AMENDMENT NO. 2
TO THE CONTRACT FOR PURCHASE OF SERVICES
(DESIGN PROFESSIONALS)
CONTRACT 8413

SPRING HARBOR WATERSHED STUDY

RECITALS

This amendment is for additional work beyond the scope of the existing agreement and consists additional analysis for the Spring Harbor gage trouble shooting, conversion of model to new software, and proposed peak flow control analysis.

1. On July 16, 2019, the City of Madison, hereinafter called the "City", and Advanced Engineering and Environmental Services, Inc., hereinafter called the "Consultant" entered into a contract for a flood and stormwater modeling of the Spring Harbor Watershed, Legislative File No.54801.

2. Article 9 and Article 10, of the contract, provided for amendment of the contract for additional services.

3. The City has authority to execute an amendment to this contract as provided by Council Legislative File No. 55655.

NOW THEREFORE, The City and the Consultant hereby agree to amend the contract as follows:

A. PROJECT DESCRIPTION

Amend project Scope of Work per the attached file, entitled "Spring Harbor Watershed Study – Amendment No. 2, Contract 8413".

B. COMPENSATION

Amend Paragraph 24 of purchase of services contract to increase the contract by $103,740.00 for a new contract amount of $471,140.00.

IN WITNESS WHEREOF, the parties hereto have set their hands at Madison, Wisconsin.

CONTRACTOR:

Advanced Engineering and Environmental Services, Inc.
(Type or Print Name of Contracting Entity)

By: _____
(Signature)

_____
(Print Name and Title of Person Signing)

Date: _____

CITY OF MADISON, WISCONSIN
a municipal corporation:

By: _____
Satya Rhodes-Conway, Mayor

Date: _____

Approved:

By: _____
David P. Schmiedicke, Finance Director

Date: _____

By: _____
Maribeth Witzel-Behl, City Clerk

Date: _____

Approved as to Form:

By: _____
Eric T. Veum, Risk Manager

Date: _____

By: _____
Michael P. May, City Attorney

Date: _____

Spring Harbor Watershed Study - Amendment No. 2; Contract 8413

Amend contract as follows:

Amend contract to replace all references to "InfoSWMM" with "XP-SWMM/XP-STORM"

TASK 1 - Review Existing Data and Support Data Collection Plan Development

TASK 1 SCOPE:

Add the following scope:

1.5 Coordinate with USGS to troubleshoot the Spring Harbor USGS gage, including:

1. Up to 8 hours of coordination with USGS and City staff on issues.
2. Use Watershed Study SWMM model and detailed HEC-RAS model of box storm sewer to provide supporting information on potential reasons for Spring Harbor gage accuracy issues.
3. Field visit with USGS and City staff to visually observe gage equipment, assist with surveying existing weir, and visually observe existing box storm sewer from lake backwater (downstream end) to railroad tracks (upstream end).
4. Field visit during moderate storm to visually observe hydraulic jump.

1.6 Complete field observations, data review, and sensitivity analysis on model parameters to confirm that no reasonable set of model parameters or secondary flow path would create flow peaks and volumes at the Spring Harbor USGS gage that the USGS recorded.

TASK 1 DELIVERABLE:

Add the following text:

Email correspondence with City and USGS staff, as necessary.

Fee: $14,800 (Increment)

Fee: $40,200 (Revised Total, including Original Contract and Addenda 1 and 2)

TASK 3 - Develop and Calibrate Existing Conditions InfoSWMM (now XP-SWMM/XP-STORM) Model for the Watershed

TASK 3 SCOPE:

Add the following scope:

3.1.6 Provide up to 4 hours of support to the City of Madison for review of updated modeling guidance to fit XP-SWMM/STORM or PC-SWMM.

3.2.8 Update IDs for SWMM network based on updated SWMM modeling guidance.

3.2.9 Convert current InfoSWMM 1D model to XP-SWMM/STORM, as follows:

- Remove 1D links (street conduits, greenway conduits, and surface overflow weirs).
- Create base map elements for XP-SWMM/STORM model framework, particularly aerial base map tiles since XP is limited to 100 MB files.
- Import model and review import process to determine elements not imported correctly.

- Manually re-assign parameters / settings that are not imported correctly.
- Re-assign / reconfigure approximately 500 subcatchments to conform to XP modeling methodology for entirely pervious, entirely directed connected impervious, and entirely indirectly connected impervious area.
- Generate 2D Terrain in XP
- Create 1D-2D connections to accurately capture street flow to simulate inlet capture for approximately 350 groups of inlets.
- Reconfigure inflow / outflow links and structures to storage nodes to flow onto the 2D surface and remove storage nodes.
- Troubleshoot XP 2D model stability / accuracy.

TASK 3 ASSUMPTIONS:

Fee: $32,400 (Increment)

Fee: $103,250 (Revised Total, including Original Contract and Addenda 1 and 2)

TASK 4 – Execute Existing Conditions Modeling

TASK 4 SCOPE:

Add the following bullet item 8) to 4.5:

7) Provide additional modeling and reporting effort needed from XP-SWMM/STORM reporting inefficiencies compared to InfoSWMM since XP is not GIS-based.

Fee: $4,700 (Increment)

Fee: $26,750 (Revised Total, including Original Contract and Addenda 1 and 2)

TASK 6 – Evaluate Flood Mitigation Alternatives

TASK 6 SCOPE:

Remove Task 6.1 and 6.2 Scope and replace with the following:

6.1 Volume Control – No Scope Included in this Addendum

6.2 Peak Flow Control (PFC)

For the purposes of this addendum, PFC shall include stormwater measures that either reduce the runoff rate or increase the peak flow capacity, but do not include measures to reduce runoff volume.

1) Identify Causes of Flooding

- Referencing inundation maps and flooding location tables from Task 4, identify up to 10 preliminary constriction points throughout the watershed for each of the 10-year, 25-year, and 100-year, 24-hour MSE4 storm events using the City of Madison Flood Mitigation Goals outlined in Exhibit 3 of the original contract.

- Summarize draft results and maps for meeting with the City.
- Prepare for and attend 1 meeting with City staff (occurring separately from monthly progress meeting) to prioritize locations/and or deficiencies within the current stormwater network.
- Based on input from City during meeting, finalize selection of watershed constriction points.
- Provide QA/QC of Identified Causes of Flooding
- Provide Deliverables as outlined in "Task 6 Deliverables"

2) Identify Locations for PFC Infrastructure

- No Scope Included – See Task 6 Assumptions

3) Develop Solutions for PFC

- Create "Maximum Peak Flow Control Infrastructure (PFCI) Model"
    - Prepare for and attend brainstorming session with City to identify potential PFCI. Preparation will include review of City-provided shapefiles – provided in Task 6.2, 2) above, reasons for flooding, and experience gained from previous Watershed Studies to develop potential "high-level idyllic solutions".
    - Develop draft "Max PFCI Model"-Modify existing conditions model to incorporate one or two solutions per constriction point and summarize results.
    - Meet with City staff (occurring separate from monthly progress meetings) to discuss draft results.
    - Create a final "Maximum PFCI" model using City guided solutions and run the 10-year, 25-year, and 100-year, 500-year MSE 4 events.
    - Provide Deliverables as outlined in "Task 6 Deliverables"
- Create "PFC Solutions Model"
    - Meet with the City (occurring at different time than regular monthly progress meetings) to discuss findings from City internal meetings that informs feasible solutions.
    - Modify Maximum PFCI Model to develop Preliminary Draft PFC Solutions Model for discussion with the City.
    - Meet with City staff (occurring separate from monthly progress meetings) to discuss findings from Preliminary Draft PFC Solutions Model.
    - Based on City comments, prepare a Final Draft PFC Solutions Model
    - Meet with City staff (occurring separate from monthly progress meetings) to discuss final draft
    - Finalize PFC Solutions Model
    - Provide Deliverables as outlined in "Task 6 Deliverables"

4) Assess the 500-yr Storm and Potential Upgrades

- Create a draft "Upsized PFC Solutions Model" to increase capacity of solutions developed in PFC Solutions Model to relieve as much flooding as possible for the 500-

yr event while staying within the ownership boundaries of the facilities developed in the PFC Solutions Model

- Meet with City staff (occurring separate from monthly progress meetings) to discuss draft "Upsized PFC solutions model"
- Finalize "Upsized PFC Solutions" model
- Identify the location and number of buildings that are no longer inundated with the upsized PFCI model compared to the "PFC Solutions Model".
- Provide Deliverables as outlined in "Task 6 Deliverables"

6.3 Draft Watershed Solutions Report

Prepare draft watershed solutions report documenting Task 6 findings.

TASK 6 DELIVERABLES:

Remove all Task 6 Deliverables and replace with the following:

1. Task 6.2, 1)
    - Three colored maps of the watershed with selected constriction points clearly identified for each 10-year, 25-year, and 100-year, 24-hour MSE4 storm events.
    - Description of selected constriction points provided in presentation format during meeting with the City.
2. Task 6.2, 3) Maximum PFCI Model
    - Spreadsheet or list for each PFCI that includes rough sizing/dimensions where applicable for all PFCI measures incorporated in the "Maximum PFCI Model".
    - Four color figures showing the maximum extent of flooding during each storm event 10-year, 25-year, and 100-year, 500-year MSE 4 events coded by depth.
    - Table noting the flooding depth and duration for the locations identified during Task 4 for 10-year, 25-year, and 100-year, 500-year MSE 4 events.
    - Model files and documentation (including GIS file if relevant) supplied on an external hard drive
3. Task 6.2, 3) PFC Solutions Model
    - Spreadsheet or list that includes rough sizing/dimensions where applicable (approximate storage volume required, increase in pipe size, diversion pipe size, etc.) for each PFCI.
    - Conceptual drawings for each PFCI.
    - Conceptual cost estimates for each PFCI.
    - Seven color figures showing the maximum extent of flooding during each storm event coded by depth.
    - Table noting the flooding depth and duration for the 25 locations identified during Task 4.
    - Table noting number and location of structures removed from flooding during the 100-year event.

- Model files and documentation (including GIS files where relevant) delivered to the City on an external hard drive.

4. Task 6.2, 4)

- Table comparison of infrastructure costs between the "PFC Solutions Model" and the "Upsized PFC Solutions Model" for the 500-yr event.
- Count of buildings inundated in the 500-yr event compared to the inundated buildings for the "PFC Solutions Model" during the 500-yr event
- Model files and documentation (including GIS files where relevant) delivered to the City on an external hard drive.

Change "Task 6.3, Draft Watershed Solutions Report" to "Task 6.4, Draft Watershed Solutions Report"

Add the following:

6.3 Combine Volume Control and Peak Flow Controls Solutions – No Scope Included in this Addendum

TASK 6 ASSUMPTIONS:

Remove Assumption 3 and replace with:

3. City to provide GIS layers (shapefiles) for use by AE2S, as follows:

- GIS layer with the following layers intersected:
    a) Right of Way
    b) Ownership (Public)
    c) Public Space Type (i.e. Park, Engineering, MMSD, County etc)
    d) Groundwater Table Depth
    e) Topography – categorize slope
    f) Bedrock Depth
    g) Open Water
    h) Tree Canopy
    i) Utility Corridor
    j) FEMA Floodplain
    k) Conveyance Area
    l) Storage Area
    m) Landmarks/Historical Sites/Archeological Sites

- GIS layer with the following "constraint" codes, as assigned:
    a) Right of Way → 0000000000001
    b) Ownership (Public) → 0000000000010
    c) Engineering Owned Land → 0000000000100
    d) Wetland→ 0000000001000
    e) Excessive Cut Required → 0000000010000
    f) Depth to Bedrock ≤ 5 feet → 0000000100000
    g) Landuse is Open Water → 0000001000000
    h) Tree Canopy Present → 0000010000000
    i) Utility Corridor→ 0000100000000
    j) FEMA Floodplain→ 0001000000000
    k) Conveyance Area →0010000000000

l) Storage Area → 0100000000000
m) Landmarks/Historical Sites/Archeological Sites → 1000000000000

- GIS layer with a compiled "constraint" code for each area summarizing all potential constraints.

Add the following assumptions:

6. For Task 6.2, 1), a "constriction point" could include multiple streets as a single constriction point. If streets are identified as one of the 10 constriction points, these groups of streets are assumed to be as follows:

- South of Beltline
- Beltline to Mineral Point Road
- Mineral Point to Inner Drive
- Inner Drive to Rosa Road
- Rosa Road to Old Middleton Road
- Old Middleton Road to Lake Mendota

7. For Task 6.2, 3), one solution will be developed for 7 of the 10 constriction sites (either "slow the water down" or "move the water faster"), and 3 of the 10 constriction sites will have both a "slow the water down" and "move the water faster" solution developed.

8. A single solution may work for multiple constriction points, and constriction points may be different for the three events. For the purposes of this scope, a total of 13 draft solutions will be developed in the draft Maximum PFCI model, with the solutions narrowed to 10 for the final Maximum PFCI model based on meeting with the City.

9. PFC Solutions Model will include up to 16 identified solutions (i.e. 6 additional "constriction points" beyond the 10 evaluated in the Maximum PFCI Model).

10. City internal meetings will not delay the current schedule to the extent that services need to be pushed into 2021.

Fee: $40,100 (Increment)

Fee: $130,200 (Revised Total, including Original Contract and Addenda 1 and 2)

TASK 7 - QA/QC Other Watershed Models and Review Proposed Mitigation Alternatives

- Added level of effort to provide peer review of XP-SWMM/STORM model as compared to InfoSWMM since comparing results between different runs and within a model is more cumbersome in XP-SWMM/STORM and than InfoSWMM

Modify Task 7.2, 3) to read:

3) Following completion of the PFC Solutions and Upsized PFC Solutions Models.

Fee: $6,210 (Increment)

Fee: $35,460 (Revised Total, including Original Contract and Addenda 1 and 2)

TASK 10 – Project Management and Progress Meetings

TASK 10 SCOPE:

Provide additional project management and coordination to support the additional time associated with Amendment 2.

Fee: $5,530 (Increment)

Fee: $43,380 (Revised Total, including Original Contract and Addenda 1 and 2)

Spring Harbor Watershed Study – Amendment No. 2 Contract 8413

Budget Summary

The following table summarizes the requested budget amendment:

Task	Item / Task	Additional Cost
1 Review Existing Data and Support Data Collection Plan Development	1.5 Coordinate with USGS to troubleshoot the Spring Harbor USGS gage 1.6 Complete field observations, sensitivity analysis, data review	$ 14,800.00
3 Develop and Calibrate Existing Conditions Model	3.1 Update modeling guidance document 3.2 Update and convert model to XP-SWMM	$ 32,400.00
4 Execute Existing Conditions Model	4.5 Provide additional modeling reporting effort to reporting	$ 4,700.00
6 Evaluate Flood Mitigation Alternatives	6.2 Peak Flood Control	$ 40,100.00
7 QA/QC Other Watershed Models and Review Proposed Mitigation Alternatives	Added level of effort to provide peer review of XP-SWMM	$ 6,210.00
10 Project Management and Progress Meetings	Provide additional project management for time associated with Amendment 2	$ 5,530.00
	Total	**$ 103,740.00**