



City of North Port  
UTILITIES  
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### WORK ASSIGNMENT

CONSULTANT	CDM Smith, Inc.
CONTINUING CONTRACT # & TITLE	2016-23 Professional Engineering Services for NPU
THIS WORK ASSIGNMENT	
WORK ASSIGNMENT #	2017-03
SHORT TITLE <i>Attach justification and supporting documentation</i>	Wastewater Hydraulic Model
DATE SUBMITTED	11/28/16
AMOUNT (LUMP SUM)	\$99,994.00
SCHEDULED COMPLETION	May 26, 2017

### CONTRACT AND BUDGET OVERVIEW

	DEPARTMENT	CITYWIDE (completed by Purchasing)
TOTAL OF PREVIOUS ASSIGNMENTS	\$ 0.00	\$ 94,105.00
THIS WORK ASSIGNMENT	\$ 99,994.00	\$ 99,994.00
TOTAL WORK ASSIGNMENTS	\$ 99,994.00	\$ 194,099.00
ACCOUNT NO/PROJECT NO	420-6062-535-3105 / N/A	VARIOUS

All work assignments require City Manager approval. In presenting this work assignment, it is understood that:

1. Unless specified herein, work does not involve watercraft, boat piers and/or other activities requiring additional workers compensation endorsements.
2. Contact or involvement with hazardous materials is not anticipated, should hazardous materials be encountered, the City shall be informed.

SUBMITTED BY: Paul Perante 11/28/16  
CONSULTANT DATE

APPROVED BY: Michael Veeb 11/28/16  
DEPARTMENT DIRECTOR DATE  
Denny Dwyer 11/29/16  
PURCHASING MANAGER DATE  
R 12-1-16  
FINANCE DIRECTOR DATE  
PRH 12/1/16  
CITY MANAGER DATE

## **TASK AUTHORIZATION No. 1**

### **FOR**

### **CONSTRUCT CITY-WIDE CALIBRATED HYDRAULIC WASTEWATER MODEL**

This Authorization, when executed, shall be incorporated in and become part of the Agreement for Professional Services between the City of North Port (OWNER), and CDM Smith Inc. (CONSULTANT), dated September 14, 2016 hereafter referred to as the Agreement.

#### **PROJECT BACKGROUND**

The OWNER owns and operates an extensive wastewater collection system comprised of 64 miles of force mains, 151 miles of gravity and 101 lift stations, but is growing annually. Sewage from the OWNER's approximately 15,500 customers is collected and pumped into the OWNER's Wastewater Treatment Facility (WWTF) where it is treated. The City limits encompass an area of approximately 103 square miles, of which approximately 45% is designated within the OWNER's Urban Service Area Boundary. Currently the OWNER's wastewater system extends to approximately 25% of the Urban Service Area, leaving a majority of the platted lots relying on on-site septic tank/drainfield systems for wastewater treatment and disposal. The wastewater system consists of lift stations, gravity sewers and force mains, and other infrastructure ages that range from less than one-year to more than 50 years old.

The West Villages Improvement District (WVID) installed a 12-inch diameter force main from Pan American Blvd. to their development, along the US41 corridor to serve their property. Pursuant to the 2007 Amended and Restated Utility Agreement, the OWNER has agreed to maintain the capacity in the agreement (3,600 ERCs) to the WVID properties, however the OWNER also has the challenge of serving the commercial properties directly on US41. In 2010, the US41 Corridor Study was conducted, which provided a capacity analysis and recommendations to ensure the OWNER's ability to serve these commercial properties while maintaining capacity for WVID per the 2007 Amended and Restated Utility Agreement with the OWNER. Analysis of current capacity availability in the 12-inch diameter force main to serve the US41 Corridor as well as maintain capacity for WVID is required. This portion of the scope is time sensitive, therefore, will be expedited as the first phase of the work.

#### **SCOPE OF WORK**

The following is a description of the services to be provided under this Task Authorization.

##### **TASK 1 - US41 CORRIDOR FORCE MAIN CAPACITY**

CONSULTANT will prepare for, attend and prepare minutes for a project kick-off meeting with OWNER staff to review the scope of work, schedule, and model preferences, and to formally request OWNER-provided data.

The CONSULTANT will perform a minimum of two (2) existing conditions steady-state scenarios and four (4) future conditions steady-state scenarios using the existing conditions with pumping capacities at lift stations in WVID and along US41 Corridor to help determine the available capacity in the 12-inch diameter force main that will serve the commercial properties located immediately along the US41 Corridor between the western limit of the platted lot City limit and the eastern limit of the WVID prior to

the new water and wastewater plants being constructed in the WVID. Demands for future scenarios involving development directly adjacent to US41 Corridor will be determined using the estimates provided in the US41 Corridor Study or as provided by the OWNER. Single-node demands will be added to the closest transmission main for each future development.

A draft technical memorandum will be prepared and electronically submitted summarizing the findings from the steady-state modeling and providing a recommendation for US41 Corridor Force Main capacity. The draft report will be submitted as an electronic copy (MS Word doc).

A meeting will be held with OWNER staff to review questions and comments on the draft technical memorandum. Following the meeting, agreed upon changes to the report will be incorporated into the document and a final technical memorandum will be developed and delivered to the OWNER. Five (5) copies of the technical memorandum will be provided along with an electronic copy (MS Word doc and pdf).

## **TASK 2 - CONSTRUCT HYDRAULIC MODEL NETWORK AND ASSIGN MODEL DEMANDS**

Following the kick-off meeting, the CONSULTANT will construct the existing conditions model piping network using Bentley's SewerGEMS V8i or equivalent. The piping network will be created by importing the OWNER's current GIS line work for the existing wastewater collection system. This information will be imported into SewerGEMS or equivalent, and the piping network will be checked to ensure that there is no loss in pipeline connectivity during the conversion. Where available, the referenced pipe materials will be used to input pipe inner diameters to replace the nominal pipe diameters currently referenced in GIS. All pipeline C-factors will be set by the CONSULTANT as appropriate to the pipe age and material. Record drawing information from the OWNER's WWTF and from existing lift stations will be used to develop these model elements.

The OWNER's GIS does not include elevation information for existing wastewater infrastructure. For the purposes of setting up a useful hydraulic model, record drawing elevations at the OWNER's WWTF and lift stations will be input. Pipeline elevations for the collection system will be assigned using Light Detection and Ranging (LiDAR) general ground elevations across the City with an assumed depth of cover.

Following the development of the hydraulic model, a meeting will be held with OWNER staff to review an overall map of the model elements. Staff will have the opportunity to correct any elements that are known to be inaccurately depicted. These items could include connectivity issues and pipeline diameters as well as known valve operations.

A lift station point file (to be provided in the form of a GIS shape file by the OWNER) of all lift stations in the system will be provided. The file will identify each lift station by depth, pump sizing and type, run times, etc. Within the GIS, these lift stations will be grouped and assigned to wastewater model nodes. High demand large users (master lift stations) will be referenced to the land use or parcel file. An assumed lift station size-wastewater demand reference table will be developed that will attempt to balance the demands to the existing consumption. This GIS file will be imported into SewerGEMS or equivalent, and demands assigned to junctions by assigning lift station to the nearest junction in the model.

### **TASK 3 - MODEL CALIBRATION**

The CONSULTANT will prepare a suggested lift station flow testing plan for OWNER staff to perform flow tests at no more than ten selected locations in the collection system to develop representative friction/C-factors for various types of wastewater mains based on age, size, and material if applicable.

The CONSULTANT will use the flow testing information to adjust initial C-factors and or unit demands assigned to lift stations in the existing conditions model to better match the hydraulic characteristics present in the system. Calibration efforts will achieve a level of calibration deemed acceptable by the CONSULTANT and OWNER staff.

The CONSULTANT will prepare a technical memorandum documenting the work completed to build the existing conditions model. The memo will include existing conditions model results, a log of information used in model development, and other pertinent information for future model development efforts.

### **TASK 4 - EXTENDED PERIOD SIMULATION AND ENGINEERING EVALUATION OF MODEL RESULTS**

The CONSULTANT will perform nine (9) extended period simulations using historic wastewater demand diurnal flow. There will be a demand scenario for maximum, minimum and average day demands.

Based on the analyses described, the results will be summarized in the form of maps and data tables. The results will be reviewed to identify areas of high pressure, excessive pump run times, system bottlenecks, areas of inflow & infiltration concern and flow reversal. Based on identified areas of concern, changes to the wastewater system including operational adjustments to lift station operating pressures, air release valves, valve operation, or physical changes such as adjustments to pump sizes, piping sizes, diverting of flows, sizing of on-site plant piping or changing the intake design at the plant will be considered.

A meeting will be held with OWNER staff to discuss the model outcomes and discuss the potential changes or improvements to be considered. Based on the staff meeting additional model runs (up to 5) will be performed to determine effectiveness in addressing potential issues.

### **TASK 5 - REPORT OF FINDINGS**

The CONSULTANT will prepare a report summarizing the assumptions made in developing the model, the results of the model calibration, and summary tables and maps of the scenario outputs of the model. The report will also provide a summary of the engineering evaluation of the model outputs and will discuss the pressures and opportunities for system improvement analysis. Recommendations for potential operational changes will be provided along with potential physical improvements such as adjustments to pipe or pump sizes, diverting of flows, sizing of on-site plant piping or changing the intake design at the plant.

The report will be provided in draft form to the OWNER for review in advance of a meeting to discuss the model results and recommendations. Five (5) copies and an electronic copy of the draft report will be delivered. A meeting will be held with OWNER staff to review questions and comments on the draft report.

Following the meeting agreed upon changes to the report will be incorporated in the document and a final report will be developed and delivered to the OWNER. Five (5) copies of the report will be provided along with an electronic copy and an electronic version of the model.

## **DATA OR COORDINATION ASSISTANCE TO BE PROVIDED BY THE OWNER**

1. Lift station FPL meter information
2. SCADA system information
3. Wastewater Plant MORs and daily flow information
4. US41 Corridor Study final documents
5. Up-to-date GIS files
6. Record drawings of facilities (as needed)
7. Database of existing water meters and water meter read information (as required)

## **ASSUMPTIONS**

The above described engineering services have been based upon the following assumptions:

1. The OWNER's GIS does not include elevation information for existing wastewater infrastructure. For the purposes of setting up a useful hydraulic model, record drawing elevations at the OWNER's WWTF and lift stations will be input. Pipeline elevations for the collection system will be assigned using Light Detection and Ranging (LiDAR) general ground elevations across the City with an assumed depth of cover. Assigning true pipeline elevations from record drawings is not included in this scope of work.
2. The City will provide or obtain the LIDAR data if it is not readily available to download.
3. The OWNER's GIS shapefiles representing the piping network has greater than 90-percent connectivity and will not require additional programming to correct or fix the connectivity.
4. City staff will provide input and/or data that represents the normal operation and system configuration including normal valve operations and abandoned pipes.
5. A diurnal curve will be developed using the OWNER's historical data based on pump SCADA data and influent flow SCADA data to the WWTF.
6. OWNER provided data will be delivered in a standard desktop electronic format compatible with Microsoft Office applications.
7. The term calibration is defined as matching the model results within 10-percent of the field data collected by the City during the lift station flow testing plan.
8. Hydraulic model will not include gravity mains based on the initial GIS data obtained on October 19, 2016.
9. The CONSULTANT will receive a signed agreement and a notice to proceed no later than November 23, 2016.

## **DELIVERABLES**

CONSULTANT will provide the following deliverables to the OWNER:

1. An draft electronic version (MS Word doc) of a Technical Memorandum summarizing the findings from the steady-state modeling and providing a recommendation for US41 Corridor Force Main capacity by December 20, 2016.
2. A final Technical Memorandum summarizing the findings from the steady-state modeling and providing a recommendation for US41 Corridor Force Main. Five (5) copies and an electronic copy (MS Word doc and pdf) of the draft report will be delivered by January 6, 2017.
3. An electronic version (MS Word doc) of a Technical Memorandum documenting the work completed to build the existing conditions model.
4. A draft report of findings summarizing the assumptions made in developing the model, the results of the model calibration, and summary tables and maps of the scenario outputs of the model. Five (5) copies and an electronic copy (MS Word doc) of the draft report will be delivered by April 28, 2017.
5. A final report of findings summarizing the assumptions made in developing the model, the results of the model calibration, and summary tables and maps of the scenario outputs of the model. Five (5) copies and an electronic pdf copy of the draft report will be delivered by May 26, 2017.
6. A working, calibrated wastewater hydraulic model for OWNER's use in SewerGEMS or equivalent by May 26, 2017.

## **TIME OF COMPLETION/SCHEDULE**

CONSULTANT shall commence work within 14 calendar days after issuance of a written notice-to-proceed from the OWNER. A data request letter shall be presented to the OWNER within 14 days of notice to proceed.

As noted above, a portion of the work is time sensitive, and the final capacity analysis and recommendations regarding available capacity along the US41 corridor to serve the commercial properties should be received by the OWNER by January 6, 2017. A final City-wide calibrated hydraulic wastewater model should be received by the OWNER by May 26, 2017.

## **COMPENSATION AND PAYMENT**

In the Basic Services performed under the Scope of Work, the OWNER agrees to pay the CONSULTANT as follows:

For work done by the CONSULTANT at the hourly billing rate for the category of the individual performing the work, for all time directly chargeable to the project. The CONSULTANT's schedule of Hourly Billing Rates is attached as **Exhibit A**.

The total cost of all Basic Services shall not exceed \$99,994.

CONSULTANT will submit invoices on a monthly basis along with written monthly status reports.

Attachment A

City of North Port  
Construct City-Wide Calibrated Hydraulic Wastewater Model  
Fee Estimate

Task Description	Principal-in-Charge \$275 /hr ✓		Principal \$210 /hr ✓		Senior Project Manager \$200 /hr ✓		Senior Designer \$122 /hr ✓		Clerical \$75 /hr ✓		Totals Labor Costs	
	hours	costs	hours	costs	hours	costs	hours	costs	hours	costs	hours	costs
Task 1 - US41 Corridor Force Main Capacity	6	\$1,375	10	\$2,100	11	\$2,200	114	\$13,908	22	\$1,650	162	\$21,233
Task 2 - Construct Hydraulic Model Network and Assign Mod	4	\$1,100	12	\$2,520	18	\$3,600	144	\$17,568	0	\$0	178	\$24,768
Task 3 - Model Calibration	0	\$0	8	\$1,680	4	\$800	86	\$10,492	0	\$0	98	\$12,972
Task 4 - Extended Period Simulation and Engineering Evalua	0	\$0	14	\$2,940	18	\$3,600	182	\$22,204	0	\$0	214	\$28,744
Task 5 - Report of Findings	6	\$1,375	10	\$2,100	6	\$1,200	56	\$6,832	10	\$750	87	\$12,257
<b>Total</b>	<b>14</b>	<b>\$3,850</b>	<b>54</b>	<b>\$11,340</b>	<b>57</b>	<b>\$11,400</b>	<b>582</b>	<b>\$71,004</b>	<b>32</b>	<b>\$2,400</b>	<b>739</b>	<b>\$89,994</b>

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# CITY OF NORTH PORT



## CHANGE ORDER/CONTRACT AMENDMENT FORM

Change Order/Amendment No.: 1 Date Submitted: 2/2/17

City's Contract No.: 2016-23, WA 2017-03 Project Manager: Mike Vuolo

Project Name: Wastewater Hydraulic Model

Originating Department: Utilities / Field Operations

Contractor: CDM Smith, Inc.

Change required due to:

☐ Changed/Unforeseen Conditions ☐ Errors and Omissions ☒ Change in Scope  
☒ Time Extension/Deletion ☐ Change in Price

### Explanation of Change (What is changing? Include effect on completion time):

Utilities is requesting the expansion of services under Task 1 of this work assignment to incorporate the evaluation of a temporary wastewater booster pump station in an effort to improve the limited capacity of the US 41 Corridor Force Main as revealed in the preliminary findings. The Consultant has provided a scope and fees not to exceed \$12,972 for this additional work. Upon review of remaining tasks and Utilities resources, staff has determined that the work included in Task 3 should be able to be assumed by the Utilities Engineer. The assumption of Task 3 by Utilities staff will free up \$12,972 of the existing work assignment which can be applied to covering the additional services required under Task 1.

It is anticipated that the inclusion of this additional scope of work will add an estimated 30 days to the time necessary to complete the project. To accommodate the additional time needed, final completion date for the wastewater hydraulic model will be extended to June 26, 2017.

### Reason for Change Order (Why is it changing?):

The preliminary findings of Task 1 with regard to the capacity available in the US 41 Corridor force main have revealed an immediate need to investigate possible means to increase capacity so the City can meet the needs of existing customers and future development until the Southwest Wastewater Treatment Facility is constructed and operational. Initial findings indicate the most cost effective method to increase capacity in the force main is the addition of a temporary inline wastewater booster pump station along the US 41 Corridor. By adding this temporary booster station, the hydraulics of the force main will be improved, allowing for greater capacity for the provision of service to existing and future customers. This scope will provide a hydraulic analysis based on the inclusion of this new booster pump station, determine the most beneficial location for the station, opinion of probable cost, and technical memorandum of the approach and findings.



Attachments (list documents supporting change):

1. CDM Smith Scope of Work and Fees.

CHANGE IN CONTRACT PRICE						CHANGE IN CONTRACT TIME		
Original Contract Amount:		99,994.00				Original Contract Time (days):		177
Previous	Amendments:	#	0	to #	0	Approved Additions/Deductions of time:		0
	Change Orders:	#	0	to #	0			
Approved Amount:		Amend		0.00		Current Contract Time:		177
Amendments/Change Orders		CO		0.00		(y-t-d before this request)		
Current Contract Price:		99,994.00				This request: Add/(Deduct) contract time		31
This Change Add/(Deduct):						If approved: Total Contract Time (y-t-d with this request):		208
Total Contract Amount w/this change (pending approval):						Contract Start Date:		12/1/16
						Original Completion Date:		5/26/17
						Revised Completion Date:		6/26/17

CONTINGENCY FUNDS	
Use of Contingency Funds?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Original Contingency Amount:	0.00
Approved Use of Contingency Amount:	0.00
Increase/(Decrease):	0.00
Contingency Balance:	0.00

RECOMMENDED:

By: Paul P. Smith  
Contractor

Date: 2/2/17

APPROVED:

By: Chris Anderson  
Department Director

Date: 2/2/17

APPROVED:

By: M  
Finance Director

Date: 2.8.17

RECOMMENDED:

By: Michael Vado  
City Project Manager

Date: 2/2/17

APPROVED:

By: Manny Irujo  
Purchasing Manager

Date: 2/6/17

APPROVED (if applicable):

By: [Signature]  
City Manager

Date: [Signature]

CONTRACT NO. 2016-23, WORK ASSIGNMENT 2017-03

CITY OF NORTHPORT WASTEWATER HYDRAULIC MODEL

CHANGE ORDER NO. 1

### SCOPE OF WORK

Evaluation of Booster Pump Station Scope:

1. Hydraulic Evaluation to obtain the hydraulic performance characteristics for a new inline booster pump station (BPS) on the 12" FM along the US 41 Corridor to maximize capacity available in the force main.
  - a. Preliminary Estimated BPS capacity – 2,000 gpm
    - i. This assumes 1,400 gpm capacity for MPS 82 (954 gpm PHF) and MPS 88 (447 gpm PHF)
    - ii. Identify capacity for the US 41 Corridor and WVID customers upstream of the BPS until the Southwest Wastewater Treatment Facility is constructed and operational.
    - iii. Provide an estimated capacity for the commercial developments located downstream of the BPS.
2. Conceptual Design that would include a plan and a section view of the booster pump station layout. This would also include a minimum footprint required with fencing, electrical equipment, etc.)
3. Opinion of Probable Construction Cost or rough order of magnitude cost estimate for constructing the inline BPS.
4. Technical memorandum summarizing the approach and findings. Attend one (1) meeting to review draft TM and incorporate City comments.

Estimated Fee for this Task:

1. The fee for this task shall not exceed \$12,972.
2. If the City would like to replace something from the original scope of work, I'd recommend replacing the existing Task 3 (Model Calibration). The budget for Task 3 is \$12,972. There is a lot of value to having a calibrated model; however, the field work could still be performed by the City staff and cross-checked with the model to verify that the model is accurate for design and planning purposes. The reality is that the system is constantly changing (i.e. operational changes, pipe age, roughness, new pump stations, new plants, etc.). This requires that the model be updated every 1 to 2 years to remain validated/calibrated.

We estimate that this evaluation can be completed within four (4) weeks after authorization to proceed. Please call me if you want to discuss further.