 expansion to 34 mgd</td>
<td>10</td>
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<td>60 mgd</td>
<td>12</td>
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</tr>
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<td>N/A</td>
<td>Wastewater</td>
<td>Veolia</td>
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<td>The contract was not consummated. The issue was the advantages and disadvantages of short-term private operations. It was decided in June of 2011 by a 50.3 to 49.7% vote against.</td>
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<td></td>
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</tbody>
</table>
TECHNICAL MEMORANDUM

DATE: October 19, 2010

TO: Eric Mische, General Manager, Woodland-Davis Clean Water Agency

FROM: Jim Yost, R.C.E. # 24137 and Jerry Gilbert, R.C.E. #11497, West Yost Associates Team

SUBJECT: Davis-Woodland Water Supply Project—Project Delivery Analysis and Recommendation

The following technical memorandum (TM) is the result of a city and consultant staff level analysis conducted over the last two years and based on extensive assessment of water industry experience and the needs of the project. The conclusions and recommendations are those of Agency support staff which are intended to assist the General Manager and Board in making appropriate facility procurement decisions.

PART I CONCLUSIONS AND RECOMMENDATION

The Cities of Davis and Woodland are planning to supplement their primary source of water supply from groundwater wells by diverting surface water from the Sacramento River. The regional facilities necessary to achieve this objective are called the Davis Woodland Water Supply Project (Project) and include: a Sacramento River intake, pipeline conveying water from the river intake to the treatment plant, a treatment plant, and treated water pipelines delivering water to City facilities (Figure 1). To complete delivery of water to their users, each City will also construct improvements to their local distribution facilities. These local facilities will be implemented individually by each City and are thus not part of the regional facilities and are not included in the Project. The Cities have created a water agency, the Woodland-Davis Clean Water Agency (Agency), to build and operate the regional facilities. The estimated regional facilities capital cost (based on 2015 completion) is $245 million, the local facilities are estimated to cost $30 million for Davis and $47 million for Woodland.

Staff members of the Cities of Woodland and Davis, together with the University of California, began reviewing project delivery in 2008. This review consisted of meetings, discussions, and analysis that progressively reached the following conclusions: 1) the Cities did not desire at the outset to undertake all of the efforts necessary to assume operating responsibility for the water treatment facilities and delivery system due primarily to cost and administrative burden; 2) the preferred delivery approach would be one that optimizes lifecycle costs; 3) the pipeline connecting the intake with the treatment plant will be conveying Sacramento River water that has significant turbidity fluctuations and the design and operation of the three elements requires coordination; and 4) if these three project elements are assigned to a single contractor, the inclusion of the treated water pipeline would seem practical. As a result, the design-build-operate (DBO) method of project delivery became the default selection, and this memorandum tests the justification for this assumption, and compares the advantages and disadvantages of the traditional and other methods of project delivery.
With this background, this TM was prepared. It focuses on the method most likely to meet these four points, recognizing that the cities are intimately familiar with conventional delivery processes, and have had some experience with contracting the combination of designing and building. While comparisons of delivery methods are included, this TM is not an independent analysis of the pros and cons of all methods, but rather a comparative summary of experiences that other public agencies have had with alternative contracting.

With this guidance, staff has developed a list of development goals and priorities as follows:

1. Develop a project with a primary focus on achieving the lowest life-cycle cost, considering capital, long-term operation, maintenance, repair and replacement;

2. Provide operational staff for the project. Project operations require a staff with significant technical competence and experience. Neither city possesses such a staff nor do they currently desire to acquire and train one. However, future Agency operations should remain a possibility;

3. Meet or exceed all present and anticipated drinking water standards by providing a high quality supply that minimizes the occurrence of any potential contaminants of concern (see separate contaminant control report);

4. Provide supply reliability through an optimal balance through conjunctive use of surface and groundwater;

5. Construct and maintain facilities that are efficient, sustainable and reliable and that will achieve high energy efficiency;

Figure 1. Proposed Project Facilities

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3. Meet or exceed all present and anticipated drinking water standards by providing a high quality supply that minimizes the occurrence of any potential contaminants of concern (see separate contaminant control report);

4. Provide supply reliability through an optimal balance through conjunctive use of surface and groundwater;

5. Construct and maintain facilities that are efficient, sustainable and reliable and that will achieve high energy efficiency;
6. Allocate future risks (i.e. raw water quality changes and energy and chemical costs) to those project participants that are best suited to accept each risk; and

7. Schedule project delivery to maximize opportunities for financial assistance, and obtain optimal market related bidding conditions.

Recommendation on Delivery Strategy

West Yost Associates (West Yost) is responsible for overall Program Management of the Project under contract with the Agency. West Yost has assembled an experienced team of consultants, and legal counsel working directly for the Agency, to evaluate a number of options for project delivery. The goals and priorities outlined above and the work of the technical team over the last two years, have led to the recommendation that the project be delivered and operated through a single DBO contract, with possible exceptions concerning the diversion/intake portion of the project. This recommendation has been reviewed with the Facilities Procurement Committee (Diane Phillips, Dick Donnelly, Rhodes Trussell, Jerry Gilbert, and Jim Yost) in consultation with Dick Shanahan, Eric Peterson, and the Agency General Manager Eric Mische.

The single largest Project investment is the treatment plant, which when the present worth of future operating costs is included, results in an expense of over $200 million. It is clear that a single DBO contract for this facility is optimal to meet the seven goals identified above. Contractors who are likely to propose on this plant will all also have extensive experience and capability of designing and constructing the pipelines and intake facility. There is an overriding advantage to the Agency of having a single contract responsibility to coordinate design and construction of facilities in all phases, optimize low-cost purchasing, and avoid contractual/responsibility disputes. Concerns about placing responsibility in one contracting entity (a single DBO contractor) will be offset by the advantages of complete project coordination, the bonding and guarantee requirements that will be provided, the vetting of innovative ideas on project design and construction in the selection process, and the Agency’s ability to respond to any unforeseen events.

During the initial phases of the solicitation process, the DBO approach can be followed and if necessary modified to take into consideration new information that may be available. Such information might occur with respect to the location and nature of the intake facility, subsurface conditions related to any of the Project facilities, requirements, flood criteria, and other items still under investigation. These seven goals identified above can best be achieved through a single DBO process for the following reasons:

1. It is the only process that allows for competitive bidding to determine and firmly establish all project costs based on a life-cycle analysis. Through this process, the cities will have a firm basis upon which to make financial projections and undertake the appropriate financing considering the potential availability of outside funding.

2. The bidding process will include operational performance requirements so that a single entity that designs, builds, and operates and maintains the facilities will be responsible and accountable.
3. The DBO process will assure that the Agency is provided high quality water by defining performance standards that will assure compliance through the Project Service Agreement which will establish the contractor’s responsibility to meet all present and future regulations and minimize contaminant occurrence, except for exceptional circumstances as defined in the Agreement.

4. A single contract establishes a single responsibility for construction and operations; with the latter requiring the contractor to deliver appropriate water quantity and quality at flows and pressures determined by the City’s operating departments to provide reliable service and high quality water.

5. A single contractor responsibility ensures that all facilities (built under the Agency's specifications) will be compatible, coordinated, and cost-effectively maintained to assure long-term reliability, optimize energy use, and meet future sustainability goals.

6. A single DBO contract can assign all ordinary utility risks to the contractor, while protecting the contractor from extraordinary events for which the Agency can most economically assume responsibility.

7. A single contracting process will allow the Agency to establish the market-based overall Project cost at the earliest point in the schedule, taking advantage of current market conditions, and potential availability of financial assistance. It will also allow a competitive process selection that will result in the use of the best available technology.

In addition to satisfying these seven basic goals, the DBO process can be structured to assure opportunities for smaller and/or local contractors who will be used by the DBO contractor to build the pipelines, and who will also have opportunities to design and construct the local facilities that will be implemented independently by each city.

Consolidated DBO to Maximize Economy of Scale

Table 1 considers each project element and the relative appropriateness of various project delivery techniques, considering goals and site conditions. By dividing the project into discrete elements, the delivery method could be tailored for each project feature. Although the total cost of each element is still large, it might provide opportunities for more local and smaller bidders that may not have the financial capability to compete for a larger project. It is also possible to add a smaller contractor selection preference to a combined DBO process.

Table 2 compares the pros and cons of pursuing separate contracts for each facility versus consolidating project facilities into a design-build (DB) contract.

Part II, Table 5 of this report shows cost savings for various DB and DBO projects. In general, experience with large treatment plants on the West Coast has resulted in a potential savings in a normal bidding climate (1996-2007) in the range of 15 to 30 percent of capital cost. If one contractor is responsible for long-term operations, 10 or 15 years, then the contractor’s costs can be recovered over time and investments in capital can be balanced with long-term operating costs. Estimated savings in Seattle were enough for the City to purchase a new central office building valued at $70 million. In San Diego the estimated savings were in the range of $30 million compared to the engineer’s estimate of traditional delivery. Today’s bidding circumstances are quite different and may be distinctly to the Agency's advantage particularly if the bidding process can be expedited.
Table 1. Summary of Comparison of Project Delivery Methods for Each Project Element

<table>
<thead>
<tr>
<th>Project Element</th>
<th>Delivery Method</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td>D.B.B. +Oc(a)</td>
<td>Work already completed and complex permitting requires special considerations for inclusion in DBO contract.</td>
</tr>
<tr>
<td>Raw Water Pipelines</td>
<td>Alternate</td>
<td>Inclusion of regional pipelines allows for standardization, integrated responsibility for project delivery, and creative designs to accommodate unusual site conditions. Procurement can be structured to require use of local contractors.</td>
</tr>
<tr>
<td>Treatment Plant</td>
<td>Alternate</td>
<td>Lowest potential short and long-term cost, integrated project responsibilities, fastest scheduling (Critical Path), and competitive process selection, all support use of DBO.</td>
</tr>
<tr>
<td>Treated Water Pipelines</td>
<td>Alternate</td>
<td>Inclusion of regional pipelines allows for standardization, integrated responsibility for project delivery, and creative designs to accommodate unusual site conditions. Procurement can be structured to require use of local contractors.</td>
</tr>
<tr>
<td>Local Facilities</td>
<td>Best</td>
<td>Straightforward design and noncritical scheduling support DBB, but DB could also be considered.</td>
</tr>
</tbody>
</table>

(a) DBB = Design-Bid-Build: Traditional project delivery, separate contracts for each phase.
(b) Oc = Facility Operations by Contract;
(c) DB = Design-Build: Design and construction in one contract; separate operations contract.
(d) DBO = Design-Build-Operate: Design, build, and operate in a single contract with a term of 10 or more years, 15-20 years is optimal.
(d) CM@Risk = Construction Manager at Risk: Construction manager accepting defined risks (possibly including designer), selected on qualifications with maximum price, subsequent interaction between the Agency and CM on actual construction specifications and bidding; would require separate operations contract.
Table 2. Comparison of Separate Element (DBB) Versus Combined Project (DBO) Solicitation Approach

<table>
<thead>
<tr>
<th>Project Criteria</th>
<th>Separate Element DBB Contracts</th>
<th>Consolidated DBO Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital cost</td>
<td>The potential for greater competition may exist because smaller more local contractors may be more willing to bid than to subcontract to the DBO general. Offsetting this is the extra administrative cost to the Agency and the economies of scale provided by a single contract.</td>
<td>Provides the greatest potential to minimize capital cost, and reduce the potential for change orders resulting from contract coordination. It can also provide for smaller local contractor inclusion.</td>
</tr>
<tr>
<td>Operating cost</td>
<td>A treatment plant DBO contractor or a separate operation contractor could operate the facilities, but it would be harder to optimize facility design or manage for operating facilities that are designed and constructed by others.</td>
<td>Assures cost-effective operating cost through the coordination of specifications, purchasing, tie-ins, and better anticipation of performance guarantees.</td>
</tr>
<tr>
<td>Operational reliability</td>
<td>Potential for divided responsibility, even though operated by a single company.</td>
<td>Maximizes consideration of supply reliability when each project element is built under the direction of a single contractor.</td>
</tr>
</tbody>
</table>

Combining of project elements could have significant advantages. These include:

- Reduced procurement costs and time;
- Reduced project management and oversight costs;
- Reduced materials costs due to economies of scale in purchase of pipelines and other waterworks construction materials and equipment;
- Improved coordination and accountability for connections between separate elements and in design, construction and operations of a centralized control system; and
- Creating a single responsibility for centralized operations of the project elements (treatment plant, intake structure, and pipelines) that have been designed and built by a single entity.

Future operation of the Project is expected to be carried out under a performance-based contract with an experienced operating entity that will be part of each competitive team. With the exception of the local facilities portion of the Project, all other facilities will be operated by the Agency under the DBO contract.
Project Schedule Considerations

The project schedule will affect project cost in several ways. The potential for financial assistance, both state and federal, will be greatest in the next several years. Raw materials and construction costs have dropped dramatically, and in recent years contractor’s bids have been more competitive. The initial Project planning was based on traditional delivery for a completion date in the year 2016. It is possible and financially beneficial to complete the project by early 2016 using the DBO contract delivery method for at least the critical path item, the water treatment plant. This process will increase the rate of expenditure of early project development costs including specifications; the bidding, review and contract negotiation process; and permitting which collectively can represent up to 10 percent of project costs; but is expected to significantly reduce long-term cost.

Facility Permitting

Regardless of the delivery method selected, it is important to coordinate the permitting activities. Early phase activities on various permits are underway including such approvals as water rights, DHS, and for right-of-way encroachment, are underway. The cities and the DWCWA should work with the selected contractor using their best capabilities to obtain each permit and assure that the construction schedule is not delayed.

Opportunities to Modify Delivery Program

The recommended delivery process gives the Agency a number of opportunities to change the delivery approach if market conditions and project developments warrant. For instance, interaction with potential bidders during the RFQ phase may indicate that changes in project elements, goals, or financial requirements may result in a less costly and/or better project. Developments related to permits, particularly of the intake, newly discovered subsurface conditions, and Agency cash flow considerations or presently unrecognized circumstances could lead to modifications of the program. During each step, the Agency should evaluate potential bidder comments, changes in project circumstances, and the level of investment required of all parties for the next step. The ultimate objective is to achieve the goals identified above.

Initiation of the Solicitation Process and Schedule of Activities

If this recommendation is approved, it is further recommended that the Agency begin by formally communicating with all potential and interested teams. This communication should be initiated electronically and/or by a letter expressing the Agency’s intent to conduct a solicitation process, and inviting potential bidders to a workshop to be held this fall. The letter would request a response from a potential DBO bidders or participants in the DBO process, and establish points of contact between the potential bidders and the Agency. The workshop would begin with a project description, and be followed by responses to questions, and any comments that potential bidders have. It is important that a level playing field be established to encourage the maximum amount of competition among potential bidders. This should be facilitated by the adoption of a communications protocol as discussed below in Part II of this report.
Activities necessary to complete the project are identified in fiscal 2010-11 budgets. They include an RFQ process with the RFQ released in February of 2011 and a shortlist of bidders selected by June 30, 2011; followed by an RFP process which could be completed before the end of fiscal year 2012. Each process includes a series of activities discussed in Part II of this report.

**PART II PROJECT DELIVERY – ANALYSIS AND REPORT**

During the past several years a number of planning and engineering studies have been completed to develop the Project. The partners created the Agency to implement the Project to serve Davis and Woodland, and possibly UC Davis in the future. The Agency is governed by a four member Board composed of two representatives from both Woodland and Davis. The Project’s goal is to provide a reliable supply of high quality water. The Project includes the following facilities:

1. Intake structure to divert water from the Sacramento River
2. Raw water conveyance pipelines from the intake to the treatment plant
3. Drinking water treatment plant
4. Pipelines to deliver treated water to the cities of Davis and Woodland, and to UC Davis

Representatives of Davis, UC Davis, and Woodland have employed a consulting team led by West Yost and supporting consultants including: Trussell Technologies, Bartkiewicz Kronick & Shanahan, Environmental Science Associates, Public Financial Management, and Jerome B. Gilbert, to develop basic work necessary to implement the project that has been endorsed by both City councils. This team has been working on permitting, facility siting, scheduling, financing, cost estimating, and reviewing experiences and savings using alternate project delivery (performance-based procedures to optimize completion and operation of the Project). A series of monthly meetings have been held since March 2009 and special briefings since October 2008.

**Project Background and Development Priorities**

Project goals and priorities are discussed in Part I of this TM. The following is an expanded discussion of the information, presentations, and analysis that have formed the basis for project goals, priorities, and the contract procurement recommendation defined in Part I of this TM.

Independent studies commissioned by the Project Partners through multiple industry experts concluded that treated surface water diverted from the Sacramento River, supplemented by groundwater, is vitally necessary to increase both the sustainability and quality of their water supply. Davis and Woodland are two of the very few remaining urbanized communities in California to rely only on ground water and the area ground water quality is deteriorating while drinking water quality standards are becoming increasingly more stringent. Using surface water in conjunction with groundwater will significantly increase both the quality and reliability of the local water supply, providing insurance against further water quality impacts or major water shortages. Although high levels of dissolved solids in the region’s groundwater meet most current drinking water standards, salinity levels in discharged wastewater effluent currently exceed anticipated Central Valley Regional Water Quality Control Board discharge limits.
Wellhead treatment for the reduction of salt content in the source groundwater or in wastewater effluent is possible, but is unacceptable due to cost and environmental impact. Mixing low-salinity surface water with groundwater will more cost-effectively reduce the salt content of the regional water supply, create less environmental impacts, and eliminate the need to reduce salinity at the wastewater treatment plant.

River water obtained through the partner’s water right permit and supplemented by purchased summer water as necessary will meet water demands year-round through the current planning horizon of 2040. Well water will be blended with river water in summer months to meet summer peak demands while helping to control project costs while still meeting state standards. Continued attention to water conservation is planned to keep projected demands and project costs down, and meet new state requirements.

**Alternative Project Delivery Research and Development Activities**

In October of 2008, West Yost prepared a TM entitled “Davis Woodland Water Supply Project Delivery”. The TM provided background information on alternate project delivery concepts. Since then, the team has participated in a series of presentations/discussions on alternative delivery processes including: conventional design, bid, build (DBB); DB, DBO, and CM@Risk (including various contractor responsibilities). These presentations and discussions included:

1. John Cevaal, Montgomery Watson Harza with focus on CM @ risk;
2. Paul Meyerhofer, Camp Dresser McKee with focus on CM @ risk;
3. Joe Glicker, CH2MHill, with focus on DBO;
4. Eric Peterson on the legal aspects of various contracting methods; including the use of alternative delivery procedures in California;
5. Rhodes Trussell with focus on water quality and water treatment processes;
6. Tim Suydam and Liz Kelly project managers of San Diego County Water Agency and City of Seattle DBO water treatment plant projects, respectively, with focus on public contracting responsibilities and experiences, particularly for DBO projects;
7. Freeport Regional Water Project field trip – an Agency project using conventional design-bid-build contracting procedures;
8. Mark Madison, City of Stockton, with a focus on the DBB approach on their river intake, and Design/CM@Risk on the their new water treatment plant;
9. Rick Wood, City of Fairfield, with a focus on the Agency and joint operations experience and lessons learned between the City of Fairfield and City of Vacaville in the North Bay Regional Water Treatment Plant;
10. John Bonow and Sarah Hollenbeck of Public Financial Management presentation on the current status of municipal project funding;
11. Will Lyles of Lyles Construction Group gave a presentation on alternate project delivery and the group's capability; and
12. West Yost team presentations on project scheduling cost estimates, and comparison of long-term costs of alternate Project delivery methods and timetables.
In addition, the team has compiled a library of model contracting procedures, specifications, and reference materials to facilitate project implementation. The project planning team that participated in this several month effort has included: Jim Yost, Dave Anderson, Lindsay Sadler, Monique de Barruel, Jerome Gilbert, Alan Lilly, Bill Emlen, Mark Deven, Bob Weir, Bob Clarke, Greg Meyer, Jacques DeBra, Doug Baxter, Keith Smith, Diane Phillips, Dick Donnelly, Liz Houck, Sid England, and David Phillips.

**Project Financing and Costs**

It is anticipated capital costs of the project will be financed by a combination of municipal bonds issued either by the cities or the new Agency and loans and grants to the extent that they are successfully acquired from state and federal government sources. The potential cost advantages of an early project completion are significant, but will result in earlier expenditures for project development, bidding, and permitting. Because the project will result in increased water rates for the participants, the team has maintained a high focus toward minimizing and balancing rate impacts and ensuring the project is built and operated at the lowest life-cycle cost.

Even if substantial grants and loans cannot be acquired in the short term, the proposed schedule could take advantage of the current market conditions, and minimize the overall administrative costs of the project. Project financing may also be designed to defer bond interest and repayment. The initial strategy will be to tailor rate increases to the extent possible with appropriate repayment deferrals, while at the same time minimizing project cost through the current schedule and the most efficient project delivery procedures described above.

**Traditional Project Delivery**

The completion date for the Project is scheduled for early 2016. Early project planning was based on traditional project delivery that could result in treated surface water being available to the partners no sooner than 7 to 9 years. Traditional project delivery includes the following separate phases: planning, design, construction, and operations. Because different entities usually conduct each of these elements, the process requires maximum oversight; there can be disagreements between the entities which in some cases lead to cost overruns and delays. Most projects use this traditional approach for the types of facilities that make up the Project. Traditional delivery for this project would mean a commitment by the cities, and/or the DWCWA for a major staff activity, or the retention of an "owner's representatives consultant" to oversee the program.

This model involves three separate contracts for each project facility: the designer, the constructor, and the Agency’s contractor responsible for operating the plant. In the first step of the traditional model, a private design firm is hired under contract to the utility. Its responsibilities include determining plant requirements and developing design and related specifications, and bid and contract documents. In the second step, bids are tendered by contractors to meet the requirements of the contract and specifications for each element of the project. The lowest responsive bidder is awarded the job of constructing the facility. In the third step, the utility is responsible for operating the facility in accordance with performance standards, either with public staff or under contract with a service provider.

The traditional model has the principal advantage of being well understood by all of the parties, but there are some potential shortcomings.
Segmenting the design and construction process can lead to higher design costs and normally does not permit the designer and builder to collaborate on efficient process design that could lead to optimization of construction and operations costs.

- Risks associated with the failure of the plant to operate in accordance with the utility’s intent are often ultimately borne by the utility.
- The low-bid, fixed-price method of selecting constructors heightens the risk of performance failures; this situation worsens where it is not clear who is to be responsible for a failure (designer, builder, or owner).
- The low-bid method of selecting constructors has high potential for costly change orders, resulting in unpredictable budget increases.
- Schedules can become extended due to difficulty in managing and staffing large technically complex project delivery systems.
- Some municipalities are not equipped to efficiently operate complex plants, may not be able to achieve economies of scale in procurement of operating supplies, and may be subject to labor agreement limitations.
- Responsibility for cost overruns associated with design or construction are typically borne by the owner, as are risks of regulatory compliance associated with plant operations.
- It is not possible to optimize construction and operating costs, including: engineering, capital, energy, chemicals, and labor.

It should be noted that under either a traditional or alternative bidding procedure described below, the project would be designed and built by one or more private contractors. The owner has the option of operating all facilities by acquiring and training the necessary staff. Most utilities have some capability in the operation and maintenance of pipelines and pump stations. However, operating a modern water treatment plant requires a commitment to a significant level of operator capability, continuing training, and accepting the responsibility for compliance with increasing standards. Neither Davis nor Woodland currently has water treatment plant operating capability. At least three private operating firms with significant experience are available to undertake at least initial plant operations, and the Agency could retain the option to assume operating responsibility at a later date. It would also be possible to complete the project using traditional delivery methods, followed by a separate, competitively bid operations contract.

**Alternative Delivery Concepts**

The Project as a whole, or each of its components, could be constructed and operated using an alternative approach that has been recently used on similar projects by communities in Seattle, San Diego County, Stockton, Phoenix, Spokane, and Sacramento. They have successfully used the DBO, DB, or CM@Risk approach either in combination, or individually for selected project elements. Table 3 shows the distinguishing features of traditional and alternative approaches to Project delivery.

- The **DB** or design-build approach, involve a single contract let for the design and construction of a facility. There are several variations of this approach under which the bidder can propose a fixed price for design and construction or offer a maximum price
under which the bidder would solicit proposals for the construction phase and share in the savings if any with the owner. DB with a separate operations contract for a treatment plant is an option when the owner wishes to delay an operating decision, or wants to change the mix of potential bidders. The bidding process for operations could parallel construction activities. This approach involves greater management efforts and prevents obtaining efficiencies of integration of operations and capital investment.

- **The DBO** or design-build-operate approach is usually applicable when the owner does not have the staff expertise or desire to operate the facility. The DB and DBO approaches offer potential advantages of greater efficiency by integrating project elements and sharing risks with a single contractor. A DBO approach for new facilities is essentially single-source procurement for a performance and specifications based scope of work for what had been traditionally separate contracts. The DBO agreement includes a "front end" component which deals with the DB aspects of the project and an operational section that is similar to a long term O&M contract. The legal, financial, and contractual issues increase in this form of service agreement.

- **The CM@Risk** approach. There are two different types of CM@Risk: one in which the construction manager assumes the risk of construction costs (called CM@Risk) and one in which the design team assumes the risk of construction costs (called Design-CM@Risk). Under both methods of project delivery the owner selects teams based on qualifications with price considerations. The owner maintains involvement in design and construction phases. While CM@Risk offers one of the faster methods of project deliveries, Design-CM@Risk is faster. Under both CM@Risk methods, project costs are determined later on in the design process so the owner has more control of project cost throughout the project. The Design-CM@Risk method of project delivery uses a single team to engineer, procure, and manage the construction of a facility. Design-CM@Risk is essentially the same as working with a DB team except that the DB team assumes the construction risk. In other words, the project costs are guaranteed and the owner shares in any cost savings. In this method, the engineer, procurement, and construction management team hold contracts with design and construction subcontractors and material and equipment suppliers.

<table>
<thead>
<tr>
<th>Distinguishing Features</th>
<th>Traditional</th>
<th>DB</th>
<th>DBO</th>
<th>CM@Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Integration</td>
<td>Segmented</td>
<td>Partial</td>
<td>Complete</td>
<td>Partial</td>
</tr>
<tr>
<td>Operational Responsibility</td>
<td>Staff/Contract</td>
<td>Staff/Contract</td>
<td>Contract</td>
<td>Staff/Contract</td>
</tr>
<tr>
<td>Ownership and Financing</td>
<td>Agency</td>
<td>Agency</td>
<td>Agency*</td>
<td>Agency</td>
</tr>
</tbody>
</table>

**Special DBO Factors**

**Risk:** Underlying the performance contract is an appropriate sharing of risk between the contractor and the owner. This sharing is based on the concept that each entity should undertake the risk that it can most efficiently and reliably handle. Table 4 shows an example of risk-sharing in a DBO contract.
A more detailed assessment of risk is described in the risk memorandum from attorneys Dick Shanahan and Eric Peterson.

<table>
<thead>
<tr>
<th>Risk/Responsibility</th>
<th>Project Partners (Owner)</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing and setting rates to meet project cash flow</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>Site Acquisition</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>Permitting</td>
<td>X (Initial)</td>
<td>X (development and operating compliance)</td>
</tr>
<tr>
<td>Design</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>Construction</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>Operation</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>Raw Water Quality</td>
<td>X</td>
<td>—</td>
</tr>
<tr>
<td>Treated Water Quality</td>
<td>—</td>
<td>X</td>
</tr>
<tr>
<td>Change in Law</td>
<td>X</td>
<td>—</td>
</tr>
</tbody>
</table>

**Early Stage Price Certainty:** Under the DBO project delivery method, the lump sum price for the project can be ascertained by the owner-governmental agency much earlier in the procurement process, and for a much lower “transactional” cost. DBO contractors will propose both a fixed price in response to a request for proposals based on a 20-30 percent complete design and an annual service fee, which may be subject to escalation based on a pre-agreed upon inflation factors.

**Shared Cost:** Changes in the costs of raw materials are frequently difficult to predict. Variations in raw water quality that are beyond the control of a contractor can also affect quantities of chemical use and energy requirements. A frequent practice in DBO contracting is to index these variables. Also during the term of the contract, the contractor may be able to affect savings through additional investments. Incentives can be offered to share the benefits of these savings between the owner and the contractor. The underlying concept of a DBO contract is that both parties must be successful. The contractor offers a competitive price with a built-in profit, and the owner desires regulatory based performance, and to sustain the facility while minimizing cost. Successful DBO’s maintain both of these objectives.
Long-Term Operational Viability: The DBO procurement method enables the development of an “operator-driven” design, which will likely involve significant attention to project operability. The risks assumed by the DBO contractor in the operations phase help to ensure that the project will be designed and constructed in a manner that will produce a highly operable, cost-effective facility. When the owner-governmental agency steps in upon expiration or earlier termination of the service contract, it can do so with a high level of confidence in the operability and cost-effectiveness of the facility.

Strong DBO Market: The companies that compete in the DBO industry are strong companies that specialize in providing the services required for a DBO project. More often than not, these companies have investment grade credit ratings, which enable them to provide the financial security required in connection with major capital improvement projects. Owner-governmental agencies can be confident that sufficient resources will be brought to bear upon the successful completion of a DBO project.

Project Strategy: The project elements can be bid as a package, or divided into several packages. These packages can include: the intake, the raw water pipeline, the treatment plant, and the distribution pipelines (which can be further subdivided if desired). These packages can be bid at the same time so the owners will know the full cost at the time of decision on any element. Packages can be combined and bid as a single proposal. The owners would then have the opportunity to consider whether to award single or multiple contracts based on total cost, owner oversight obligations, and contract schedule optimization.

Change Orders: The number of change orders required in a DBO process should be minimal. The concept is that the contractor takes the risk of most circumstances, with the agency assuming risk of rare or unforeseen circumstances that are carefully defined in the service contract.

Proposal Development and Evaluation: The partners design an evaluation process and forms that meet their priorities and policy needs. Balancing factors include: short and long-term cost, capital cost, operating cost, performance reliability, performance guarantees, passed contractor performance, minimization of future cost increases, and others as appropriate. Selection decision is frequently based on a recommendation from a selection committee that may include outside experts. It is important that this committee participate in the RFQ and RFP phases, and in assisting in drafting and reviewing the draft service agreement.

Project Financing

The most logical and least costly method of financing this project would be to issue local agency revenue bonds to the extent grants cannot be obtained. It would be possible to use the build-own-operate-transfer (BOOT) alternative if there was interest in interim or long-term private financing, but this option would be ultimately more expensive. This would be similar to a DBO, but with private financing. The interest rate on municipal bonds has been consistently lower (1/2-3 percent) than the rate of private borrowing. A new form of financing infrastructure projects is through the “I-Bank” which issues taxable bonds to the buyer with interest costs reduced by an I-Bank subsidy. Another form of private financing would be the use of private activity bonds (bonds that are tax exempt providing they are for a public purpose although borrowed by a private entity). These bonds are subject to a statewide cap, which currently has an available allocation. PFM provided a preliminary analysis of financing issues. The Agency will need to address the most advantageous system of borrowing, by the Agency or Davis and Woodland, and the types of financing available to meet the final construction schedule.
Alternate Project Delivery

Recent experiences with alternate delivery concepts have demonstrated that similar projects that can be constructed rapidly are more likely to incorporate the latest technology, limit the risk associated with regulatory compliance, and achieve project goals at a substantially lower short and long-term cost. Table 5 is a 2008 summary of water and wastewater projects demonstrating the cost savings gained in various water and wastewater projects by applying an alternative project delivery method. Of particular note are projects in Seattle, Tampa Bay, Stockton, and most recently San Diego. The San Diego and Seattle experiences are discussed separately below and are particularly relevant. Alternative delivery projects yield a cost savings of between 20 to 30 percent under estimates for traditional project delivery.

The following information developed by the publication "Public Works Financing", is based on calculations by individual agencies, which use different criteria to determine savings. As a result, the numbers are only a rough indication of the significance of savings in each case. In general, they do not result from life cycle cost analyses, and represent capital cost savings*. The projects described without the "DBO" designation are DB projects. Operating costs are identified in the following discussions of the Seattle and San Diego projects, and they are heavily influenced by the treatment process selected. It is anticipated that the Agency will use lifecycle cost as a primary selection criteria and it can be compared against an engineer's estimate, including an estimate for operations using a theoretical staff employed by the Agency.

<table>
<thead>
<tr>
<th>Location</th>
<th>Description, system type</th>
<th>Plant Size, mgd</th>
<th>Contract Operations Term, years</th>
<th>Estimated Capital Cost Savings, dollars*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augusta, Ga.</td>
<td>Wastewater</td>
<td>46</td>
<td>10</td>
<td>5 million</td>
</tr>
<tr>
<td>Bessemer, Ala.</td>
<td>DBO Water</td>
<td>24</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Bridgeport, Conn.</td>
<td>Wastewater</td>
<td>40</td>
<td>10</td>
<td>N/A</td>
</tr>
<tr>
<td>Boston, Mass.</td>
<td>Wastewater Sludge</td>
<td>125 dtpd</td>
<td>15</td>
<td>95 million (34 percent)</td>
</tr>
<tr>
<td>Brockton, Mass.</td>
<td>Water/Wastewater</td>
<td>24</td>
<td>20</td>
<td>20 million</td>
</tr>
<tr>
<td>Cranston, R.I.</td>
<td>DBO Wastewater</td>
<td>23</td>
<td>25</td>
<td>35 million</td>
</tr>
<tr>
<td>Wetumpka, Ala.</td>
<td>Water</td>
<td>10</td>
<td>20</td>
<td>1 million</td>
</tr>
<tr>
<td>Evansville, Ind.</td>
<td>Water</td>
<td>60</td>
<td>10</td>
<td>8.1 million</td>
</tr>
<tr>
<td>Farmington, N.M.</td>
<td>Water/Wastewater</td>
<td>20</td>
<td>8</td>
<td>4 million</td>
</tr>
<tr>
<td>Fillmore, Calif.</td>
<td>DBO Wastewater</td>
<td>1.8</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Forsyth County, Ga.</td>
<td>DBO Wastewater</td>
<td>2.5</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Franklin, Ohio</td>
<td>BOT Wastewater</td>
<td>4.5</td>
<td>20</td>
<td>23 percent</td>
</tr>
<tr>
<td>Franklin, Ohio</td>
<td>BOT Water</td>
<td>5</td>
<td>20</td>
<td>30 percent</td>
</tr>
<tr>
<td>Fulton Co., Ga.</td>
<td>Wastewater</td>
<td>24</td>
<td>10</td>
<td>4 million</td>
</tr>
<tr>
<td>Honolulu, Hi.</td>
<td>DBO Wastewater Sludge</td>
<td>27 dtpd</td>
<td>15+10</td>
<td>35 million</td>
</tr>
</tbody>
</table>
### Table 5. Summary of Alternative Delivery Projects

<table>
<thead>
<tr>
<th>Location</th>
<th>Description, system type</th>
<th>Plant Size, mgd</th>
<th>Contract Operations Term, years</th>
<th>Estimated Capital Cost Savings, dollars*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indianapolis, Ind.</td>
<td>Wastewater</td>
<td>250</td>
<td>19</td>
<td>250+ million</td>
</tr>
<tr>
<td>Indianapolis, Ind.</td>
<td>Water</td>
<td>140</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Milwaukee, Wis.</td>
<td>Wastewater</td>
<td>550</td>
<td>10</td>
<td>145 million (30 percent)</td>
</tr>
<tr>
<td>Naugatuck, Conn.</td>
<td>Wastewater</td>
<td>10.3</td>
<td>20</td>
<td>21 million</td>
</tr>
<tr>
<td>New Haven, Conn.</td>
<td>Wastewater</td>
<td>40</td>
<td>15</td>
<td>22.5 million</td>
</tr>
<tr>
<td>Newport, R.I.</td>
<td>Wastewater</td>
<td>10</td>
<td>20</td>
<td>22 million (24 percent)</td>
</tr>
<tr>
<td>Norwalk, Conn.</td>
<td>Wastewater</td>
<td>20</td>
<td>20</td>
<td>10 million</td>
</tr>
<tr>
<td>Oak Ridge, Tenn.</td>
<td>Utilities</td>
<td>—</td>
<td>10+10</td>
<td>70 million</td>
</tr>
<tr>
<td>Pawtucket, R.I.</td>
<td>DBO Water</td>
<td>25</td>
<td>20</td>
<td>37 million</td>
</tr>
<tr>
<td>Phoenix, Ariz.</td>
<td>DBO Water</td>
<td>80</td>
<td>20</td>
<td>27 million (7 percent)</td>
</tr>
<tr>
<td>Pinellas County, Fla.</td>
<td>DBO Wastewater Sludge</td>
<td>25 dtpd</td>
<td>10+10</td>
<td>N/A</td>
</tr>
<tr>
<td>Rahway, N.J.</td>
<td>Water</td>
<td>6</td>
<td>20</td>
<td>32 million</td>
</tr>
<tr>
<td>Richmond, Calif.</td>
<td>Wastewater</td>
<td>16</td>
<td>20</td>
<td>75 million</td>
</tr>
<tr>
<td>Sacramento, Calif.</td>
<td>DBFO Wastewater Sludge</td>
<td>30 dtpd</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Seattle, Wash.</td>
<td>DBO Water (Tolt)</td>
<td>120</td>
<td>25</td>
<td>70 million (40 percent)</td>
</tr>
<tr>
<td>Plymouth, Mass.</td>
<td>DBO Wastewater</td>
<td>3</td>
<td>20</td>
<td>7.4 million (19.7 percent)</td>
</tr>
<tr>
<td>Seattle, Wash.</td>
<td>DBO Water (Cedar)</td>
<td>180</td>
<td>18+5+5</td>
<td>50 million (30 percent)</td>
</tr>
<tr>
<td>Springfield, Mass.</td>
<td>Wastewater</td>
<td>67</td>
<td>20</td>
<td>10 percent</td>
</tr>
<tr>
<td>Stockton, Calif.</td>
<td>Water/DBO Wastewater</td>
<td>65</td>
<td>20</td>
<td>175 million (22 percent)</td>
</tr>
<tr>
<td>Stonington, Conn.</td>
<td>Wastewater</td>
<td>3</td>
<td>20</td>
<td>N/A</td>
</tr>
<tr>
<td>Tampa Bay, Fla.</td>
<td>DBO Water</td>
<td>66</td>
<td>15+5</td>
<td>85 million (21 percent)</td>
</tr>
<tr>
<td>Tampa Bay, Fla.</td>
<td>DBO Desal</td>
<td>25</td>
<td>30</td>
<td>50 percent</td>
</tr>
<tr>
<td>Taunton, Mass.</td>
<td>Wastewater</td>
<td>8.3</td>
<td>20</td>
<td>62 million</td>
</tr>
<tr>
<td>Wash. Boro, N.J.</td>
<td>DBO Wastewater</td>
<td>1.2</td>
<td>15+5</td>
<td>2.2 million (11 percent)</td>
</tr>
<tr>
<td>West Haven, Conn.</td>
<td>Wastewater</td>
<td>12.5</td>
<td>15</td>
<td>12 million</td>
</tr>
<tr>
<td>Wilmington, Del.</td>
<td>Wastewater</td>
<td>105</td>
<td>20</td>
<td>60 million</td>
</tr>
<tr>
<td>Woonsocket, R.I.</td>
<td>DBO Wastewater</td>
<td>16</td>
<td>20</td>
<td>45 million</td>
</tr>
</tbody>
</table>

*Source: Public Works Financing*
The City of Seattle’s (City) initial willingness to consider an innovative approach to developing the Tolt Filtration Plant, and the ultimate selection of the DBO model derived from the overall effort to find more efficient ways of doing business. A variety of specific factors led to the viability of using an alternative approach over the traditional approach to design, construction and operations of the Tolt facility:

- Seattle’s lack of experience in filtration plant design, construction and operation;
- A growing body of demonstrated private experience in plant operation;
- The emergence of capable design, build, and operations consortia; and
- Potential cost-savings associated with an alternative approach.

In implementing the DBO model, Seattle sought to ensure that the Tolt facility would perform to a standard at or above conventional implementation and operation, but at minimum cost to the City within a preferred risk allocation framework.

Seattle’s needs and objectives setting process resulted in a “project philosophy” built around the following concepts:

- That the City describe its needs in terms of facility performance requirements and other key outcomes, and allow vendors to propose solutions to achieve these requirements;
- That technological innovation be encouraged within the range of proven technology, and competition be used to achieve both technical innovation and lower cost;
- That an integrated contractual responsibility be provided for design, construction, and long term operations with a single point of accountability, and that all phases of the contract be secured by a single financially strong guarantor;
- That risk be allocated between the City and the vendor in a manner which minimized overall project costs (i.e., assign the risk to the party best able to manage it);
- That a long-term service agreement be established for operations, thereby assuring performance of the facility beyond construction completion; and
- As the entity ultimately responsible for providing a safe and reliable water supply, the City should maintain ownership of the facilities (an economic analysis and market feedback also concluded this to be the least cost approach over the long term).

The City used a DBO process for its new 120 mgd Tolt Filtration Facilities. The total value of the contract was about $101 million (net present value, 1998 basis). This included $65 million for design and construction, and $36 million for 25 years of facility operations. The term of the contract was 25 years (15 years with options for two five year renewals with the same contract terms, at the City’s discretion). The obligation for design, construction, and operations lies with the successful bidder. This innovative procurement process produced a savings of $70 million when compared to the estimated cost of building a comparable facility using the conventional process of consultant design, low-bid construction, and city operations.
San Diego County Water Authority

DBO procurement was selected primarily to expedite implementation of additional regional treatment capacity and secondarily to allocate the risk of operation and maintenance of a WTP to the most qualified entity. The SDCWA has typically implemented capital facilities using DBB procurement. The Authority evaluated several different procurement methods and determined DBO to be the most expeditious method to implement the project and provide industry expertise for operation and maintenance of the WTP. The Authority determined DBO procurement would, at a minimum, implement the plant one year quicker, 4 years compared to 5 years for DBB procurement, when beginning at the solicitation phase (either for the design consultant under DBB procurement, or the DBO entity under DBO procurement).

The second reason for using DBO procurement was to allocate the operation and maintenance risk to the entity most qualified to handle this risk. The plant will be the first WTP owned by the Authority. The Authority has a qualified operations and maintenance (O&M) department, but its core experience and expertise is in large water conveyance facilities, not treatment. Because of the timing the Authority did not feel it could effectively manage and implement an additional division of personnel in its O&M department for water treatment. The Authority determined the DBO industry was well established with qualified companies and personnel with expertise and experience best able to handle this risk.

Another major benefit of using the DBO procurement method was the potential for reduced costs. During the solicitation the Authority prepared a conceptual design for a submerged membrane WTP consisting of membranes and granular activated carbon contactors. The estimated capital construction cost for this facility, not including design, ranged from $181 to $236 million. This cost estimate assumes DBB procurement. The actual DB cost at contract execution was $157 million, 13 to 33 percent less than the conceptual design cost estimate. Reduced costs were a direct result of integrating the designer, contractor and the operator under the DBO procurement method. The estimated annual operating cost for the conceptual design membrane WTP was $6.7 million. The annual operating cost as bid for the TOVWTP is $7.6 million approximately 13 percent greater. The main reason for the higher operating costs is because the successful contractors’ design and operation includes ozonation facilities where the conceptual design did not, which makes the cost reduction on the capital side all the more impressive.

Other DBO Projects

Pima County, Arizona: Pima County operates a 60 mgd wastewater treatment system serving the Tucson metropolitan area. The County utilized a multi-disciplinary advisory team for the development and implementation of its $1 billion capital improvement plan to expand capacity, replace obsolete facilities and meet more stringent regulatory effluent standards. The assessment of available and appropriate alternative project delivery methods resulted in the current procurement of a contract for the new 30 mgd, $300 million, Roger Road Water Reclamation Campus that will be awarded on a DBO project delivery basis.
City of Phoenix, Arizona: The City of Phoenix engaged a multi-discipline study team that completed a seminal, in-depth study of 11 alternative project delivery methods for the proposed 80 mgd, $200 million Lake Pleasant Water Treatment Plant. DBO was selected as the delivery method for the new water treatment plant, raw water intake and raw water transmission line. Traditional design-bid-build project delivery was chosen for the implementation of a finished water pipeline. The Lake Pleasant plant, which is now operating, was procured utilizing Arizona’s omnibus alternative project delivery legislation. The plant treats Central Arizona Project Colorado River water to enhanced standards and under very high periodic turbidity conditions, serves rapidly developing north Phoenix, and is expandable to 320 mgd.

Fulton County, Georgia: Atlanta’s Fulton County procured the 24 mgd Camp Creek Wastewater Treatment Plant project on a DBO basis. This was the first major project to be implemented under new statewide DBO legislation. The private vendor’s work scope involved building a new and larger treatment plant to upgraded renewal permit standards, while operating an existing, aging facility.

Spokane County, Washington: Spokane County recently procured a new regional water reclamation facility on a DBO basis. The facility is currently being designed and constructed and is an advanced treatment facility with membrane filtration providing an initial 8 mgd of capacity with an ability to be expanded in phases up to 24 mgd.

Fillmore, California: The City of Fillmore is replacing an obsolete wastewater treatment plant with a 1.8 mgd wastewater reclamation facility. Instead of discharging effluent to navigable water, the new plant will discharge to percolation ponds and eventually to a reclaimed water distribution system. The project was procured on an alternative delivery basis, using DBO for the plant under Government Code 5956, DB for the conveyance facilities, and private operation for the collection system.

City of Hialeah, Florida: The City of Hialeah is currently in negotiations with a private vendor for a new reverse-osmosis water treatment plant that has been procured on a DBO basis. The plant will be a baseline facility and treat 10 mgd of brackish groundwater from the Floridian Aquifer. The facility will be designed with an ability to be expanded in phases up to 17.5 mgd.

Steps in the Procurement Process

The diagram shown in Figure 2 illustrates the steps in the procurement process and can be used either with DBO or DB proposals. It reflects the full range of activities that were the basis for the recent award of a wastewater reclamation facility contract by Spokane. This process can be modified to reduce the time required which should be roughly 12 to 18 months. An expedited agency board action should include policy decisions on the procurement method and a schedule of activities that fit its needs.
Figure 2. Procurement Process Steps for DB or DBO Project Delivery

Project Delivery Schedule

Table 6 is a rough timeline to implement procurement of a DBO project. Much will depend upon owner review desires, and adequate preparation of materials for decision-making.

Communications Protocol

The procurement process depends on numerous participants including: the owner, the owner’s representatives, inspectors, designers, construction contractors, contract operators, and support firms. The implementation process should be fair and open and interested parties should receive information about the DBO project and the competitive solicitation processes. A series of project updates can be mailed to all parties who had expressed interest in the project. The first of the project updates can outline the solicitation process, schedule and communications protocol.

Factors to consider include:

- Achieving fair distribution of relevant information to anyone interested;
- Avoiding the appearance of unfair, or “insider” information going to any proposing firm;
- Providing regular informational updates about the project; and
- Responding promptly and thoroughly to parties with questions or concerns.
### Table 6. Sample Timeline of a DBO Contract Procurement Process

<table>
<thead>
<tr>
<th>Month</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Request for Qualifications (RFQ) issued</td>
</tr>
<tr>
<td>3</td>
<td>Receive Statements of Qualifications (SOQs)</td>
</tr>
<tr>
<td>4</td>
<td>Determine Pre-qualified Teams for Proposal Phase</td>
</tr>
<tr>
<td>5-6</td>
<td>Request for Proposals (RFP) issued with Draft Service Contract</td>
</tr>
<tr>
<td>8</td>
<td>Initial Submittals of preliminary technical concepts without price</td>
</tr>
<tr>
<td>9-10</td>
<td>Full technical and price Proposals received</td>
</tr>
<tr>
<td>11-13</td>
<td>Draft Service Contract negotiations, clarification of technical Proposals, and preliminary evaluation of Proposals</td>
</tr>
<tr>
<td>13</td>
<td>Request for Best and Final Offer (BAFO) issued to Teams, BAFOs received, and BAFOs evaluated</td>
</tr>
<tr>
<td>13</td>
<td>Selection Committee Decision on Recommended Team submitted to Board of Directors for Approval</td>
</tr>
<tr>
<td>14</td>
<td>Owners Decision on Successful Team, and authorization to execute Service Contract</td>
</tr>
<tr>
<td>15</td>
<td>Service Contract execution and Notice to Proceed</td>
</tr>
<tr>
<td>30-40</td>
<td>In-service date depending upon bid packages and selected design</td>
</tr>
</tbody>
</table>

A single contact person is desirable for communication with interested parties, response to questions, and receipt of requests for information and clarifications. Reference materials for the Project, including policy and technical background documents are currently available to interested parties on an Internet Web Site. It can be the vehicle for all future project development and reference information. The single point of contact for this project currently is the Project Engineer, Jim Yost of West Yost.

### Partner/Owner Oversight

The construction of a large and complex facility by a public agency requires dedicated oversight under traditional or alternative project delivery. Experience has indicated that benefits of alternative delivery can be realized only if the owner is prepared to invest in oversight and project participation through its staff or a combination of its staff and consultants (usually referred to as the owner’s representative). The oversight can include: administration of the bidding process, development of competitive specifications (with a service contract in the case of a DBO), technical analysis of water quality requirements and proposals, the development of performance criteria, and inspection during construction.

The oversight of a DBO treatment plant should include professional capability to assure continuing performance, and as a backstop should the operating contractor fail to meet its obligations. Oversight during the operations phase can include: monitoring of key performance criteria, review of operations, assurance that maintenance and replacement schedules are followed, attention to regular reporting, and review of personnel actions and transitions.
Operational performance was based on water quantity and quality standards that are strictly defined in the service agreement. Water quality performance has usually been required at a higher level than required by state and federal agencies. The Agency should maintain a “window” into operations of the facility through monitoring of instrumentation and control, and through sampling and review of operational reports. Agency staff can participate in facility operations training at the discretion of the Agency, and monitor water quality parameters within the facility. Continuing oversight of replacement and repair as agreed in the service contract is necessary to assure project sustainability.

**Legal Issues**

General Law cities, such as Davis and Woodland, are authorized to procure the Project using the DBO procurement method. California Government Code 5956 authorizes cities to conduct a competitive proposal process, rather than a lowest responsible bidder process, to procure water treatment facilities. The procurement may be for design, construction, financing, operation or maintenance services, or any combination thereof, that involve the use of private sector capital. Water facilities are among the fee producing projects listed in the statute, along with sewage treatment, power, highway and other civil infrastructure facilities. The primary selection criteria is to be the "demonstrated competence and qualifications" of the proposers, which is to be determined through a request for proposals process. The statute contains a number of procedural and substantive requirements that must be observed in carrying out the procurement. Government Code 5956 has been used to successfully procure several water, wastewater, and power projects in California over the last 10 years.

The legal authority for the Agency to procure the Project using the DBO procurement method pursuant to Government Code 5956 will be confirmed by a formal legal review and memorandum of law prepared by special counsel, Hawkins Delafield & Wood LLP, under the direction of Agency General Counsel, Richard P. Shanahan.

**Project Delivery Recommendation**

In November 2009, the team members achieved consensus on the initial approach to investigate for contracting for the five project elements. While the first assumption was to consider issuing five separate contracts for the project elements, the team gave further consideration to the potential for a single DBO contract for the project (excluding local facilities). The new Agency will make the final decisions on the contracting procedures. It is necessary to proceed expeditiously to achieve the goal of delivering water by 2016. A single DBO contract for the project, with separate contracts for local facilities, would expedite planning, minimize cost during the current competitive bidding climate, assure coordinated construction, and maximize opportunities for financial assistance.

**Sacramento River Intake Facility:** (DBO) initial inclusion in Project contract, with the potential for separate contracts for design and construction in the event circumstances warrant in 2011. Operations in any event will be included in the overall project operations program to be administered from the water treatment plant. Substantial planning and design work has been completed on the intake facility. The intake facility will require a significant amount of permitting activity during all project phases. Neither schedule nor cost considerations would be benefited through CM@risk nor the Design/Build approach. However, if the intake is constructed jointly
with Reclamation District RD 2035, which is expected to have a completed design for the intake, the RFP can include a request for proposals on only the construction and operation of the intake structure. If it should be necessary to construct a new intake to be used only by the Project, the RFP could include the design and construction and operation for the intake as well.

It also is possible that the intake/diversion component of the Project may be designed and constructed outside the DBO contract. To provide for a range of options for the agency, the RFQ would request proposers to include their qualifications to provide a full range of intake/diversion services.

**Raw Water Pipelines:** (DBO) inclusion in Project contract with the potential creative use of construction techniques to reflect field conditions. Operations responsibility would be included in the DBO Project contract. Initial alignment and soils investigations for this facility are currently underway. Inclusion in a single contract would have the advantages as identified in Table 2.

**Water Treatment Plant:** (DBO) a single contract competitively awarded for the design, construction, and operation of the treatment facility, and overall project operation. This approach has the greatest potential for cost savings, can result in water deliveries at the earliest date, and can be used to integrate Project activities. This approach will ensure the most efficient design and operations for compliance with regulatory requirements, and enhance reliability.

**Treated Water Pipelines:** (DBO) inclusion in Project contract with operations responsibility defined in the DBO Project contract. Initial alignment and soils investigations for this facility are currently underway. Inclusion in a single contract would have the advantages identified in Table 2.

**Local Facilities:** Because these facilities will be independently designed, constructed, owned and operated by each city, each city will determine their preferred method for contract delivery. Separate contracts could allow for smaller packages and phased implementation to meet the projected completion of regional facilities. Final bidding procedures will be considered by each city as final planning and design of these facilities is completed.

JBG:nmp