

**Ronald J. Tanenbaum, PhD, CVS, PE, GE, F. ASCE ([ron@vms-inc.com](mailto:ron@vms-inc.com))**



Ron Tanenbaum is a Senior Value Engineer with Value Management Strategies, Inc., and President of GeoVal, Inc. With over 40 years of teaching and consulting experience in geotechnical and civil engineering, Ron is actively involved in Value Engineering having participated in and/or facilitated over 100 VE workshops of which over 40 have been for the U.S. Army Corps of Engineers, 30 for transportation-related projects, and the balance mostly for water/wastewater systems. As a member of SAVE International, he serves as the San Diego Chapter Vice President - Membership, and is a *Certified Value Specialist*. In addition to the U.S. Army Corps of Engineers and the California Department of Transportation, he has conducted VE/VA workshops for numerous other agencies including the Metropolitan Water District of Southern California, Los Angeles Department of Water & Power, San Diego Water and Wastewater Department, Eastern Municipal Water District, Guam Department of Public Works, New York Office of Management & Budget, and the U.S. Navy. He is a graduate of the University of Arizona with a B.S. and M.S. in Geological Engineering and Texas A&M University with a PhD in Civil/Geotechnical Engineering.

**Gordon Johnson, PE ([gjohnson@mwdh2o.com](mailto:gjohnson@mwdh2o.com))**



Gordon Johnson is Chief Engineer for the Metropolitan Water District of Southern California. Mr. Johnson has responsibility for all engineering activities including management of a \$4 billion capital improvement program. Current fiscal year expenditures will exceed \$560 million. Functions included are facility planning, design, construction management and inspection, project management, environmental planning, infrastructure monitoring, and engineering testing and research laboratories. Staff consists of over 400 engineers, technicians, administrative staff, and technical specialists, located at four major facilities. Major programs underway include the \$1.08 billion Inland Feeder, a 45-mile conveyance program featuring 13 miles of 12-foot finished-diameter tunnel under the San Bernardino Mountains; the \$970 million Ozone Retrofit Program to add ozonation for primary disinfection at Metropolitan's five water treatment plants; two treatment plant expansion projects; three large diameter pipeline projects; and eight major infrastructure rehabilitation programs. Over 400 individual projects are in various stages of completion. Mr. Johnson is affiliated with the American Water Works Association, the International Ozone Association and the American Water Resources Association. He is a graduate of Loyola Marymount University with a B.S. in Civil Engineering and of Stanford University with a M.S. in Environmental Engineering.

## ABSTRACT:

Sometimes we, as value methodology practitioners, do not see all of the opportunities to which the methodology, or even selected components of the methodology, can be successfully applied. Then, along comes a forward-seeing agency that has a goal to self inspect its operating procedures and to change these procedures in its quest to become the Best-in Class in their arena of practice and service to the public. This was the case with the Metropolitan Water District of Southern California who approached Value Management Strategies to lead a series of unique workshops addressing three critical areas where the District saw opportunities to improve: Alternative Delivery Methods, Engineer's Cost Estimates, and Construction Change Order Management. This paper will address the following:

- How a Best-in-Class Workshop correlates with and utilizes the VM methodology
- Composition of the VM Team(s) necessary to complete a successful workshop
- How to conduct three workshops in three days with three independent teams
- General findings from each of the workshops including selected "Quick Hits"
- Creating a "Living " document that allows the District to implement selected ideas and modify the document to meet its ever-changing future needs

The paper will conclude with recommendations for performing successful Best-in-Class workshops for any agency that shares a goal to self inspect their operations, accept change, and possess a sincere desire to be better, if not the best.

## INTRODUCTION:

Through the methodology of facilitated workshops conducted with respected industry consultants known to have a wide degree of exposure and experience working with leading-edge companies, the Best in Class Benchmarking Initiative Process Analysis (PA) study sought to identify best business practices and/or procedures that can be adopted by Metropolitan to enhance the Engineering Services Section performance in areas of *Alternative Project Delivery Methods*, *Engineer's Cost Estimating*, and *Construction Change Order Management*. The primary objective was to identify the best business practices of leading-edge companies and agencies, and also identify pitfalls to be avoided to increase the probability of project success.

With an objective of soliciting ideas and proposals from outside experts and not from Metropolitan staff, a total of ten independent consultants specializing in *Alternative Project Delivery (ADP) Methods*, *Engineer's Cost Estimating (ECE)*, and *Construction Change Order (CCO) Management* (three to four each, relatively) were selected to participate in the Best in Class Benchmarking Initiative PA study. The PA study was organized in one pre-study meeting and three one-day workshops to address the three topics.

## GOALS:

In identifying the Best in Class processes for each of the three topic areas, Metropolitan encouraged each team member to focus on general, holistic, best in class methods utilized in industry, specifically the water industry, and not on the specific practices of Metropolitan. Metropolitan assessed the proposals generated at a later date, and determined how best to adopt those proposals offering the most opportunity for improvement of services. Below is a list of goals or suggested objectives that were utilized to stimulate the creative thoughts of the teams.

- Define what other leading agencies/companies (the industry) are doing to provide the best practice in each area.
- Provide expert assessment on where the Water Industry is today with regard to each topic, and where it will be tomorrow.
- Identify how Metropolitan might then implement an improvement program.
- Suggest how the measurement of results might occur.
- Utilize the team's considerable experience in identifying what they see as working and not working in the industry.
- Refine what Metropolitan does to assist a consultant in providing a quality product.
- Provide an inventory of what alternative project delivery methods are used and what would be appropriate for this industry.
- Assess whether the five class method of the Association for the Advancement of Cost Engineering International (AACE) is the preferred estimating approach, or are there other methods to consider.
- Identify external estimating programs that would be recommended to Metropolitan.
- Identify other sources of labor units, etc. (other than Means).
- Identify external estimating standards that Metropolitan might use.
- Assess the track record of Partnering and whether it has proven to be successful in the industry.
- Address what other owners are doing to negotiate, handle, monitor, and decide to proceed with their construction change order process.

Based on these goals, the PA participants prepared a list of proposals under each topic with rational and action items.

## STATE OF PRACTICE:

### *Alternative Project Delivery Methods*

The traditional model for developing and operating public capital works in the United States has been the design-bid-build-operate model. Three basic parties constitute this model: designer, constructor, and owner/operator of the facility. Today, however, cities, towns and special districts across the country are faced with the unenviable task of delivering capital projects with budgets that are not always in line with project requirements, time lines that are significantly shortened, or risk profiles that do not align with owner capacities. While the traditional model is well understood, it has some inherent

advantages, and is the basis for much of the public works law across the country. There are shortcomings that owners have addressed by turning to a variety of alternative project delivery methods.

These organizations are looking for new, more innovative means of project delivery, that range from construction management at risk to design-build and design-build-operate to turnkey solutions that incorporate financing and ownership. Accordingly, there are many variations of alternative delivery that may be applied by organizations to meet their capital project needs. Owners must choose what best meets their need; a need that is not necessarily static. Requirements and context vary from project to project and many owners find that a “tool box” of solutions is the best approach to maintain flexibility and provide the greatest return on capital works investment funds.

The Best-in-Class workshop for alternative project delivery methods provided input on the large range of issues and potential approaches for delivering capital works projects in today’s environment, presenting some the many innovative approaches that have been successfully applied across the industry.

### ***Engineer’s Cost Estimating***

In order to allow owners to properly budget for future needs, cost estimates must be available so that anticipated needs can be adequately evaluated. These cost estimates can be wide ranging, starting at a “blue sky” type estimate where there is no data except a quantity – “we will need a 50 million gallon a day water treatment plant in the ‘xyz’ area around year 2015” - to the case where there is an exact location, 100 % design, and a definite anticipated start date. Handling this range of estimating within the parameters of a variable and rapidly changing pricing environment and global market conditions is a very difficult task.

The 5 class method of the Association for the Advancement of Cost Engineering International (AAEI) is the currently preferred estimating approach in the costing of water projects. Especially important to their concept of estimating is the application of the appropriate contingencies and escalations. To be successful and accurate within the parameters available at the time the estimate is developed, the estimate should be performed by people experienced in estimating, who have access to the proper tools: the Owner’s historical cost records for similar projects, published manuals for labor units, material pricing, equipment rental rates, and inflation cost indices are examples of required data. If large projects are routinely being estimated, Owners are encouraged to use a proprietary estimating system.

Many projects in the water industry can be classified as “typical work”, work that is done routinely and repetitively, work such as installing runs of small diameter pipelines. Historical data with cost indexing can be used to price this type of project. For larger more unique projects, a significant amount of time and effort is required to create a responsible estimate.

It is important for Owners to note that engineering estimates are a “best guess” at a specific point in time. For example, those estimates prepared in August of 2005 were no longer valid in September of 2005 (Katrina hit August 29, 2005). The Best-in-Class workshop addressed this point and examined the

many options available to Owners to improve the cost estimates generated internally or received from consultants while effectively communicating the accuracy and meaning of these estimates to decision makers.

### ***Construction Change Order Management***

Despite the fine efforts of Owners to define project requirements, and design professionals to produce complete, accurate and reliable construction projects, virtually every project experiences the need to modify, add to, or otherwise alter the project after opening the bids. Changes during construction are a routine occurrence within the water industry, where projects often involve modifications to existing complex facilities (such as water treatment plants) or involve subsurface construction projects that, by their nature, carry some inherent risk and uncertainty (subsurface construction such as pipelines and tunnels). Change orders (i.e. alterations considered within the scope of the original contract) may be necessary to incorporate contractor suggestions, respond to unforeseen site conditions, or correct errors and omissions in the plans or specifications.

Even the most successful projects have change orders. What often separates successful projects from unsuccessful projects is how construction change orders are managed. Over the last several decades the water industry marketplace participants including owners, designers, construction managers and contractors have developed industry standard practices, procedures and tools to help manage construction change orders. Leading agencies and companies in the water industry that design and construct projects have developed best practices which improve the effectiveness and efficiency of managing construction change orders. Some of these best practices include improvements in design procedures, construction contract writing, construction records management and tracking, construction management staffing, and improvements to construction management roles and responsibilities.

During the construction change order management Best-in-Class benchmarking workshop, many of these best practices were identified, refined and recommended for potential implementation on future Metropolitan projects.

## **FINDINGS FROM WORKSHOPS:**

After an intense three days, the three independent workshop Value Engineering teams generated numerous recommendations for consideration by Metropolitan. A total of 211 ideas (62 ADP; 69 ECE; and 80 CCO) were identified during the Creativity Process from which 86 proposals (some consisting of combined ideas) were prepared by the teams, with the balance rejected during the workshops. These were categorized into Quick Hit Proposals and Recommended Proposals. Each proposal contained a brief description justifying its recommendation along with a series of bullets indicating the steps or actions required for implementation. The proposal presented below provides an example of the format utilized:

***Use Alliance Contracting (Australian Model) / Form Joint Venture between Metropolitan and Private Industry***

*This suggestion proposes to evaluate and adopt a version of the alliance form of contracting. This approach has been very successfully applied in Australia and the U.K. for public infrastructure projects and within the energy exploration field and heavy industry for complex and high risk projects. For more in depth information, see attached white paper "Introduction to Project Alliancing" located in Appendix F. Benefits of alliancing include assurance of better performance in non-process areas combined with likelihood of lower direct costs, greater certainty of on-time or early delivery, better informed decisions on technical solutions, better balance between capital investment and life-cycle costs, and collaborative management and alignment of commercial interests. Concerns include potential perception of uncertainty in cost outcomes, significant involvement and commitment of Owner staff and senior management to be effective, and overall cultural shift.*

***Implementation:***

- *Review alliancing as a potential form of project delivery to be included in the Metropolitan "portfolio" of delivery options.*
- *Identify the potential legal hurdles that must be overcome to make alliancing an option for Metropolitan.*
- *Identify a team of Metropolitan personnel that would be specifically charged with defining and chartering potential alliancing projects.*
- *Prioritize a list of potential Metropolitan projects to be delivered under an alliance contract. The approach requires effort and probably cannot be justified for all projects.*

The Quick Hit Proposals were evaluated to be immediately implementable to produce direct results related to the goals of the PA study. After review by Metropolitan management, the balance of the Recommended Proposals were either selected or not selected. Some were found to be current Metropolitan practice and were so indicated. This resulted in following quick hit/selected/not selected/current Metropolitan practice number of proposals:

<b>Performance Area</b>	<b>Quick Hits</b>	<b>Selected Proposals</b>	<b>Not Selected Proposals</b>	<b>Current Metropolitan Practice</b>	<b>Total Proposals</b>
<i>Alternative Project Delivery Methods</i>	5	8	15	0	<b>28</b>
<i>Engineer's Cost Estimating</i>	2	7	22	0	<b>31</b>
<i>Construction Change Order Management</i>	3	8	9	7	<b>27</b>
<b>TOTAL</b>	<b>10</b>	<b>23</b>	<b>46</b>	<b>7</b>	<b>86</b>

## QUICK HIT PROPOSALS

Ten quick hit proposals were selected as a result of the findings from the workshop. It was felt by Metropolitan that these ten proposals could be implemented without any cross-department impacts or approvals. Reproduced below, as an example, is one of these quick hit proposals. It is presented to demonstrate how Metropolitan is recording and tracking the action items and progress of each proposal that has been selected.

<b>Construction Change Order</b>			
<b>Proposal # 8 (#71)</b>			
<b>Perform Constructibility Reviews/Lessons Learned and Proper Project Closeout Documentation</b>			
<b>Summary:</b>			
<p>It is recommended that “lessons learned” documentation be developed at the closeout of each project to address constructibility issues that can be better implemented on future projects and to compare change order frequency and cost to other similar projects. This is a process that should start at the beginning of construction using design feedback forms, to keep the design team informed of problem areas uncovered in the documents or specific process issues noted during installation and startup. Use this information as a transfer of knowledge to the design or construction teams, as necessary, to limit future difficulties or to promote technology or construction practices that went very well and should be implemented on future projects.</p>			
<b>Action Item</b>	<b>Status</b>	<b>Date of Completion</b>	
		<b>Anticipated</b>	<b>Actual</b>
<ul style="list-style-type: none"> <li>Develop and use standardized forms <i>to relay information from the field</i> back to the design team during construction.</li> </ul>	<p>Current documentation provides the Project Manager and Designer with information about the changes and issues that are occurring on the contract. As-built drawings also indicated what had to be changed in the field.</p> <p>Current practice (for</p>	2007	Completed
<ul style="list-style-type: none"> <li>Perform a closeout “review and recommendations” document to identify the pitfalls and positive lessons learned on the project.</li> </ul>			

<ul style="list-style-type: none"> <li>Maintain budget to perform this task.</li> </ul>	<p>larger projects) is to perform a “lessons learned” analysis, although not always performed.</p> <p>Need Task Description for budgeting purposes.</p>		
---	---	--	--

## FINDINGS FROM WORKSHOPS:

Appended at the end of this section of the paper is a table listing all of the proposals considered by the Metropolitan Water District of Southern California. The color coding indicates how these proposals were to be resolved (quick hits, selected proposals and not selected proposals). These decisions were based on the following considerations:

- If a proposal contained benefits which appeared to outweigh the cost of resources anticipated for research and implementation, it was selected for further development.
- If a proposal was considered to be cost prohibitive, it was not selected.
- If there was a legal impediment, that is the current regulatory framework of the State of California prohibited certain actions/methods by the District, it was not selected.
- If a proposal was already partly or completely implemented, it was so identified and not selected for further development.

Of the Quick Hit Proposals, three have been implemented, one is pending, four are anticipated to be completed by winter 2009 and two remain undecided. Of the 23 Selected Proposals, three have been completed, five are anticipated to be completed by winter 2009, no decision has been made regarding twelve proposals, two are classified as being on-going, and one has now been considered to no longer be applicable due to cost concerns to the District if they were implemented.

One accomplishment that came out of the best practices process was that Metropolitan created a prequalification list for urgent pipeline repair projects. That was covered under one of the proposals (16 & 17-QH below) that suggested the creation of such a prequalification list. Successfully making this change has created more flexibility in contracting for these repairs. It is believed that this single accomplishment is a big win coming out of the best practices process.

<i>General Manager's Best-in-Class List of Proposals</i>		
<b>Legend</b>		
	<b>Study Categories</b>	
QH	Quick Hit Proposals	
SP	Selected Proposals	
NS	Proposals Not Selected	
CP	Current Metropolitan Practice	
<b>PROPOSAL NO.</b>	<b>PROPOSAL</b>	<b>STATUS</b>
<b>A. Alternative Project Delivery Methods</b>		
1-NS	Actively Seek Statutory Authority for Design/Build; Issue Aggressive Legal Interpretation of Existing Statutes; Study Statute of Other States (Arizona); Use Caltrans Model to Establish Statute Authority	
2-NS	Structural Design/Build Delivery Model that Fits Metropolitan and Industry Constraints	
3-SP	Develop Project Delivery Selection Process	Sept. 2009
4-SP	Use Alliance Contracting (Australian Model)/Form Joint Venture Between Metropolitan and Private Industry	Undecided
5-NS	Consider Appropriate Involvement of Third-party Advisors, Consultants, and Program Managers to Facilitate Successful Negotiations and Delivery of Projects	
6-NS	Form Joint Powers Authority with Agencies that Have Design/Build Authority	
7-QH	Survey Member Agencies and Private Water Companies to Understand How They Deliver Contracts	Sept. 2009
8-NS	Optimize Standard Forms and Contracts	
9-NS	Develop Alternative Project Delivery Methods (APDM) Implementation Team; Organize Separate Organizational Unit within Metropolitan for APDM	
10-QH	Review and Update Metropolitan's Existing Metrics; Define Acceptable Metrics	Sept. 2009
11-SP	Refine or Revise Metropolitan Business to Incorporate Alternative Project Delivery Methods	Undecided
12-QH	Define Different Criteria for Lifeline versus Non-Lifeline Facilities; Use Design/Build in Non- Process Facilities	Undecided
13-NS	Consider Use of Design -Construction Management at Risk	
14-SP	Define the Optimum Risk Allocation that Meets its Needs and Conforms to Best Practices in the Industry	Undecided
15-SP	Utilize Construction Management at Risk as a Means of Projects Delivery	Undecided
16 & 17-QH	Consider Task Order-Based Contracts for Small Projects and Develop List of Pre-Qualified On-Call Contractors and Design-Builders	Sept. 2009
18-SP	Identify Small Business Enterprise Opportunities and Challenges with Alternative Project Delivery; Utilize Mentor-Protegee Program within Small Business Enterprise Program	Undecided
19-SP	Utilize Incentive Contracting to Improve project Delivery and Overall Performance of Delivery Teams	Undecided
20-NS	Use Design/Build for "Greenfield" Projects	
21-NS	Use Design/Build for Plant Modifications with Multiple Measurement and Payment Provisions; Utilize Flexible Measurement and Payment Provisions for Rehabilitation Work	
23-NS	Do Not Use Design/Build for Projects That Will Employ Unproven Technology	
23-SP	Tie the Delivery Approach to Programmatic Use of Building Information Systems or Three -Dimensional Models or Asset Management	Undecided
24-NS	Utilize Design/Build/Operate	
25-NS	Utilize Cost Reimbursable Contracting with Fixed Fee for Complex Facilities	
26-NS	Consider Target Price Contracting	
27-NS	Consider Open Book Negotiated Design/Build Contracts	
28-NS	Use Guaranteed Maximum Price Approaches with Shared Savings and Allowances	

<i>General Manager's Best-in-Class List of Proposals</i>		
<b>Legend</b>		
	<b>Study Categories</b>	
QH	Quick Hit Proposals	
SP	Selected Proposals	
NS	Proposals Not Selected	
CP	Current Metropolitan Practice	
PROPOSAL NO.	PROPOSAL	STATUS
<b>B. Engineer's Cost Estimating</b>		
29-NS	Find Better Index than Engineering News Record Construction Index	
30-NS	Reduce/Modify/Identify Onerous Front End Conditions (Schedule, Liquidated Damages, Project Labor Agreements, Unforeseen Conditions, M/W/SBE	
31-NS	Evaluate Current Estimating Tools to Determine if They are Best in Class (Timberline, Mc2, US Cost, Success, Excel, Etc.)	
32-NS	Develop Database of Costs; Metropolitan Should Hire a Third Party to Develop Database; Find Industry Standard or Database for Estimating Accuracy (AACE)	
33-NS	Consider American National Standards Institute Method for Defining Cost Estimating Methods in lieu of Association of Advancement Cost Engineering International	
34-SP	Investigate Benchmarking Data from Construction Industry Institute	July 2009
35-NS	Conduct Market Analysis Prior to Preparing Engineer's Estimate	
36-SP	Establish Estimating Standard for Multiple-Firm Estimates; Metropolitan (Possibly with Third-Party Consultants) to Develop Estimating Manual	Completed
37-NS	Provide Additional Budget to Complete Engineer's Estimates; Establish Reasonable Budget for Engineer's Estimate	
38-NS	Develop Cost Factors	
39-NS	Perform Monte Carlo Analysis to Identify Risk and Contingency and to Evaluate Which Risks are Driving the Upfront Costs and Whether it May Make Sense to Transfer Risk	
40-QH	Provide Estimates Throughout Design Process	Completed
41-SP	Educate Organization, Both Board and Management, on Goals for Engineering Estimates; Reeducation of Board and Management	On-going
42-SP	Retain On-Call Consultants to Perform Cost Estimating	N/A
43-SP	Educate and Train Metropolitan Estimators	On-going
44-NS	Evaluate Salary Structure for Cost Estimating Staff (Adjust to Industry Standard)	
45-NS	Have Construction Type Rather than Engineering Type Conduct Cost Estimates; Utilize Consultants Constructors Division to Prepare Estimates	
46-NS	Try Multiple Estimates on Several Jobs (Both Internal and External) to Compare and Review Differences	
47-NS	Avoid Unfriendly Interface of Owner/Engineers/Designers with Contractors	
48-NS	Meet with General Contractors to Discuss Front Ends and Possibly to Discuss Projects in Early Final Design (Ongoing Dialogue)	
49-NS	Provide Incentives for Accurate Estimates to Metropolitan Staff and Consultants	
50-NS	Be Aware of Bonding Problem for Projects Over \$100 Million or Lasting Longer than Three Years; Have Discussion with Bonding and Insurance Companies to Better Define Front - End Documents	
51-NS	Understand the Consultant Engineer's Track Record in Producing 100% Quality Design	
52-NS	Hire Certified Estimators (in Different Disciplines) and Hire Estimating Manager or "Chief Estimator"	
53-SP	Apply Total Quality Management Tools to Cost Estimating	June 2009
54-QH	Incorporate the Review of the Cost Estimate in Value Engineering Studies	Completed
55-NS	Control the Addendum Process Where you Have Many or Complicated Addenda (Especially Close to the Bid Date); Honor Requests from General Contractors to Extend the Bid Date	
56-SP	Comprise List of Estimating Consultants with Specialized Fields of Expertise	June 2009
57-NS	Consider Escalation Clause Where the Owner and General Contractors Share the Risk	
58-NS	Allow the Modeling Tools Used by the Design Engineer to be Available to the Bidders (Three-Dimensional Modeling) - See also Proposal 23	
59-NS	Allow Contractors to Create Alternate Bid on Modified Schedule	

<i>General Manager's Best-in-Class List of Proposals</i>		
<i>Legend</i>		
	Study Categories	
QH	Quick Hit Proposals	
SP	Selected Proposals	
NS	Proposals Not Selected	
CP	Current Metropolitan Practice	
PROPOSAL NO.	PROPOSAL	STATUS
<b>C. Construction Change Order Management</b>		
60-CP	Perform Formal Risk Analysis of Design Documents; Identify Undefined Scope Items	Current Practice
61-NS	Upgrade and Enhance Construction Administration Management Systems	
62-CP	Track Discipline of Change Orders (Structural, Mechanical, Instrumentation, Electrical)	Current Practice
63-NS	Communicate the Reality of Change Orders to the Board of Directors and Research Industry Standards	
64-NS	Consider More Use of Allowances	
65-NS	Include Unit Price Costs in Contract for Change Orders (for High-Risk Items)	
66-SP	Reduce Modification of Standard Specifications	Undecided
67-NS	Attract Qualified and Experienced Trade Contractors	
68-SP	Form Internal Instrumentation and Control Review Plan Check Team or Consider Commissioning a Task Force Aimed at Reducing Electrical and Instrumentation and Control Change Orders	Undecided
69-SP	Metropolitan to Develop Construction Standard Review Checklist for Use During Design Review (30%,60%,90%) and Maintain to Keep Current	Undecided
70-QH	Streamline and Improve the Change Order Process	Pending
71-QH	Perform Constructibility Reviews/ Lessons Learned and Proper Project Closeout Documentation	Completed
72-CP	Construction Schedules: Establish Realistic Owner Goals and Mandate the Baseline Schedule; Utilize the Full Contract Duration	Current Practice
73-NS	Conduct President's Walks on Job Sites	
74-CP	Consider Improving Operations and Maintenance and Field Inspection Inputs	Current Practice
75-NS	Improve As-Built Drawings	
76-CP	Implement Pending Issue Log During Design	Current Practice
77-CP	Update Field Inspection and Construction Administrative Standards Manual	Current Practice
78-SP	Perform More Pre-Design Exploratory Potholing and Site Investigation	Undecided
79-QH	Provide Adequate Budget for Design Services During Construction	Undecided
80-SP	Create an Education Program for Internal Staff and Resident Engineers	Completed
81-SP	Initiate Designer Evaluation; Perform Contractor Evaluation ( i.e. Model Both After Corps of Engineers Format)	Undecided
82-SP	Implement Three-Dimensional Design- See Also Proposals 23 and 58	Undecided
83-CP	Identify Hazardous Materials Pre-Bid and Contract On-Call Services for Remediation Services	Current Practice
84-SP	Rate and Utilize Partnering Facilitators	Completed
85-NS	Consider Management of Escalation in the Contract Documents	
86-NS	Obtain Field Inspection Staff Input on Bid Packaging	

## FUTURE ACTIONS:

Once the assessment of all of the proposals has been completed by Metropolitan, it is planned that the results will be shared with all of Metropolitan's member agencies. In this way, each of the member agencies will be able to benefit from the lessons learned in this Process Analysis Workshop so that the implementable Best-in-Class concepts would benefit all of the agencies' operations. The member agencies would not be required to implement the same or all of the concepts accepted by Metropolitan, but could pick and choose those most appropriate to their operations. In the long run, a more consistent operating procedure among the various agencies may evolve and would facilitate better communications and more uniform contracting, estimating and construction monitoring.

The Best-in-Class Process Analysis Study is considered by Metropolitan to be a "living document", that is, as new ideas and approaches are implemented and tested to improve the District's practices, changes may be made to the document to keep it up to date. These changes may come in the form of altering a selected proposal to better meet the new needs of the District, selecting a previously unselected proposal because of changed conditions (for example – new regulations that permit actions previously prohibited), and removal of previously selected proposals because they are no longer deemed necessary or economical or they have been superseded by improved methods.

## PROCESS ANALYSIS TEAM MEMBER ACKNOWLEDGMENT

Metropolitan selected consultants from leading-edge consulting firms to identify best business practices and/or procedures that can be adopted by Metropolitan to enhance the Engineering Services Section performance in areas of *Alternative Project Delivery Methods*, *Engineer's Cost Estimating*, and *Construction Change Order Management*. These individuals made up the Process Analysis (PA) teams and were responsible for generating the proposals presented in this report. As such, they deserve significant recognition and thanks for the effort required to complete these studies. In addition, key individuals from Metropolitan's staff in each of the three topic areas were included in the team.

The studies were performed between January and February 2007. The PA studies were led by Ron Tanenbaum, CVS from Value Management Strategies, Inc. The PA team members are listed below:

Ron Tanenbaum, CVS	Value Management Strategies, Inc	Team Leader
Ashley Carson, AVS	Value Management Strategies, Inc	Team Assistant
Solomon Moore	Metropolitan Water District	Engineering Services Section
Tony Perez	Metropolitan Water District	Engineering Services Section
Brian Folsom	Metropolitan Water District	Engineer's Cost Estimating
Eric Anderson	Metropolitan Water District	Alternative Project Delivery
Ron Brown	Metropolitan Water District	Construction Change Orders
Peter Tunnicliffe	Camp Dresser & McKee	Alternative Project Delivery
Mark E. Alpert	CH2MHill	Alternative Project Delivery
Dan Wetstein	CH2MHill	Alternative Project Delivery

BEST-IN-CLASS: AN EXECUTIVE LEVEL APPLICATION OF THE VALUE METHODOLOGY  
(Ronald J. Tanenbaum, CVS, PhD, PE, GE, F.ASCE and Gordon Johnson, PE)

Gary Meyerhofer	Carollo Engineers	Alternative Project Delivery
Mike Doyle	Camp Dresser & McKee	Engineer's Cost Estimating
Daniel Reynolds	CH2MHill	Engineer's Cost Estimating
Charles George	Parsons Water & Infrastructure	Engineer's Cost Estimating
Thomas Haid	Parsons Water & Infrastructure	Construction Change Orders
Kevin McEvoy	Camp Dresser & McKee	Construction Change Orders
Larry Johnson	MWH Constructors	Construction Change Orders