

Req. # 50077

Entered by: Amm

Date: 4/14/2015

PURCHASE ORDER REQUISITION
FORT COLLINS UTILITIES

Vendor 130088
Icon Engineering, Inc.

Address 8100 S. Akron Street
Suite 300
Centennial, CO 80112

QTY.	DESCRIPTION	UNIT	TOTAL	CHARGE NUMBER
1	2015 Michaud Basin hydrologic model conversion from MODSWMM to EPASWMM including PVL, NMD and LCC#C Irrigation Canal unsteady flow HEC-RAS modeling.	1	\$38,300.00	504.5040452818.521130.3

Comments See attached scope of services and fee breakdown. This work is needed in order to complete the 2015 West Vine Basin Update.

K. A. C. S. A. 4/13-15
Requested By Date Authorized By Date

EXHIBIT "A"
WORK ORDER FORM
PURSUANT TO AN AGREEMENT BETWEEN
THE CITY OF FORT COLLINS
AND
Icon Engineering Inc.

Req # 50077
AMM 4/14/2015

DATED: February 21, 2012

130088
Work Order Number: KCS-2015-1

Purchase Order Number: Charge # 504.5040452818.521130.3

Project Title: 2015 Michaud Basin Update (EPASWMM Conversion and HEC-RAS Unsteady Models for Canals)

Commencement Date: May 1, 2015

Completion Date: November 20, 2015

Maximum Fee: (time and reimbursable direct costs): \$ 38,300.00

Project Description: Project includes the conversion of the Michaud hydrologic model from MODSWMM to EPASWMM 5.0 and updating the HEC-RAS unsteady flow models for three irrigation canals -- the Pleasant Valley and Lake (PVL) Irrigation Company, the New Mercer Ditch (NMD) Company and the Larimer #2 (L#2C) Canal Company. This work is needed in order to complete the 2015 West Vine Basin Update.

Scope of Services: See attached scope of work

Service Provider agrees to perform the services identified above and on the attached forms in accordance with the terms and conditions contained herein and in the Services Agreement between the parties. In the event of a conflict between or ambiguity in the terms of the Services Agreement and this work order (including the attached forms) the Services Agreement shall control.

The attached forms consisting of four (4) pages are hereby accepted and incorporated herein by this reference, and Notice to Proceed is hereby given.

CC: Purchasing

Service Provider: Icon Engineering, Inc.

By: [Signature] Date: 4-13-15

City of Fort Collins: Water Utilities Engineering Division

Submitted By: [Signature]
Project Manager
Date: 4/13/2015

Reviewed By: [Signature]
Water Utilities Engineering Manager

Date: 4-13-15

Reviewed By: [Signature]
Water Engineering & Field Serv. Manager

Date: 4/13/15

Approved By: _____
Utilities Executive Director

Date: _____

Approved By: _____
Purchasing & Risk Mgmt Director

Date: _____

7300 Consulting Engineering Svcs
for Clearview Channel
Improvements

Exhibit A
Scope of Work
Michaud Basin SWMM Conversion Project
City of Fort Collins
11/26/2014

ICON Engineering, Inc. is pleased to provide this proposal for engineering services to complete the SWMM conversion for the Michaud watershed. As discussed, the City is requesting that hydrologic modeling for the watershed be updated to the SWMM5 format in order to be used in support of ongoing updates to adjacent watersheds, including the West Vine Basin. Our scope of work is outlined below. A fee spreadsheet has also been provided for your review.

Task 1: Data Collection and Review:

All project meetings are proposed to be held concurrently with similar work for the West Vine basin. Up to two (2) additional conference calls have been assumed specifically to discuss the Michaud Basin. All other correspondence items will be made via phone calls and emails.

Task 2: Data Collection & GIS Conversions:

ICON will convert hydrologic basins and routing elements provided as part of the 2009 report for the *Michaud Basin Hydrologic Evaluation and Canal System Capacity Analysis* into a GIS database.

Topology adjustments will be made for sub-basins based on the City's current LiDAR topography. Sub-basin areas will be compared with originally modeling assumptions. Differences in basin areas will be discussed with City staff.

Task 3: SWMM 5.0 Conversion:

The existing MODSWMM model from previously hydrology updates will be converted to the SWMM5 program format. In general, the following steps will be performed to complete the conversion process.

SWMM5 Conversion Steps:

1. Rainfall / Runoff: Approximately 38 sub-basins will be converted maintaining the existing rainfall distribution and runoff parameters as the MODSWMM models.
2. Land-Use: Limited land-use and sub-basin changes have been assumed for this watershed.
3. Routing Elements and Nodes: Approximately 73 node and conveyance elements make up the current Michaud study. Elevations for nodes in SWMM5 will be established from a GIS DTM at relative locations within each sub-basin. Adjustments will be made to best estimate the thalweg elevations using regional LiDAR data, contours, or other mapping sources. The majority of the MODSWMM routing elements for the current study reflect trapezoidal channels with channel overflows for floodplain areas. For the conversion, ICON will develop new transects representative of the DTM and routing conditions.
4. Detention Ponds: Approximately 8 detention ponds exist in the current Michaud study. The technical backup information for the original pond modeling will be used to establish the required values for SWMM5. ICON will convert elevations to the NAVD 1988 vertical datum using a uniform conversion factor. Elevations, surface area, and outflow will be modeled to maintain consistency in elevation output, as required for the Dynamic interface.

5. Diversions: With exception to at the canal locations, no diversions are currently modeled within the Michaud Basin. Any new need for diversions will be discussed with City staff on a case-by-case basis.

6. Model Execution: The SWMM5 model results will be compared with past models to identify conveyance and volumetric differences. The SWMM5 model will also be run for the 2-, 5-, 10-, 25-, 50-, and 100-year storm events. The models will be executed using the Dynamic interface in SWMM. Results will be presented to City staff prior to producing the final project report.

Task 4: PVL, NMD, LCC#2 Canals:

New inflow hydrographs will be routed through the PV&L, NMD, and LCC#2 using the unsteady flow routine in HEC-RAS, version 4.1. Modeling will be based on the past HEC-RAS models prepared for the 2009 Canal Capacity study, converted to the current version. As with the 2009 study, canal spill flows will be balanced with inflow and outflows from the West Vine Basin downstream. Modeling for the West Vine Basin will be completed separately and coordinated with this study, as appropriate. New outflow hydrographs will be exported from HEC-RAS and re-imported into the SWMM5 model at three separate locations. No geometric changes are anticipated with the HEC-RAS update; however time has been included to trouble shoot result differences between the original modeling in version and version 4.1.

Task 5: Submittals and Reports:

ICON will assemble a project report summarizing the background, data, methodology, and results from the study. Basin maps with hydrologic routing will be generated using GIS. Exhibits will also be prepared documenting the results for spills from each of the Canals, for all flow frequencies. An exhibit will also be prepared comparing discharges for the original and revised models at key locations. Technical information will be assembled in project appendices.

Task 6: Review and Revisions:

Limited time has been included to address comments from the City.

Project Fees and Schedule:

A fee spreadsheet has also been provided for your review. We estimate that this project can be completed for \$38,300, and within approximately 4 months of notice to proceed. Please note that this fee assumes a portion of the canal work will be completed alongside a similar update for the West Vine Basin, adjacent to Michaud.

ICON ENGINEERING, INC.

PROJECT ESTIMATING SHEET

PROJECT NAME: Michaud Basin EPA-SWMM Conversion CLIENT: CITY OF FORT COLLINS - Mark Kempton	Description	Principal	Professional Engineer III	Professional Engineer I	Engineer I	Cadd/GIS Designer	Admin	Project Surveyor	Survey Crew	Misc. Direct Costs	TOTALS
		Hours \$150	Hours \$140	Hours \$120	Hours \$82	Hours \$62	Hours \$58	Hours \$75	Hours \$147	Hours	
1 Correspondence b. Conference Calls & Correspondence		3	3								\$780
2 Data Collection & GIS Conversion a. Convert Original ICON Basin Mapping to GIS b. Sub-basin topology adjustments				4	12	18				\$10 \$10	\$1,986 \$2,218
3 SWMM 5.0 Conversion a. Rainfall / Runoff Conversions (~38 Basins) b. Misc. Land-use Changes (Assumed Hours) c. Routing Elements / Nodes (~73 Elements with new transects) d. Detention Ponds (~8 Ponds) - Pond Conversions e. Diversions (none) g. Model Execution (Flow frequencies, Dynamic Wave)			2	4	6	2				\$10 \$10 \$10	\$1,426 \$906 \$5,138
4 PV&L, NMD, LCC#2 Canal (inflow/outflow) a. Update Models to HEC-RAS 4.1 (All canals, Michaud Basin) b. Inflow Hydrographs (all frequencies) c. Outflow Hydrographs (all frequencies)			4	16	4	2				\$25 \$10 \$10	\$2,997 \$2,322 \$2,322
5 Submittals and Report Items a. Hydrology Report - Rainfall Documentation and Modifications - Land-use & Basin Adjustments - Node and Routing Element Methodology - Detention Pond Methodology - Canal Analyses and Outflow Figures - Hydrology Comparison Figures - Results - Sub-basin and Connectivity Diagrams			12	32	16	16	8			\$48	\$8,656
6 Review and Revisions			6	16	8	8	4			\$62	\$4,366
TOTAL		0	40	113	150	72	12	0	0	\$240	\$38,300
		\$0	\$5,600	\$13,560	\$12,300	\$5,904	\$696	\$0	\$0	\$240	\$38,300