

May 29, 2018

Chris Mattingly, PE
City of Norman
201 West Gray, Building C
Norman, OK 73069

Subject: Norman Water Treatment Plant Phase II Improvements
DWSRF Project No. P40-1020801-02, Norman Contract No. K-1617-121
Review of potential change order items

Dear Mr. Mattingly:

The purpose of this letter is to review 23 potential change order (PCO) items received and one as-bid to as-built quantity change. The potential change order proposals are attached to this letter with brief descriptions provided below. The recommended changes are summarized in Table 1 at the end of the letter.

As bid to as-built quantity - Pier quantity changes

To recognize a significant cost savings, pier diameter were changed to 3'-6" with temporary casing. This impacted bid items 2, 3, and 12 for a total deductive cost of \$249,508.00.

PCO1 - New or modified manholes on chemical drain piping

The Work consists generally of adding or modifying four manholes and increasing chemical drain pipe length. Manholes provide easier access for maintenance of drain lines in future. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$9,554.41 proposed as an addition to the Contract Price and 21 calendar days as an addition of to the Contract Time.

PCO2 - Eliminate temporary liquid ammonium sulfate (LAS) system

The Work consists generally of eliminating the temporary LAS system and modifying the existing ammonia system for continued use during construction. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal in the deductive amount \$7,451.85 to the Contract Price with no change to the Contract Time.

PCO3 - New Maintenance Building ejector pump system

The Work consists generally of adding a sewer pump station and other modifications at the maintenance building. This work is necessary to get sewage out of the maintenance building. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$35,415.59 proposed as an addition to the Contract Price and 7 calendar days as an addition of to the Contract Time.

PCO5 - Add isolation valve on raw water supply to SCC4

The Work consists generally of adding 4-inch buried butterfly valve near SCC4. The isolation valve will allow easier maintenance of SCC4 in future. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$4,961.83 proposed as an addition to the Contract Price and 1 calendar days as an addition of to the Contract Time.

PCO6 - Additional fire dampers in Chemical/Ozone Building

The Work consists generally of adding duct fire dampers in the four new locations in ozone building as required by Building Permit review. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$3,376.00 proposed as an addition to the Contract Price and no calendar days as an addition of to the Contract Time.

PCO7 - Changes to the UV MCC/Transformer

The Work consists generally of UV transformer changes to accommodate submitted equipment needs. The UV equipment required a smaller amperage circuit breaker than shown on the bid documents. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and deduct the \$9,763.95 from the Contract Price with no change to Contract Time.

PCO8 - New or modified valves on potable water piping near Ozone Building and LOX pad

The Work consists generally of modifying the potable water piping near the Ozone Building. The new and relocated buried valves will allow for better isolation of potable water lines facilitating easier maintenance in future. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$3,286.99 proposed as an addition to the Contract Price and no calendar days as an addition of to the Contract Time.

PCO9 - Modified beams in Chemical and Ozone Building

The Work consists generally of providing wide flange beams instead of joists at 5 locations the Chemical and Ozone Building. The Chemical and Ozone facilities are classified as Seismic Design Category D based on IBC 2015 classification of the building for storing hazardous chemicals(risk category IV) and the soil classification provided by the Geotechnical engineer. The structure became risk category IV during the later stages of the design process. For buildings assigned to SDC D and higher. The IBC dictates higher levels of design requirements to ensure the flexible metal roof diaphragm remains connected to the heavy masonry walls during the shaking of a seismic event. To accomplish the level of performance required by the code, several roof framing members must change from joists to steel beams. Steel beams are required for two reasons. First the masonry walls must be anchored to the roof framing to resist the loads that exceed the capacity of

the joist connections can achieve. Secondly, the roof members themselves must be designed to resist significant axial loads that are more readily resisted by a steel beam. The risk of not making this change is that the building will not perform as required by code during a seismic event.

Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$38,035.07 proposed as an addition to the Contract Price and 8 calendar days as an addition of to the Contract Time.

PCO10 - Modify filter effluent piping

The Work consists generally of modifying the filter effluent piping so that only partial shutdowns are necessary. It is necessary to make tie-ins between new piping and existing filter effluent (FE) piping in order to bring the new UV system online. During design, these tie-ins were intended to be installed during two - three day, full plant shutdown. Full shutdowns require the contractor to install the pipe, weld, coat, and disinfect the lines within a specified window. If small problems or unforeseen conditions arise, the length of full shutdown will increase in order to address these and finish work and may stress the city's ability to provide water to customers.

As Foley, Norman, and Carollo discussed these FE connections, we realized that with some piping changes that the work in this area could be changed from full plant shutdowns to partial shutdowns. In this case, the WTP can produce water through Filters 1-4 and supply it to the distribution system while work is being done on Filters 5-8 piping (and similarly, in a separate partial shutdown Filters 5-8 will produce water while work is being done on Filters 1-4 piping). As discussed on October 3, 2017, approximately four partial shutdowns will be needed to make FE piping connections with two planned for Winter 2017/2018 and two planned for Winter 2018/2019.

Generally, a partial shutdown is desirable for all participants. A partial shutdown provides more time for inspection and disinfection of the critical tie-ins while keeping the plant operational. This reduces the risk for both Norman and the contractor. In this spirit, the agreed to cost of this proposed change includes material cost offsets from Foley which reduced the material costs to Norman from \$35,825 to \$22,882.

Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$22,882.00 proposed as an addition to the Contract Price and 14 calendar days as an addition of to the Contract Time.

PCO11 - Changes to chillers and heaters for the onsite sodium hypochlorite generation (OSHG) system

The Work consists generally of changes between the original design of OSHG and actual submitted equipment. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and deduct the \$4,407.90 proposed from the Contract Price with no change in Contract Time.

PCO12 - Provide PPG Atlantica Glazing at Administration Building

The Work consists generally of providing green tinted glass (Atlantica) at the Administration Building. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$3,292.28 proposed from the Contract Price with no change in Contract Time.

PCO13 - Modifications to chemical building coatings and handrails

The Work consists generally of changes to the stair locations (which impacted other features in design) to address building permit review comments and modification to drilled pier diameter. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$3,065.63 proposed as an addition to the Contract Price and no change in Contract Time.

PCO14 - Modifications to High Pressure Zone (HPZ) valve vault sump pumps

The work generally includes connecting drain from existing vault to new HPZ vault and electrical and instrumentation work associated with sump pumps. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$26,299.12 proposed as an addition to the Contract Price and additional 4 days of change in Contract Time.

PCO16 - Increase plunger valve size

The work generally includes increasing size of plunger valve diameter from 16" to 20". The plunger valve is used for backwashing the filters only when the backwash tank is offline. During the submittal review process, the manufacturer expressed concerns about cavitation of the proposed plunger valve under certain operating conditions that were not expressed during the design of project. Additional modeling was completed by both engineer and manufacturer and it was determined that the most efficient solution was to increase the plunger valve diameter. Carollo recommends that the City accept this response to this proposal and provide the \$8,578.94 proposed as an addition to the Contract Price with no change in Contract Time.

PCO18 - Temporary wiring to lagoon pump station conduit

The work generally includes rerouting of existing conduit that serves the lagoon pump station found during excavation of new clearwell drain pump station. The conduit was not located as shown on available drawings. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$15,448.86 proposed as an addition to the Contract Price and additional 3 days as a change in Contract Time.

PCO19 - Modifications to ARV inside UV Building

The Work consists generally of relocating the ARV on the 48-inch FE header inside the UV building. The ARV was located underneath the grating, but the submitted equipment was taller than expected and conflicts with the grating, restricting access. The relocation moves ARV to nearby wall to avoid conflict and improve access for maintenance. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$5,315.05 proposed as an addition to the Contract Price and 0 calendar days as an addition of to the Contract Time.

PCO20 - Modifications to the utility water piping in Lime Building

The Work consists generally of increasing utility water supply to the CO2 system and adding push water to SCC 1 and SCC2 ferric sulfate systems along with yard piping replacement/changes. This change will eliminate low water pressures currently experienced at Lime Building. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$47,607.59 proposed as an addition to the Contract Price and 5 calendar days as an addition of to the Contract Time.

PCO21 - Modifications to Chemical Building retaining wall

The Work consists generally of increasing the strength of the retaining wall to accommodate a wall with higher soil loadings than originally anticipated (increased height, increased footer, increased rebar, and drainage behind wall). The wall was redesigned and the proposal represents only the increase in cost above the bid price. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$57,352.37 proposed as an addition to the Contract Price and 7 calendar days as an addition of to the Contract Time.

PCO23 - Modifications to SCC1 and SCC2 influent pipes

The Work consists generally of replacing a portion of the existing SCC1 and SCC2 influent pipe with HDPE pipe due to corrosion, adding push water for chemical injection (to further reduce potential for corrosion), add sump pump, as well as electrical and I&C modifications. When the contractor removed soil from the SCC1 influent pipe, a portion of the top of pipe collapsed. In November 2017, a video inspection was made of SCC1 and portions of SCC2 influent pipes that were accessible and indicated corrosion occurred in the upper portion of the influent pipes and requires that pipe be replaced.

Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$94,314.92 proposed as an addition to the Contract Price and 7 calendar days as an addition of to the Contract Time.

PCO24 - Change ozone and chlorine sample pumps

The work generally providing NSF compliant ozone and chlorine sample pumps. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$658.20 proposed as an addition to the Contract Price and no additional days as a change in Contract Time.

PCO25 - Modifications at Lime Building

The Work consists generally of modifying the layout to provide better maintenance access as well as electrical and I&C modifications. A better layout is accomplished by slightly adjusting the centerline of aging tanks and grit classifier, using alternative grating material in heavy traffic areas, adjusting height of some valves, adding washdown hose bibbs for easier cleanup, and adjusting platforms.

Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$54,357.37 proposed as an addition to the Contract Price and 7 calendar days as an addition of to the Contract Time.

PCO27 - Lagoon Pump Station re-wiring

The work generally includes installing new wiring from the electrical building to lagoon pumps. This work minimizes number of splices in the wiring between the Electrical Building and lagoon pumps thereby reducing potential for electrical failure in future. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accepts this proposal for \$17,252.12 and no additional contract time.

PCO28 - Modifications to Administration Building retaining wall

The work generally includes relocating the HPZ surge vault to accommodate more robust retaining wall design as well as additional work on retaining wall. The change increases the strength of the retaining wall to accommodate a wall with higher soil loadings than originally anticipated. The wall was redesigned and the proposal represents only the increase in cost above the bid price. Following a review of the Contractor's proposal, Carollo Engineers has determined that the price and time proposed by Foley Company is fair and equitable for addition of the Work. Carollo recommends that the City accept this response to this proposal and provide the \$27,805.32 proposed as an addition to the Contract Price and additional 3 days as a change in Contract Time.

Change Order 1 Summary

Table 1 presents a summary of the potential change order proposals presented and discussed here. Carollo recommends that the City process a change order in the amount of \$207,727.96 with an increase in contract time of 87 calendar days.

Table 1: Change Order 1 Summary

Item Description	Change in Contract Amount	Change in Contract Time (Calendar Days)
As-bid to As-built quantity adjustments: Pier quantity	(\$249,508.00)	0
PCO1 - New or modified manholes on chemical drain piping	\$9,554.41	21
PCO2 - Eliminate temporary liquid ammonium sulfate (LAS) system	(\$7,451.85)	0
PCO3 - New Maintenance Building ejector pump system	\$35,415.59	7
PCO5 - Add isolation valve on raw water supply to SCC4	\$4,961.83	1
PCO6 - Additional fire dampers in Chemical/Ozone Building	\$3,376.00	0
PCO7 - Changes to the UV MCC/Transformer	(\$9,763.95)	0
PCO8 - New or modified valves on potable water piping near Ozone Building and LOX pad	\$3,286.99	0
PCO9 - Modified beams in Chemical and Ozone Building	\$38,035.07	8
PCO10 - Modify filter effluent piping	\$22,882.00	14
PCO11 - Changes to chillers and heaters for the onsite sodium hypochlorite generation (OSHG) system	(\$4,407.90)	0
PCO12 - Provide PPG Atlantica Glazing at Administration Building	\$3,292.28	0
PCO13 - Modifications to chemical building coatings and handrails	\$3,065.63	0
PCO14 - Modifications to High Pressure Zone (HPZ) valve vault sump pumps	\$26,299.12	4
PCO16 - Increase plunger valve size	\$8,578.94	0
PCO18 - Temporary wiring to lagoon pump station conduit	\$15,448.86	3
PCO19 - Modifications to ARV inside UV Building	\$5,315.05	0
PCO20 - Modifications to the utility water piping in Lime Building	\$47,607.59	5
PCO21 - Modifications to Chemical Building retaining wall	\$57,352.37	7
PCO23 - Modifications to SCC1 and SCC2 influent pipes	\$94,314.92	7
PCO24 - Change ozone and chlorine sample pumps	\$658.20	0
PCO25 - Modifications at Lime Building	\$54,357.37	7

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Item Description	Change in Contract Amount	Change in Contract Time (Calendar Days)
PCO27 - Lagoon Pump Station re-wiring	\$17,252.12	0
PCO28 - Modifications to Administration Building retaining wall	\$27,805.32	3
Total recommended change order	\$207,727.96	87
Original contract value and time	\$29,990,165.00	730
Revised contract value and time	\$30,197,892.96	817

Sincerely,

CAROLLO ENGINEERS, INC.



Amber Wooten, PE
Project Manager

Enclosures: PCO documentation

cc: Tom Crowley, Carollo