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Water Supply Needs and Sources Assessment: Alternative Water Supply Strategies Investigation: Assessment of the Cost Effectiveness of Specific Water Conservation Practices

by

PBS&J

in association with
Burton and Associates, Inc.

St. Johns River Water Management District
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EXECUTIVE SUMMARY

This report is part of a series of St. Johns River Water Management District (SJRWMD) investigations into alternative water supply strategies. Prepared by PBS&J in association with Burton & Associates, Inc., the report addresses Task VII – Assessment of the Cost Effectiveness of Specific Water Conservation Practices.

The purpose of this study is to determine the cost effectiveness of specific water conservation practices by comparing the amounts of water saved with the cost of implementing the water conservation practice.

Specific services, by task, performed for the scope of work were as follows:

A. Consult with water management districts (WMDs) and specific Florida utilities identified by WMDs for information on cost and water savings of operational and consumer conservation programs.

B. Conduct literature review for cost and water savings of operational and consumer conservation programs when signficant data is lacking from Florida contacts.

C. Estimate overall cost and water savings for each conservation practice.

D. Consult with building departments to determine the generalized cost of modifying building codes resulting from implementation of water conservation ordinances.

E. Provide written documentation at project completion.

Three primary types of conservation practices were analyzed:

1. Operational Conservation Practices
2. Consumer Conservation Programs

3. Local Ordinances Related to Water Consumption

Operational conservation practices refer to efforts implemented by the water-providing utility independent of customer participation. Operational conservation programs include utility system audits, leak detection and repair, and meter replacement.

Consumer conservation programs involve the consumer directly in the effort. Examples of consumer conservation programs include education programs, plumbing retrofits, irrigation retrofits, consumer audits, and consumer leak detection.

Ordinances can be developed by local governments to encourage conservation. They can include irrigation standards, landscaping requirements, plumbing requirements, reclaimed water requirements, and metering standards.

According to the information obtained from the literature review, operational conservation practices provide the most cost effective conservation alternatives. An important benefit of operational conservation practices is that conservation measures are performed by the utility and are not subject to the uncertainty of consumer participation. Based on equivalent annualized cost, leak detection and repair is the most cost effective of the alternatives reviewed. The greatest water savings is generally produced during the first leak detection and repair event. Detection services constitute approximately half of the leak detection and repair program costs. The remaining costs involve leak repairs.

Of the consumer conservation programs evaluated, the most information was available for plumbing retrofits. A high degree of variability was found in the cost of retrofit programs. Program costs were determined primarily by the method of retrofit delivery and fixture quality. The actual cost effectiveness is directly affected by customer installation and retention rates. Fixture quality is an important factor in customer retention of retrofit fixtures, especially low flow showerheads. Homes built prior to enactment of conservation oriented plumbing codes should be the intitial targets for plumbing retrofit programs. These homes are more likely to be

outfitted with high consumption fixtures which can easily be replaced through a retrofit program.

Plumbing retrofit programs are flexible and can be tailored to the needs of the utility and characteristics of the target consumer. Survey of the consumer is encouraged in order to choose prospective program participants with the greatest likelihood of achieving the greatest water savings through the program. Communication with the public is key to the success of a residential retrofit program. Consumer notification and followup are recommended as part of a residential retrofit program. Literature distributed to consumers should be simple and kept to a minimum. Instructions should be clear, concise and simple.

No data were found specifically addressing irrigation retrofit programs. Irrigation audits were infrequently mentioned in the literature and were primarily referred to as being performed in conjunction with residential household audits. However, significant water savings were found to occur with residential irrigation conservation. Irrigation audit programs or public education focusing on proper irrigation practices offer potential water use reduction.

Although evaluation of consumer leak detection programs was defined as part of this study, no data were found specifically addressing consumer leak detection as a "stand alone" program. Consumer leak detection refers to leaks on the household side of the individual water service meter. Some sources mentioned consumer leak detection as being performed in conjunction with residential household audits.

A cost–benefit analysis performed by South Brevard Water Authority indicates that building code and ordinance modification are the most cost effective water conservation methods. Literature indicates that communication is of primary importance to ensure participation, acceptance, and the overall success of conservation measures affecting the consumer. There is a better chance of receiving public support and approval for water conservation if the general public understands the need behind the change.

Table E-1 presents a summary of the range of cost effectiveness for operational and consumer conservation measures discussed in the report.

The estimated cost of building code modification ranged from $8,202 to $19,273 depending on the method selected. A unit cost for building code modification was calculated using cost per equivalent residential connection (ERC). The unit cost per ERC is dependent on the size of the utility, assuming the cost of code modification is equivalent for all utility sizes. To present a range of unit costs, a large utility (City of Jacksonville - 250,667 ERC) and a small utility (City of Holly Hill - 3,867 ERC) were used. The resulting cost of building code modification ranged from $0.03 to $4.98 per ERC, respectively. Based on this analysis, building code modification has been demonstrated to be more cost effective for larger-sized utilities.

The costs presented in this report are taken from a broad range of programs with each program being comprised of varied components and performed under diverse conditions. The results of this report can be used as a general guideline, but utilities should implement conservation measures based on a project-specific study of the costs and benefits supplied to the utility and its customer base. The following recommendations are made:

- Treat conservation practices as an alternative water supply source in development of regional water supply plans.
- Require water utilities to maintain water use, local climatalogical, and cost data which can be used to better track the effects of water conservation practices.
- Develop a guideline to assist with implementation of plumbing retrofit projects based on the findings of this study.
- Implement water system audits for utilities with high percentages of unaccounted for water.

Table E-1. Cost Effectiveness of Operational and Consumer Conservation Practices and Programs

Conservation Type	Cost Effectiveness[1] Average ($/1,000 Gallons Saved)	Range ($/1,000 Gallons Saved)	Service Life (years)	Number of Sources Referenced
Operational Conservation Practices				
Utility system leak detection and repair	0.12	0.04 - 0.27	5	3
Utility system water audits[2]	0.07	0.03 - 0.11	5	5
Monthly billing	Not available	Not available	Not available	Not available
Consumer Conservation Programs				
Plumbing retrofits				
-Retrofit kits[3]	0.60	0.04 - 1.69	10	30
-Toilet rebate/replacement	1.60	0.51 - 3.70	20	11
Irrigation system retrofits	Not available	Not available	Not available	Not available
Consumer leak detection	Not available	Not available	Not available	Not available

(1) Costs based on data found in literature times factor of 1.45 to account for non-construction capital costs. All costs in 1996 dollars.

(2) Includes one or more of the following: meter testing, leak detection (not repair), and system inventory.

(3) Includes retrofit kit costs for programs with and without audits.

- Implement a leak detection program similar to the Southwest Florida Water Management District (SWFWMD) program. SWFWMD provides an expert and leak detection and pinpointing equipment for the utility. The utility provides an employee trained in basic leak detection and a vehicle.

- Implement an irrigation audit program similar to the SWFWMD program. SWFWMD provides a licensed irrigation auditor. Municipal, commercial, and in-ground residential irrigation systems in affluent neighborhoods could be targeted.

- Implement building code changes in larger cities and more highly populated counties.

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BACKGROUND

St. Johns River Water Management District (SJRWMD) is responsible for managing water resources in a nineteen county area of northeast Florida. Ground water aquifers are currently the primary sources of potable water supply in SJRWMD. The most dependable ground water source is the Floridan aquifer. However, Vergara (1994) indicates that unacceptable impacts are likely to occur in certain parts of SJRWMD as a result of ground water pumpage if present utility water supply plans are carried out. Areas with existing or 2010 projected water supply problems have been designated as priority water resource caution areas (PWRCAs).

As a result, SJRWMD embarked on an Investigation of Alternative Water Supply Strategies. Strategies being investigated include use of lower quality water supplies, surface water, reclaimed water, aquifer recharge, aquifer storage and recovery, mitigation and avoidance of vegetative impacts, and various water conservation techniques.

SJRWMD contracted with PBS&J to perform various tasks for the purpose of assessing water conservation and the reuse of reclaimed water as effective alternative water supply strategies. This report, prepared in association with Burton & Associates, Inc., addresses assessment of the cost effectiveness of specific water conservation practices.

Water conservation practices are utilized to manage water demands to extend the available supply of water. In order to evaluate water conservation as a strategy in comparison to other alternative water supply options, it is important to know both the cost and water savings attributable to various conservation measures.

PURPOSE

The purpose of this study is to determine the cost effectiveness of specific water conservation practices by comparing the amounts of

water saved with the cost of implementing the water conservation practice. Conservation practices evaluated are as follows:

1. Operational Conservation Practices

    a. Utility system leak detection and repair
    b. Meter testing and replacement program
    c. Utility system water audits
    d. Monthly customer billing versus bi-monthly and quarterly billing

2. Consumer Conservation Programs

    a. Plumbing retrofits
    b. Irrigation system retrofits
    c. Consumer leak detection program

3. Local Ordinances Related to Water Conservation

    a. Irrigation system standards
    b. Low water use landscaping ordinance
    c. Low flow plumbing and hot water pipe insulation
    d. Require tensiomenters and rain collection devcies
    e. Required retrofit at resale
    f. Required taking of reclaimed water
    g. Required dual piping for reuse
    h. Prohibition of "green lawn" requirments
    i. Individual meters in new multi-unit construction
    j. Submeter retrofitting in multi-unit buildings

Operational conservation practices are implemented by the water utility independent of the water customer. Consumer practices involve customer participation in the conservation effort. The cost per 1,000 gallons water saved were developed for both operational and consumer conservation practices. Local ordinances target the consumer, but were evaluated in terms of the cost per equivalent residential connection to implement.

SCOPE OF SERVICES

Specific services performed were as follows:

A. Consult with water management districts (WMDs) and specific Florida utilities identified by WMDs for information on cost and water savings of operational and consumer conservation programs.

B. Conduct literature review for cost and water savings of operational and consumer conservation programs if signficant data are lacking from Florida contacts.

C. Estimate overall cost and water savings for each conservation practice.

D. Consult with building departments to determine the generalized cost of modifying the building code through implementation of water conservation ordinances.

E. Provide written documentation at project completion.

METHODOLOGY

REVIEW OF AVAILABILITY OF FLORIDA DATA

Representatives of three WMDs (Donald Brandes of SJRWMD, Tabitha Ostow and Carl Wright of SWFWMD, and Bruce Adams and Dick March of SFWMD) were contacted to identify information available on operational and consumer conservation programs. Each of the contacts provided PBS&J with suggested utility contacts or a list of data sources. Sixteen utilities were identified for contact. They included:

- City of Cocoa
- City of Daytona Beach
- Florida Water Services
- Gainesville Regional Utilities
- Hillsborough County
- City of Lake Mary
- City of Melbourne
- Utilities Commission of New Smyrna Beach
- Orange County Utilities
- Orlando Utilities Commission
- City of Port Orange
- City of Sanford
- South Brevard Water Authority (defunct)
- City of Tampa
- City of Titusville
- West Coast Regional Water Supply Authority

These utilities, except the South Brevard Water Authority, were contacted and asked to provide specific data on the cost and water savings of operational and consumer conservation programs. Files of the South Brevard Water Authority located at the City of Melbourne branch of the Brevard County library were reviewed.

NATIONWIDE LITERATURE REVIEW

The nationwide literature review was only to be conducted if insufficient data were found from the Florida contacts. A conference call meeting was held with SJRWMD and it was determined that additional data would be required. Reports were collected using the following sources:

- Internet/AWWA WaterWiser site
- USEPA (1993)
- Literature search through UCF library
  - Journal of Water Resources
  - Journal of American Water Works Association (AWWA)
  - Water Resources Research
  - Proceedings of AWWA CONSERV '90
  - Proceedings of AWWA CONSERV '96
- Personal contact with City of Seattle Water Department

An information base was formed from articles, reports, reference manuals, and Internet sites that contained both cost and water savings data or sufficient data from which to make an estimate.

WATER SAVINGS AND COST OF WATER CONSERVATION PROGRAMS

Data collected from the literature were reviewed and tabulated by source, conservation practice, year in which the program was enacted, water savings, and program cost. To be consistent with previous SJRWMD reports, program costs were converted to 1996 dollars and 45 percent added to account for contingency, engineering, and administrative factors. Some of the costs presented in the literature may have included these factors. Because it was not clear, 45 percent was added, recognizing that presented costs may be high.

Also, unit water costs were presented as equivalent annual cost to maintain consistency with previous SJRWMD Investigation of Alternative Water Supply Strategies studies. The equivalent annual cost was calculated by dividing the 1996 program cost by gallons

saved per year (unit water cost) then annualizing the unit water cost over the estimated effective life of the program. In order to compare the cost effectiveness of the different programs, the unit water cost was calculated in terms of dollars per 1,000 gallons water saved.

Program costs were converted to 1996 dollars then to an equivalent cost based on the estimated life expectancy of the conservation measure. The equivalent annual cost was then divided by the estimated annual water savings.

For example, a plumbing retrofit program in 1995 having an estimated life expectancy of ten years is estimated to save 229,000 gallons per day at a program cost of $224,500. Using a three percent real discount rate (Pekelney et al. 1996) and seven percent interest (Law Engineering 1996):

$$\text{Annualizing Factor} = \frac{0.07 \times (1 + 0.07)^{10}}{(1+ 0.07)^{10} - 1}$$

$$\frac{1.45 \times (\$224{,}500) \times (1+ 0.03)^{(1996-1995)} \times \text{Annualizing Factor}}{(229{,}000 \text{ gpd}) \times (1 \text{ year}) \times (365 \text{ days}/1 \text{ year}) \times (1/1{,}000)}$$

$$= \$0.57 \text{ / } 1000 \text{ gallons saved}$$

Once the unit cost was computed for each program, the information data base was sorted once according to unit cost and then again according to conservation practice. Sorting by unit cost allowed for the observation of trends in cost effectiveness of one type of program over another. Sorting by conservation practice provided a range of costs for each program type.

BUILDING DEPARTMENT INFORMATION

The building/zoning/code enforcement departments, utility departments, clerk's offices, attorney's offices, personnel departments,

and administrative offices for the following Florida cities and counties were interviewed:

- City of Daytona Beach
- City of Fernandina Beach
- City of Jacksonville Beach
- City of Melbourne
- City of Titusville
- Orange County

During the interview process, the types of code changes which may be required and costs associated with each type of change were determined. A sample of the local ordinances related to water conservation which were considered were as follows:

1. Irrigation system standards
2. Low water use landscaping ordinance
3. Low flow plumbing and hot water pipe insulation
4. Required tensiomenters and rain collection devcies
5. Required retrofit at resale
6. Required taking of reclaimed water
7. Required dual piping for reuse
8. Prohibition of "green lawn" requirements
9. Individual meters in new multi-unit construction
10. Submeter retrofitting in multi-unit buildings

In order to determine the sequence of events required to create an ordinance, various city and county staff members were interviewed, including:

- City mangers or county administrators
- City or county attorneys
- Building, zoning or code enforcement staff
- Engineering staff, finance or accounting staff
- Purchasing staff
- Outside resource firms providing professional consulting services (e.g. legal, engineering, financial, public relations, software or programming and codification)

Interviews determined the general flow of events as well as labor and capital resource requirements. After the interviews were conducted, a schedule identifying each event with the corresponding labor and capital resources was developed. The schedule was sent to the interview subject for verification of the adequacy and accuracy of the interview data. A sample schedule is presented in Attachment A of Appendix B.

The list of local ordinances related to water conservation represent code changes which require different levels of staff and capital resources. Depending on the specific content of an ordinance, a city or county may elect to procure additional expertise or services from outside firms who provide legal, financial, engineering, hardware, software, or codification services. Some or all of these services may be required at varied levels during the creation of an ordinance. Therefore, the cost of implementing an ordinance was calculated for four distinct scenarios, as follows:

1A) Minimum implementation, outside resources utilized
1B) Extensive implementation, outside resources utilized
2A) Minimum implementation, no outside resources utilized
2B) Extensive implementation, no outside resources utilized.

DISCUSSION

RESULTS OF FLORIDA SURVEY

Contacts with the selected WMDs were successfully established and data were provided. SJRWMD provided a list of utilities that could potentially provide conservation and water use references. SWFWMD provided several references that detailed both water savings and cost information and also provided well-documented cost and water savings data from its leak detection program. SFWMD had some cost and water savings data including data on its mobile irrigation lab.

Of the 16 utilities contacted which had water conservation programs, only three had both water savings and cost data. The City of Tampa provided reference documents regarding its conservation efforts. Hillsborough County provided data on the cost and savings of its toilet rebate program. Data were reviewed detailing conservation efforts by the now defunct South Brevard Water Authority (SBWA). The remaining utilities had no formal data or estimates of water savings or cost for their respective conservation measures. Daytona Beach, for example, indicated significant water savings from six different conservation efforts, but could not distinguish between water savings attributable to local newspaper articles and water savings resulting from the implementation of conservation programs.

Three of the utilities contacted have conservation programs recently underway and plan to collect information during implementation (West Coast Regional Water Supply Authority, Gainesville Regional Utilities, and City of Titusville).

Records of SBWA were reviewed at the Brevard County Regional Library and copies of relevant information were made. SBWA information contained water savings and cost information from conservation efforts made in the late 1980s and early 1990s.

A summary of pertinent data collected from the survey of contact personnel at Utilities and WMDs is presented in Table 1. While some Florida data were available on the cost effectiveness of certain water

Table 1. Florida Water Management District and Utility Survey Results

WMD/Utility	Contact	Phone #	Conservation Type	Data Availability Cost	Data Availability Water Saved	Comments	References Sent
City of Cocoa	Don Downs	407-639-7656	Various	none	none	No formal data.	--
City of Daytona Beach	Richard Dembinsky	904-258-3174	Leak detection	none	none	Individual measures not tested for cost effectiveness.	--
City of Daytona Beach	Richard Dembinsky	904-258-3174	Newspaper	none	none	--	--
City of Daytona Beach	Richard Dembinsky	904-258-3174	Public education	none	none	--	--
City of Daytona Beach	Richard Dembinsky	904-258-3174	Water audits	none	none	--	--
City of Daytona Beach	Richard Dembinsky	904-258-3174	Water rates	none	none	Synergistic effect of all measures successful.	--
Florida Water Services	Chris Arcand	407-880-0058	Plumbing retrofit	none	none	--	--
Gainesville Regional Utilities	David Richardson	352-334-3400	Rate structure	pending	pending	--	--
Hillsborough County	Norman Davis	813-272-5977x23	Toilet rebate-Comm.	Yes	Yes	--	--
Hillsborough County	Norman Davis	813-272-5977x23	Toilet rebate-Res.	Yes	Yes	--	--
City of Melbourne	Jeff Mitskevich	407-722-6026	Various	none	none	Programs just starting. Will collect data in future.	Now-defunct South Brevard Water Authority boxed data in Brevard Co. library.
Utilities Commossion of New Smyrna Beach	Pete Korelich	904-423-7104	Various	none	none	No formal or organized data.	--
Orange County	Chuck Digerlando	407-836-6831	Plumbing retrofit	none	none	Water savings estimates from manufacturer literature.	--
Orange County	Chuck Digerlando	407-836-6831		none	none	--	--
OUC	Stacy Isabel	407-423-9100x20	Fix up program	none	none	--	--
OUC	Stacy Isabel	407-423-9100x20	Water Audit	none	none	Could not locate data from conservation program from 2 yrs ago.	--
City of Port Orange	Fred Griffith	904-756-5378	Reclaimed water	none	none	No formal data.	--
City of Port Orange	Fred Griffith	904-756-5378	Toilet rebate	none	none	--	--
City of Sanford	Bill Marcous	407-330-5649	Various	none	none	13 conservation measures practiced. No quantification of water savings.	Florida section of AWWA did comprehensive conservation survey recently.
SFWMD	Dick March	561-686-8800	Low-flow shower	Yes	Yes	--	Excerpts from Upper East Coast Water Supply Plan
SFWMD	Dick March	561-686-8800	Low-volume toilet	Yes	Yes	--	--
SFWMD	Dick March	561-686-8800	Mobile irrigation lab	Yes	Yes	--	--
SFWMD	Dick March	561-686-8800	Rain sensor switches	Yes	Yes	--	--
SJRWMD	Don Brandes	904-329-4126	Various	none	none	--	Melbourne data
SWFWMD	Tabitha Ostow	352-796-7211	--	--	--	--	Reclaimed Water User Cost Study (KMPG Peat Marwick, 1992)
SWFWMD	Tabitha Ostow	352-796-7211	Ordinances	none	none	--	1996 Annual Reuse Report (SWFWMD, 1997)
SWFWMD	Tabitha Ostow	352-796-7211	Plumbing retrofit	Yes	Yes	--	Retrofit Programs & Reuse Projects Summary Report 1997
SWFWMD	Tabitha Ostow	352-796-7211	Reclaimed water	Yes	Yes	--	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)
SWFWMD	Tabitha Ostow	352-796-7211	Toilet rebate	Yes	Yes	--	NWSI 1996 Annual Report (SWFWMD, 1996)
SWFWMD	Tabitha Ostow	352-796-7211	Utility leak detection	Yes	Yes	--	Tri-County Water Cons. Initiative 1994-1997
City of Tampa	Neil Mingledorff	407-836-6831	Education	Yes	Yes	--	--
City of Tampa	Neil Mingledorff	407-836-6831	Irrigation evaluation	Yes	Yes	--	--
City of Tampa	Neil Mingledorff	407-836-6831	Irrigation restrictions	Yes	Yes	--	--
City of Tampa	Neil Mingledorff	407-836-6831	Meter replacement	Yes	Yes	--	--
City of Tampa	Neil Mingledorff	407-836-6831	Plumbing retrofit	Yes	Yes	--	Tampa Water Cons. Program 1989-1994
City of Tampa	Neil Mingledorff	407-836-6831	Toilet rebate	Yes	Yes	--	Evaluation of Sunset Park Landscape Irrigation Cons. Program
City of Tampa	Neil Mingledorff	407-836-6831	Water Audit	Yes	Yes		
City of Titusville	Jennifer Wilster	407-722-6026	Rain sensor rebate	pending	pending	--	--
City of Titusville	Jennifer Wilster	407-722-6026	Toilet rebate	pending	pending	City starting programs. Will document cost and savings in future.	--
WCRWSA	Dave Bratchiano	813-791-2313	Various	pending	pending	--	West Coast Regional Demand Management Plan in progress.

conservation measures, there was not enough information to adequately assess all measures. Further literature review was needed to better evaluate all conservation measures.

RESULTS OF NATIONWIDE LITERATURE REVIEW

A summary of the pertinent data collected in the nationwide literature review is presented in Tables 2A, 2B, and 2C. Data from the Florida literature review are also included in these tables. Of the 100 articles, reports, and internet sites reviewed, approximately 30 had specific data on cost and water savings. A summary of reviewed sources that did not have complete cost and water savings data is presented in Appendix A.

One notable reference, prepared for the California Urban Water Conservation Council, included guidelines pertaining to cost-effectiveness analysis of conservation measures. The guidelines suggested conducting a cost-effectiveness analysis in four steps (Pekelney et al. 1996). These steps are described as:

1. Identify Costs and Benefits – Not all costs and benefits are quantifiable. In addition, cost and benefits differ based on perspective (i.e., supplier, customer, or total society).

2. Measure and Value Costs and Benefits – Measurement should include incremental savings realized from the conservation measure. The value of saved water can be calculated as simply the value of the water based on gallons saved or the value can include avoided water supply and environmental costs. Although difficult to express in dollars, external environmental benefits can also be added to the value of a conservation measure.

3. Discount Costs and Benefits – Cost effectiveness can be calculated by several different methods including: payback period, cost/benefit ratio, net present value, and levelized cost (Planning and Management Consultants et al. 1993).

Table 2A. Assessment of the Cost Effectiveness of Specific Water Conservation Practices (Sorted by $/1,000 gallon)

Source	Reference	Study/Ref. Year	Conservation Type	Estimated Life (yrs)[3]	Water Savings (gpd)	Cost of Program	Cost of Prog (1996)[4]	Annualized Cost $/1,000 gal
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	1,236,000	$29,750	$61,504	0.03
Journal AWWA	Long-Term Options for Municipal Water Conservation	1981	Plumbing Retrofit	10	21,168,000	$871,000	$1,967,635	0.04
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	540,000	$15,500	$32,044	0.04
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Hillsborough County	1995	Util Leak Detect & Repair	5	1,430,568	$58,814	$87,839	0.04
SWFWMD	Personal Conversation with Carl Wright (3/2/98)	1998	Util Leak Detect & Repair	5	1,731,960	$78,180	$106,854	0.04
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	198,000	$9,000	$18,606	0.06
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	165,000	$10,000	$20,674	0.08
SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Faucet	10	15	$2	$3	0.08
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	86,000	$7,000	$14,471	0.11
Seattle Water Department	An Analysis of the Seattle Multifamily Retrofit Pilot Program	1990	Plumbing Retrofit	10	82	$14	$24	0.12
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Tampa	1991	Plumbing Retrofit	10	1,530,000	$286,202	$481,091	0.12
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Plant City	1994	Plumbing Retrofit	10	81,416	$20,023	$30,801	0.15
SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Urinals	10	56	$19	$28	0.19
Journal AWWA	The Economics of Leak Detection and Repair - A Case Study	1977	Util Leak Detect & Repair	5	1,517,553	$239,052	$607,810	0.27
Journal AWWA	"The Effectiveness of Residential Water Conservation Measures"	1987	Plumbing Retrofit	10	37	$15	$28	0.30
City of Tampa	Tampa Water Cons. Program 1989-1994	1992	Plumbing Retrofit	10	1,770,000	$875,094	$1,428,143	0.31
Conserv96	"Regional Plumbing Retrofit Initiative Targeting West Central FL Residents and Visitors"	1990	Plumbing Retrofit	10	95,350	$53,000	$91,763	0.38
Conserv96	"Partnership in Conservation Education - Bringing the Message Home"	1991	Plumbing Retrofit/Education	10	47	$28	$47	0.39
Seattle Water Department	An Analysis of the Seattle Multifamily Retrofit Pilot Program	1990	Plumbing Retrofit	10	15	$9	$15	0.40
Journal AWWA	Long-Term Options for Municipal Water Conservation	1986	Plumbing Retrofit	10	343,200	$180,000	$350,762	0.40
SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Toilets	10	19	$16	$22	0.47
SBWA	SBWA Water Conservation Program Report On Results	1983	Plumbing Retrofit	10	1,550,000	$901,297	$1,919,198	0.48
Internet	"Evaluation of Savings From Seattle's 'Home Water Saver' Apart./Condo Program"	1993	Plumbing Retrofit	10	956,000	$751,122	$1,190,118	0.49
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Tampa	1995	Toilet Rebate/Replacement	20	465,000	$610,465	$911,729	0.51
SWFWMD	NWSI 1996 Annual Report (SWFWMD, 1996)	1996	Plumbing Retrofit	10	15,800,000	$14,450,000	$20,952,500	0.52
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Hillsborough County	1995	Plumbing Retrofit	10	229,000	$224,500	$335,291	0.57
Seattle Water Department	Single Family Pilot Residential Retrofit Project for Water Conservation	1990	Plumbing Retrofit	10	10	$9	$15	0.57
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Hillsborough County	1995	Toilet Rebate/Replacement	20	453,178	$675,000	$1,008,113	0.58
SWFWMD	Retrofit Programs & Reuse Projects Summary Report 1997, Basin Board	1995	Plumbing Retrofit (est.)	10	7,615,416	$7,612,995	$11,370,008	0.58
Conserv90	"Home Water Survey Program"	1989	Audit/Plumbing Retrofit	10	107,520	$91,450	$163,084	0.59
City of Tampa	An Evaluation of Sunset Park Landscape Irrigation System Conservation Program	1995	Irrigation Evaluation	10	31,616	$33,696	$50,325	0.62
Conserv96	"Regional Plumbing Retrofit Initiative Targeting West Central FL Residents and Visitors"	1990	Plumbing Retrofit	10	1,353,038	$1,310,000	$2,268,102	0.65
Water Resources Research	"Residential Water Conservation in a Noncrisis Setting: Results of a NJ experiment"	1980	Plumbing Retrofit	10	7,733	$5,606	$13,044	0.66
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Temple Terrace	1996	Toilet Rebate/Replacement	20	4,850	$10,000	$14,500	0.77
Seattle Water Department	Single Family Pilot Residential Retrofit Project for Water Conservation	1990	Plumbing Retrofit	10	10	$13	$22	0.84
Conserv96	"Regional Plumbing Retrofit Initiative Targeting West Central FL Residents and Visitors"	1990	Plumbing Retrofit	10	1,897,920	$2,426,392	$4,200,996	0.86
Conserv96	"Denver's Low Income Conservation Program"	1995	Audit/Plumbing Retrofit	10	10,706	$16,952	$25,318	0.92
SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Showerhead	10	6	$10	$15	0.93
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Conserv96	"Evaluation of Nine Residential Retrofit Methods"	1993	Plumbing Retrofit	10	6,208,719	$13,260,000	$21,009,862	1.32
Internet	"Research Shows That Low-Flow Toilets Save Water and Money in El Paso"	1991	Toilet Rebate/Replacement	20	102,400	$311,296	$523,272	1.32
Conserv96	"Denver's Low Income Conservation Program"	1996	Audit/Plumbing Retrofit	10	51,724	$126,000	$182,700	1.38
SWFWMD	NWSI 1996 Annual Report (SWFWMD, 1996)	1996	Toilet Rebate/Replacement	20	13,450,000	$53,150,000	$77,067,500	1.48
Journal AWWA	Water Audit Encourages Residents to Reduce Consumption	1988	Audit/Plumbing Retrofit	10	5,959	$13,062	$23,992	1.57
City of Tampa	Tampa Water Cons. Program 1989-1994	1994	Toilet Rebate/Replacement	20	20,140	$80,560	$123,926	1.59
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Temple Terrace	1993	Plumbing Retrofit	10	21,000	$57,589	$91,247	1.69
Conserv90	"'Hands-On' Residential Audit"	1988	Water Audit	5	25	$45	$83	2.20
Conserv96	"The Implementation of an Aggressive Water Conservation Plan"	1994	Toilet Rebate/Replacement	20	292,500	$1,775,390	$2,731,091	2.41
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Conserv96	"Water Conservation Program - A Case Study"	1994	Toilet Rebate/Replacement	20	27,250	$219,840	$338,181	3.21
UCF Online Srch	Net 1	1994	Toilet Rebate/Replacement	20	145,000	$1,350,000	$2,076,712	3.70
Conserv90	"Dialing for Dollars: Meters are a Monetary Plus"[2]	1984	Metering	20	10,369	$35,500,000	$73,391,042	1,830.38

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Table 2B. Assessment of the Cost Effectiveness of Specific Water Conservation Practices (Sorted by Conservation Practice)

Source	Reference	Study/Ref. Year	Conservation Type	Estimated Life (yrs)[3]	Water Savings (gpd)	Cost of Program	Cost of Prog (1996)[4]	Annualized Cost $/1,000 gal
Conserv90	"Home Water Survey Program"	1989	Audit/Plumbing Retrofit	10	107,520	$91,450	$163,084	0.59
Conserv96	"Denver's Low Income Conservation Program"	1995	Audit/Plumbing Retrofit	10	10,706	$16,952	$25,318	0.92
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Seattle Water Department	An Analysis of the Seattle Multifamily Retrofit Pilot Program	1990	Plumbing Retrofit	10	82	$14	$24	0.12
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SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Plant City	1994	Plumbing Retrofit	10	81,416	$20,023	$30,801	0.15
Journal AWWA	"The Effectiveness of Residential Water Conservation Measures"	1987	Plumbing Retrofit	10	37	$15	$28	0.30
City of Tampa	Tampa Water Cons. Program 1989-1994	1992	Plumbing Retrofit	10	1,770,000	$875,094	$1,428,143	0.31
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Internet	"Evaluation of Savings From Seattle's 'Home Water Saver' Apart/Condo Program"	1993	Plumbing Retrofit	10	956,000	$751,122	$1,190,118	0.49
SWFWMD	NWSI 1996 Annual Report (SWFWMD, 1996)	1996	Plumbing Retrofit	10	15,800,000	$14,450,000	$20,952,500	0.52
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Hillsborough County	1995	Plumbing Retrofit	10	229,000	$224,500	$335,291	0.57
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SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Toilets	10	19	$16	$22	0.47
SWFWMD	ICI Water Cons. In the Tri-County Area of SWFWMD (SWFWMD,1997)	1996	Plumbing Retrofit, Urinals	10	56	$19	$28	0.19
Conserv96	"Partnership in Conservation Education - Bringing the Message Home"	1991	Plumbing Retrofit/Education	10	47	$28	$47	0.39
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Tampa	1995	Toilet Rebate/Replacement	20	465,000	$610,465	$911,729	0.51
SWFWMD	Tri-County Water Cons. Initiative 1994-1997, Hillsborough County	1995	Toilet Rebate/Replacement	20	453,178	$675,000	$1,008,113	0.58
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Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	198,000	$9,000	$18,606	0.06
Journal of Water Resources Planning and Management	The Role of Water Audits in Water Conservation[1]	1984	Utility Water Audit	5	165,000	$10,000	$20,674	0.08
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Conserv90	"'Hands-On' Residential Audit"	1988	Water Audit	5	25	$45	$83	2.20
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4. Analyze Uncertainty – Imprecision of underlying data, variability of costs or benefits, and unavoidable rough assumptions should be stated and included in the cost-effectiveness analysis.

The steps described above are applicable to a utility wishing to choose and implement a water conservation measure. Parts of the recommended procedure were adopted and used for this analysis.

WATER SAVINGS AND COST OF OPERATIONAL WATER CONSERVATION PRACTICES

Operational water conservation practices are implemented entirely by the water supply utility and do not depend on consumer participation for success. The following four operational water conservation practices were evaluated for this report:

1. Utility system leak detection and repair,
2. Meter testing and replacement,
3. Utility system water audits, and
4. Monthly customer billing versus bi-monthly and quarterly billing.

Utility System Leak Detection and Repair

Costs associated with leak detection and repair can include leak detection equipment, labor, leak repair, administration, and contractors. Benefits include reduced operation and maintenance costs, such as chemicals, energy, and labor, and reduced capital costs for production, treatment, storage, transportation, and distribution facilities (Pekelney et al. 1996).

Leak detection is characterized by two basic steps: survey and pinpoint. A leak detection survey generally notes the existence of a leak and a pinpoint determines the exact location of the leak. Two different pieces of equipment based on acoustic listening are necessary for the two steps. The survey uses listening points, such as hydrants, valves and services. Purchase price for survey equipment ranges from

$1,200 to $3,500. Leak detection surveys by private companies generally cost from $125 to $150 per mile of pipe (Wright 1998). Small cities have on the order of 35 to 40 miles of pipe, while larger cities may have over 1,000 miles of pipe. Purchase price for pinpoint equipment, called a leak correlator, is significantly more than survey equipment, ranging from $50,000 to $60,000. Pinpointing generally costs approximately $100 per hour when using private companies (Wright 1998). The cost of leak repair has been estimated at $15 to $500 per leak. A survey of 91 systems indicated that cost-effective repair can be performed on leaks greater than 3,000 gpd per mile of water main (Grisham and Fleming 1989).

The Westchester Joint Water Works (WJWW) performed a study of a leak detection and repair program consisting of three detection events performed over five years. The program resulted in approximately a ten percent drop in unaccounted for water. The WJWW serves a population of 50,000 with 188 miles of pipe, 1,334 hydrants, and two pump stations which deliver approximately 10 mgd in Mamaroneck, NY. The WJWW leak detection and repair study determined detection services to be the largest program expense (46.3 percent). Other costs associated with the leak detection and repair program included labor (21.8 percent), overhead (16.7 percent), pavement (10.4 percent), and materials (4.8 percent). A skilled survey team and sonic detection equipment were determined to be effective means of leak detection since only 0.5 percent of the total number holes excavated were dry holes. A dry hole indicates an excavation that does not uncover a leak. Net benefit occurred in the following order, with the greatest benefit listed first (Moyer et al. 1983):

1. Main Leaks
2. Customer Service Leaks
3. WJWW Service Leaks
4. Hydrant Leaks
5. Other

Estimated costs and benefits of the program indicate that almost 2,800 million gallons of water were saved during the five year program at a cost of approximately $240,000 (1977 dollars), which included costs for both leak detection and leak repair.

SWFWMD implemented a leak detection program that provides detection equipment and one leak detection expert for utility system leak detection. The utility provides a staff member trained in leak detection and a vehicle. SWFWMD completed 64 surveys including 52,600 listening points for various utilities over 473 days in the field and found a total of 655 leaks. The 655 leaks repaired saved an estimated 1.73 mgd based on leak estimates presented in Table 3. Ninety percent of the leaks found by the SWFWMD program were fire hydrant and valve packing leaks. The other ten percent were service, joint, or distribution leaks. The majority of the distribution leaks occurred on older, galvanized steel two-inch diameter pipe.

Table 3. Water Distribution Leak Estimates

Item	Estimated Leaks (gpm)
Valve Packing	1/8
Service	1/4
Joint	5
Distribution	18
2" Galvanized (Maximum)	90

Note: Information provided by Carl Wright, SWFWMD.

Meter Testing and Replacement Programs

Utility Meters. Meter accuracy is of significant importance to a utility and promotes correct quantification and billing of water supplied. Utility income, operational decisions, system improvements, and estimated volume of unaccounted for water are all influenced by meter accuracy. Therefore, meter testing is a priority in many system audits. In two northwestern cities, technical consultants were retained to test and repair large commercial meters. In one case, 55 percent of the meters tested were stopped, broken, or inaccurate. In the second instance, after meters were tested and repaired, revenue increased by over $100,000 per year, simultaneously reducing the unaccounted for loss. Cost of repair to the second set of meters was only $5,000 (Sowby 1981). Testing of larger meters can be conducted in place and is suggested as an annual event (Gagnon 1984). Orange County (Florida) Utilities Water Department uses 5 percent for under-reading meters

and 3 percent for over-reading meters as thresholds for replacement. Water savings associated with meter testing and replacement is not easily quantified.

Residential Meters. Accurate residential meters ensure utility revenue, generate reliable data for future conservation programs, and encourage reduced water consumption. Although testing of smaller residential meters is not financially practicable, an eight to ten year rotating schedule of removing, replacing and rebuilding is recommended (Gagnon 1984). Residential meters commonly under-register with age, which can result in lost revenue to the utility (Gagnon 1984). Water savings associated with meter testing and replacement is not easily quantified. Cost to replace a residential meter is approximately $200 per meter not including any required repair or backflow prevention retrofitting.

Utility System Water Audits

The term "utility system water audit" generally implies an accounting of all water supplied by a utility and a thorough examination of a representative sample of the utility's distribution system. Normally, a complete water audit consists of three basic elements: 1) meter testing; 2) leak detection and quantification; and 3) system inventory. Meter testing and leak detection are usually performed on a representative sample of the distribution system. Results from the sample are extrapolated to the entire system. Each element of a utility system water audit can be performed independently. However, when combined, they produce a complete accounting of the water within the distribution system as well as an up-to-date cataloging of system components and their condition (Gagnon 1984).

Aside from meter testing and leak detection, the primary component of utility system water audits is a system inventory. Costs for system inventories are primarily associated with the examination of system records, control equipment, and administration (Pekelney et al. 1996). An inventory provides information regarding defects or conditions that vary from the systems records. The system inventory information is then noted for correction in utility records. System details at street

intersections as well as valve and hydrant locations can also be recorded. This information allows system improvements to be implemented more effectively (Gagnon 1984).

Examples of Water Savings Through Utility System Water Audit.

Gagnon (1984) presents several case histories in which one or more elements of an utility water audit were utilized to achieve improved utility revenue and performance in a community. A brief description of each program is detailed below and in Table 4. The cost of actual leak repair was not provided and is therefore not included in the study cost listed.

Community 1: Approximate study cost - $8,700

1) Investigation of reservoir leakage; 2) Leak detection and quantification; 3) Field inspection for unauthorized use by large consumers; and 4) System inventory.

Community 2: Approximate study cost - $6,900

1) Testing all master meters; 2) Testing of industrial meters greater than four inches in diameter; 3) Leak detection and quantification; 4) Investigation for unauthorized use by large consumers.

Community 3: Approximate study cost - $10,000

1) Leak detection; 2) Location and operation of valves and hydrants; 3) Location of curb stops; and 4) Preparation of an updated water system map and intersection details.

Community 4: Approximate study cost - $29,750

1) Leak detection survey

Community 5: Approximate study cost - $15,500

1) Master meter testing; 2) Leak detection and quantification; and 3) System inventory.

Table 4. Water Savings Through Operational Conservation Programs

Comm.	Population	Water Main (miles)	Leakage Identified (gpd)	Average Pumpage (gpd)	Potential Leakage Reduction (%)
1	3,300	17	198,000	593,000	33.3
2[1]	2,500	13.5	86,000	675,000	12.7
3	Small pop.	Not Available	165,000	220,000	75.0
4	79,000	100[2]	1,236,000	10,200,000	12.1
5	39,000	100	540,000	4,300,000	12.5

Gagnon 1984.
[1] Large industrial base.
[2]100 miles surveyed, 200 miles water main total.

Monthly Customer Billing Versus Bi-Monthly and Quarterly Billing

Billing frequency was not discussed in the literature reviewed as a conservation measure. However, monthly billing can be implemented in conjunction with consumer conservation programs. More frequent billing allows the consumer to see the results of the conservation efforts and allows the water utility to obtain useful data for future use in studies or program planning. Extra costs for monthly billing are incurred from staff and administration expenses. Most water utilities in the central Florida area currently bill on a monthly basis.

WATER SAVINGS AND COST OF CONSUMER WATER CONSERVATION PROGRAMS

A reduction in water use can be achieved through consumer conservation programs such as plumbing retrofits, toilet replacement, indoor/outdoor water audits, and public education. The argument has been made that consumer conservation programs decrease the revenue of the utility. Although revenues may initially decrease,

consumer demand reduction can provide an increase in system capacity which can be used to serve additional customers and generate future revenue, without additional capital or O&M costs. Also, many consumer conservation programs, such as plumbing retrofits, are characterized by inherent secondary benefits such as reduced generation of wastewater.

Plumbing Retrofits

Bathing and toilet flushing are estimated to comprise up to 75 percent of residential indoor water consumption (Grisham and Fleming 1989). Costs associated with plumbing retrofit programs can include retrofit fixtures, installation, staff time, administration, contractors, and marketing. Benefits include reduced water, wastewater, chemical, and energy costs. In addition, O&M and capital costs to the utility decrease for production, transport, storage, treatment, distribution, and wastewater treatment (Pekelney et al. 1996). Once plumbing retrofits are in place, they do not require changes in consumer behavior or consumption patterns to generate reductions in water use and wastewater production. Plumbing retrofit measures are most often either toilet replacement or retrofit kits, which may contain some combination of faucet aerators, low flow showerheads, toilet dams, toilet displacement devices, and leak detection dye tablets. The toilets or kits may be distributed in a variety of ways, including depot pickup, mail delivery, and delivery by utility staff or agents. After delivery, the consumer may be responsible for installing the devices or the utility may provide installation.

Water savings from retrofit programs are directly related to customer installation and retention rates. Water savings are only achieved when low flow devices are installed and retained. Therefore, the success of a program can be directly linked to factors such as communication with the public, fixture quality, method of delivery, follow-up, etc. Water saving devices have been estimated to save at least ten percent of residential use (Grisham and Fleming 1989). A study of a New Jersey conservation program found a 10 to 20 percent reduction in water usage through installation of plumbing retrofit kits (Palmini and Shelton 1982).

Several studies have been performed to determine the effect kit distribution method has on program participation and water use reductions. Smith (1990) observed approximately 25 percent participation for depot pickup and 59 percent for direct installation/canvass.

Nero (1991a) estimates program participation to be 15 percent for direct mail, 20 percent for depot pickup, 50 percent for direct installation, and 85 percent for delivery/canvass. Direct installation methods may experience a lower participation rate in comparison to delivery/canvass due to homeowner absence during attempted installation. Personal follow-up and assistance may also explain the greater participation rates observed in delivery/canvass method as compared to direct installation. Research suggests that the following factors also effect program participation: owner versus renter occupied home, perceived device effectiveness, perceived economic benefit of the device, and receipt of a flyer or prior notification of the program.

Morgan (1996) evaluated water savings in a study of different payment types and distribution methods for plumbing retrofit kits. One group received retrofit kits free while another group received the retrofit kit for a charge of $15. For both the paying and non-paying groups, water use reduction was greatest for canvass and direct installation and least for depot pickup and mail out. In the canvass and direction installation groups, water savings were equal for both paying and non-paying customer groups. For depot pickup and mail out methods, water savings were 10 to 20 percent higher for the group receiving the kit free than for the group paying for the kit.

A review of literature citing both cost and water savings information indicated that the equivalent annual cost of plumbing retrofit kit programs ranged from $0.04 to $1.69 per 1,000 gallons water saved. Several of these programs include a household water audit. Water audits alone averaged an equivalent annual cost of $2.32 per 1,000 gallons water saved. The equivalent annual cost of programs providing both a retrofit kit and a residential audit ranged from $0.59 to $1.57 per 1,000 gallons water saved. The wide range of cost and cost effectiveness associated with retrofit kits results from the many

variables in the kit itself and how it is provided to the consumer. For example, while higher quality fixtures may increase the cost of the kit, consumers are more likely to utilize the kit and keep the fixtures in place. Cost of kit distribution can be lowered by using public service groups or utility meter readers to deliver the kits. Follow-up inquiry regarding kit installation may contribute an additional expense but at the same time may encourage the consumer to install and retain the fixtures provided.

Retrofit of conventional toilets with low flow models has been achieved with both replacement and rebate programs. One program cited the observation that using vouchers instead of rebates offered a method of achieving program success in areas of the market characterized by low or fixed income consumers. Vouchers allow consumers who cannot afford to wait for a rebate check to take advantage of the toilet replacement and the associated water and sewer savings. In addition, vouchers help eliminate "free riders" from the program (Craft 1996, Yuen and Munoz 1996). A "free rider" is an individual who would receive benefit from the program even though they would have taken the same action without the program. For instance, in a voucher program, a homeowner who is planning to replace a toilet and can readily afford to do so would be less likely to take advantage of the program because of the wait involved in a voucher program. However, a rebate program can easily be taken advantage of in this situation, even though the homeowner would have replaced the toilet without an incentive program.

A review of literature citing both cost and savings information indicated that the equivalent annual cost of toilet replacement or rebate programs ranged from $0.51 to $3.70 per 1,000 gallons water saved.

Irrigation System Retrofits

Landscape irrigation accounts for a large portion of residential water use. PBS&J (1997) estimated that irrigation can account for 20 to 45 percent of a utility's total water use. Skeel and Lucas (1995) evaluated Seattle Water Department data and found that single family landscape irrigation makes up 87 percent of the increase observed in peak

summer consumption. They collected data on household demographics (lot size, irrigated area, house size, house age, property value, number and age of residents, and household income), residential indoor conservation efforts, outdoor water usage, and presence of an irrigation timer. Using these data, they were able to develop a predictive equation for outdoor water use.

North Marin Water District in California found water-conserving landscapes used 54 percent less water than traditional landscapes. Marin County achieved an estimated savings of 19 gpd per capita with the use of water-saving techniques. These techniques included automatic timers, soil moisture sensors, and a sprinkler system designed to apply water slowly to clayey soils (Grisham and Fleming 1989).

Households with permanent (in-ground) irrigation systems were found to use approximately four times the amount of water used by households utilizing non-permanent irrigation (Seattle Water Department 1996). Residential irrigation audits were presented in several conservation references reviewed. The audit estimates irrigation requirements and the length of time required for a system to deliver the necessary amount. Irrigation time controllers can be adjusted to provide the optimum irrigation amounts. The auditor will generally provide a list of recommendations to the homeowner for improving the system. Recommendations generally include system repairs, irrigation scheduling, or the addition of rain sensors. The irrigation audit can result in indirect water savings provided that the homeowners implement the auditor's recommendations. One reference found an average of 1,700 gallon per year (4.7 gpd) per home actual water savings from a residential water audit (Nelson 1992).

A Seattle Water Department study targeting potential savings using timers found that the highest potential savings could be obtained by distributing timers to households comprised of persons 55 years of age or greater, with irrigated turfgrass lawns greater than 1,000 square feet (Skeel and Lucas 1995). A California program conducted a residential single-family retrofit/audit program which included an irrigation audit. Water savings attributed to the irrigation audit were estimated at 1.8 gpd per capita (Nelson 1992). Public education concerning

proper irrigation practices also offers potential water use reduction. However, suggested irrigation practice must be easy to remember and utilize.

Consumer Leak Detection and Repair Programs

Costs associated with leak detection and repair can include leak detection equipment, labor, administration, and contractors. Leak repair costs may be borne by the customer or the utility. Direct benefits include reduced frequency and cost of major leaks for the utility and lower water bills for the consumer. Indirect benefits to the utility include decreased operation and maintenance costs and decreased capital costs for production, transport, storage, treatment, and distribution facilities (Pekelney et al. 1996). This conservation measure does not require any changes in consumer behavior or consumption patterns to generate water savings.

No cost data were found specifically addressing consumer leak detection programs.

Targeting the Right Customers for Conservation Programs

Customer age, income, and home age affect the success of a program. A study by Whitcomb (1990a) indicates that the greatest water savings are achieved in adult/senior consumers and those users with annual incomes greater than $60,000. Findings from a 1980 study of a residential plumbing retrofit program indicate that kit installation rates were greater in above-average socioeconomic households with high water usage (Morgan and Pelosi 1980). No upper income level at which conservation efforts become less effective was found in the literature, although it would be expected that price elasticity for water would disappear at very high incomes.

Other Conservation Programs

Other operational programs discussed in the literature are water billing rate structure and building code ordinances. A cost benefit study of 20 conservation measures within ten SWFWMD utilities showed conservation rate structures to have the lowest

implementation cost and to be cost-effective (Salgaonkar et al. 1988). The South Brevard Water Authority found implementation of a building code ordinance to be a cost-effective conservation measure.

BUILDING CODE MODIFICATION

An evaluation of the cost of modifying build codes through implementation of water conservation ordinances was conducted by Burton and Associates, Inc. and is presented in Appendix B.

Based on information obtained from interviews with two Florida counties (Flagler and Orange) and seven Florida cities (City of Daytona Beach, City of Fernandina Beach, City of Gainesville, City of Jacksonville, City of Jacksonville Beach, City of Orlando, and City of Titusville) ordinance implementation generally proceeds in the sequence of events described in items 1 through 6:

1. **Review Need for Ordinance** - The need for ordinances by a city or county is typically dispatched for consideration, review, and filing.

2. **Establish Calendar for Public Hearings, Adoption, Implementation, and Public Notification of New Ordinance** - A calendar or timeline establishing target dates for required time provisions (e.g., filing dates, specific notification dates) or revenue requirements necessary for implementation.
3. **Determination of Outside Resource Requirements** - Outside legal and/or consulting services (i.e., legal, engineering, financial, public relations, codification, etc.) may be required for interpretation, compliance, and implementation of the ordinance.

4. **Procurement of Outside Resources** - Outside resources need not always necessarily be procured through the formal procurement process. The city or county may already have a firm on contract or may allow a firm to be hired on a task-by-task basis or lump-sum basis. In general, the following steps represent a typical procurement policy:

a) Establish List of Service Providers
b) Develop RFP/RFQ or Letter of Interest
c) Determine Selection Committee
d) Review and Rank Proposals
e) Make Selection
f) Negotiate Contract
g) Issue Notice to Proceed

5. **Conversion of Water Conservation Measures to Ordinance -** Converting a water conservation measure to ordinance generally requires staff participation on the part of several departments. Several tasks are generally required depending on the nature and content of the conservation measure. These tasks are described in detail in Appendix B.

6. **Implementation and Enforcement of a Newly Adopted Ordinance -** The implementation of a new ordinance requires that all administrative and departmental heads understand and concur with the necessary staff resource and capital requirements. Enforcement includes notification and education of enforcement personnel, as well as the ongoing, annual incremental cost of enforcing the ordinance. The level of effort and cost involved with enforcement of codes is code and utility specific and was not identified. Therefore, an analysis of the potential staff resource and capital requirements is typically performed internally or by an outside resource.

The cost of code implementation ranged from $8,202 to $19,273 depending on the method selected. A unit cost for code implementation was calculated using the estimated implementation costs. Enforcement costs were not idientified due to the variable nature.

Cost effectiveness was calculated as a cost per Equivalent Residential Connection (ERC). The cost per ERC is the overall cost of code implementation distributed equally among each of a utility's residential connections. The cost per ERC is dependent on the size of the utility assuming the cost of code implementation is equivalent for all utility sizes. To present a range of costs per ERC, a small utility

located in the City of Holly Hill, comprised of approximately 3,867 ERCs, and a large utility located in the City of Jacksonville, comprised of approximately 250,667 ERCs, were studied. The resulting cost of code implementation ranged from $0.03 per ERC for the City of Jacksonville to $4.98 per ERC for the City of Holly Hill. Based on this analysis, code implementation has been demonstrated to be more cost effective for a larger-sized utility. Table 5 gives a summary of the building code implementation costs per ERC.

Table 5. Ordinance Cost Per ERC Range for SJRWMD Utilities

Utility	1995 Water Supplied ADF (mgd)	Unit Water Use (gpd/ERC)	Estimated ERC	Cost for[1] Changing Ordinance ($)	Ordinance Cost ($/ERC)
Large Utility (City of Jacksonville)					
Procedure A[2]	75.2	300	250,667	10,000	0.04
Procedure B[3]	75.2	300	250,667	20,000	0.08
Small Utility (City of Holly Hill)					
Procedure A[2]	1.16	300	3,867	10,000	2.59
Procedure B[3]	1.16	300	3,867	20,000	5.17

(1) Cost for changing ordinance is a one-time cost. On-going enforcement costs were not included due to the variability of the ordinance-specific on-going costs.

(2) Procedure A - Minimum implementation and requires outside resources.

(3) Procedure B - Extensive implementation and requires outside resources.

CONCLUSIONS

INTRODUCTION

The interview of selected Florida utilities and WMDs resulted in useful water conservation cost effectiveness information. The WMDs information was in the form of water supply plans provided by utilities or direct results from WMD sponsored conservation programs, such as leak detection or mobile irrigation labs. Utilities in SJRWMD had little or no information on conservation program costs or water savings. Most of the relevant utility data came from the west coast of Florida including the City of Tampa and Hillsborough County. Data for plumbing retrofit and leak detection conservation programs were obtained from these utilities. Table 6 gives a summary of the data availability results from the Florida survey.

Table 6. Subtask A - Data Collection Review and Assessment

Conservation Practice	Data Availability	Cost Effectiveness WMD/Utility
Operational Conservation Practices		
Utility System Leak Detection and Repair	Y	SWFWMD
Meter Testing and Replacement	Y	Tampa
Utility System Water Audits	Y	Tampa
Monthly vs. bi-mo. and quart. billing	N	None
Consumer Conservation Programs		
Plumbing Retrofits	Y	SFWMD, SWFWMD, Tampa. Hillsborough Co. Tampa
Irrigation System Retrofits	Y	Tampa, SFWMD
Consumer Leak Detection Program	N	None

The national literature review provided sufficient data to evaluate the cost effectiveness of certain water conservation methods. Of the 100 potential references reviewed, approximately 30 had both cost and water savings data. Plumbing retrofits were by far the most prevalent conservation measure found in the literature. Other measures found were utility audits, leak detection, meter testing, consumer audits, and irrigation audits. Several references also gave guidelines for evaluating the cost effectiveness of various conservation measures.

COST EFFECTIVENESS OF OPERATIONAL AND CONSUMER CONSERVATION PROGRAMS

Cost effectiveness results from the review of literature available from Florida sources are included with those of the nationwide literature review in Tables 2A and 2B. Cost of Florida conservation programs fell within the range of costs calculated from nationwide sources.

Table 7 presents a summary of the costs of the conservation practices reviewed based on the data presented in Tables 2A and 2B. Figure 1 shows a graphic comparison of unit water costs and Table 8 presents ranges of potential water savings found in the literature review. Based on these sources, the following conclusions were formed:

- The first leak detection event generally yields the greatest results with fewer leaks found in subsequent events (Moyer et al. 1983, Kempe and Liston 1990). At an equivalent annual cost of $0.04 to $0.27 per 1,000 gallons water saved, utility leak detection and repair has been identified as the most cost effective conservation measure investigated in this report.

- Actual water savings do not result directly from system audits. However, repair and replacement of meters or leaks identified by a water system audit can be a cost effective method of reducing water consumption. Furthermore, the payback period for the cost of a system audit can be a year or less based on reduced operational cost savings once identified leaks are repaired.

Table 7. Cost Effectiveness of Operational and Consumer Conservation Practices and Programs

Conservation Type	Cost Effectiveness[1] Average ($/1,000 Gallons Saved)	Range ($/1,000 Gallons Saved)	Service Life (years)	Number of Sources Referenced
Operational Conservation Practices				
Utility system leak detection and repair	0.12	0.04 - 0.27	5	3
Utility system water audits[2]	0.07	0.03 - 0.11	5	5
Monthly billing	Not available	Not available	Not available	Not available
Consumer Conservation Programs				
Plumbing retrofits				
-Retrofit kits[3]	0.60	0.04 - 1.69	10	30
-Toilet rebate/replacement	1.60	0.51 - 3.70	20	11
Irrigation system retrofits	Not available	Not available	Not available	Not available
Consumer leak detection	Not available	Not available	Not available	Not available

(1) Costs based on data found in literature times factor of 1.45 to account for non-construction capital costs. All costs in 1996 dollars.

(2) Includes one or more of the following: meter testing, leak detection (not repair), and system inventory.

(3) Includes retrofit kit costs for programs with and without audits.

Figure 1. Comparison of Unit Water Costs

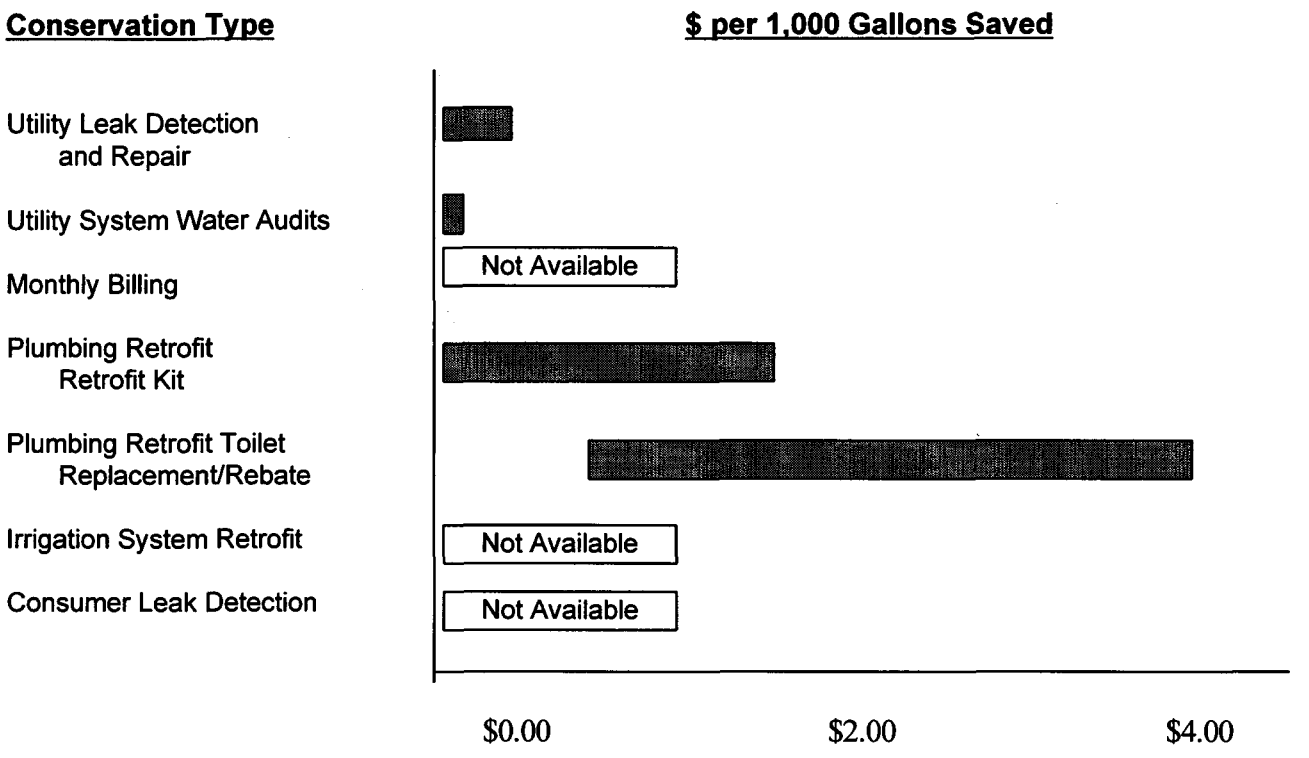

Table 8. Potential Water Savings[1]

Conservation Type	Potential Water Savings
Utility Leak Detection and Repair[2]	12.65%
Utility System Water Audits[2]	12% - 33%
Monthly Billing	Not Available
Plumbing Retrofit Kit[3]	5% - 20%
Plumbing Retrofit Toilet Replacement/Rebate[3]	20% - 30%
Irrigation System Retrofit	Not Available
Consumer Leak Detection	Not Available

(1) Water savings are not additive. Note that these are potential savings based on data presented in the literature. Actual savings will be utility-specific and dependent on conservation measures already in place.
(2) Savings based on percentage of average utility pumpage.
(3) Savings based on daily household consumption.

- Repair and replacement of water meters to increase meter accuracy can result in water savings from changes in consumption behavior due to an increase in the consumer's water bill.

- Although billing rates and structures are frequently discussed in literature as a means of consumer demand reduction, frequency of billing is not discussed as a conservation measure. However, monthly billing can be instigated in conjunction with consumer conservation programs in order to help the consumer realize the results of conservation efforts. Most utilities in SJRWMD are currently on a monthly billing schedule.

- Plumbing retrofit programs are flexible and can be tailored to both the needs of the utility and characteristics of the target consumer group. Program costs are highly variable, determined primarily by method of delivery and fixture quality.

- The actual cost effectiveness of a plumbing retrofit program is directly affected by customer installation and retention rates.

- Communication with the public is key in the success of program. Findings indicated that the literature should be simple and kept to a minimum. Instructions should be clear, concise and simple.

- Irrigation retrofits include addition of automatic times and/or rain sensors to the irrigation systems. Irrigation audits were infrequently mentioned and primarily referred to as being performed in conjunction with residential household audits.

- Due to high water usage and the technology of the water saving equipment, homeowners with in-ground irrigation systems should be targeted for irrigation system audits.

- No data were found specifically addressing consumer leak detection programs. Indoor consumer leak detection was mentioned as being performed in conjunction with some residential household audits and outdoor leak detection may be

performed as part of a utility system leak detection and repair program.

- Literature indicates that, for conservation measures affecting the consumer or general public, communication is of primary importance to ensure the participation, acceptance, and overall success of a program.

BUILDING CODE MODIFICATION THROUGH IMPLEMENTATION OF WATER CONSERVATION ORDINANCES

The cost of development, adoption, and implementation of building code modification through implementation of ordinances related to conservation measures varies according to the amount of effort and resources required during the conversion process. The cost of implementation, based on the amount of implementation effort and required outside resources, is described below in the Procedure Schedule:

Procedure Schedule

Procedure 1A - Minimum Implementation/Requires Outside Resources
Associated labor costs: $ 9,548

Procedure 1B - Extensive Implementation/Requires Outside Resources
Associated labor costs: $ 19,273

Procedure 2A - Minimum Implementation/Requires No Outside Resources
Associated labor costs: $ 8,202

Procedure 2B - Extensive Implementation/Requires No Outside Resources
Associated labor costs: $ 16,189

The cost of building code modification ranged from $8,202 to $19,273 depending on the method selected. A unit cost for implementation was calculated. The estimated unit cost is a one-time implementation cost; on-going costs associated with enforcement were not included due to the variabilities of the conservation codes.

Cost effectiveness was calculated as a cost ERC. The cost per ERC is dependent on the size of the utility assuming the cost of ordinance implementation is equivalent for all utility sizes. A large utility (City of Jacksonville, approximately 250,667 ERCs) and a small utility (City of Holly Hill, 3,867 ERCs), were used to find a unit cost range from $0.03 to $4.98 per ERC, respectively. Based on this analysis, ordinance implementation has been demonstrated to be more cost effective for a larger-sized utility.

COMPARISON TO OTHER SJRWMD ALTERNATIVE WATER SUPPLY STUDIES

The results of this report were compared with other SJRWMD alternative water supply investigations. As with other conservation methods under study by SJRWMD, 45 percent has been added to the program cost found in the literature to account for contingency, engineering, and administrative costs. Because the majority of sources used for this report did not specify a breakdown of program cost, some program costs may already include elements accounted for by the 45 percent addition. Using the average of the cost range could compensate for this uncertanty. The equivalent annual cost conversions presented in this report are comparable with previous SJRWMD investigations. The cost comparison is presented in Table 9.

Table 9. SJRWMD Alternative Water Supply Strategy Cost Comparison

Alternative Water Supply	Equivalent Annual Cost Range $/1,000 gallon	Example	Source
Operational Conservation Leak Detection & Repair[1]	0.04 - 0.27	--	This report
Consumer Conservation Plumbing Retrofit[1]	0.04 - 3.70	--	This report
Surface water treatment	1.84 - 2.01	Lake Monroe example	PBS&J 1996
Reclaimed water to citrus	1.79 - 5.4	Specific examples	CH2M HILL 1997
Reclaimed water to fern	1.39 - 1.81	Volusia County	PBS&J 1998
Reclaimed water to RIBs	0.63	Based on Conserv II	PBS&J 1998
Self-supply well irrigation to replace public supply	3.08	121,000 self-supply wells	PBS&J 1997
Reclaimed water irrigation to replace public supply	2.62	1 mgd example	PBS&J 1997

[1] Costs based on data found in literature times a factor of 1.45 to account for non-construction capital costs. All costs in 1996 dollars.

RECOMMENDATIONS

Based on the findings of the previous sections the following recommendations are given:

- Treat conservation practices as an alternative water supply source in development of regional water supply plans.
- Require water utilities to maintain water use, local climatalogical, and cost data which can be used to better track the effects of water conservation practices.
- Develop a guideline to assist with implementation of plumbing retrofit projects based on the findings of this project.
- Implement water system audits for utilities with high percentages of unaccounted for water.
- Implement a leak detection program similar to SWFWMD program. SWFWMD provides an expert and leak detection and pinpointing equipment for the utility. The utility provides an employee who will be trained in basic leak detection and a vehicle.
- Implement an irrigation audit program similar to SWFWMD program. SWFWMD provides a licsensed irrigation auditor. Municipal, commercial, and in-ground residential irrigation systems in affluent neighborhoods could be targeted.
- Implement conservation related code changes in larger cities and more highly populated counties.

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Appendix A

Summary of Sources with Inadequate Cost or Water Savings Data to Calculate Cost Effectiveness

Assessment of the Cost Effectiveness of Specific Water Conservation Practices - Summary of Sources with Inadequate Cost or Water Savings Information to Calculate Cost Effectiveness

Author	WMD/Utility/Agency	Reference	Ref. Year	Conservation Type
Whitcomb	Seattle, WA	Calculating the Water Use Reduction Resulting from Water Fixture Retrofitting of Single Family Homes in Seattle	1990b	Plumbing Retrofit
Babcock	Phoenix, AZ	Evaluating Plumbing Retrofit Devices	1990	Toilet Retrofit
Anderson and Siegrist	Phoenix, AZ	Critical Review of Research and Long-Term Experience with Minimum Flow Toilet Fixtures	1990	Low Consumption Toilet
Kempe and Liston	Massachusetts Water Resources Authority	Leak Detection and Repair	1990	Pipe Leakage
Engle	San Diego Co., CA	San Diego County Turf Water Audit Program	1990	Irrigation Water Audit
Raucher, et al.	--	Evaluating the Impact on Conservation Programs	1990	Conservation Programs
Baumann and Simms	--	The Social Acceptability of Water Conservation	1990	Consumer Survey
Davis and Dziegielewski	--	Estimating the Benefits and Costs of Implementing Water Conservation Measures	1990	Implementing Conservation Measures
Maddaus	--	Evaluating The Benefits and Costs of Proposed Water Conservation Programs	1990	Implementing Conservation Measures
Stein and Kilgore	--	Interactions Between Water Conservation Measures and The Effects on Conservation Programs	1990	Conservation Measures Interactions
Schultz	Glendale, AZ	Low Flow Fixtures Role in Water Conservation	1990	Low Flow Toilets/Urinals
Vickers	--	The Performance of Low Volume Plumbing Fixtures: Some Recommendations for New Fixture Standards	1990	Establish Fixture Efficiency Standards
Corpening	--	Low Flow Fixtures Role in Water Conservation	1990	Low Flow Faucets, Shower Heads, Toilets
Davis	South Brevard Water Authority	The Water Wise Home Program - A Water Conservation Success Story	1990	Low Flow Faucets, Shower Heads, Toilets
Smith	Massachusetts Water Resources Authority	Retro-Fitting Water Fixtures - Success Stories	1990	Low Flow Faucets, Shower Heads, Toilets
Nechamen	Long Island, NY	A Pilot Residential Retrofit Program in Long Island, New York	1990	Low Flow Faucets, Shower Heads, Toilets
Soltani	Santa Monica, CA	City of Santa Monica's BAYSAVER Fixture Rebate Program	1990	Low Flow Toilet
Phillips	U.S. Bureau of Reclamation	Partnerships for Water Conservation - Bureau of Reclamation Programs	1990	Conservation Plan
Dobbs	Irvine, California	Residential Water Savings with Improved Irrigation Control - A Sense of Magnitude	1990	Low Flow Shower Heads, Toilets, Irrigation
Keating	Waterloo, Ontario	Water Conservation: Curriculum in Action	1990	Plumbing Retrofit
Celona	Westchester County Water Authority	Westchester County's Approach to Public Education and Out-Reach	1990	Conservation Education
Pape	Pasadena Water and Power Department	Water and Energy Conservation for Residential Customers	1990	Plumbing Retrofit
Lahage	Massachusetts Water Resources Authority	Residential and Industrial Audit Experience	1990	Low Flow Shower Heads, Toilets
Viswanathan and Al-Rashed	Kuwait	Water Conservation Strategies for the State of Kuwait	1996	Plumbing Retrofit/Public Eduaction
Fox	San Antonio Water System	Analysis, Design and Implementation of a Conservation Rate Structure	1996	Design of Rate Structure
Beecher and Mann	--	The Role of Price in Water Conservation Evidence and Issues	1996	10% price increase = 3% drop in demand
Rothstein	--	Applications of Decision Analysis to Water Conservation Program Planning	1996	Integration of Water Conservation Planning
Opitz and Bennett	East Bay Municipal Utility District	Water Conservation Baseline Study Methodology and Results	1996	Developing Study Data Generation Methods
Fryer	Marin Municipal Water District	Water Conservation Baseline Studies	1996	Identify Conservation Opportunities
Lannom and Hines	Metropolitan Water District of S. Calif.	In Concert with the Environment - Residential Survey/Education Program	1996	Conservation Education
Hull, et al.	Tampa, FL	Water Ambassador Program: In-school Education to Sustain Community Water Conservation	1996	Conservation Education
Nieswiadomy and Fox	--	Calculating Water Savings Using a Spreadsheet Program	1996	Computer Program Description
Chesnutt, et al.	California Urban Conservation Council	Handbook for Designing, Evaluating, and Implementing Conservation Rates	1996	Alternative Pricing Procedures
DeOreo, et al.	Boulder, CO	New Approaches in Assessing Water Conservation Effectiveness	1996	Assessing Conservation Impacts
Nieswiadomy and Stuewe	Texas	Evaluation of Water Conservation Programs of Texas Public Water Suppliers	1996	Leak Decection Most Cost Effective
Evett and Robidous	--	A Graduate Level Course in Water Conservation	1996	Conservation Education
Jeane, et al.	Sonoma County Water Agency	Avoided Cost of Water Conservation in Sonoma County, California	1996	Effectiveness of Several Conserv. Measures
Weber	Contra Costa Water District	Measuring Overall Conservation Performance	1996	Measuring Conservation Performance

Assessment of the Cost Effectiveness of Specific Water Conservation Practices - Summary of Sources with Inadequate Cost or Water Savings Information to Calculate Cost Effectiveness

(Continued)

Author	WMD/Utility/Agency	Reference	Ref. Year	Conservation Type
Mulville-Friel, et al.	Tampa, FL	Water Savings and Participant Satisfaction Realized: City of Tampa Toilet Rebate Program Evaluation	1996	Low Flow Toilets
Rothstein	--	Benefit/Cost Evaluation of Water Conservation Programs	1996	Conservation Programs Analysis
Pekelney, et al.	California Urban Conservation Council	Guidelines to Conduct Cost-Effectiveness Analysis of BMP's for Urban Water Conservation	1996	Conservation Programs Analysis
Henning	--	How to Obtain and Maintain Public Involvement: The Key to Successful Conservation Programs	1996	Conservation Education
Truesdale and Maddaus	Houston, TX	Houston Sets the Example for Water Conservation in a Water Rich Area	1996	Conservation Education, Repairs, Retrofit
McFadden, et al.	Tampa, FL	Design and Implementation of ULFT Rebate Programs in the Southeast	1996	Ultra Low Flush Toilets
Munoz	San Diego County Water Authority	A Comprehensive Approach to Toilet Retrofitting	1996	Ultra Low Flush Toilets
Jordan	Sonoma County Water Agency	A Case Study of Using Price to Conserve Water	1996	15% price increase = 10% drop in demand
Nechamen, et al.	New York City, NY	Assessment of New York City Residential Water Conservation Potential	1996	Low Flow Shower Heads, Toilets, Leakage
Kuzminski	Portland Water Supply Division	Building a Conservation Program for a Small Utility	1996	Conservation Education
Mariscal and Bamezai	San Diego County Water Authority	Designing an Effective Public Institutions Plumbing Retrofit Program - A Multi-Agency Approach	1996	Plumbing Retrofit Program Design
Mitroff, et al.	--	The Last 25! We Need to Address the First 50%!	1996	Conservation Incentives
Shridhar	Seattle, WA	The Right Research: Measuring the Success and Effectiveness of Public Information Programs	1996	Conservation Education Evaluation
Barnes and Henning	Rockland Co., NY	The Conservation Challenge for United Water New York	1996	Water Management
Finn	Pompano Beach, FL	Reducing Lost Water a Multidisciplinary Approach	1996	Reducing Leakage
Lutes	Austin, Texas	Calculating Economic Impacts of Conservation-Driven Major Water and Wastewater Capital Facility Deferrals in Austin, TX	1996	Demand Management Analysis
Mee	Phoenix, AZ	New Directions for Maturing Municipal Water Conservation Programs	1996	Conservation Program Analysis
Mayer, et al.	Boulder, CO	Conservation Retrofit Effectiveness: A Risk-Based Model Using Precise End-Use Data	1996	Low Flow Shower Heads, Toilets
Tabone and Fairchild	--	A Survey of Conservation in the Pacific Northwest	1996	Frequency of Conservation Program Use
Craft	--	Environmental Equity in Conservation Programs	1996	Vouchers vs. Rebates
Sanchez and Sanchez	--	Step by Step: How to Deliver Conservation Services Using Community Organizations	1996	Conservation Education
Yuen and Munoz	San Diego County Water Authority	The Voucher Concept: A New Twist to the traditional ULFT Rebate Program	1996	Ultra Low Flush Toilet Vouchers
Curry and Dietz	Austin, Texas	Information Management for a Water Conservation Program	1996	Conservation Program Evaluation
Freestone	Vallecitos Water District, CA	Program Implementation Strategies	1996	Conservation Program Evaluation
deMonsabert and Liner	--	WATERGY: A Water and Energy Savings Model for Federal Agencies	1996	Water Usage Computer Modeling
Schlette	--	Water Rate Surcharges as a Conservation Mechanism	1991	Rate Surcharge = Consumption Decrease
Leserman, et al.	Pasadena, CA	Strategies for Gaining Public Acceptance for Water Rate Increases and Restructuring	1991	Rate Determination
Nero	Tampa, Florida	Penetration: Myth or Reality - Local Agency Perspective	1991a	Penetration = Participation Amounts
Rodrigo and Dziegielewski	Metrocpolitan Water District of S. Calif.	Market Penetration of Residential Retrofits: A Statistical Perspective	1991	Program Implementation Techniques
Mullarkey	Lower Colorado River Authority	Low-Volume Toilet Retrofits in Two Low-Income Public Housing Projects	1991	Ultra Low Flush Toilet Retrofit
Not in ref.	Austin, TX	Austin Saves Water by Providing Free Low-Flow Toilets to Customers with Low, Fixed Incomes - Not in ref.	1998	Ultra Low Flush Toilet Retrofit
Not in ref.	Austin, TX	Austin's Long-Term Water Efforts Awarded - Not in ref.	1998	Low Flow Shower Heads, Toilets
Prouty	Corpus Christi, TX	Corpus Christi Home Retrofits Show Savings - Not in ref.	1998	Plumbing Retrofit
Gerston	--	Conservation Rates Affect Demand Management - Not in ref.	1998	Rate Surcharge = Consumption Decrease
McCain	High Plains	High Plains Introduces Water Wise Program - McCain (Not in ref.)	1998	Conservation Education
Not in ref.	Seattle, WA	Outdoor Water Use Study - Not in ref.	1998	Breaks Down Types of Outdoor Water Use
Shridhar	Seattle, WA	Measuring the Success and Effectiveness of Public Information Programs - (Not in ref.)	1998	Income Level Predicts Usage
Nero	Tampa, FL	Local Conservation Programs: Factors Affecting Success	1991b	Income Level Predicts Usage

Appendix B

Determination of Generalized Cost of Modifying the Building Ordinance Code Through Implementation of Water Conservation Ordinances

By

Burton & Associates, Inc.

APPENDIX B

INTRODUCTION

The objective of this report is to determine the generalized cost of implementing water conservation ordinances through the modification of existing code. The sequence of activities commonly used by cities and counties to modify code and the generalized cost of ordinance implementation are described in this report.

METHOD

Selected Study Participants

In order to gather the information necessary for this study, interviews were conducted with a variety of departments and personnel involved in the ordinance implementation process. The personnel of the building/zoning/code enforcement departments, utility departments, clerk's offices, attorney's offices, personnel departments, and administrative offices of the following cities and counties within the St. Johns River Water Management District (SJRWMD) were selected as interview participants.

City of Daytona Beach, Florida
City of Fernandina Beach, Florida
City of Jacksonville, Florida
City of Jacksonville Beach, Florida
City of Melbourne, Florida
City of Orlando
City of Titusville, Florida
Flagler County, Florida
Orange County, Florida

Local Ordinances Related to Water Conservation

Determination of the character and nature of potential ordinances was necessary to determine the costs required for the varying levels of resources and implementation. Local ordinances considered in this

study encompass conservation measures requiring varying levels of implementation. The costs associated with differing levels of implementation were addressed during the interview process.

Ordinances considered include:

1. Irrigation system standards
2. Low water use landscaping ordinance
3. Low flow plumbing and hot water pipe insulation
4. Require tensimeter and rain collection devices
5. Required retrofit at resale
6. Required taking of reclaimed water
7. Required dual piping for reuse
8. Prohibition of "green lawn" requirements
9. Individual meters in new multi-unit construction Submeter retrofitting in multi-unit buildings

The varying levels of staff and capital resources required for ordinance implementation are addressed in this report, therefore each ordinance "type" was considered.

Determination of Ordinance Implementation Activities and Costs

To determine the flow of activities required for implementation of water conservation ordinances, Burton & Associates interviewed the following city and county staff:

- City managers;
- County administrative staff;
- City and county attorneys;
- Building, zoning and code enforcement staff;
- Engineering staff;
- Finance and accounting staff;
- Purchasing staff; and
- Outside resources firms.

Outside resources firms provide professional consulting services. These services include assistance in legal, engineering, financial, public relations, software, programming, and codification procedures. In

addition to a description of ordinance implementation activities, the interviews provided associated information regarding the necessary labor and capital resources.

After the interviews were conducted, a schedule was developed containing the interview data. The schedule was then sent to the interviewees for verification of the accuracy and interpretation of the interview data. A sample schedule is presented in Attachment A. Data gathered during the interviews included listings of labor resources, salary ranges, and indirect labor multipliers for senior, secondary, and outside resource staff positions used for ordinance implementation.

Salary ranges and indirect labor data were cataloged and averaged for each position listed in Table 1. These data were then utilized to determine a dollar amount per hour per activity required for each position.

FLOW OF ACTIVITIES

Determine and Review Specific Water Conservation Measures

Once the decision has been made to enforce specific water conservation measures, a preliminary draft of these measures must be dispatched to the following staff for consideration and review:

- City manager or county administrator
- Clerk
- City or county attorney
- Directors of the departments which will need to implement and enforce the ordinance

Establish Calendar for Public Hearings, Adoption, Implementation and Public Notification of New Ordinance

Based on a review of time requirements associated with the development and implementation of an ordinance (such as filing dates

Table 1. Senior, Secondary & Outside Resource Staff Positions

Senior Government & Outside Resources Staff Positions	Secondary Government & Outside Resource Staff Positions
City Manager/County Administrator	Staff Level 1 Staff Level 2 Clerical
City/County Attorney	Staff Level 1 Staff Level 2 Clerical
Director of Code Enforcement	Staff Level 1 Staff Level 2 Clerical
City/County Engineer	Staff Level 1 Staff Level 2 Clerical
Director of Building/Zoning	Staff Level 1 Staff Level 2 Clerical
Director of Finance	Staff Level 1 Staff Level 2 Clerical
Computer Programmer/Software	Staff Level 1 Staff Level 2 Clerical
Outside Resources-Consultants	Staff Level 1 Clerical
Outside Resources-Engineer	Staff Level 1 Clerical
Codification Specialists	Staff Level 1 Staff Level 2 Clerical

or specific notification dates), or revenue requirements necessary for proper implementation, a calendar or timeline must be established which sets target dates for the following:

1. Incorporation of specific water conservation measures into ordinance format by legal staff.

2. Distribution of preliminary draft ordinance for review and comment to the administration and affected department staff.

3. Edit of preliminary draft ordinance to include comments from administration and staff.

4. Presentation of final draft ordinance to commission/council members for review and comment.

5. Edit of final draft ordinance to include comments from commission/council.

6. Incorporation of new ordinance into agenda for first reading to public.

7. Incorporation of new ordinance into agenda for second reading to public.

8. Incorporation of new ordinance into code, if appropriate.

9. Implementation (or purchase) of required equipment, staff, and automation changes necessary to properly implement and enforce the new ordinance.

Determination of Outside Resource Requirements

Depending upon the content of the draft ordinance, the administrative review team may determine that outside legal and/or consulting services are needed for technical interpretation, compliance, and implementation of the ordinance. Outside services must sometimes be procured to ensure appropriate legal assistance, to fully understand engineering and/or financial ramifications, and to provide assistance

for cost effective public notification and education. The outside services often procured by city and county governments during the ordinance draft, public notification, and implementation process are listed below.

1. Legal Services - Law firms with specifically related experience.

2. Engineering Services - Engineering firms with specifically related project experience.

3. Financial Services - If the implementation of the ordinance has financial implications or requirements, cities and counties will often procure the services of a financial consultant to analyze those implications and the funding sources available.

4. Public Relations - The presentation and implementation of the public notification/education phase of a new ordinance can be very important to successful implementation. A public relations firm is often retained to ensure public awareness and cooperation.

5. Codification Services - Outside firms typically codify new ordinances and resolutions.

6. Other Services - Depending on the content of the ordinance, other outside or specialized services may be required occasionally.

Procurement of Outside Resources

Once the decision has been made that outside resources are required for successful codification of an ordinance, a city or county may procure the services as detailed by their procurement policies. It is not always necessary to procure outside resources through the formal procurement process. If a firm is already providing services to a local government, or if the city or county's procurement process allows for a less formal arrangement, services may be retained on a task-by-task or lump-sum basis. However, the following steps represent typical procurement policy.

1. Establish List of Service Providers - Most cities and counties have created a data base of prospective service providers by service category.

2. Develop RFP/RFQ or Letter of Interest - Based upon the administration's determination of the services required for successful implementation of the ordinance, a Request for Proposals/Request for Qualifications (RFP/RFQ) or Letter of Interest will be developed listing the scope of services required as well as the selection criteria.

3. Determine Selection Committee - A committee is selected whose responsibility will be to rank the respondents proposals, hear oral presentations from the top ranked firms, and make a final selection for presentation to the council/commission for approval.

4. Review and Rank Proposals - The selection committee will review all proposals and determine the top two or three most responsive.

5. Make Selection - Top ranked firms will make presentations to selection committee for final selection.

6. Negotiate Contract - Scope of services will be reviewed, a contract will be negotiated, and notice to proceed issued with the selected firm.

Conversion of Specific Water Conservation Measures to Ordinance

Converting a specific water conservation measure to an ordinance requires the participation of several departments and their staff. Depending on the nature and content of the conservation measure, the tasks presented in Table 2 comprise those activities required for ordinance development and implementation.

Table 2. Ordinance Tasks

Tasks	Department Responsibility	Specific Responsibility
1. Determine and Review Specific Water Conservation Measures	Administration Legal Specific Department Head(S) Engineering Financial	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance
2. Determine Required Outside Resources	Administration Legal Specific Department Head(S) Engineering Financial	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance
3. Procure Required Outside Resources	Administration Legal Specific Department Head(S) Engineering Financial Purchasing	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Dir. of Purchasing
4. Meet With All Relevant Staff and Outside Resources Firms (If Required) to Determine Scope of Conversion and Calendar	Administration Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
5. Develop Preliminary Draft of Ordinance Based Upon Input From All Resources	Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
6. Review & Edit Preliminary Draft Ordinance	Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
7. Distribute Final Draft of Ordinance to All Relevant Project Members	Legal	City/County Attorney
8. Review & Edit Final Draft Ordinance	Administration Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
9. Present Final Draft Ordinance to Council/Commission For Review and Comment	Administration Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
10. Incorporate All Comments From Staff & Council/Commission and Present New Ordinance to Public at Council or Commission Meeting as First Reading.	Administration Legal Specific Department Head(S) Engineering Financial Outside Resource Firms	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team

Table 2. Ordinance Tasks (cont'd)

Tasks		Department Responsibility	Specific Responsibility
11.	Conduct Second Reading of New Ordinance at Public Hearing	Administration Legal Specific Department Head(s) Engineering Financial Outside Resource Firms	City/County Manager City/County Attorney Dir. of Building/Code Enf. City/County Engineer Dir. of Finance Outside Resource Team
12.	Execute Adoption of New Ordinance	Legal Administration	City/County Attorney City/County Clerk
13.	Notify Public of Adoption & Implementation Criteria (If Required)	Legal Specific Department Head(s) Engineering Outside Resource Firms	City/County Attorney Dir. of Building/Code Enf. City/County Engineer Outside Resource Team Public Relations Team
14.	Implement New Ordinance (Including Public Education/Awareness Programs)	Specific Department Head(s) Engineering	Dir. of Building/Code Enf. City/County Engineer
15.	Incorporate Policy/Procedure Changes Into Code Enforcement Software Program	Specific Department Head(s) Engineering	Dir. of Building/Code Enf. City/County Engineer
16.	Incorporate Policy/Procedure Charges Into Code Enf. Software Program	Specific Department Head(s) Engineering	Dir. of Building/Code Enf. City/County Engineer
17.	Enforce New Ordinance Council/Commission Or Review & Comment	Specific Department Head(s) Legal	Dir. of Building/Code Enf. City/County Attorney
18.	Codifiy New Ordinance	Outside Resource Firms	Codification Staff

Implementation and Enforcement of a Newly Adopted Ordinance

The implementation of a new ordinance requires that all administrative and department heads understand and concur with the staffing and capital requirements for successful implementation. Therefore, an analysis of the potential staff resource and capital requirements is typically performed. This analysis may occur prior to the actual adoption of an ordinance in order to facilitate resource planning.

An analysis of staffing and capital requirements for implementation and enforcement of a new ordinance generally will include the following considerations:

1. Staff Resource Requirements

    a) Public notification of new ordinance.

    b) Implementation of new ordinance.

    c) Periodic review & update of policy and procedures.

    d) Enforcement.

    The staffing analysis determines by task and subtask additional staff required, level of experience, and salary required for each necessary position. Additional staff may not be required for every new ordinance. However, an analysis of the tasks and subtasks required for each phase of implementation provides administration with a resource planning tool to ensure adequate implementation and enforcement of the new ordinance.

2. Capital Requirements

    a) Hardware/Software
    b) Equipment
    c) Vehicles
    d) Building/Office Space

The capital requirement analysis determines by task and subtask additional capital requirements necessary for the successful implementation and enforcement of the new ordinance. If analysis determines that additional capital is required, subsequent investigation of potential funding sources available is also conducted.

SCHEDULE OF ESTIMATED COSTS

Implementation of the new ordinance may begin once the additional staff and/or capital resources (if any) have been determined and procured, and existing staff are made familiar with the implementation and enforcement policies and procedures.

Each local ordinance requires changes to code which utilize a different level of staff and capital resources. Furthermore, depending on the specific content of each ordinance, a city or county may elect to procure additional expertise or services from outside resource firms. These services include assistance with legal, financial, engineering, hardware/software, or codification procedures. Some or all of these services at differing levels may be required during the implementation of an ordinance. For example, one type of ordinance may require only a few hours of outside legal and financial services while requiring extensive outside engineering services. However, another type of ordinance may require substantial services from an outside software firm. The compliment of outside resources required for implementation may vary significantly among different ordinances.

Also, certain steps must be taken during the implementation of an ordinance regardless of ordinance type. These steps may require minimum or extensive implementation effort by the administrative, legal, financial, building, zoning, code enforcement, and/or engineering staff. Therefore, the range of implementation costs has been "framed" by presenting a schedule of anticipated costs, at levels of minimum and extensive implementation effort, with and without the procurement of outside resources. These costs are identified and presented in Schedules One through Four (see Attachment B).

SUMMARY

Based on interviews with seven Florida cities (City of Daytona, City of Fernandina Beach, City of Gainesville, City of Jacksonville, City of Jacksonville Beach, City of Orlando, and City of Titusville) and two Florida counties (Flagler and Orange), estimated hours and associated labor costs required for the development and implementation of an ordinance are presented in summary below.

Determination of Generalized Cost Schedules	Associated Labor Costs
Schedule 1 Minimum Implementation/Requires Outside Resources	$ 9,548
Schedule 2 Extensive Implementation/Requires Outside Resources	$19,273
Schedule 3 Minimum Implementation/Requires No Outside Resources	$ 8,202
Schedule 4 Extensive Implementation/Requires No Outside Resources	$16,189

ATTACHMENT A

SAMPLE SCHEDULE

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
1. Determine and Review	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
Water Conservation		Level 1	21.43	9.16	30.59	0.0	$0.00
Measures Considered for		Level 2	14.67	6.27	20.95	0.0	$0.00
Ordinance		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**
2. Determine Required	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
Outside Resources		Level 1	21.43	9.16	30.59	0.0	$0.00
(if any)		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
3. Meet with All Relevant Staff and Outside Resource Firms (if required) To Determine Scope of Implementation & Events Calendar	Administration	City/County Manager	32.17	13.75	45.92	1.5	$68.88
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.5	$78.60
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.5	$38.00
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.5	$36.11
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.5	$49.01
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.5	$43.43
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$245.15**
4. Develop Preliminary Draft of Ord. Based Upon Input From All Resources (Inside/Outside)	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	2.0	$50.66
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	2.0	$48.14
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	2.0	$65.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$196.57**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
5. Review & Edit Preliminary Draft Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$114.50**
6. Distribute Final Draft of Ordinance To All Relevant Project Members	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	1.0	$23.81
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
SubTotal							**$37.78**
7. Review & Edit Final Draft Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
8. Present Final Draft Ordinance To Elected Officials	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**
9. Incorporate All Comments From Staff &Council/Com. and Presentation Of New Ordinance To Public @ Council/Commission Meeting	Administration	City/County Manager	32.17	13.75	45.92	0.0	$0.00
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$81.22**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
10. Second Reading of New Ordinance At Public Hearing	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.3	$5.77
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$50.87**
11. Adopt & Record New Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Administrative	City/County Clerk	12.61	5.39	18	2.0	$36.00
SubTotal							**$88.40**
12. Notify Public Of Adoption & Implementation Criteria (if (required)	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$4,268.56**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Sample Schedule For Development And Implementation Of Ordinance

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
13. Implement New Ord. (including Public Education/ Awareness Programs)	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$3,737.60**
14. Incorporate Policy/Procedure Changes Into Code Enf. Software Program	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	4.0	$80.84
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	4.0	$96.28
		Level 1	14.81	6.33	21.14	4.0	$84.56
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
SubTotal							**$363.00**
15. Incorporate Policy/Procedure Changes Into Policy/ Procedure Manuals	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	2.0	$40.42
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	2.0	$42.28
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	4.0	$48.40
		City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	2.0	$50.38
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	4.0	$48.32
SubTotal							**$292.96**
16. Enforce New Ordinance	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	8.0	$202.64
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	16.0	$258.08
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	48.0	$1,014.72
		Level 2	11.23	4.80	16.04	48.0	$769.92
		Clerical	8.48	3.63	12.1	16.0	$193.60
		City/County Engineer	22.88	9.78	32.67	8.0	$261.36
		Level 1	17.65	7.54	25.19	48.0	$1,209.12
		Level 2	13.90	5.94	19.85	24.0	$476.40
		Clerical	8.46	3.62	12.08	8.0	$96.64
	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
SubTotal							**$6,008.16**
17. Codification of New Ord.	Outside Resource Firms	Codification Staff			82.5	2.0	$165.00
SubTotal							**$165.00**
		TOTAL					**$16,189.43**

ATTACHMENT B

SCHEDULES ONE THROUGH FOUR

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
1. Determine and Review Water Conservation Measures Considered for Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**
2. Determine Required Outside Resources (if any)	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.3	$7.24
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$52.34**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
3. Procure Required Outside Resources	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Purchasing	Purchasing Agent	16.06	6.87	22.92	3.0	$68.76
		Level 1	13.80	5.90	19.7	2.0	$39.40
		Clerical	8.27	3.54	11.81	1.0	$11.81
SubTotal							**$329.31**
4. Meeting with All Relevant Staff and Outside Resource Firms (if required) To Determine Scope of Implementation & Events Calendar	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	1.0	$105.00
		Jr. Consul.			75	1.0	$75.00
		Clerical			30	0.0	$0.00
SubTotal							**$343.42**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
5. Develop Preliminary Draft of Ord. Based Upon Input From All Resources (Inside/Outside)	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	1.0	$105.00
		Jr. Consul.			75	1.0	$75.00
		Clerical			30	1.0	$30.00
SubTotal							**$324.50**
6. Review & Edit Preliminary Draft Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	2.0	$60.00
SubTotal							**$227.00**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
7. Distribute Final Draft of Ordinance To All Relevant Project Members	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	1.0	$23.81
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
SubTotal							**$37.78**
8. Review & Edit Final Draft Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$157.19**
9. Present Final Draft Ordinance To Elected Officials	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$157.19**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
10. Incorporate All Comments From Staff &Council/Com. and Presentation Of New Ordinance To Public @ Council/Commission Meeting	Administration	City/County Manager	32.17	13.75	45.92	0.0	$0.00
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	1.0	$30.00
SubTotal							**$133.72**
11. Second Reading of New Ordinance At Public Hearing	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.3	$5.77
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.3	$26.25
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$77.12**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
12. Adopt & Record New Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Administrative	City/County Clerk	16.68	7.13	23.81	2.0	$47.62
SubTotal							**$100.02**
13. Notify Public Of Adoption & Implementation Criteria (if (required)	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	2.0	$27.94
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	8.0	$202.64
		Level 1	14.16	6.05	20.21	5.0	$101.05
		Level 2	11.30	4.83	16.13	5.0	$80.65
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	8.0	$192.56
		Level 1	14.81	6.33	21.14	8.0	$169.12
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	16.0	$522.72
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$2,279.52**
14. Implement New Ord. (including Public Education/ Awareness Programs)	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	8.0	$161.68
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	16.0	$385.12
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	4.0	$48.40
	Engineering	City/County Engineer	22.88	9.78	32.67	4.0	$130.68
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	4.0	$48.32
SubTotal							**$2,079.80**
15. Incorporate Policy/Procedure Changes Into Code Enf. Software Program	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	2.0	$50.66
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	2.0	$48.14
		Level 1	14.81	6.33	21.14	2.0	$42.28
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Outside Resource Firms	Software Programmer			82.5	4.0	$330.00
SubTotal							**$471.08**
16. Incorporate Policy/Procedure Changes Into Policy/ Procedure Manuals	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	1.0	$20.21
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	2.0	$23.42
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	1.0	$21.14
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	2.0	$24.20
		City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	1.0	$25.19
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	2.0	$24.16
SubTotal							**$174.85**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 1 - For Development And Implementation Of Ordinance Requiring Outside Resources & Minimum Impementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs			Time In Hours Per Person	Total Labor Costs
			Average Direct Labor	*Average Indirect Labour @ 29.95%*	*Total*		
17. Enforce New Ordinance	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	8.0	$161.68
		Level 2	11.30	4.83	16.13	4.0	$64.52
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	16.0	$385.12
		Level 1	14.81	6.33	21.14	24.0	$507.36
		Level 2	11.23	4.80	16.04	16.0	$256.64
		Clerical	8.48	3.63	12.1	4.0	$48.40
		City/County Engineer	22.88	9.78	32.67	2.0	$65.34
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	4.0	$79.40
		Clerical	8.46	3.62	12.08	4.0	$48.32
	Legal	City/County Attorney	36.71	15.70	52.4	4.0	$209.60
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	4.0	$55.88
SubTotal							**$2,433.46**
18. Codification of New Ord.	Outside Resource Firms	Codification Staff			82.5	2.0	$165.00
SubTotal							**$165.00**
		TOTAL					**$9,547.97**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
1. Determine and Review	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
Water Conservation		Level 1	21.43	9.16	30.59	0.0	$0.00
Measures Considered for		Level 2	14.67	6.27	20.95	0.0	$0.00
Ordinance		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**
2. Determine Required	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
Outside Resources		Level 1	21.43	9.16	30.59	0.0	$0.00
(if any)		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
3. Procure Required Outside Resources	Administration	City/County Manager	32.17	13.75	45.92	3.0	$137.76
		Level 1	21.43	9.16	30.59	1.0	$30.59
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	3.0	$157.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	1.0	$20.21
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
		City/County Engineer	22.88	9.78	32.67	3.0	$98.01
	Engineering	Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
		Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
	Financial	Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Purchasing	Purchasing Agent	16.06	6.87	22.92	5.0	$114.60
		Level 1	13.80	5.90	19.7	2.0	$39.40
		Clerical	8.27	3.54	11.81	1.0	$11.81
SubTotal							**$701.90**
4. Meeting with All Relevant Staff and Outside Resource Firms (if required) To Determine Scope of Implementation & Events Calendar	Administration	City/County Manager	32.17	13.75	45.92	1.5	$68.88
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.5	$78.60
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.5	$38.00
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.5	$36.11
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.5	$49.01
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.5	$43.43
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	3.0	$315.00
		Jr. Consul.			75	3.0	$225.00
		Clerical			30	0.0	$0.00
SubTotal							**$785.15**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
5. Develop Preliminary Draft of Ord. Based Upon Input From All Resources (Inside/Outside)	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	2.0	$50.66
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	2.0	$48.14
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	2.0	$65.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	3.0	$315.00
		Jr. Consul.			75	6.0	$450.00
		Clerical			30	4.0	$120.00
SubTotal							**$1,081.57**
6. Review & Edit Preliminary Draft Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	2.0	$60.00
SubTotal							**$227.00**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
7. Distribute Final Draft of Ordinance To All Relevant Project Members	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	1.0	$23.81
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
SubTotal							**$37.78**
8. Review & Edit Final Draft Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$157.19**
9. Present Final Draft Ordinance To Elected Officials	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$157.19**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
10. Incorporate All Comments From Staff and Elect. Officials and Presentation Of New Ordinance To Public @ Council/Commission Meeting	Administration	City/County Manager	32.17	13.75	45.92	0.0	$0.00
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.5	$52.50
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	1.0	$30.00
SubTotal							**$133.72**
11. Second Reading of New Ordinance At Public Hearing	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.3	$5.77
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
	Outside Resource Firms	Consultants			105	0.3	$26.25
		Jr. Consul.			75	0.0	$0.00
		Clerical			30	0.0	$0.00
SubTotal							**$77.12**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
12. Adopt & Record New Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Administrative	City/County Clerk	16.68	7.13	23.81	2.0	$47.62
SubTotal							**$100.02**
13. Notify Public Of Adoption & Implementation Criteria (if (required)	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$4,268.56**
14. Implement New Ord. (including Public Education/ Awareness Programs)	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$3,737.60**
15. Incorporate Policy/Procedure Changes Into Code Enf. Software Program	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	4.0	$80.84
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	4.0	$96.28
		Level 1	14.81	6.33	21.14	4.0	$84.56
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Outside Resource Firms	Software Programmer			82.5	8.0	$660.00
SubTotal							**$1,023.00**
16. Incorporate Policy/Procedure Changes Into Policy/ Procedure Manuals	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	2.0	$40.42
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	2.0	$42.28
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	4.0	$48.40
		City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	2.0	$50.38
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	4.0	$48.32
SubTotal							**$292.96**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 2 - For Development And Implementation Of Ordinance Requiring Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs			Time In Hours Per Person	Total Labor Costs
			Average Direct Labor	*Average Indirect Labour @ 29.95%*	*Total*		
17. Enforce New Ordinance	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	8.0	$202.64
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	16.0	$258.08
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	48.0	$1,014.72
		Level 2	11.23	4.80	16.04	48.0	$769.92
		Clerical	8.48	3.63	12.1	16.0	$193.60
		City/County Engineer	22.88	9.78	32.67	8.0	$261.36
		Level 1	17.65	7.54	25.19	48.0	$1,209.12
		Level 2	13.90	5.94	19.85	24.0	$476.40
		Clerical	8.46	3.62	12.08	8.0	$96.64
	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
SubTotal							**$6,008.16**
18. Codification of New Ord.	Outside Resource Firms	Codification Staff			82.5	2.0	$165.00
SubTotal							**$165.00**
		TOTAL					**$19,272.58**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
1. Determine and Review	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
Water Conservation		Level 1	21.43	9.16	30.59	0.0	$0.00
Measures Considered for		Level 2	14.67	6.27	20.95	0.0	$0.00
Ordinance		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**
2. Determine Required	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
Outside Resources		Level 1	21.43	9.16	30.59	0.0	$0.00
(if any)		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.3	$7.24
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$52.34**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: Average Direct Labor	Hourly Costs: Average Indirect Labour @ 29.95%	Hourly Costs: Total	Time In Hours Per Person	Total Labor Costs
3. Meet with All Relevant Staff and Outside Resource Firms (if required) To Determine Scope of Conversion & Events Calendar	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$163.42**
4. Develop Preliminary Draft of Ord. Based Upon Input From All Resources (Inside/Outside)	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$114.50**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: Average Direct Labor	Hourly Costs: Average Indirect Labour @ 29.95%	Hourly Costs: Total	Time In Hours Per Person	Total Labor Costs
5. Review & Edit Preliminary Draft Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$114.50**
6. Distribute Final Draft of Ordinance To All Relevant Project Members	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	1.0	$23.81
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
SubTotal							**$37.78**
7. Review & Edit Final Draft Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: Average Direct Labor	Hourly Costs: Average Indirect Labour @ 29.95%	Hourly Costs: Total	Time In Hours Per Person	Total Labor Costs
8. Present Final Draft Ordinance To Council/Commission	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**
9. Incorporate All Comments From Staff &Council/Com. and Presentation Of New Ordinance To Public @ Council/Commission Meeting	Administration	City/County Manager	32.17	13.75	45.92	0.0	$0.00
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$81.22**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	Hourly Costs: *Average Indirect Labour @ 29.95%*	Hourly Costs: *Total*	Time In Hours Per Person	Total Labor Costs
10. Second Reading of New Ordinance At Public Hearing	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.3	$5.77
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$50.87**
11. Adopt & Record New Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Administrative	City/County Clerk	12.61	5.39	18	2.0	$36.00
SubTotal							**$88.40**
12. Notify Public Of Adoption & Implementation Criteria (if (required)	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	2.0	$27.94
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	8.0	$202.64
		Level 1	14.16	6.05	20.21	5.0	$101.05
		Level 2	11.30	4.83	16.13	5.0	$80.65
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	8.0	$192.56
		Level 1	14.81	6.33	21.14	8.0	$169.12
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	16.0	$522.72
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$2,279.52**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 3 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Minimum Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: Average Direct Labor	Hourly Costs: Average Indirect Labour @ 29.95%	Hourly Costs: Total	Time In Hours Per Person	Total Labor Costs
13. Implement New Ord. (including Public Education/ Awareness Programs)	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	8.0	$161.68
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	16.0	$385.12
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	4.0	$48.40
	Engineering	City/County Engineer	22.88	9.78	32.67	4.0	$130.68
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	4.0	$48.32
SubTotal							**$2,079.80**
14. Incorporate Policy/Procedure Changes Into Code Enf. Software Program	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	2.0	$50.66
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	2.0	$48.14
		Level 1	14.81	6.33	21.14	2.0	$42.28
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
SubTotal							**$141.08**
15. Incorporate Policy/Procedure Changes Into Policy/ Procedure Manuals	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	1.0	$20.21
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	2.0	$23.42
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	1.0	$21.14
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	2.0	$24.20
		City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	1.0	$25.19
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	2.0	$24.16
SubTotal							**$174.85**
16. Enforce New Ordinance	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	8.0	$161.68
		Level 2	11.30	4.83	16.13	4.0	$64.52
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	16.0	$385.12
		Level 1	14.81	6.33	21.14	24.0	$507.36
		Level 2	11.23	4.80	16.04	16.0	$256.64
		Clerical	8.48	3.63	12.1	4.0	$48.40
		City/County Engineer	22.88	9.78	32.67	2.0	$65.34
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	4.0	$79.40
		Clerical	8.46	3.62	12.08	4.0	$48.32
	Legal	City/County Attorney	36.71	15.70	52.4	4.0	$209.60
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	4.0	$55.88
SubTotal							**$2,433.46**
17. Codification of New Ord.	Outside Resource Firms	Codification Staff			82.5	2.0	$165.00
SubTotal							**$165.00**
		TOTAL					**$8,202.41**

Determination of Generalized Cost of Modifying the Building Code
Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
1. Determine and Review Water Conservation Measures Considered for Ordinance	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**
2. Determine Required Outside Resources (if any)	Administration	City/County Manager	32.17	13.75	45.92	1.0	$45.92
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.0	$28.95
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$209.34**

Determination of Generalized Cost of Modifying the Building Code
Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
3. Meet with All Relevant Staff and Outside Resource Firms (if required) To Determine Scope of Implementation & Events Calendar	Administration	City/County Manager	32.17	13.75	45.92	1.5	$68.88
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	1.5	$78.60
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.5	$38.00
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.5	$36.11
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	1.5	$49.01
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	1.5	$43.43
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$245.15**
4. Develop Preliminary Draft of Ord. Based Upon Input From All Resources (Inside/Outside)	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	2.0	$50.66
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	2.0	$48.14
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	2.0	$65.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$196.57**

Determination of Generalized Cost of Modifying the Building Code
Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
5. Review & Edit Preliminary Draft Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.5	$5.86
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.5	$6.05
	Engineering	City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.5	$6.04
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$114.50**
6. Distribute Final Draft of Ordinance To All Relevant Project Members	Legal	City/County Attorney	36.71	15.70	52.4	0.0	$0.00
		Level 1	16.68	7.13	23.81	1.0	$23.81
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
SubTotal							**$37.78**
7. Review & Edit Final Draft Ordinance	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**

Determination of Generalized Cost of Modifying the Building Code Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs			Time In Hours Per Person	Total Labor Costs
			Average Direct Labor	*Average Indirect Labour @ 29.95%*	*Total*		
8. Present Final Draft Ordinanc	Administration	City/County Manager	32.17	13.75	45.92	0.5	$22.96
To Elected Officials		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.5	$14.48
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$104.69**
9. Incorporate All Comments	Administration	City/County Manager	32.17	13.75	45.92	0.0	$0.00
From Staff &Council/Com.		Level 1	21.43	9.16	30.59	0.0	$0.00
and Presentation Of New		Level 2	14.67	6.27	20.95	0.0	$0.00
Ordinance To Public @		Clerical	9.64	4.12	13.76	0.0	$0.00
Council/Commission Meetin	Legal	City/County Attorney	36.71	15.70	52.4	0.5	$26.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	1.0	$13.97
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.5	$12.67
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.5	$12.04
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.5	$16.34
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.0	$0.00
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$81.22**

Determination of Generalized Cost of Modifying the Building Code
Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: Average Direct Labor	Hourly Costs: Average Indirect Labour @ 29.95%	Hourly Costs: Total	Time In Hours Per Person	Total Labor Costs
10. Second Reading of New Ordinance At Public Hearin	Administration	City/County Manager	32.17	13.75	45.92	0.3	$11.48
		Level 1	21.43	9.16	30.59	0.0	$0.00
		Level 2	14.67	6.27	20.95	0.0	$0.00
		Clerical	9.64	4.12	13.76	0.0	$0.00
	Legal	City/County Attorney	36.71	15.70	52.4	0.3	$13.10
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	0.3	$6.33
		Level 1	14.16	6.05	20.21	0.0	$0.00
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	0.3	$6.02
		Level 1	14.81	6.33	21.14	0.0	$0.00
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
	Engineering	City/County Engineer	22.88	9.78	32.67	0.3	$8.17
		Level 1	17.65	7.54	25.19	0.0	$0.00
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	0.0	$0.00
	Financial	Dir. Of Finance	20.28	8.67	28.95	0.0	$0.00
		Level 1	16.17	6.91	23.08	0.3	$5.77
		Level 2	12.88	5.51	18.38	0.0	$0.00
		Clerical	8.70	3.72	12.42	0.0	$0.00
SubTotal							**$50.87**
11. Adopt & Record New Ordinance	Legal	City/County Attorney	36.71	15.70	52.4	1.0	$52.40
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	0.0	$0.00
	Administrative	City/County Clerk	12.61	5.39	18	2.0	$36.00
SubTotal							**$88.40**
12. Notify Public Of Adoption & Implementation Criteria (if (required)	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$4,268.56**

Determination of Generalized Cost of Modifying the Building Code
Through Implementation Of Water Conservation Ordinances

Schedule 4 - For Development And Implementation Of Ordinance Requiring No Outside Resources & Extensive Implementation

Task Descriptions	Department Responsibility	Specific Responsibility	Hourly Costs: *Average Direct Labor*	*Average Indirect Labour @ 29.95%*	*Total*	Time In Hours Per Person	Total Labor Costs
13. Implement New Ord. (including Public Education/ Awareness Programs)	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	24.0	$607.92
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	8.0	$129.04
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	16.0	$338.24
		Level 2	11.23	4.80	16.04	8.0	$128.32
		Clerical	8.48	3.63	12.1	8.0	$96.80
	Engineering	City/County Engineer	22.88	9.78	32.67	24.0	$784.08
		Level 1	17.65	7.54	25.19	16.0	$403.04
		Level 2	13.90	5.94	19.85	8.0	$158.80
		Clerical	8.46	3.62	12.08	8.0	$96.64
SubTotal							**$3,737.60**
14. Incorporate Policy/Procedur Changes Into Code Enf. Software Program	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	4.0	$101.32
		Level 1	14.16	6.05	20.21	4.0	$80.84
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	0.0	$0.00
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	4.0	$96.28
		Level 1	14.81	6.33	21.14	4.0	$84.56
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	0.0	$0.00
SubTotal							**$363.00**
15. Incorporate Policy/Procedur Changes Into Policy/ Procedure Manuals	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	1.0	$25.33
		Level 1	14.16	6.05	20.21	2.0	$40.42
		Level 2	11.30	4.83	16.13	0.0	$0.00
		Clerical	8.20	3.51	11.71	4.0	$46.84
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	1.0	$24.07
		Level 1	14.81	6.33	21.14	2.0	$42.28
		Level 2	11.23	4.80	16.04	0.0	$0.00
		Clerical	8.48	3.63	12.1	4.0	$48.40
		City/County Engineer	22.88	9.78	32.67	1.0	$32.67
		Level 1	17.65	7.54	25.19	2.0	$50.38
		Level 2	13.90	5.94	19.85	0.0	$0.00
		Clerical	8.46	3.62	12.08	4.0	$48.32
SubTotal							**$292.96**
16. Enforce New Ordinance	Specific Department Staff	Dir. Of Building/Zoning	17.74	7.59	25.33	8.0	$202.64
		Level 1	14.16	6.05	20.21	16.0	$323.36
		Level 2	11.30	4.83	16.13	16.0	$258.08
		Clerical	8.20	3.51	11.71	8.0	$93.68
	Specific Department Staff	Dir. Of Code Enforcement	16.86	7.21	24.07	24.0	$577.68
		Level 1	14.81	6.33	21.14	48.0	$1,014.72
		Level 2	11.23	4.80	16.04	48.0	$769.92
		Clerical	8.48	3.63	12.1	16.0	$193.60
		City/County Engineer	22.88	9.78	32.67	8.0	$261.36
		Level 1	17.65	7.54	25.19	48.0	$1,209.12
		Level 2	13.90	5.94	19.85	24.0	$476.40
		Clerical	8.46	3.62	12.08	8.0	$96.64
	Legal	City/County Attorney	36.71	15.70	52.4	8.0	$419.20
		Level 1	16.68	7.13	23.81	0.0	$0.00
		Level 2	13.80	5.90	19.7	0.0	$0.00
		Clerical	9.78	4.18	13.97	8.0	$111.76
SubTotal							**$6,008.16**
17. Codification of New Ord.	Outside Resource Firms	Codification Staff			82.5	2.0	$165.00
SubTotal							**$165.00**
		TOTAL					**$16,189.43**