CITY OF COLUMBIA

AGENDA MEMORANDUM

MEETING DATE: **June 7, 2016**

DEPARTMENT: **Purchasing**

FROM: ***Sandra Wright, Purchasing Agent***

SUBJECT: **AMR/AMI Feasibility Study and Project Management**

FINANCIAL IMPACT: **Engineering- Special Contract (water/sewer)**
5511706– 638305

ORIGINAL BUDGET: **$2,000,000.00**

STRATEGIC GOALS: **Business Growth & Investment**

Six (6) proposals were received in response to the solicitation released for the AMR/AMI Feasibility and Project Management Services (RFP011-15-16) as requested by Utilities and Engineering.

This consultant will perform the feasibility study and up to five years of project management services not to extend beyond June 30, 2021. I respectfully request City Council's approval for these services to be awarded to Ch2m at the cost listed below. Thank you for your consideration and approval of this request.

Description	Duration	Cost
Feasibility Study	4 months	$ 122,000.00
Contingency for Feasibility Study at 15%		$ 18,300.00
Project Management	Up to 5 years	$1,600,000.00
Contingency Project Management at 15%		$ 240,000.00
Total		$1,980,300.00

ATTACHMENTS:

- CC Information (PDF)

- Exhibit- Project Schedule (PDF)
- ColumbiaSC_Price_CH2M_Envelope_1_CD (PDF)
- Exhibit- Project Schedule (PDF)
- APPENDIX III BUSINESS INFORMATION RECORDS_v3 (PDF)
- ColumbiaSC_Price_CH2M_Envelope_2_CD (PDF)
- Fee_Tables (PDF)
- Scope of Work- (Feasibility Study) (PDF)
- Scope_of_Work_v5(FINAL) (PDF)

We Are Columbia

The attached documents reflect the following:

- Letter of DBE and local participation
- Business Information and Affirmative Action Goals
- Tasks cost breakdown
- A conservative estimated timeline of events to include other variables such as completion date, public hearings, acquisition of technology and meters, etc.

CH2M
200 Verdae Boulevard
Greenville SC, 29607
www.ch2m.com

City of Columbia/Purchasing Division
1136 Washington Street - 4th floor
Columbia, SC 29201

June 3, 2016

Attention: RFP011-15-16 -- Automated Meter Reading (AMR) and Advanced Metering Infrastructure Feasibility Study and Project Management Services

Dear Ms. Robinson-Lee,

The City of Columbia is undertaking this project to assess the benefit and cost of installing Automated Meter Reading (AMR) and/or Advanced Metering Infrastructure (AMI) and to proceed with implementation if the business case is favorable. This project, if implemented, will represent the City's largest project ever undertaken.

CH2M and our teaming partners are very excited to be selected by staff to provide professional services for this project. Through contract negotiations we have increased our commitment utilization of disadvantaged business enterprises (DBEs) from $81,439 to $398,077. These services will be provided by out teaming partners Rohadfox (Women Business Enterprise) and Atlantic South Consulting Services (Minority Business Enterprise) who has an office at 1728 Main Street in Columbia. Attached please find the revised Appendix III – Business Information Records that reflects this increase in DBE utilization. Also attached is the completed Affirmative Action Procurement and Contracting Goals form which documents our commitment to meeting a 11.5 percent DBE participation goal through our subcontracting efforts.

We understand that the City has an overall goal of 20 percent for DBE/LBE utilization for this project. As we develop the request for proposals for the Contractor(s) who will provide and install the selected AMR/AMI systems we will require a 20% commitment from those entities.

Our team is looking forward to working with your staff on this important project.

Respectfully,

CH2M HILL Engineers, Inc.

Kent Smith, V.P.
Greenville Office Manager

Jaason Englesmith
Project Director

Attachments:
Revised Appendix III – Business Information Records form
Affirmative Action Procurement and Contracting Goals form

AFFIRMATIVE ACTION PROCUREMENT AND CONTRACTING GOALS

It is the goal of the City of Columbia, SC to maximize opportunities for historically Disadvantaged Enterprise Businesses (DBEs) including, but not limited to, Small Businesses (SBEs), Minority Businesses (MBEs), Women-Owned Businesses (WBEs). The City has implemented an overall citywide 10% goal to encourage socially and economically disadvantaged business participation. This goal extends to bidders, subcontractors and suppliers on its procurement and contracting offerings.

Additional information on the City's affirmative action goals and objectives may be obtained by contacting the following office:

City of Columbia Office of Business Opportunities
1225 Lady Street, Suite 102
Columbia, SC 29201
(803) 545-3950
www.columbiasc.net/OBO

The City's success in tracking the amount of business received by SBE, MBE and WBE FIRMS (whether as a prime contractor or subcontractor) is dependent upon the business community partnering with us in this important endeavor.

Each firm submitting a bid, offeror or RFQ shall ensure their proposed submittal identifies the percentage of subcontracting anticipated for this effort. Please complete the Small Business Form included in your bid packet and sign to certify if your business is a SMWBE and the anticipated percentage of work that you intend to subcontract to assist the City with its DBE goals.

SUBCONTRACTING GOALS

As a result of this contract/agreement, the subcontracting goals are as follows:

SB Goals 0 %

MBE 6 %

WBE 5.5 %

LSA 0 %

The contractor will also be expected to ensure subcontractor performance during the period of performance and include optional periods as applicable. Achievement of these goals is expected during the life of the contract/agreement to include any changes incorporated by modification to the contract/agreement.

AFFIRMATIVE ACTION UTLIZATION GOALS

INCLUDING LABOR SURPLUS UTILIZATION PLAN

INSTRUCTIONS: This form must be submitted with any bid, proposal, or proposed negotiated contract or within a reasonable time thereafter, but prior to contract award. This Utilization Plan must contain a detailed description of the supplies and/or services to be provided by each certified Small, Minority and Women-owned Business Enterprise (SMWBE) under the contract. This form includes federally required Labor Surplus Utilization efforts. Attach additional sheets if necessary.

If you are a SBE, MBE WBE, or other type of disadvantaged business enterprise, please check one of the following boxes:

SBE ☐ MBE ☐ WBE ☐ Other _____

1. In the spaces below, report the anticipated dollars that you intend to subcontract to each business type if a contract or agreement is awarded to your firm. (If you do not intend to subcontract any work to others, even if you are a S/M/WBE, put zeros in the spaces below).

   Total **SBE Participation Percentage** to be subcontracted _____%

   Total **MBE Participation Percentage** to be subcontracted $208,098 (6%) %

   Total **WBE Participation Percentage** to be subcontracted $189,979 (5.5%) %

   Total **Other DBE Participation Percentage** to be subcontracted_____%

2. If you are not a SBE, MBE, or WBE and you do not plan to utilize such firms in this agreement, please state your reasons and use an additional page if needed:

_____

_____

_____

_____

LABOR SURPLUS UTILIZATION PLAN

In accordance with federal requirements, the City also encourages the use of firms located in labor Surplus areas. A Labor Surplus area is an area designated by the Secretary of Labor as having concentrated unemployment or underemployment in comparison with other areas. Used as one of the criteria for designating economically disadvantaged vendors/suppliers. **If your business is located in a labor surplus area, please check here:** ☐

Define the LSA here_____

The City anticipates that this effort will be continued to the maximum extent practicable throughout the life of the contract or agreement. Any changes or modification to the contract/ agreement will include, at a minimum the same proposed goals included in the negotiated agreement/contract.

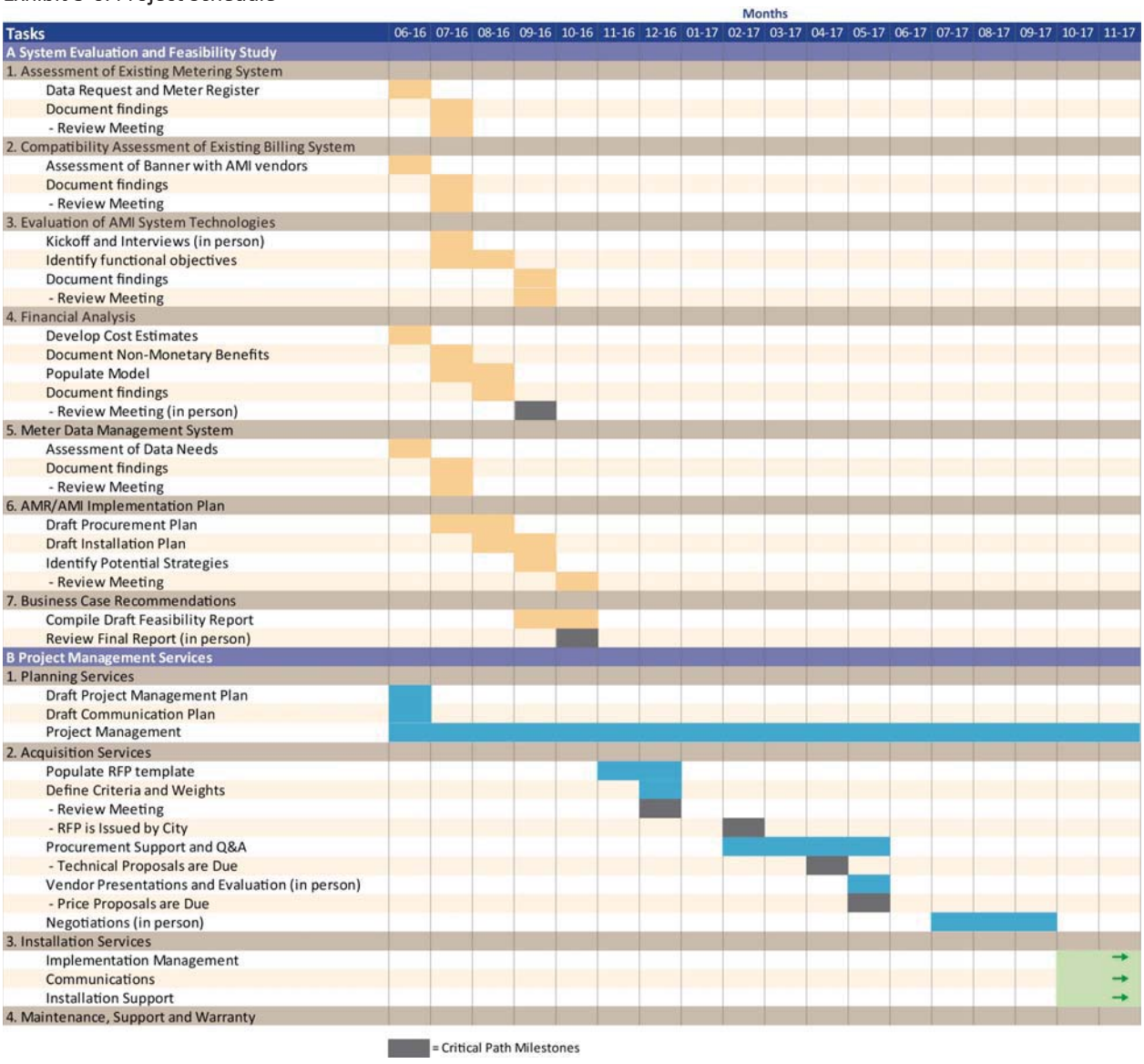
The goals provided by the Successful Offeror shall be incorporated into the final contractual agreement between the parties or as amended through final contract negotiations.

By submitting this Exhibit, the respondent certifies he/she is an authorized representative of the company, understands and will comply with all requirements herein in any awarded action.

Matth D No

Signature	**Date** 6/2/2016
(Print Name) Matt Noesen	**Business Name** CH2M HILL Engineers, Inc.

Exhibit 3-6. Project Schedule



Anticipated Level of Effort of CH2M Team

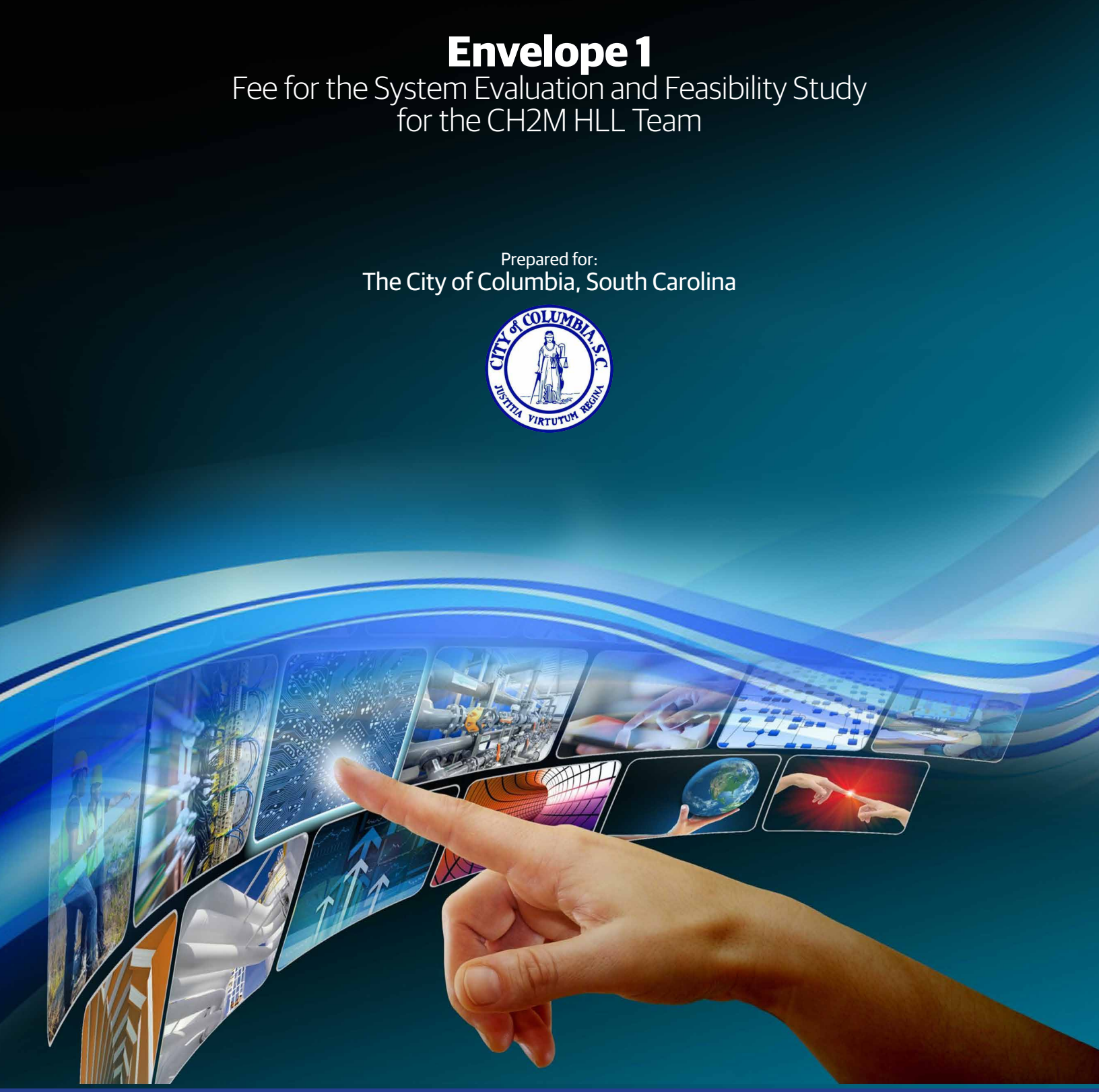
Our estimated level of effort for the System Evaluation and Feasibility Study is presented in Exhibit 3-7 and forms the basis for our firm price for these services is attached in a separate envelope. CH2M has hand-selected the team below, which we feel represents the best combined experience and value for Columbia for this important project. Our Project Director, Jaason Englesmith, is a national expert in AMR/AMI feasibility and vendor procurement. Our Dedicated Project Manager, Josh Braman, has extensive experience implementing AMR/AMI systems for large water utilities. We have supplemented our team with sub consultant Atlantic South Consulting Services to provide specific local knowledge and expertise, including Elisa Linbaugh, the former Chief Information Officer (CIO) for the City.

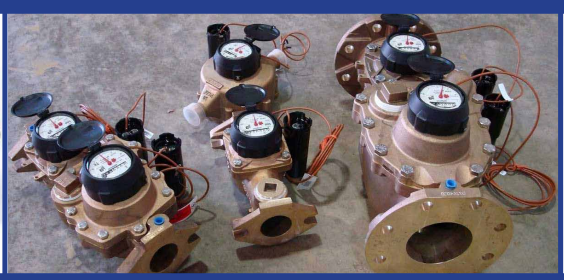
CH2M has extensive experience conducting smart water meter evaluations, overseeing the - implementation of customized AMR/AMI solutions, and operating and maintaining water utilities. A key differentiator in our proven approach is that we perform both an operational assessment to determine functional objectives as well as a cultural assessment to ensure that

Envelope 1

Fee for the System Evaluation and Feasibility Study
for the CH2M HLL Team

Prepared for:
The City of Columbia, South Carolina





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System Evaluation and Feasibility Study

Task No.	Task Description	Fee, $
1	Assessment of Existing Metering System	$7,639
2	Compatibility Assessment of Existing Billing System	$3,746
3	Evaluation of AMI System Technologies	$30,610
4	Financial Analysis	$45,544
5	Meter Data Management System	$2,162
6	AMR/AMI Implementation Plan	$6,090
7	Business Case Recommendations	$25,416
	Total	$121,206

Assumptions/Notes:

1. Work will be completed in 2016

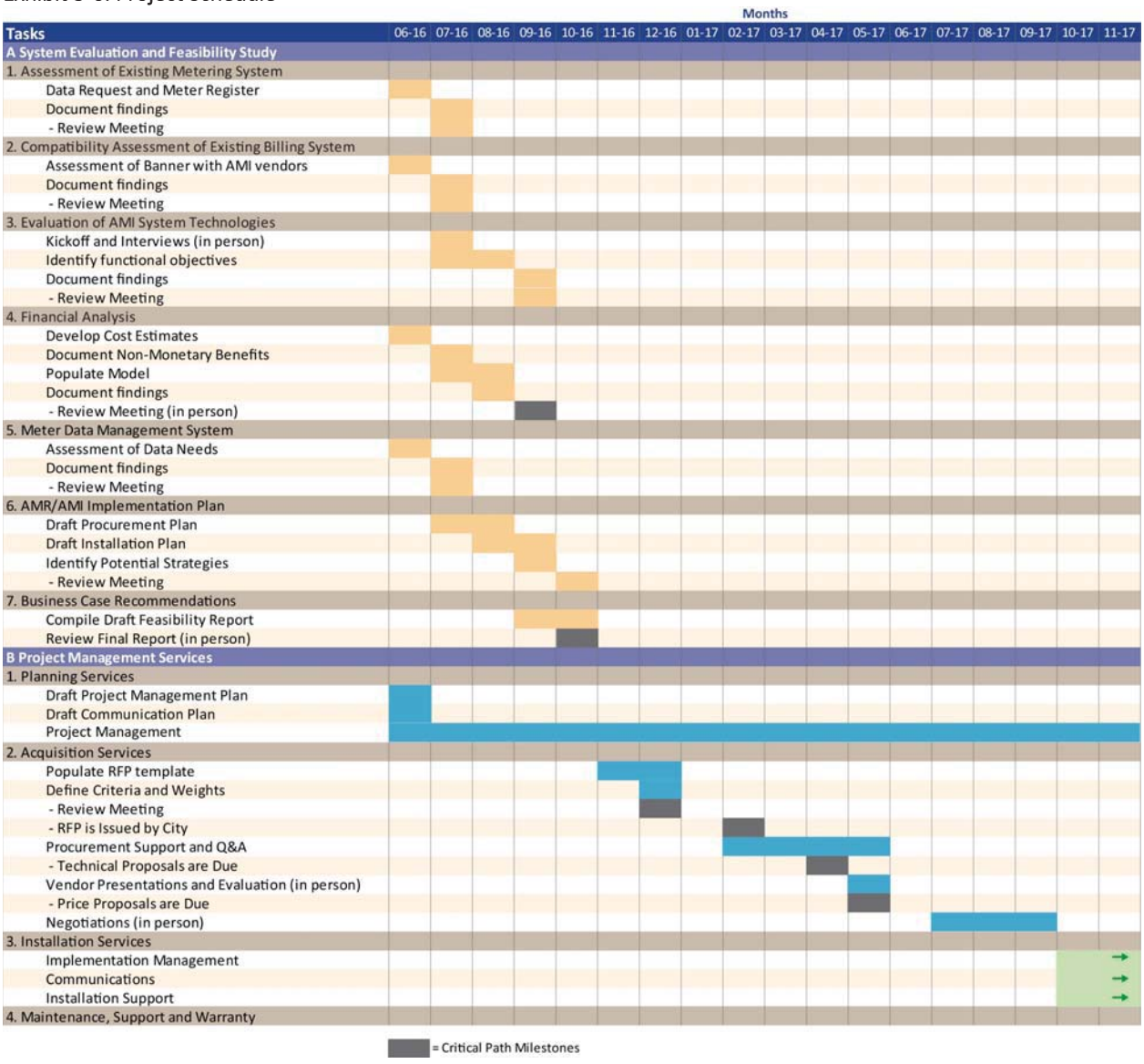
APPENDIX VII- RATE SCHEDULE FOR CH2M TEAM

Project Manager	$172	Per Hour
Water Engineer (Junior)	$130	Per Hour
Water Engineer (Senior)	$220	Per Hour
Water Field Technician	$ N/A	Per Hour
Water Meter Foreman	$ N/A	Per Hour
Water Meter Inspector	$ N/A	Per Hour
Water Meter Servicer	$ N/A	Per Hour
Other, if so please add below		
Project Director	$263	Per Hour
QA/QC and Project Engineer I	$263	Per Hour
Project Engineer II	$186	Per Hour
Administrative Support I	$90	Per Hour
Administrative Support II	$68	Per Hour
Project Engineer (Rohadfox)	$145	Per Hour
Project Inspector (Rohadfox)	$110	Per Hour
Project Engineer (Atlantic South)	$150	Per Hour
Senior Project Engineer (Atlantic South)	$175	Per Hour
IT Integration Support/Public Relations Support (Atlantic South)	$120	Per Hour

Rates are for calendar year 2016. Subsequent years will be adjusted 3% each year with the adjustment occurring on January 1.

Direct CH2M Expenses are billed at cost; outside services will include a 10 percent markup.

Exhibit 3-6. Project Schedule



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APPENDIX III- BUSINESS INFORMATION RECORDS

RFP011-15-16: AMR/AMI Feasibility Study and Project Management Services

The Bidder shall list all subcontractors and vendors, who will be providing subcontracting services, furnishings materials, etc. for this project. The list shall be submitted in the format provided below. Any proposed changes from the list shall be submitted in writing to the Owner prior to initiation of any action, with the reason for the proposed changes.

Business Name/ Address	**Contact Name Telephone**	**Services/Materials to be Provided**	**Cost of Service/Mat ($ Value)**
Atlantic South Consulting Services 1728 Main Street, Columbia, SC 29201	Brent Herring (843)266-3998	Assistance with System Evaluation and Feasibility Study (various subtasks) Project Management Services (support with Installation Services)	$10,890 $197,208*
Rohadfox Construction Control Services Corporation 1320 Main Street, Columbia, SC 29201	Joe Porter (404) 880-9888	Project Management Services (support with Installation Services)	$189,979*

TOTAL: $ 398,077

***Note that the specific services to be provided under the Project Management Services are not well defined this time. A preliminary estimate has been developed; however, once the required services is better defined later in the project the corresponding costs of these services can be better determined.**

CH2M HILL Engineer, Inc.

Contractor

By 

I certify this information is true and correct.

June 3, 2016

Date

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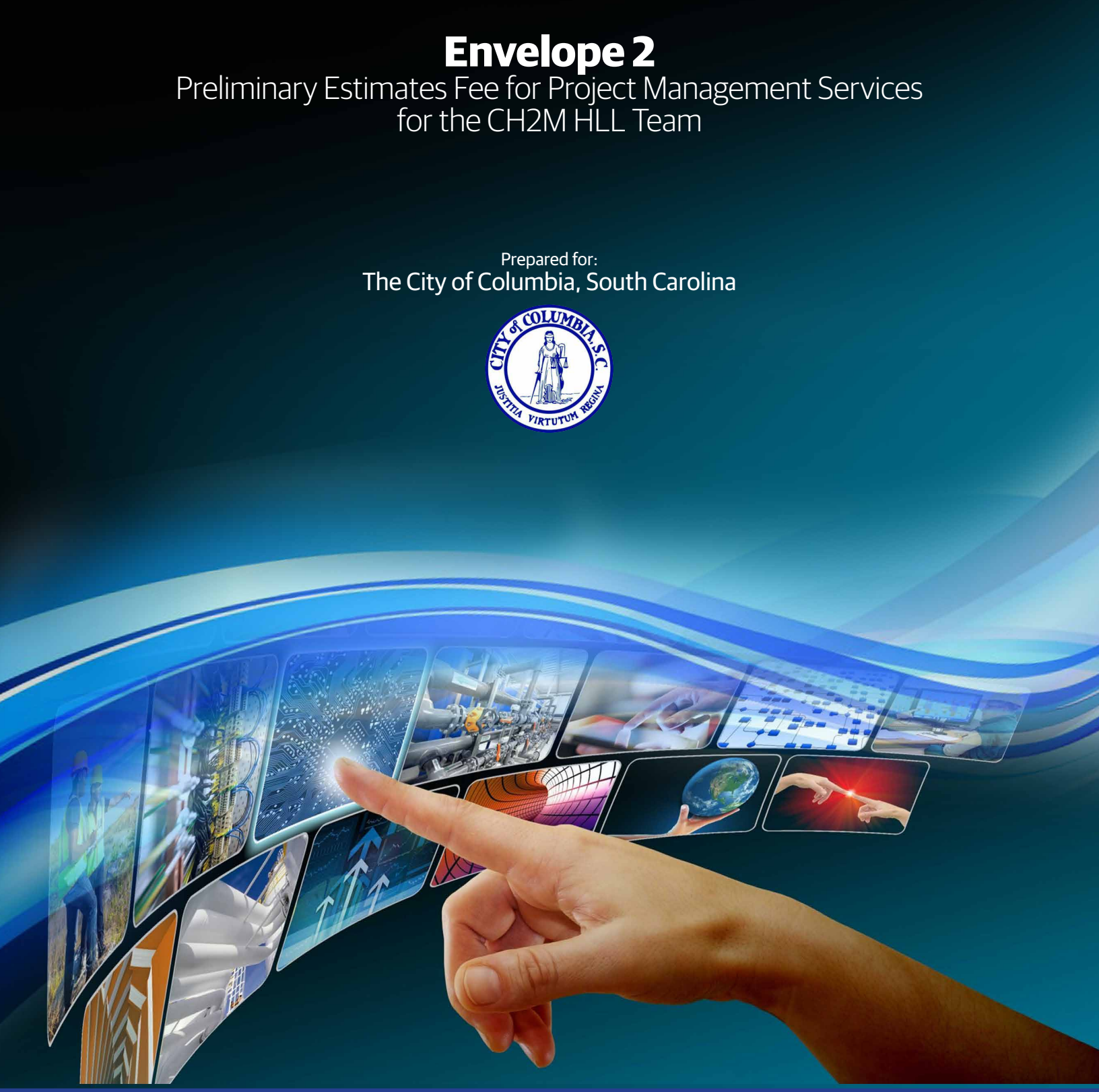
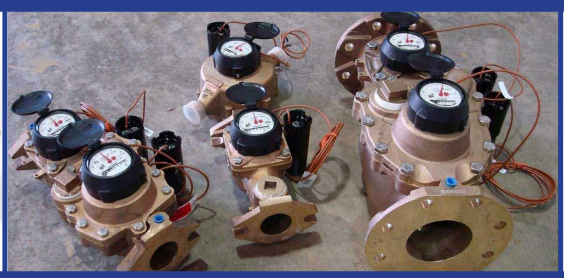
Envelope 2

Preliminary Estimates Fee for Project Management Services
for the CH2M HLL Team

Prepared for:
The City of Columbia, South Carolina





ch2m SM

Project Management Services

Task No.	Task Description	Fee, $
1	Planning Services	$57,678
2	Acquisition Services	$65,806
3	Installation Services	$1,440,754
4	Maintenance, Support and Warranty	$9,724
	Total	$1,573,963

Assumptions/Notes:

1. Fees are based on 3% escalation per year of labor rates.
2. Fees for installation services are based on a preliminary estimate of level of effort which is which is based on limited knowledge of the project scope. Estimate will have to be updated at a later time once the project direction is better defined.

Task 1: System Evaluation and Feasibility Study

Subtask No.	Subtask Description	Fee, $
1.1	Assessment of Existing Metering System	$7,903
1.2	Compatibility Assessment of Existing Billing System	$3,746
1.3	Evaluation of AMI System Technologies	$30,610
1.4	Financial Analysis	$45,544
1.5	Meter Data Management System	$2,162
1.6	AMR/AMI Implementation Plan	$6,090
1.7	Business Case Recommendations	$25,416
1.8	Project Management	$29,878
	Total	$151,348

Task 1 Assumptions/Notes:

1. Work will be completed in 2016

Task 2: Project Management Services

Subtask No.	Subtask Description	Fee, $
2.1	Planning Services	$27,800
2.2	Acquisition Services	$65,806
2.3	Installation Services	$1,497,468
2.4	Maintenance, Support and Warranty	$9,724
	Total	$1,600,798
2.5	Optional Subtask: Additional Installation Services	$1,735,097

Task 2 Assumptions/Notes:

1. Fees are based on 3% escalation per year of labor rates.
2. Fees for Installation Services are based on a preliminary level of effort estimate based on limited knowledge of the project scope. Estimate may have to be updated at a later time once the project direction is better defined. For example, assumes 40 months duration with PM at half time. See scope of work for additional assumptions.
3. Optional Subtask 2.5 provides two, full-time Field Services Managers for 40 months.

Scope of Work

for the

Automated Meter Reading (AMR) & Advanced Metering Infrastructure (AMI) Feasibility Study and Project Management Services

Background

CH2M employs a comprehensive client-centric approach to the development of AMR/AMI programs based on leading industry knowledge and insight. Through our experience representing both small and large utilities and municipalities, we maintain our industry leading position and up-to-the-date technical knowledge regarding communication networks, system functionality, and device-specific capabilities. This knowledge is invaluable as we work with our clients to determine their specific functional objectives for AMR/AMI, determine which technical solutions are feasible, specify performance criteria in procurement documents, and evaluate proposals to select the system that meets the long term needs of the community.

Our tailored approach to AMR/AMI programs emphasizes matching the right technology with Columbia-specific needs to confirm that the selected AMR/AMI system serves the long-term goals and objectives of providing residents with outstanding quality, service, and value. **We understand that the City is ultimately focused on delivering water service, not just a technology project, so we take a holistic approach to deliver proven AMR/AMI solutions that improve not just meter-to-cash, but overall utility operations.** As consulting engineers, we go the extra mile as your owner's agent to confirm benefits are realistic and achievable, because we want to be a long-term partner with the City of Columbia and won't just walk-away after the new meter system is installed, something no other water-focused AMR/AMI consultant with large utility experience can claim.

As part of the written feasibility study, CH2M will assess and develop functional objectives for a system that will support the goals and ambitions of Columbia; this is not a "one size fits all" technology. Developing the functional objectives for an AMI system is dependent upon the future processes that Columbia is willing and able to implement in order to leverage the interval data. For example, remote disconnect meters are more expensive and require full two-way communications, which may or not be desirable depending on the City's objectives and ability to support the required business process changes to successfully utilize this system.

In our experience, in order to leverage the investment in this technology, and harness the value drivers, it is very important to understand current and future utility operations, not just meter reading and billing. A key differentiator in our approach is that we perform both an operational assessment to determine functional objectives as well as a cultural assessment to ensure that the operational changes required to leverage and disseminate interval data throughout the enterprise will be possible. This will enable our team to begin with the end in mind.

CH2M's Approach Will Incorporate Lessons Learned from Columbia's AMR/AMI Pilots

The City conducted AMR and AMI pilots and learned many valuation insights including:

- Collaboration between City departments: The pilot highlighted the importance of close collaboration between various City departments. Early involvement of the City's IT department will be critical so that data storage infrastructure requirements can be understood and addressed.
- Quality of AMR/AMI System: During the pilot there were durability issues with some of the MIUs. Uptime and reliability of signal transmission under various situations (e.g., vehicles parked over transponders) needs to be addressed.
- Meter Installation: Meter installers need to be pre-qualified to ensure competency.
- Management oversight resources during deployment: Identifying staff with the available time and pertinent experience is critical to successfully manage the work progress.

Our proven approaches outlined in our approach address these items so that the lessons learned from the pilot are thoroughly addressed ensuring a successful project.

Project Scope of Work Outline

Task 1: System Evaluation and Feasibility Study:

- Task 1.1: Assessment of Existing Metering System
- Task 1.2: Compatibility Assessment of Existing Billing System
- Task 1.3: Evaluation of Advanced Metering Infrastructure System Technologies
- Task 1.4: Financial Analysis
- Task 1.5: Meter Data Management System
- Task 1.6: AMR/AMI Implementation Plan
- Task 1.7: Business Case Recommendations
- Task 1.8: Project Management

Task 2: Project Management Services

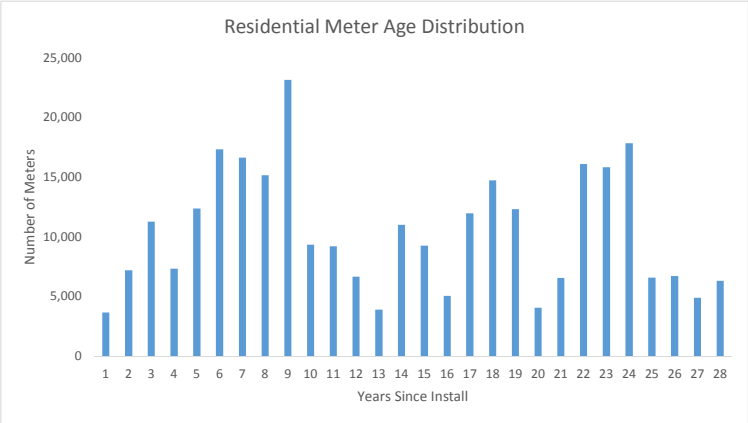
- Task 2.1: Planning Services
- Task 2.2: Acquisition Services
- Task 2.3: Installation Services
- Task 2.4: Maintenance, Support and Warranty Management Assistance
- Task 2.5: Optional Services – Additional Installation Services

Scope of Work

Task 1: System Evaluation and Feasibility Study

Subtask 1.1: Assessment of Existing Metering System

CH2M will kick off this task by providing an initial data request, which will be used to develop the initial meter register. We will work with staff to determine which assets should be replaced and/or migrated to the new system based on age, condition, and compatibility, with an interest in developing uniformity across the meter inventory.



Metrology – CH2M will work closely with staff to identify the desired functionality objectives of the future meters in order to weigh the two options: replacement versus retrofitting. Replacement of existing meters, lids, and pits can be one of the biggest cost elements of an advanced meter implementation. Retrofitting, rather than replacing, meters and lids can result in significant cost savings but can also adversely affect meter reliability. Legacy meters may provide inadequate measurement granularity and/or low-flow accuracy for important applications. There is a trend towards improved leak detection beyond the meter, but some meter registers simply do not have the granularity to provide that functionality. CH2M will work closely with staff to determine the desired functionality and then reflect that functionality in the technical specifications in the RFP (which will be developed in Subtask 2.2: Acquisition Services of the subsequent Task 2) so that the correct system to meet Columbia's objectives is eventually selected.

Assumptions:

- Inspect up to 500 meter boxes in 15 different areas; performed by subconsultant with guidance from CH2M.
- Industry standard benchmarks will be used for increased registration assumptions in the business case, based on City's meter inventory and age records; site specific meter efficiency sampling & testing will not be conducted.

Deliverables:

- Data request in Email format
- Findings from this task will be documented in a draft memorandum (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and the revised findings will be

included in the implementation plan road map/business case recommendations generated under Subtasks 1.6 & 1.7.

Subtask 1.2: Compatibility Assessment of Existing Billing System

Beyond the obvious automation of manual meter reading, the benefits of AMR/AMI come from integrating it with the City's other systems, particularly the CIS, to enable applications such as final reads, consumption analysis to research high bill complaints, and monitoring customers whose service has been terminated to make sure it stays off. Other applications support the AMR/AMI system as well as the City's operations; these include:

- Providing customers access to their consumption information through a web portal
- Using time-synchronized meter readings to perform a "mass balance" on a portion of the distribution system to identify water losses
- Evaluating coincident demands from a sample of meters to provide peaking information for a hydraulic model
- Generating a work order for an MIU with an error flag or a succession of missing reads
- Tracking meters, meter registers, MIUs and DCUs in an asset management system

Our team brings technical expertise in AMR/AMI software, customer service and billing applications such as Banner, GIS systems such as ESRI's Arc products, web technology, and a variety of other software products.

While the City's existing Banner CIS will likely be compatible with any AMR/AMI system, the real difference is realized during systems integration and meter change-out. When meters are replaced during the implementation phase, a daily file is received from the AMR/AMI vendor including the new meter details. An interface uses that file to automatically update the meter properties at the upgraded account. This process can include a series of quality control checks to avoid duplicate serial numbers or mis-keyed information from hardware not in the City's inventory system of record.

Every interface has to be managed, maintained and upgraded (almost every time there is a version change in one of the systems). Unless data sets have unique "homes," multiple databases need to be synchronized. For example, data from an MIU change-out work order needs to update the AMR/AMI system database and perhaps the CIS.

We have learned from our other AMR/AMI projects that it is essential to be explicit about the costs and responsibilities for these interfaces, and to engage the software vendor or application developer early on to provide time to scope, develop, test, document and train utility staff.

Assumptions:

- Staff discussions necessary to perform this assessment will be conducted as part of the staff interviews conducted under Subtask 1.3

Deliverables:

- Findings from this task will be documented in a draft memorandum (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and the revised findings will be included in the Phase 1 report generated under Subtask 1.7.

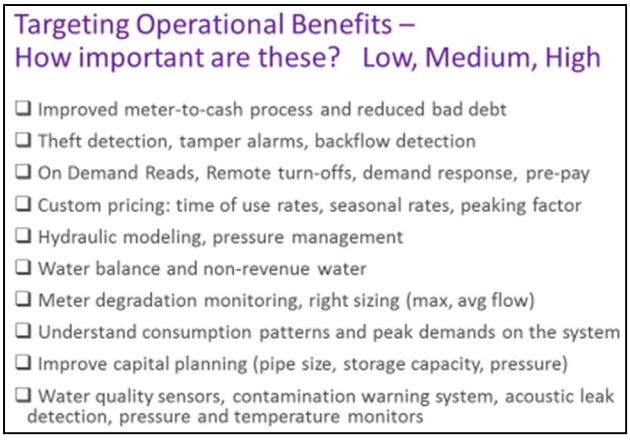
Subtask 1.3: Evaluation of Advanced Metering Infrastructure System Technologies

We will follow the initial data request by holding a kickoff meeting along with a series of interviews with key stakeholders across the enterprise to identify issues and opportunities that would be presented by an advanced metering system because advanced metering data could affect every department within the City, such as personnel in meter reading, customer service, billing, engineering, and IT.

To maximize the value provided by a new system deployment, each employee within the Department needs to understand the benefits associated with interval data. We will work with City staff to evaluate each benefit and rate them Low, Medium, or High based on level of interest, which will help drive the conversation related to functional objectives. Some of the common topic areas that we will cover include theft detection, on-demand reads, leak alarms, remote shut-off, backflow detection, accommodating temporary construction meters and customer web portals that are both enabled and supported by various systems in different ways.

People/Staffing – A basic assessment of the current staffing levels and future staffing levels required to operate and maintain an advanced system will be performed. This will include the number of full time equivalent positions (FTEs) required for meter reading, billing, inspection, etc. for the future state assuming that identified process improvements are successfully implemented.

Business Processes – Efficiency improvements in business processes can be had but tend to be the second or third most important business case element behind labor reductions and conservation/supply management opportunities. Understanding existing business processes and anticipated improvements or changes to those processes is essential to successful deployment. CH2M will work with process owners and subject matter experts to understand how the various process improvements will affect the business case, timing, and dependencies. The City will likely identify immediate, near term, and long term process improvements relative to the adaptability of advanced analytics. For example, process changes such as eliminating truck rolls for customer inquiries can be implemented immediately following training of customer service representatives. Other changes such as actively managing storage levels to



minimize pumping volumes and potential nitrification will require advanced analytics and likely a longer term implementation horizon.

Communication Technology – Current communications protocols are not interoperable, so selecting a fixed network RF "language" means partnering with that specific vendor for the life of the technology, typically 20 years. This concept drives many of our procurement practices, providing our clients with the best opportunity to benefit from this partnership, rather than be hindered by it.

Assumptions:

- Up to two CH2M project team members (anticipated to be the project director and project manager) will attend kick-off meeting and staff interviews.

Deliverables:

- Agenda and minutes for kick-off meeting
- Findings from this task will be documented in a draft memorandum (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and the revised findings will be included in the report generated as part of Subtask 1.7.

Subtask 1.4: Financial Analysis

CH2M will leverage our existing probabilistic business case model to articulate target benefits for AMR/AMI and explore the return on investment based on a range of values rather than specific targets. This model, demonstrated in Exhibit 1, enables us to provide a confidence range for the business and an understanding of relative sensitivities to each of the business case drivers. Not only does this provide greater insight into the realities of potential savings, but also enables us to improve risk management during implementation to confirm that highly-sensitive value drivers are carefully managed to succeed.

In addition to identifying the benefits of system deployment, we will also develop cost estimates after identifying the particular functionality and process changes that will be enabled and supported by the City.

Exhibit 1. Example Business Case Dashboard

Business Case Outputs:	AMI	AMR
Initial Capital Cost	$58,500,000	$52,900,000
Annualized Benefit	$5,300,000	$3,400,000
Simple Payback (years)	11.0	15.5
Net Present Value	$13,700,000	($3,900,000)
Internal Rate of Return (IRR)	9.0%	3.6%

AMR Alternative - What percent (%) of the system is AMR?

100

POSITIVE BENEFITS

		Total Weighted NPV	$ 90,200,000	$ 48,200,000
Business Case Elements	Weight	AMI NPV	AMR NPV	
Additional Revenue				
AR1: Additional water revenue (one time).	100%	$ 4,300,000	$ 4,300,000	
AR2: Additional sewer revenue (one time)	0%	$ -	$ -	
AR3: Charge for water theft from SFO accounts	100%	$ 1,400,000	$ -	
AR4: Less bad debt resulting from smaller bills	100%	$ 7,700,000	$ 7,700,000	
AR5: Less money returned to Customers for fraudulent leaks	75%	$ 2,400,000	$ -	
AR6: New Meters, Improved Registration	100%	$ 12,500,000	$ 12,500,000	
AR7: Salvage Value	100%	$ 1,100,000	$ 1,100,000	
Cost Savings				
CS1: Reduced meter reading labor or avoided hire	100%	$ 26,900,000	$ 19,800,000	
CS2: Reduced meter-reading vehicle use	100%	$ 3,700,000	$ 2,800,000	
CS3: Reduced labor & costs from turn-ons/turn-offs	75%	$ 15,800,000	$ -	
CS4: Reduced labor from testing disputed meters	100%	$ 2,700,000	$ -	
CS5: Reduced Labor from Leak Committee Process	100%	$ 700,000	$ -	
CS6: Improved Capital Planning	25%	$ 4,200,000	$ -	
Avoided Costs				
AC1: Avoided labor cost of achieving target abandonment rate	75%	$ 3,500,000	$ -	
AC2: Backflow detection/prevention on residential meters	25%	$ 2,500,000	$ -	
Other Benefits				
OB1: Other Benefits	25%	$ 800,000	$ -	

NEGATIVE IMPACTS

		Total Weighted NPV	$ 76,300,000	$ 51,900,000
Business Case Elements	Weight	AMI NPV	AMR NPV	
Capital Cost				
CC1: Meters: Neptune T-10 or similar	100%	$ 23,800,000	$ 23,800,000	
CC2: Composite Lids: Nicor or similar	100%	$ 4,200,000	$ 4,200,000	
CC3: MIUs: Neptune R900i or similar	100%	$ 19,700,000	$ 19,700,000	
CC4: Communication Network	100%	$ 2,400,000	$ -	
CC5: Integration Costs	100%	$ 2,900,000	$ 300,000	
Additional Operating Cost				
OC1: Software Licenses and Backhaul Fees	100%	$ 4,500,000	$ -	
OC2: Additional staff analysts on staff for business intelligence	50%	$ 4,000,000	$ -	
OC3: Additional staff at walk-in center to handle monthly billing	50%	$ 800,000	$ 800,000	
OC4: Postage for Monthly Billing	100%	$ 1,900,000	$ 1,900,000	
Reduced Revenue				
RR1: Less Leak Dispute Revenue	50%	$ 6,600,000	$ -	
RR2: Water Conservation	25%	$ 4,300,000	$ -	
Other Costs				
OT1: Other Costs (contingency)	50%	$ 1,200,000	$ 1,200,000	

Examples of Tier 1 benefits are described in Exhibit 2, but we also include other benefits identified with the City during the functional assessment. Ultimately, the benefit model we develop will be consistent with the functional and technical objectives of the selected system.

Exhibit 2. Key Elements of Business Case Model: Level 1 Benefits

Activities	Summary
Meter reading labor	AMR/AMI technology reduces the number of meter readers and thus reading labor cost. Meter reading employees could possibly be redeployed to perform work tasks such as service disconnection and meter installation/maintenance.
Customer accounting	This process is streamlined because with AMR/AMI capabilities, meters can be read faster and more accurately. As a result, manually created or modified bills are reduced.
Reduction in customer information activity	Customer information activity frequently is the result of estimated bills, skipped reads, and misreads, generating customer visits or calls to utilities. AMR/AMI systems help reduce these activities, saving labor costs.
Reduction in credit and collection	Fixed network technologies offer billing flexibility, resulting in credit and collection reduction.
Reduction in arrears	Because of efficiencies in deployment of AMR/AMI technologies, utilities are often able to reduce backlogs in readings and in addressing accounts receivables.
Field work reduction	Locating meters, high bill inquiries, resolution of meter mixups, stopped meter investigations, disconnect and recheck, and vehicle usage are some activities associated with work reduction.
Water leak detection	Water leakage occurring within the system and customer's property may be detected with AMR/AMI.
Tamper/theft detection	AMR/AMI systems have built-in tamper detectors. This function can discourage tampering and theft of water.
Water quality	AMR/AMI can identify cases of backflow.

Exhibit 2. Key Elements of Business Case Model: Level 1 Benefits

Activities	Summary
Hydraulic model	AMR/AMI can greatly enhance the accuracy and functionality of a utility's hydraulic model.
Meter accuracy	Analysis of the existing population's meter accuracy will indicate whether replacement of all or part of the population is warranted and the potential revenue enhancement.

CH2M will identify technologies that deliver key functional requirements (AMR, Traditional AMI, Cellular, and hybrid) and develop both Capital and O&M cost estimates (based on our industry database) for each type of technology that meets the functional requirements, including meter and pit lid replacement, meter installation labor, meter interface hardware, meter interface installation labor, communication network hardware, communication installation labor, ongoing operation and maintenance, and customer information & billing system integration requirements. A life cycle cost analysis will be performed, and a Net Present Value (NPV) will be calculated so we can compare cost-benefit for various system-types over 10 years of ownership.

Also included in Task 4 will be a facilitated discussion about potential funding mechanisms as well as available grants to help offset the cost of AMR/AMI. CH2M has experience writing and submitting successful grant applications for AMI systems. A recent example was the award of $300,000 to the Jordan Valley Water Conservancy District in 2014 from the Bureau of Reclamation's WaterSmart grant program.

Assumptions:

- Up to two CH2M project team members (anticipated to be the project director and project manager) will attend a meeting with City staff to review findings.

Deliverables:

- Agenda and minutes for review meeting
- Findings from this task will be documented in a draft memorandum (PDF format provided electronically). One set of consolidated review comments will be provided by the City (if necessary) in addition to the comments verbally provided at the review meeting. Comments will be addressed as appropriate and the revised financial analysis will be included in the report generated as part of Subtask 1.7.

Subtask 1.5: Meter Data Management System

Should a fixed network AMI system be selected, it will require a meter data management (MDM) system. Fixed network vendors typically include their MDM system as part of their proposal. However, some 3rd party vendors also provide stand-alone MDM systems to support AMI. Should we determine that a third-party application is needed, we will work with Columbia to incorporate that requirement as a separate contract line item in the AMI RFP (which will be developed in Subtask 2.2: Acquisition Services of the subsequent Task 2).

Implementation of an advanced metering system can be potentially disruptive to the enterprise, particularly during implementation and integration. However, data integration is critical to the successful realization of benefits. We will work closely with your staff to ensure a smooth integration with the existing systems (Banner, CMMS, etc.) that will need to receive interval data from the MDMS and highlight any concerns or special situations. The system vendor will propose specific integration steps and system interfaces that are required to enable data connectivity with their specific MDMS.

Assumptions:

- Staff discussions necessary to perform this assessment will be conducted as part of the staff interviews conducted under Subtask 1.3

Deliverables:

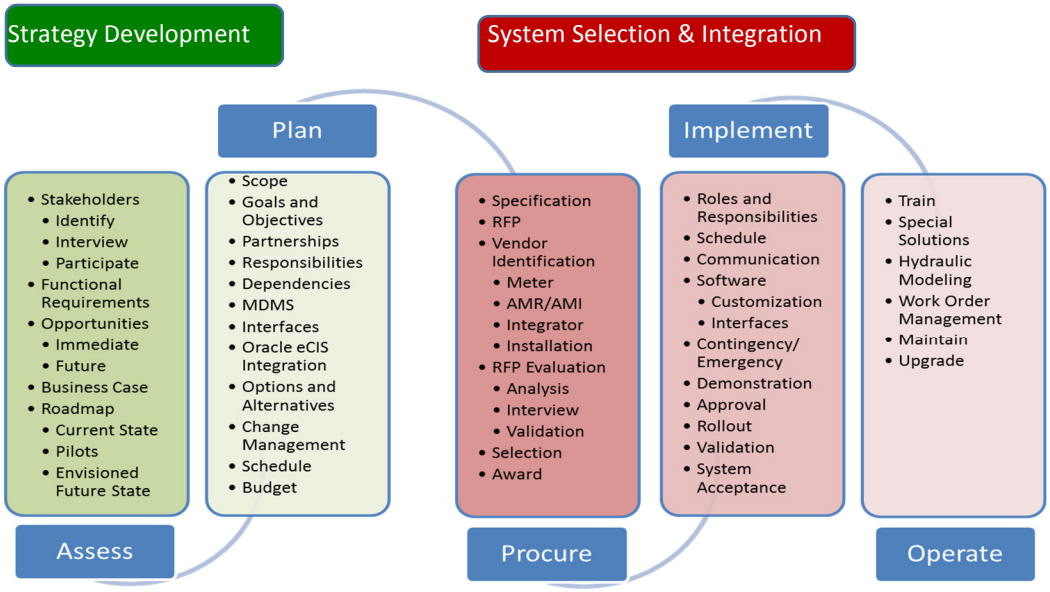
- Findings from this task will be documented in a draft memorandum (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and the revised findings will be included in the report generated as part of Subtask 1.7.

Subtask 1.6: AMR/AMI Implementation Plan

CH2M will provide a high-level, multi-faceted implementation plan outlining the recommended roadmap for completion of the AMR/AMI project based on the above assessment tasks including a discussion describing the issues needing consideration and the importance of each element, as demonstrated by the example in Exhibit 3. CH2M believes thorough development of such a plan, and active engagement of key staff in its creation, is critically important to program success.

Also included will be a discussion related to procurement considerations and implementation strategies, for example how AMR/AMI could be deployed in phases, potential partnerships with other local electric utilities (such as SCE&G, Fairfield Electric Co-Op, and Mid Carolina Electric Co-Op), unit costs and separate contract line items for best pricing, ways to address customer concerns related to AMI technologies, on-call maintenance contracts, creative financing, and managed versus hosted services.

Exhibit 3. CH2M Roadmap for Advanced Metering



Assumptions:

- Discussions and progress reviews with staff will be conducted via teleconference.

Deliverables:

- Draft implementation plan (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and the revised implementation plan will be incorporated in the report generated as part of Subtask 1.7.

Subtask 1.7: Business Case Recommendations

The results of the first six tasks will be incorporated into a business case document that summarizes the needs and ambitions of the City for various advanced metering system capabilities and functions, based on people, process, and technology. **This document not only serves as a record of the work that was accomplished, but also as a consensus builder among stakeholders.**

Because our approach to procurement encourages all qualified vendors to provide innovative and competitive proposals, we don't typically eliminate specific brand(s) of meters, or select a specific AMI product prior to the RFP process, which we feel would be counterproductive and could limit the City's ability to select the right system at the best price.

Assumptions:

- Up to two CH2M project team members (anticipated to be the project director and project manager) will attend a meeting with City staff to review draft report.

Deliverables:

- Draft business case document (PDF format provided electronically). One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and included in the final report (Electronic format as well as six hard copies).

Subtask 1.8: Project Management

Controlling project costs in a professional, responsible manner is emphasized within CH2M. Our management approach, which consists of project instructions, work planning, scheduling, task checklists, team meetings, client workshops, status reports, and an internal management information system, promotes efficient, cost-effective project execution and communication. We will provide monthly status reports to include: Task Status; Cost, Resource and Schedule Management; and Risk and Issue Management.

In our experience, frequent and regular team meetings are a vital contributor to the success of advanced metering programs. To that end, we propose to hold regular team meetings as described below.

Team Meetings – Beginning at Notice to Proceed, the project manager will schedule progress meetings to be held with the City's Project Manager and other core City staff to review program progress.

Executive Review Meetings – Meetings will be held with the City to communicate the overall status of each task or activity to executive staff and key stakeholders in other departments. The project manager will attend, along with any technical team members needed to address specific schedule items.

Detailed task elements and schedules will be identified in consultation with City staff at the program's outset. Our project manager will review the schedule to confirm that work elements are proceeding as planned. A schedule status report will be provided to the City as part of monthly reporting, reflecting the status of budget and resources allocated, used, and remaining.

We will use Microsoft Project for initial schedule development and monitoring. Our techniques for effective scheduling include direct integration with a work breakdown structure, identification of milestones and deliverables, logical depiction of work on the critical path, and regular updates to support performance assessments. The master program schedule provides the team with reliable, accurate, and timely information for decision-making.

Assumptions:

- Task 1: System Evaluation and Feasibility Study will last 4.5 months.
- Executive review meetings will be scheduled to coincide with staff project meetings.

Deliverables:

- Project instructions, meeting/workshop agenda and minutes
- Monthly status reports with invoices

Task 2: Project Management Services

Upon completion of Task 1, the City will decide whether to proceed with the project. This scope of work and associated level of effort/fee for Task 2 has been developed based upon assumptions outlined herein. These assumptions may need to be revisited if the City opts to proceed with the project and these Task 2 services.

Task 2.1: Planning Services

CH2M will continue with controlling project costs by updating the project instructions, work plan, and schedule as needed. We will continue to provide monthly status reports to include: Task Status; Cost, Resource and Schedule Management; and Risk and Issue Management.

We will hold regular team meetings as described below.

Team Meetings – Beginning at Notice to Proceed, the project manager will schedule progress meetings to be held with the City's Project Manager and other core City staff to review program progress.

Executive Review Meetings – Meetings will be held with the City to communicate the overall status of each task or activity to executive staff and key stakeholders in other departments. The project manager will attend, along with any technical team members needed to address specific schedule items.

Detailed task elements and schedules will be identified in consultation with City staff at the outset of Phase 2. Our project manager will review the schedule to confirm that work elements are proceeding as planned. A schedule status report will be provided to the City as part of monthly reporting, reflecting the status of budget and resources allocated, used, and remaining.

During implementation management, we will hold weekly progress meetings to review risks, action items, schedule and issues (RASI). We will also implement document controls, managing progress payments to the vendor, reviewing training materials prior to field work commencing, and performing a pre-go live check of the system, procedures, and overall team readiness.

We will use Microsoft Project for initial schedule development and monitoring. Our techniques for effective scheduling include direct integration with a work breakdown structure, identification of milestones and deliverables, logical depiction of work on the critical path, and regular updates to support performance assessments. The master program schedule provides the team with reliable, accurate, and timely information for decision-making.

The implementation of the AMR/AMI program will present many decisions with regard to risks and liabilities—for example, those associated with the field work and installation phases of the program, as well as the long-term performance of the system components. We will address risk planning and mitigation early and throughout all program phases to provide for program success but also to identify the longer term issues for the City. Our approach is to incorporate risk planning and mitigation into all the project phases as well as to identify longer term issues for the City.

Our approach to communications will be based on the following principles:

- Adopt best practices from utilities that have implemented AMR/AMI
- Inform, educate, and foster a sense of ownership among city staff and other internal city stakeholders
- Communicate AMR/AMI benefits to customers, proactively address concerns, and build support for implementation

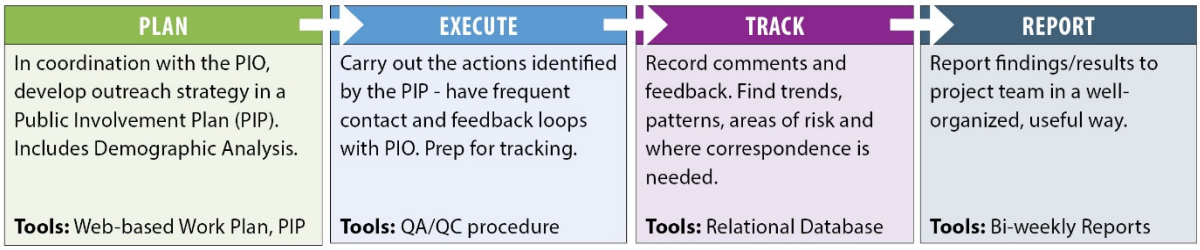
Learn from other utilities – We will use best practices and lessons learned from past projects to develop our communications plan, enabling Columbia to benefit from our communications experience. For example, during our work with Cleveland Water, we learned that utilities with successful communications programs made an effort to "go where customers are," attending numerous regularly scheduled neighborhood and organization meetings rather than relying on holding project-specific public meetings.

Communicate with employees – We have found the internal communications plan to be critical to supporting a successful external rollout. All staff need to be equipped with accurate information and a sense of ownership to confirm their interactions with the public are positive and based on fact rather than rumor. The plan will be tailored to different types of staff, with particular attention to staff who regularly interact with the public. The plan will include tools, such as an intranet site, fact sheets, and a FAQ, that will help educate staff, as well as methods for reaching out to them. These methods will include briefings at staff meetings, drop-in open houses, and field visits for staff to learn hands-on about advanced meters. It is crucial that communications to internal staff be conducted prior to implementation of the external plan so that staff can have informed interaction with customers.

Communicate with customers – The external plan will be developed alongside the internal plan to confirm that key messages are consistent. Critical to this process will be identifying the full spectrum of stakeholders so that they can be engaged during implementation. The plan will also include a description of methods and tools we will use, recognizing that the city's outreach goals include achieving informed consent of its customers. Our plan will address this goal by confirming customers are informed early, have multiple ways to be involved, have their comments and concerns addressed, and receive explanations about how their input was used and why decisions were made. We will peremptorily be addressing common customer concerns with AMI technology (e.g., Radio Frequency, security, rate impacts), to prevent the spread of misinformation and avoid any negative public perception. By keeping customers informed early and often, we will maintain strong stakeholder communications and build community support.

In a big picture sense Exhibit 4 depicts how we organize our outreach planning and implementation efforts. We put equal emphasis on all four elements: planning, because it's critical to have a comprehensive roadmap for what we intend to do; execution, because we aim to get it right the first time to earn the public's trust; tracking, because it's important to identify and address issues as they emerge; and reporting, because we need to be able to demonstrate to elected officials and others that we did what we said we would do.

Exhibit 4. Sample organization of outreach planning and implementation efforts



Assumptions:

- Task 2: Project Management Services will last 51 months (11 for Acquisition Services and 40 for Installation Services).
- Executive review meetings will be scheduled to coincide with staff project meetings.

Deliverables:

- Revised project instructions, meeting/workshop agenda and minutes
- Monthly status reports with invoices

Task 2.2: Acquisition Services

Successfully acquiring the right system for Columbia requires an RFP and procurement process that will result in well-qualified competitive proposals, an evaluation process that properly reflects the proprietary nature and long life cycle of this technology, and a strong performance-based contract that protects Columbia's investment.

CH2M recognizes that the procurement process and the contract should reflect Columbia's standard procurement procedures adapted to an AMR/AMI project (which is a hybrid of products and materials acquisition, information and communications technology implementation, construction and professional services). We have found that a three-step procurement process has provided our clients with the best functionality at the best price: 1) Request technical proposals; 2) Review and invite selected vendors for presentations and Q&A (this will increase vendor confidence and reduce their embedded "risk" pricing); and 3) Request price proposals from selected vendors.

Our experience has shown that vendors are able to provide more refined and competitive pricing after the presentation and interview stage. This also provides the City with an opportunity to short-list, or eliminate certain vendors that are not qualified prior to being exposed to potential "low-bid" situations.

The procurement document will cover system components and system performance, data communications backhaul, a meter data management system, a customer portal, interfaces and integration support, project controls, training, vendor support, replacement water meters, installation, customer communications, and warranties.

Should we determine that a third-party MDMS is needed, we will work with Columbia to incorporate that requirement as a separate contract line item in the AMI RFP. And in preparation for ongoing support we will facilitate a workshop with Columbia, evaluating various options for maintaining the AMR/AMI system. Our time tested solution is to meet with utility staff, assess which aspects they feel comfortable managing, and determine where additional assistance may be required.

RFP Development

CH2M will develop an RFP with performance-based specifications and evaluation criteria to support competitive pricing while meeting specific functional objectives like on-demand reads, remote valve operation, or specific read success rates.

We will prepare the draft RFP language for each requirement and desired feature. In some cases, it is the combination of components (including the meter register) and software that creates a performance characteristic, such as tamper detection or leak indication. We will use our proven RFP template as a starting point and incorporate Columbia-specific language and requirements; we will then review the draft document in detail with staff, and make revisions as necessary.

Standard contract language, clauses, and legal wording will be the requirement of Columbia, its procurement staff, and its counsel. Existing meter population (quantity and sizes), customer addresses, and specific locations/height of city facilities will be required by the proposers and will be required of Columbia and its staff. Once CH2M provides the draft RFP, Columbia will finalize and approve the solicitation prior to posting and publicizing it in accordance with the City's standard contracting process.

Vendor Responses and Evaluation

Before release of the RFP, CH2M will work with Columbia staff to develop appropriate evaluation criteria and relative weights (demonstrated by the example shown in Exhibit 5) based on the city's identified goals and objectives of the City as well as our past experience with successful solicitations. We will also develop a list of potential vendors to assist the City in advertising. These will be reviewed with City staff.

Exhibit 5. Example RFP Evaluation Criteria

Criteria	Definition
Strength of Proposer (25 pts)	References, experience, financial stability and solvency, revenue growth and profitability, relative R&D investments, and ability to acquire bonding and insurance
System Capabilities (25 pts)	Degree to which proposed system addresses technical specifications, performance requirements, and desirable functions

Ease of O&M (10 pts)	Ease of ongoing use and maintenance of system, including component installation, programming and repair; use of software; interface with billing system; and diagnostic and reporting capabilities.
Integration Support (5 pts)	Vendor's ability to develop, document, and support interfaces with JVWCD's MUNIS billing system and other IT systems
Data Management (5 pts)	Data integrity, security, accessibility, backup/recovery, flexibility, cross system balancing, auditing capabilities, report generation, and queries. Nonproprietary interfaces.
Support (5 pts)	How the Proposer will deliver maintenance and operational support, as well as training. Response modes and times.
Warranty (5 pts)	Period and extent of warranty coverage on meter reading system components. Overall system performance guarantees. Protection in the event of excessive failures.
Lifecycle Cost (20 pts)	Total cost of the proposed system over the expected 20-year life.

CH2M will be the point of contact for proposers, to field their calls and provide the proper responses to questions during the solicitation process (i.e., questions must be submitted in writing and questions will be answered with a response to all proposers). This approach will help protect the City from constant calls/pressure from vendors during the process.

CH2M will review questions submitted in writing prior to the deadline and provide 1) suggested responses for functional/specification related questions and 2) an itemized list of questions that pertain to legal or contractual issues for Columbia to respond. The final response to proposers and/or posting of the addendum will be the requirement of the City.

CH2M will participate on the evaluation panel (if desired by Columbia), will perform vendor reference checks, and will be onsite during the vendor presentations. During evaluation, panel participants will each score the technical proposals prior to review of the cost proposal. CH2M will facilitate a post-presentation meeting where individual technical scores are compared and a consensus is reached according to the evaluation criteria and weighing factor established. Once the evaluation is complete, CH2M will draft the consultant's recommendation for review by the City.

Vendor Negotiations

CH2M will provide Columbia with a draft contract as well as assistance during contract negotiations with the selected vendor to agree upon both initial and unit pricing, implementation timeline, contract and performance terms.

Assumptions:

- CH2M will participate in RFP review meeting by phone.
- Up to two team members will participate in vendor presentations for up to three days.
- Evaluation panel meeting will be scheduled to coincide with vendor presentations.

Deliverables:

- Draft RFP for procuring the AMR/AMI system. One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and included in the final RFP.
- Addendum to RFP (to address vendor questions)
- Letter recommending AMR/AMI system
- Draft contract for the City to use with the selected vendor

Task 2.3: Installation Services

Once the negotiations are complete and the City issues the final contract documents and the notice to proceed, CH2M will manage the contractors and preparations for deployment. For this part of the program to succeed, effective program management and individual project management must go hand-in-hand.

Large-scale installation and deployment of AMR/AMI system components requires careful coordination and monitoring of contractor activities – including appointment scheduling, meter refurbishment work, IT interfaces, meter reader redeployment, communications, and a variety of additional dimensions.

The AMR/AMI project will consist of thousands of small customer service transactions as well as thousands of work orders. These work orders must be executed efficiently and on schedule to maintain progress and budget, and the information involved must be handled properly to ensure accuracy, minimize follow-up, and minimize the number of things that "fall through the cracks." This requires good internal and external communications, not only with customers but with the Columbia employees and stakeholders.

We will require the contractors to provide monthly reports, and prepare our own, covering progress against schedule and budget, as well as other project performance measures established for the project. For example, the contractor will be required to inspect a certain percentage of work, following protocols. Failure to turn in the report, do the inspections, and meet the inspection acceptable standards will all be grounds for penalties or defaults. Other project performance measures are associated with customer contact, appointment scheduling, responsive complaints, number of data discrepancies trapped, and AMR/AMI system performance.

The AMR/AMI installation schedule will be made a part of the contract documents, since unanticipated changes to the schedule can disrupt project management and City operations. The AMR/AMI installation contractor(s) will be required to meet construction schedules through their contract term. Falling behind will create default conditions and require corrective action, such as subcontracting or hiring additional crews. Variances and concerns will be immediately addressed with the installation contractor(s) along with a recovery program. The information being reported will include historical and forecast outcomes to allow program and project leaders to make informed decisions and act to recover from schedule delays and eliminate potential budget overruns.

Of most importance is the quality and accuracy of the AMR/AMI data. There is one chance—at the time of installation—to get the data right. If Columbia customer service representatives or customers have any doubt about having the right reading from the right meter at the right location, they will lose faith in the system, and savings and other benefits may never be achieved. Therefore, a robust program control and monitoring system that considers AMR/AMI data quality is critical to project success.

CH2M will require installers to provide bar codes and scanners, handheld computers, and digital photographs of old meter registers and installation settings to help to minimize handwritten information and ensure a more foolproof data management procedure system. When project control procedures and models are well designed and followed, data discrepancies are rare, and erroneous readings are virtually nonexistent.

CH2M will release installation work route by route to avoid the poor productivity associated with scattered meter readings on the same street. CH2M will establish criteria for the completion of old routes before we will allow the contractor to move into new areas, to prevent the contractor from avoiding more difficult installations, enable us to manage inspections, minimize City's meter reading coordination efforts, and minimize manual reads on routes that have been converted to AMR/AMI.

Demonstration Period

Prior to commencement of full-scale installation, we will require the contractor to conduct a "slow-start" installation on a several hundred meters (as well as the data collection units needed to cover them, in the case of a fixed network system) so that all parties can verify system performance as well as all installation and quality-based project control procedures, including appointment scheduling, logistics, inspection, data audit, installation acceptance, the handling of anomalies (such as inaccurate data or shutoff valves that need replacing) and the data interface to the CIS.

In our experience, this type of demonstration period usually traps procedural errors associated with installation. After a short evaluation period, we will recommend any immediate corrective actions or, at the City's direction, allow the contractor to continue with full deployment.

CH2M will also establish similar test periods for any other applications involving interfaces to the AMR/AMI system. We understand the critical nature of this data to Columbia and will ensure that all components function properly before bringing them on line.

Field Inspections and Support

AMI contractor performance will be measured by tracking:

- Percentage of route completion
- Meter accuracy and meter testing
- Component failure rates and root causes (e.g., battery failures, damage during installation)
- Initial defect rate
- Read success rate, and data transfer success

- Network redundancy

CH2M's management of the project will involve regular performance reporting by the contractor, formal and informal meetings, and special meetings to handle problems.

CH2M will provide a project manager during the AMI implementation phase; either the City or CH2M will provide two field services managers during the AMI implementation phase. If the City decides to have CH2M provide these services, then optional services subtask 5.5 will be authorized.

For the first 12 months CH2M will facilitate weekly meetings with the AMI vendor. For the remainder of the installation period, meeting frequency will be reduced to biweekly. The CH2M project manager or his designee will attend these meetings.

In addition, we recommend that 5 to 10 percent of the removed meters be selected for testing by the City, to get a sense of the extent of potential increases in registration.

Installation Cost Control

At the heart of the program management effort is the administration of the cost control program for the multiple agreements with installation contractors, vendors or professional service consultants. Our program controls approach brings together the scheduling tools, budget monitoring capabilities, data management/accessibility needs, cost estimating, change management, financial management/cash flow projection, document control, and other functions into a cohesive system that has been successful on numerous programs. We will develop a document control plan for the implementation phase of the program using Microsoft SharePoint software, a web-based system with retrieval and reporting capabilities that Columbia uses on other projects.

Once the schedule and values for each contract are finalized, we can utilize a continual monitoring approach of the amount of available funds per contract through the program controls portal. The program controls system assists in managing the actual cost incurred to date and provides a structure to forecast Estimate to Complete (ETC) values and compare actual cost incurred to actual funding received.

In addition, we will establish procedures that track the receipt process to review and evaluate change orders, claims, and requests for payment. Working with Columbia, we will build into these processes the necessary coordination and procedure steps to approve or deny these requests. CH2M will review monthly pay requests (see following section); review of change orders and claims will be conducted only if authorized by the City project manager and will be tracked on a time and materials basis outside of this scope of work. Such reviews will consider the following factors: technical merit, cost, and validity.

Progress Payments

Progress payments are integral with the cost control methodology. Working with Columbia, we will develop specific procedures for payment approval and processing. The contract language will establish work acceptance criteria for payment by Columbia to the contractor for work completed, which generally consist of a combination of successful reading experience and good workmanship. As an example, acceptance criteria in the contract documents may require each installation accepted by the City to be conditioned upon (1) electronic submission of a list of completed installations containing for that installation the premise identification number, address, old and new meter ID numbers, old and new meter readings, MIU ID number, location of meter and MIU, installer's name, and all other information relevant to the installation; (2) satisfactory inspection by the City/CH2M; and (3) successful capture of a confirming meter reading or sequence of meter readings from that meter and MIU by the City operating the AMI system in a normal way. CH2M will work with City staff to develop acceptance language for Columbia's program.

Training

The majority of AMR/AMI-related training will be provided by the vendor following the training plan incorporated in the contract Scope of Work. CH2M will provide additional training that will cover aspects of the system, including operation, data retrieval, installation and maintenance of hardware and software, and administration procedures. CH2M will integrate the training plan into the project schedule.

Assumptions:

- Installation period of 40-month duration during which time CH2M will provide the project manager at half time and the City will provide two field services managers at full time (unless optional services are authorized – see Subtask 2.5).
- The presence or duties of CH2M's personnel at a construction site, whether as onsite representatives or otherwise, do not make CH2M or CH2M's personnel in any way responsible for those duties that belong to the installation Contractors or other entities, and do not relieve the installation Contractors or any other entity of their obligations, duties, and responsibilities, including, but not limited to, all installation/construction methods, means, techniques, sequences, and procedures necessary for coordinating and completing all portions of the installation/construction work in accordance with the Contract Documents and any health or safety precautions required by such work. Plumbing deficiencies/anomalies discovered in the field will be addressed by City staff.
- CH2M and CH2M's personnel have no authority to exercise any control over any installation Contractor or other entity or their employees in connection with their work or any health or safety precautions and have no duty for inspecting, noting, observing, correcting, or reporting on health or safety deficiencies of the installation Contractors or other entity or any other persons at the site except CH2M's own personnel.

- The presence of CH2M's personnel at a construction site is for the purpose of providing to the City a greater degree of confidence that the completed work will conform generally to the contract documents and that the integrity of the design concept as reflected in the contract documents has been implemented and preserved by the construction Contractor. CH2M neither guarantees the performance of the installation Contractor nor assumes responsibility for Contractor's failure to perform work in accordance with the construction documents.

Deliverables:

- Monthly progress reports during the installation period
- Document control plan
- Payment approval and processing procedures
- Training plan

Task 2.4: Maintenance, Support and Warranty

The three elements of the AMR/AMI system are: 1) MIU/Endpoints, 2) the fixed network (if selecting an AMI system), and 3) the head end software tied to AMR/AMI data. For each of these elements, Columbia can choose to perform in-house maintenance or contract the services out to a vendor or third party. For example, some utilities do not have the skillset on hand (or have the ability to hire) a field technician to maintain a radio-based fixed network infrastructure or do not have trained employees to climb communication towers to perform routine maintained on coaxial cabling. CH2M has seen utilities manage all aspects of ongoing maintenance themselves or contract out any combination of these responsibilities. We will develop a maintenance and warranty support plan that is tailored to meet the needs of Columbia taking into consideration the complexity of the selected system(s) as well as incorporating the lessons learned from the previous AMR/AMI pilots that the City conducted.

In our AMR/AMI vendor contracts, we include a failure rate limit and threshold where if exceeded the contract requires onsite correction by the vendor. An important aspect of enforcing this warranty provision is tracking error rates and root causes in a master database. We will assist Columbia to setup this database and train staff on tracking failures through the vendor RMA process.

Deliverables:

- Draft maintenance and warranty support plan. One set of consolidated review comments will be provided by the City. Comments will be addressed as appropriate and revisions will be included in the final maintenance and warranty support plan.

Optional Services Subtask 2.5: Additional Installation Services

The purpose of this optional services subtask it to have CH2M (instead of the City) provide two field services managers during the installation period. In the event that City would like to have CH2M provide these services this optional subtask will be authorized.

The field services managers will focus attention on field activities, such as inspection, investigations, supply logistics, and AMI installation coordination. These aspects of intensive AMI deployment are often the most difficult for utility employees with other responsibilities to devote adequate attention. CH2M responsibilities will include:

- Coordinate installation contractor work
- Supervise follow-up on all anomalies
- Prepare project field reports
- Attend weekly project meetings
- Coordinate receipt of supplies and materials
- Supervise safety procedures

Hands-on quality control and oversight are particularly important at the beginning of the project in order to ensure that procedural or performance problems are solved promptly, enabling a successful execution of the project in its entirety.

Quality control of field installation work involves on-site real-time spot inspection to ensure the work meets specifications. Physical inspection will identify installation problems not indicated by the AMI system (e.g., a leaky coupling or debris left at the site). It is assumed the City will not have inspection staff available to oversee the AMI vendor installations in addition to the installation contractor's own required inspections. The CH2M inspectors' key duties would be to validate the contractor's field performance, verifying the correct equipment is installed, and validate workmanship. All work turned back to the contractor also will be inspected. The percentage of sites inspected may be varied depending on the percentage and nature of problems found. In more difficult areas, the inspection rate might be increased. We will work with Columbia staff to develop protocols and mechanism for dealing with difficult installations, to minimize the burden on Columbia staff. Field inspections will be an important step in overall quality and project control procedures for determining whether the installation is approved and the contractor will be paid for that installation. Inspection guidelines will align with program goals and will provide for mechanisms for follow-up when deficiencies are noted.

Assumptions:

- CH2M will provide two field services managers at full time during the installation period (which is assumed to last 40 months).
- The presence or duties of CH2M's personnel at a construction site, whether as onsite representatives or otherwise, do not make CH2M or CH2M's personnel in any way

responsible for those duties that belong to the installation Contractors or other entities, and do not relieve the installation Contractors or any other entity of their obligations, duties, and responsibilities, including, but not limited to, all installation/construction methods, means, techniques, sequences, and procedures necessary for coordinating and completing all portions of the installation/construction work in accordance with the Contract Documents and any health or safety precautions required by such work. Plumbing deficiencies/anomalies discovered in the field will be addressed by City staff.

- CH2M and CH2M's personnel have no authority to exercise any control over any installation Contractor or other entity or their employees in connection with their work or any health or safety precautions and have no duty for inspecting, noting, observing, correcting, or reporting on health or safety deficiencies of the installation Contractors or other entity or any other persons at the site except CH2M's own personnel.
- The presence of CH2M's personnel at a construction site is for the purpose of providing to the City a greater degree of confidence that the completed work will conform generally to the contract documents and that the integrity of the design concept as reflected in the contract documents has been implemented and preserved by the construction Contractor. CH2M neither guarantees the performance of the installation Contractor nor assumes responsibility for Contractor's failure to perform work in accordance with the construction documents.

Deliverables:

Meeting Notes, Inspection Reports and Photographs generated as part of the installation inspection effort